GUIDELINES FOR
ARCHITECTS AND ENGINEERS

Revised 2020

County of Fairfax, Virginia
Department of Public Works and Environmental Services

Developed and Issued by:
Building Design and Construction Division
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A copy of these guidelines may be obtained via:
https://www.fairfaxcounty.gov/publicworks/guidelines-architects-and-engineers
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010000- GENERAL DESIGN REQUIREMENTS

I. DESIGN

A. Materials contained in the Fairfax County Guidelines for Architects and Engineers (Guidelines) are provided for information and guidance to preferred practices, and shall not be construed as waiving or granting exceptions to any element of federal, state or local building codes, ordinances, and regulatory requirements as applicable to the specific project. Any conflict between these Guidelines and the governing local, state, or federal codes shall be brought to the immediate attention of the Building Design & Construction Division (BDCD), Fairfax County Department of Public Works and Environmental Services (DPWES).

B. The Architect/Engineer (A/E) is responsible to assure that the most current version of referenced design standards in the Guidelines is used for the project. The Owner does not guarantee that Exhibits and Appendices are the most current versions.

C. Any variance from these Guidelines must be submitted in writing to the BDCD Project Manager prior to 100% design submission.

D. The project plans and specifications shall reflect the information and requirements of these Guidelines as applicable to each project and shall provide the following information:

1. Fairfax County project number, contract number, quality control signoff block, and bid authorization signature block on the cover sheet for all plan review submittal phases (see Exhibit 010000-A).
2. Building address and key map.
3. Site area (acres) and building square footage.
4. Soil boring logs and locations.
5. U-values for walls, roof/ceiling, door and window.
6. Design roof and floor loads, soil bearing value and structural material strengths.
7. Doors, windows, finish schedules; lighting fixture, equipment and signage schedules.
8. Site plan drawings shall be at a common scale and be oriented the same direction on all sheets.
9. Building Plans for all disciplines shall be at a common scale and oriented the same direction and include a true North arrow on all sheets.
10. The standard industry convention for referencing note and details shall be used on the construction documents.

E. The A/E shall complete a Quality Control (QC) sign-off block on the cover sheet for plan submittals. The QC block shall include the number of QC hours spent by each discipline and be signed off by the responsible person reviewing each discipline. The QC block is to be included on the cover sheet for all submittals except for the bid set and the permit set and conforming set if issued.

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F. The bid set documents shall be sealed, original signed and dated (all drawings and the cover sheet of specifications) by an Architect or Engineer registered in the State of Virginia.

G. Drawing Standards

1. All civil, architectural, structural, electrical, mechanical, and plumbing floor plans (including reflected ceiling plans), as a minimum, shall be prepared using the most current version of AutoCAD (CAD) to assure improved functionality when using a Building Information Modeling (BIM) program.

2. Use of BIM and Revit program is acceptable but not required at this time. When using BIM, the A/E shall coordinate with the BDCD Project Manager for advance approval if a program other than Revit will be used.

3. Quality Control of plans shall include overlaying CAD floor plans to check for conflicts. AutoCAD layering convention shall conform to AIA and AutoDesk standards.

4. AutoCAD drawings shall be formatted as follows:
   a. Zoomed to Extents
   b. UCS set to World
   c. Free of all extraneous lines or entities
   d. Purged of all unused layers and blocks
   e. Lines and polylines shall not be duplicated or contain unnecessary verticals
   f. X-refs attached at 0,0,0
   g. All entities placed on their correct/standard layer, with no entities on layer 0.
   h. Units set to Architectural feet and inches.
   i. All entities drawn with color and line type by layer

5. Revit Files shall be formatted when submitting a BIM Model:
   a. Ensure all files from different disciplines are on the same coordinate.
   b. Ensure work from different disciplines are linked in and not imported in.
   c. Units set to Architectural feet and inches.
   d. Purge all unused families.
   e. Delete all design options.

H. Specifications shall follow CSI, 50-division format; and be specific regarding the codes to be met. Sections of specifications that are performance based must be clearly identified as such. Owner must approve use of performance specifications.
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I. Project specifications shall require that operations and maintenance (O+M) manuals include a complete paint schedule for the entire building; manufacturer and color information for plastic laminates, floor tiles, stains and varnishes, ceiling tiles, ceramic tiles; and all hardware model numbers. Brand names and specific information required for future ordering from manufacturer must be provided. These requirements are to be coordinated with County General Conditions and Division 010000 Specifications for O+M manuals and as-built documents. The Contractor must be required to provide as-built information to meet these requirements.

J. The A/E shall coordinate with the BDCD Project Manager for allowances to be included in the specifications General Conditions, to include items and work scope required for unforeseen conditions. The allowance items, quantities and the associated costs are subject to Owner’s verification and approval. The common allowances may include the following:

- Unsuitable soil undercut
- Rock excavation
- Additional signage
- Contaminated soil removal
- Partnering
- Aggregate material (VDOT 21A or 21B)
- Utilities
- Geotextile fabric
- Additional fire marshal requirements

K. Requirements of these Guidelines must be coordinated with the County’s Fire Station Design Manual, Police Station Design Manual and the Library Design Manual for applicable projects. All conflicts shall be brought to the attention of the BDCD Project Manager for resolution.

L. The A/E is responsible for submitting and tracking project plans through the County building and site plan review process; Land Development Services (LDS), in a timely and diligent manner, and for making all required corrections, inserts, re-submissions, etc. Designers shall follow the latest edition of the Engineers & Surveyors Institute (ESI) Site Plan Peer Review checklist in the preparation of site plans.

M. The A/E must carefully review the County’s Special Conditions Sections A thru E and Division 1- General Requirements and coordinate all design specifications with these County requirements. Any conflicts or proposed modifications impacting standard County specifications shall be brought to the attention of the BDCD Project Manager.

N. All applicable requirements of the Fairfax County Special Inspections Program must be reflected in the project specifications. The structural engineer must comply with all
010000- GENERAL DESIGN REQUIREMENTS

requirements of the Special Inspections Program including stamping shop drawings as reviewed or approved, as required.

O. For buildings that are classified as critical structures under the Fairfax County Special Inspections Program [https://www.fairfaxcounty.gov/landdevelopment/special-inspections-program](https://www.fairfaxcounty.gov/landdevelopment/special-inspections-program), the A/E will hire a testing agency as a sub-consultant on their prime contract to perform all critical structure required inspections in the building. The Contractor shall still be responsible for all required testing and inspections not falling under the County’s Special Inspection Program. If the building is not classified as a critical structure, the Contractor shall have all required inspections performed in the building. The project specifications must reflect these inspection and testing requirements for the contractor.

P. The A/E shall coordinate with the Owner to determine if the facility or any portions of the facility are to be designated as an “Essential Facility” as defined in IBC 1604.5 as Risk Category IV, and incorporate requirements for such facilities into the project plans and specifications.

Q. In buildings with fixed shelving and stacks, such shelving and stack floor areas, shall be deducted from the net square foot floor area calculations, as approved by code.

R. Fairfax County Office Space Standards

The Fairfax County Office Space Standards were developed as a space planning tool for the allocation of space within the Government Center Complex. The "Style" categories "A", "B", and "C" represent private (drywall) offices. Categories "E" through "G" are systems furniture workstations. Square footage figures are intended for planning purposes. Actual sizes of offices or workstations may vary due to the building floor plate, column placement, or standard workstation component dimensions.

<table>
<thead>
<tr>
<th>Space Category</th>
<th>Title</th>
<th>Square Footage</th>
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<tr>
<td>Group A</td>
<td>Director</td>
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<td>Group B</td>
<td>Director &amp; Assistant Director</td>
<td>180 SF</td>
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<td>Group C</td>
<td>Director, Assist. Director, &amp; Branch Chief</td>
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<td>Group E</td>
<td>Professional &amp; Technical Staff</td>
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<td>Group F</td>
<td>Technical &amp; Clerical Staff</td>
<td>48 SF</td>
</tr>
<tr>
<td>Group G</td>
<td>Temporary &amp; Shared Workstations</td>
<td>30 SF</td>
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</table>
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T. Practices for Commercial Trash and Recyclables Handling

1. Refer to Fairfax County Public Facilities Manual (PFM) Section 10-0300 for Solid Waste and Recycling system requirements, and PFM Plate 28-10 for site layout requirements for a two dumpster trash and recycling containers area. Any variations from these requirements shall be coordinated with the BDCD Project Manager and DPWES Division of Solid Waste Collection and Recycling.

2. Collection containers described by Section 109.1-5-6 of the Code of the County of Fairfax shall not obstruct access to sanitary sewer manholes. A clear zone is required for a distance of 3 feet around the rim of any sanitary sewer manhole cover to provide access to the sanitary line in the event of an emergency and an area for erection of equipment for safe entry into the manhole.

3. The recycling collection system within the building shall include central collection containers for office paper in copier/printer rooms and other major generation areas.

4. If recycling carts are emptied directly into a dumpster or compactor, the receiving equipment shall be clearly marked to identify it as a recycling unit; “Recyclable Paper and Cardboard Only, No Trash”.

5. Recycling containers shall be different and readily distinguished from those used for refuse.

6. Trash and recycling rooms shall meet current code requirements for separation from the rest of the building or protected by automatic sprinklers.

U. Specifications shall require that the Contractor provide written, biweekly updates to the Owner/Architect detailing the status of all trade inspections including building, mechanical, electrical, plumbing, Fire Marshal, and Health Department, as applicable. Contractor’s written updates shall specifically identify all items of work, which have been rejected or otherwise not approved by inspectors.

V. Specifications shall require contractor to submit detailed coordination drawings for all central mechanical, electrical and equipment rooms or areas of congestion to confirm that all equipment will fit with the required clearances. Trades to be included but not limited to shall be Mechanical, Fire Protection, Electrical, Plumbing and Telecom. A/E shall make CAD files available to contractor for required coordination drawings.

W. All projects are to be designed and constructed under the principles of Sustainable/Green Building design defined by United States Green Building Council (USGBC) LEED®, unless BDCD Project Manager provides written direction that it is not a project requirement. Target certification is LEED® v4.0 Gold certification with the requirement 010000-5

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of achieving LEED® v4.0 silver certification. The A/E shall incorporate all LEED Prerequisite requirements and submit list of proposed systems and methods to obtain enough credits to achieve Gold or Silver status to the BDCD Project Manager for review with the County’s Environment and Energy Coordination Committee. A/E shall prepare and submit a LCCA when there are options to achieve points by static measures, such as improved building envelopes, versus complex mechanical equipment or systems. Maintenance costs (refer to 230000 – HVAC for table of costs) shall be included. The A/E shall clearly identify all products included in the specifications that contain post-industrial recycled content materials, and all regionally manufactured materials as defined by USGBC LEED® criteria. Selection of products to meet these guidelines shall be coordinated with the Owner prior to final specifications. Project drawings to include the county’s infrastructure requirements for photovoltaic panel installation after substantial completion. Note: Use the Fairfax County exterior smoking area policy which is stricter than the LEED requirement. Fairfax County policy states the following: If an exterior smoking area is to be provided for a County facility, County policy requires that it be located 50 feet from all public and all accessible entrances and 15 feet from all other entrances.

X. All site retaining walls, freestanding monumental site signs, and bus shelters must be identified on the building permit application; otherwise, a separate building permit is required. The A/E is responsible to obtain all permits. As applicable, the pre-approved bus shelter model and plan control number must be shown on plans. A state building permit is also required for all bus shelters with any part located within the VDOT right-of-way.

Y. Where site and/or rooftop mechanical equipment is unavoidable and visible to the public, the A/E is responsible to provide appropriate screening into the design and shall clearly represent aesthetic impact in all renderings.

Z. The A/E shall verify and obtain the most current version of the “Code Reference Package for Architects, Engineers, Designers and Installers” from the Fire Prevention Division of The Fairfax County Fire and Rescue Department (FRD), and all requirements of the Code Reference Package shall be reflected in the plans and specifications. A copy is available from the Fire Prevention Division’s website at:

https://www.fairfaxcounty.gov/fire-ems/fire-marshal/code-reference-packages

AA. Provide storage space identified as “FMD Storage” sized to house attic stock for the building. Ideally, locate FMD storage space within or adjacent to the mechanical room.

BB. Accessible Design

The most recent ADAAG requirements are to be used. Additional items noted in this section are based on lessons learned and past practices in county projects that the A/E is encouraged to meet to provide a greater accessibility beyond the minimum ADAAG
010000- GENERAL DESIGN REQUIREMENTS

requirements for the facility. In addition, the A/E shall coordinate closely with DPWES to strategize and determine a plan for how to most effectively allocate the 20% ADA required funding commitment for renovation projects. The building’s design shall:

All design and construction shall comply with the most current Americans with Disabilities Act Accessibility Guidelines (ADAAG), as issued by the Department of Justice under Title II Regulations for scoping and technical requirements, and the most current ICC/ANSI 117.1, whichever is more stringent. Accessible design concepts based on lessons learned referenced within this document, must be complied with as may be applicable with each project.

1. Provide for equal access and use by everyone.
2. Provide for the usability of the design features in more than one prescribed way.
3. Make it easy to understand the purpose of each design feature and how to use it.
4. Provide all essential information in a variety of modes.
5. Eliminate, isolate or shield any design feature that could prove hazardous or inconvenience any user.
6. Employ design features that require little or no physical force to use them.
7. Provide an adequate amount of space in all program areas that is appropriately arranged to enable anyone to use them.
8. Provide seating, such as benches, seat walls, etc., along path of travel for those who cannot stand or walk long distances without resting.
9. Provide for accessible counters and sinks in break rooms and kitchenettes and locate them in a central or easily reached area of a room. Provide “dummy” cabinet doors in kitchenettes as may be applicable to conceal the sink pipes for ADA.
10. Provide for easy maneuvering and passage by mobility devices such as wheelchairs, when selecting furniture and furnishings in all spaces, especially conference and meeting rooms
11. Provide adjustable desks, chairs, and podiums for conference and training rooms as applicable.
12. Provide fully automatic (sensor operated) or push-button activated automatic door (s) at the main public entrance.

CC. A/E shall review project design and shall advise BDCD Project Manager if there are any potential concerns of Radon impact.

II. PRODUCTS

A. The A/E shall coordinate with the BDCD project manager to identify any products or manufacturers that may need to be specified which are proprietary or limited to less than three acceptable manufacturers as No Substitution/No Equal Products. Justification for No Substitution/No Equal Products must be provided in advance.

B. Any specified material, equipment or system which will be a No Substitution/No Equal Product, must be approved in writing by DPWES, prior to advertisement for bids. BDCD 010000-7
010000- GENERAL DESIGN REQUIREMENTS

will obtain a letter from the “No Substitution/No Equal Products” vendor prior to advertisement of bids, stating the value of the subject work, and that the same pricing will be provided to all the contractors.

C. The A/E is responsible for verifying that the manufacturer and product numbers for all materials and products included in the specifications are current at the time of bid. This shall include verification of all material and product designations included in these Guidelines.

D. No Asbestos Containing Materials (ACM) are permitted to be specified, or otherwise approved, for use on any County project, unless the County specifically provides advance written approval.
PROJECT NAME

Project Location (address/locality)
Magisterial District: __________

Project number (including fund #)

Contract Number CN: __________

A sample elevation/3D picture as space permits

Project Submittal Phase and Current Date

Department of Public Works and Environmental Services

QC Block
(See Exhibit A, Page 2)

Show on SD, DD, and CD Sets only

Do not show on Final Bid Set

Design Team
Name
Discipline
Address
Phone

Guidelines for Architects and Engineers
Revised 2020
**APPROVALS**

RECOMMENDATION FOR APPROVAL OF CONSTRUCTION:

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**APPROVED:**

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<td>Department of Public Works and Environmental Services</td>
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**QUALITY CONTROL SIGN-OFF**

(for all submittals with the exception of Bid Set)

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030000 CONCRETE

I. DESIGN

A. All structural calculations, drawings, and mix designs for cast-in-place, structural precast and architectural precast concrete shall be prepared under the supervision of a Professional Engineer (PE) licensed by the Commonwealth of Virginia. All drawings, calculations, and mix designs shall be sealed, signed and dated by a PE licensed in the Commonwealth of Virginia. Specifications shall require the Contractor to provide PE certification of shop drawings, calculations, and mix designs.

B. Specifications and drawings of cast-in-place and precast concrete elements shall include requirements of the latest version of the Fairfax County Special Inspections Program (FC-SIP).

C. Project specifications shall state that the Contractor is not authorized to proceed with manufacture or procurement of cast-in-place or precast elements until applicable shop drawings, mix designs and color samples are approved; and any required mock-ups are constructed and approved.

D. Specifications shall reflect that the Contractor is responsible for scheduling and complying with all concrete inspections and associated reports. This includes inspections performed by the Owner-provided third-party inspection agency for the Critical Structures inspection per the FC-SIP. Refer to and coordinate with Division 01 – Testing and Quality Control.

E. All testing and inspection of concrete work not included by the FC-SIP shall be performed by the Contractor’s testing agency. This requirement is to be included in the specifications.

F. Calcium chloride use shall be limited to the values in ACI 318 Chapter 4. Calcium chloride use is not permitted in concrete for reinforced concrete pipe or drainage structures as per VDOT requirements.

G. Where concrete work abuts the building structure, plans will specify that the expansion joint will be caulked with a traffic grade caulking.

H. Architect and/or engineer shall determine locations of construction and expansion joints and note specific requirements and locations on plans.

I. Mix design for sidewalks, curb and gutter, and other site work concrete shall meet VDOT A4 (4000 psi) mix design specifications.

J. Mix design for concrete surfaces that will be exposed to deicing salts shall be per ACI 318, Chapter 4 Durability Requirements.
K. Project specifications shall require that all structural precast or architectural precast elements be manufactured at a precast plant that is a certified member of the Prestressed Concrete Institute (PCI) and is operated under the supervision of a PE licensed by the Commonwealth of Virginia.

L. For cast-in-place concrete structures and pavements exposed to freeze-thaw conditions, the project specifications shall identify requirements for Water/Cement Ratio and Entrained Air Content. On-site testing for Air Content and laboratory testing for Water/Cement Ratio will be conducted by Owner’s Testing Agency.

M. On renovation projects where a portion of the existing slab on grade is removed, the documents must show a detail with appropriate notes to identify the requirement to maintain the integrity of the under-slab vapor barrier at areas where existing slab is removed and then replaced. Where extensive saw cutting is required, contiguous larger area, slab removal is recommended instead of piecemeal slab removal and replacement to simplify the retention of a continuous vapor barrier.

N. Concrete thickness for floor slabs directly on grade shall not be less than 3 ½”.

P. The use of fly ash (ASTM 311 and ASTM C618, Class F) and/or ground iron furnace slag (ASTM C989, Grade 100 or 120) in the concrete mix design specifications is encouraged where the finish of the concrete will not be adversely impacted.

II. SHOP DRAWING

A. Project specifications shall require the Contractor to provide shop drawings for all cast in place, structural precast and architectural precast concrete, and all mix designs and connection details which are sealed, signed and dated by a PE licensed in the Commonwealth of Virginia, as required by the FC-SIP. Any documents required to be sealed, signed and dated by a PE by the FC-SIP that are not identified as a requirement of the Contractor in the specifications shall be considered to be a requirement of the Architect and the Structural Engineering Consultant.
I. DESIGN

A. Repairs and/or infills to existing structures shall be designed with matching mortar color, joint type, masonry color and texture, and masonry coursing pattern for all exposed masonry elements. Rake joints are not acceptable. Joints should be concave or grape vine to ensure weather resistant type of joint.

B. Masonry specifications and drawings shall include requirements of the Fairfax County Special Inspections Program (FC-SIP).

C. All testing and inspection of masonry work not covered by the FC-SIP shall be performed by the Contractor’s testing agency.

D. All exterior brick shall be Grade SW.

E. Testing of mortar shall comply with ASTM C270, Specification for Mortar for Unit Masonry. The compressive strength shall be specified by mortar type applicable for the type and location of masonry as required Note: Testing of mortar cubes in the field is not required by code nor recommend by ASTM C270. IBC Code inspection require that masonry assembly compressive strength be verified by either prism testing or unit strength method.

F. Glass block shall not be used on exterior walls without written approval by Building Design and Construction (BDCD) Project Manager.

G. Specify bull nosed block corners, for exposed block at occupied interior locations.

H. Stock mortar colors are preferred. Written approval by BDCD Project Manager is required for any custom or specialty colors.

I. Project specifications shall specifically require compliance with all applicable requirements of the FC-SIP, where applicable. Any requirements of the FC-SIP not specifically identified as a requirement of the Contractor shall be considered to be a requirement of the A/E and the Structural Engineering consultant.

J. Project specifications shall state that Contractor is not authorized to proceed with manufacture or procurement of masonry elements or mortar until all related shop drawings, mix designs, and color samples are approved; and any required mock-ups are constructed and approved.

K. A/E to include specifications for masonry cleaning to remove dirt, stains, efflorescence or other debris resulting from new work.
I. DESIGN

A. All design and related calculations for structural elements and connections falling under this section shall be performed under the supervision of a Professional Engineer (PE), licensed in the Commonwealth of Virginia; and, all structural drawings and calculations shall be sealed, signed and dated by the PE.

B. Structural steel specifications and drawings shall include requirements of the Fairfax County Special Inspections Program (FC-SIP) and American Institute of Steel Construction (AISC).

C. Project specifications shall specifically require the Contractor to comply with all requirements of the FC-SIP and AISC where applicable. Any requirements of the FC-SIP and AISC which are not specifically identified as a requirement of the Contractor shall be considered to be a requirement of the Architect and the Structural Engineering Consultant. Any offsite structural steel should be completed in certified shop verified by FC-SIP 3rd party firm hired by the A/E.

D. All welders must be certified by American Welding Society (AWS). Contractor must submit copies of certifications for all welders before the welders will be permitted to work on the project.

E. Contractor must touch up paint and/or primer after erection of steel or other metals. Specifications must be clear that primer is not considered a finish coat where finished metal is required.

F. Roof access ladders that lead out from the building need to be fixed aluminum “Ships Ladder” with the following specifications: Angled 60-75 degree slope, 2’ wide, 2”x 6” x 1/8” aluminum extruded channel stringers, 4” x 1/4” aluminum serrated tread on rungs, 1.666” aluminum Schedule 40 pipe on handrails. Need to be OSHA and ANSI 14.3 certified. O’Keeffes, Inc. or Approved Equal (must be approved by FMD).
I. DESIGN

A. Refer to the Fire Station Design Manual for fire station kitchen cabinets and countertops.

B. Counter tops shall be either cabinet supported or front/side leg or panel supported. Unsupported spans in excess of 3’-6” are unacceptable. Larger spans to be supported with structural member or vertical support. All counter tops in wet and humid locations must have all undersides, edges and cutouts sealed with waterproof coating. Ensure that pipes, etc., do not interfere with recessed mountings. Counter supports and base cabinets must not preclude handicap accessibility requirements.

C. All counter tops at wet areas such as public restrooms, kitchens, and other high use areas are to be a solid surface material. Particleboard counters are not to be specified at wet areas such as pools, shower rooms, locker rooms, kitchens, kitchenettes, bathrooms etc.

D. Counters shall be supported by a continuous rail along the wall fastened to structural members in the wall at maximum 16” on center.

E. All surfaces of solid wood used for finishes at interior spaces must be sealed to prevent damage due to fluctuations in humidity and temperature. Wood paneling must have built-in expansion strips.

F. All millwork and cabinetry shall be specified to be custom grade, as a minimum, as defined by the Architectural Woodworking Institute (AWI).

G. All millwork and cabinetry substrate shall meet ANSI Standards for Medium Density Fiberboard for interior use.

H. All cabinetry and millwork hardware shall be specified to be quality grade and meet minimum Builders Hardware Manufacturers Association (BHMA) standards for each type. Verify with BDCD Project Manager for instances where heavy duty hardware may be applicable and/or required.

I. Shop drawings for wooden roof trusses must be submitted to Land Development Services (LDS) for review and approval; and, drawings and calculations must be sealed, signed and dated by a Professional Engineer (PE), licensed in the Commonwealth of Virginia. Specifications shall reflect that the Contractor shall be responsible for paying LDS review fees for wood truss shop drawings.

J. Accessible Design:

1. Evaluate use of rounded corners and top edges (drip lines) for counters, cabinetry and protruding trim.
2. Provide roll under counters in all kitchenette and kitchen areas for access by wheelchairs to sinks and appliance use. Minimum clear width of the opening and the knee clearances must meet ADA Guidelines. Provide “dummy” cabinet doors in kitchenettes as may be applicable to conceal the sink pipes for ADA access.

3. A conveniently and centrally located portion of all public counters should be accessible from a standard seating position to the maximum extent possible.
070000 - THERMAL AND MOISTURE PROTECTION

I. DESIGN:
   A. All roof designs to comply with National Roofing Contractors Association (NRCA) guidelines.

   B. A metal coping system is preferred over a stone or pre-cast coping system. The BDCD Project Manager must specifically approve use of a stone or pre-cast coping.

   C. Exterior soffit should be constructed of anodized aluminum panels; Hardie Board; Dura Rock; Cement Board; or metal lathe with plaster. Gypsum board (drywall) and Green Board are not acceptable at exterior soffits.

   D. Asbestos containing materials are not to be specified for roofing, insulation, fire stopping, fireproofing or any other materials on the project.

   E. Adequate attic stocks for each type of sealant used must be required in specifications.

   F. Pitch pockets should be avoided to the extent possible and should not be used where pipe columns penetrate the roofing system. An alternate method such as typical vent flashing should be used at pipe columns. All pitch pockets shall be fabricated from stainless steel or cooper, be half-filled with non-shrink grout and a pourable sealer, and shall comply with National Roofing Contractors Association (NRCA) recommendations.

   G. Roof drain design must be coordinated with roof ballast specifications to ensure that ballast does not clog the drains. Specify screens at roof drains, as required.

   H. The use of internal gutter systems shall be avoided.

   I. All roofs will be designed with a fall protection system as required by OSHA regulation governing Fall Protection.

   J. Snow guards shall be shown at appropriate locations (at least over doors) on the roof plan for all sloped roofs and shall be mechanically fastened (no adhesives).

   K. The BDCD Project Manager must specifically approve use of skylights on the project. All skylights shall have a screen that complies with 29 code of Federal Regulations 1910.23(a)(4) which reads “Every skylight floor opening and hole shall be guarded by a standard skylight screen or a fixed standard railing on all exposed sides” or become constructed with material and manner that meets the OSHA requirements to withstand an accidental fall of person on the skylight.

   L. All roof access hatchways shall be protected as required by 29 CFR 1910.23(a)(8) “every floor hole into which persons can accidentally walk shall be guarded by either: (i) A standard railing (I) a standard railing with standard tabards on all exposed sides, or (ii) A floor hole cover of standard strength and construction.

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M. Plans and specifications shall include language requiring the contractor to completely seal all return air plenum AND obtain independent third party certification that the return air plenum envelope is appropriately sealed.

N. All roof access is to be secured. All roofs to be provided with access ladders or stairs. Refer to Division 050000 for preferred access ladder specification.

O. Plans and specifications shall identify a continuous vapor barrier at the exterior envelope, including at either the roofline or at the ceiling line of the top floor. An interior and exterior vapor barrier should be specified and detailed for the entire building envelope. The thermal envelope must be completely sealed to the exterior including attic and plenum spaces, as appropriate.

P. The design documents shall provide for a “hard” flashing detail (metal flashing or equivalent) at all joints, with adequate allowance for flashing height, between the roofing and vertical building elements, such as clerestories, walls etc.

Q. High reflectivity roofing should be provided on flat roofs and at sloped roofs where aesthetics are not adversely impacted. Intent is to minimize the heat island effect per Green Building protocol.

R. Roofing systems shall carry a minimum 20-year warranty. Roofing installation shall carry a minimum of two-year installation warranty.

S. Pavers shall be provided on flat roofs, for access and maintenance of roof top mechanical equipment to help minimize accidental or incidental membrane damage. Concrete pavers shall be used only as recommended by the manufacturer. Compatible “membrane pavers” are acceptable.

T. The roofing details shall include umbrella or continuous flashing details with minimum height of 18” at all non-curb mounted equipment to avoid blocking equipment air flow.

U. All roof top equipment to be set on curbs with a minimum height of 18” and never placed directly on roof.

V. Roof expansion joints to be provided per NRCA guidelines.

W. All low slope roof designs to incorporate positive drainage to roof drains/roof scuppers via sloping the structural framing or roof deck, designing a tapered insulation system, or a combination of both.

X. Where Lightning Protection is installed, provide UL Certification letter as well as record drawings.

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II. PRODUCTS

A. Built-Up Roofing System
   Johns Manville, Firestone, Soprema, Garland or GAF built-up 3 or 4 ply systems or Approved Equal (must be approved by FMD) with a minimum 20-year warranty.

B. Modified Bitumen Roofing System
   Johns Manville, Firestone, GAF, Siplast, Soprema, Garland or Approved Equal (must be approved by FMD) with a minimum 20-year warranty.

C. Single Ply Roofing System/IRMA System
   1. EPDM is preferred on flat roofs.
   2. Rubber membranes may be acceptable, on as project basis. The rubber membranes need to be reinforced and be installed by a fully adhered application. Non-reinforced EPDM membranes are not acceptable. The minimum acceptable systems for rubber membranes, EPDM, is Goodyear, Firestone, Carlisle, and Johns Manville 60 mil systems or Approved Equal, with a minimum 20-year warranty. PVC and CPE systems are not recommended.
   3. TPO Roofing are not allowed due to seam and membrane failures as a result of intense weather application. If a special circumstance, written approval is required from FMD thru the Building Design and Construction Division Project Manager on project by project basis.
   4. Ballasted single ply systems are not recommended because of poor maintenance and performance history.
   5. Fully adhered single ply systems are preferred.

D. Shingles-Architectural shingles with lifetime (if applicable) warranty preferred, a minimum 20-year warranty is required.
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080000 - DOORS AND WINDOWS

I. DESIGN

A. Specify a key cabinet. The cabinet should be designed to accommodate 50% more keys than the current project requirements. The specifications shall require the Contractor to sort, label, and tag all keys (as applicable); set up key cabinet with index; and review it with the Owner.

B. The A/E shall coordinate keying schedule with the DPWES, Facilities Management Department (FMD) and the using agency. Using agency will sign off on an approved schedule. All changes will be coordinated with FMD.

C. Provide adequately sized access doors or panels in all walls and ceilings to permit access to all mechanical, plumbing, electrical, or fire alarm equipment which may require maintenance or updating. A minimum access door dimension is 15”; a minimum access door size in ceilings is 24" x 24".

D. Steel sash windows should not be used. All new or replacement windows shall utilize thermo-pane glass, with thermal break sash and low-E coating. All windows shall have proper flashing (or thru wall flashing, if applicable) and sill receptor if required.

E. The A/E shall specify field quality control and testing for curtain wall systems. The testing must be conducted by a qualified independent testing and inspections agency and issue test report. The testing shall include air infiltration (ASTM E783), water penetration (ASTM E1105), and water spray (AAMA 501.2) tests on two or more representative areas of curtain wall conditions to determine compliance of installed system with the specified requirements. Curtain wall shall be repaired or replaced where test results and inspections indicate that it does not comply with specified requirements. Additional testing and inspections at contractor’s expense will be performed to determine compliance of replaced or additional work.

F. All doors within a building, both interior doors and fire rated doors, shall have matching finishes.

G. Office, meeting, training and data room doors that exceed 7 feet in height require FMD approval.

H. If possible, industrial use areas (mechanical, shop, electrical, data centers, etc.,) shall have double access doors. A/E shall confirm that door opening allows for all equipment within the space to be taken out of the space for repairs and replacement.

I. All roof access doors shall have a minimum of 6” height above finished roof or platform level.

J. All coiling grilles shall be designed with governors. Additional structural support for coiling grilles and overhead doors shall be shown on the plans.
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K. Door numbers in the design documents shall match the final operational door numbers/room numbers so that signage, keying and move-in are made easier. The numbers & signage should reflect East, West, North or South sides of buildings in large facilities.

L. In areas with drywall partition, all doors shall have floor mounted door stops.

M. Operable windows are permitted only when approved in writing by DPWES and FMD for specific use type. Locking mechanisms with key must be provided for such windows. Screens must be provided for operable windows when approved.

N. The maximum recommended clearance for the bottom of any vehicle security gate in county facilities is 6”.

O. Accessible Design

1. Use automatic door openers on main entry door. Ensure barrier-free access to door opening mechanism. Doors may be push button or automatic sensor operated. Verify with the BDCD Project Manager.

2. Do not install door closers unless necessary. If necessary, provide delayed action door closers that open freely before the closing cycle begins. If delayed action door closers can not be used, be mindful of closers on heavy doors. The door closing speed and operating pressure must comply with ADAAG.

3. If accessible corridor is less than 60” wide, provide recessed doors. Recess door design for space and approach must comply with ADAAG.

4. Dead-end hallways should be designed with sufficient wheelchair turnaround space.

P. Plans showing all door and hardware locations and a complete hardware schedule detailing all lock manufactures, functions, designs and finishes shall be provided at the start of construction to DPWES and FMD locksmith. A lock cylinder keying meeting with the building users, DPWES, general contractor, lock hardware supplier and the FMD locksmith shall be held at the start of construction. Upon completion of the building and acceptance by the Owner, Fairfax County’s permanent Schlage security lock cylinders shall be installed by FMD.

Q. Electronic Access Control System

The requirement for inclusion and scope of electronic access control system in each facility shall be evaluated with the Owner during design. The County’s standard access control system for all facilities (except for Adult Detention Center and the Courthouse) is Northern Computers with Winpak PE software. Adult Detention Center and the Courthouse facilities use TAC America access control system with INET 7 software and will continue with this system for any future work. All other facilities must

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integrate with the County’s use of Northern Computers with Winpak PE software. All access control system components must be supplied by the sole source manufacturer to ensure compatibility for networking integration with like systems in other buildings. In order to interface with the County’s main access control system, each facility must be provided with the following components:

1. Controllers:
The controllers are to be specified as Honeywell PRO-3200 Series Controllers. No other products are acceptable.
http://www.security.honeywell.com/me/access/products/co/117787.html

Each facility must be specified with one of the following:

- Pro32ENC1 Enclosure with 4amp 12VDC power supply.
- Pro32E1PS Power Supply
- Pro32IC Controller Board
- Pro32EN Ethernet Daughter Board
- Pro32R2 Two Reader Board (8 of these Boards can be put on one Controller Board to control up to 16 Doors).
- Pro32BAT1 Battery Back up
- Pro32DCC Daisy Change Cable.
- Pro3200 IC Controller and Ethernet installations manuals.

Each Pro-3200IC controller board can handle up to 32 doors. Quantity of kits must be adjusted based on the number of applicable doors in each project.

A complete ready for operation access control system including but not limited to electronic locks, card readers, reader boards, power supplies, and any other equipment required for the access control system shall be specified. Programming of the system to interface with County’s central system will be provided by the Owner.

2. Card Reader Panels:
All access control card readers shall be by HID Corporation multiCLASS™ readers capable of reading the standard 26 bit prox card (HID), MiFare Smart cards, and the FRAC Smart Cards all at the same time. RPK40 is recommended or Approved Equal that is fully compatible with all cards noted above cards and card readers. Proprietary access control system equipment, components and software are not acceptable.

3. Access Cards will be provided by the Fairfax County FMD.

4. Hardware design for Doors with Electronic Access Control
   a. Builders locksets for electric access controlled doors- The preferred lockset shall be a mortise lock with a ¾ inch latch bolt throw, it may be of a standard type (non
electric operation) and an electric strike may be used to open the door or it may be an electric operation mortise lock. All locksets used on fire doors shall be fire rated. The trim of the lock shall be a lever handle that returns to the door within ½ of an inch of the door face. All finishes shall be either US 626 or US 32.

b. **Non-acceptable builders locksets for electric access control doors**- Cylindrical key in lever locksets shall not be used with electric strikes.

c. **Panic exit hardware devices for electric access controlled doors**- The preferred panic exit hardware device shall be a rim mounted latch retraction panic hardware device or a mortise panic hardware device with electric operation. Standard rim mounted panic hardware devices may be used with jamb mounted electric strikes. Panic hardware devices shall be of the standard panic hardware device type or fire exit panic hardware device as required by the Fairfax County VA fire code. The operating trim of any panic hardware device shall be a lever handle that returns to within ½ inch of the door face. All finishes shall be either US 626 or US 32.

d. **Non acceptable panic hardware devices for electric access controlled doors**- Vertical rod panic hardware devices shall not be used with any electric access controlled door.

e. **Electrical specifications: Voltage of electric access control hardware**- Voltage of all electric access control hardware shall be determined by the requirements of the controlled access system. Consult the BDCD Project Manager and FMD for details.

f. **Electrical specifications: Fail secure or fail safe function for electric access hardware**- The function of all electric access control hardware shall be as required by the Fairfax County fire code.

II. PRODUCTS

A. All locksets and hardware shall be compatible with 6 pin tumbler Large Format Interchangeable Core (LFIC) lock cylinders to accommodate Owner’s permanent Schlage cylinders. Owner’s permanent cylinders for door hardware shall be Schlage cylinders to be purchased by the contractor, and installed by the Owner (FMD). A/E shall note in the Hardware Schedule “Schlage 6 pin Large Format cylinder to be installed by Owner but purchased by contractor” for each hardware set (group). Refer to Section III for additional coordination requirements for locksets and hardware.

B. Construction cores shall be provided by the Contractor on an as needed basis to secure the building. Construction master keys and cylinder core removal keys (control keys) shall be provided to DPWES immediately after installation. Upon completion of the building FMD shall remove all construction cores and FMD shall install owner’s permanent lock cylinder cores purchased by contractor. FMD shall retain all construction cores and keys.
C. All finish hardware with exception of electronic access control doors, exterior accessed mechanical and electrical rooms shall be selected from one of the following manufacturers’ list of cylindrical locksets with 6 pin lock cylinders.

1. Schlage, Corbin**, or Sargent** (No Equal Products or Substitutions)
   a. Schlage ND-Series US 32D or 626 Finish Rhodes Design Lever
   b. Corbin CL-3300 Series US32D or 626 Finish NZD Design Lever**
   c. Sargent 10 Line Series US 32D or 626 Finish LL Trim, L Rose, L Lever**

** A/E must confirm with manufacturer that lockset accepts and is compatible with the County’s standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor’s hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

D. All finish hardware used on doors for securing exterior accessed mechanical and electrical rooms shall be selected from the following manufactures’ list of mortise locksets.

1. Schlage, Corbin**, or Sargent ** (No Equal Products or Substitutions)
   a. Schlage L-Series US 32D or 626 Finish Orbit Knob Trim, Hotel function
   b. Corbin ML 2200 Series US 32D or 626 Finish GRC knob design, Hotel function**
   c. Sargent 7800 Series US 32D or 626 Finish OB Knob Trim, Hotel function**

**A/E must confirm with manufacturer that lockset accepts and is compatible with the County’s standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor’s hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

E. All hardware for electronic access doors shall be selected from one of the following manufactures list of mortise locksets. These locksets shall be furnished with 6 pin tumbler Large Format Interchangeable Core Cylinders (LFIC) for manual key bypass in the event of fire or emergency.

a. Electric mortise locks

1. Schlage, Corbin**, or Sargent** (No Equal Products or Substitutions)
Doors and Windows

a. Schlage L series electrified mortise locks. 06 or ND Rhodes lever design trim

b. Corbin ML20900ECL series electric operation, mortise locksets. Newport NSA/NSB/NSF lever design trim**.

c. Sergeant 8200 series electromechanical series mortise locksets. L lever design trim**.

**A/E must confirm with manufacturer that lockset accepts and is compatible with the County’s standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor’s hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

b. Non electrical mortise locks to be used with electric strikes

1. Schlage, Corbin**, or Sargent** (No Equal Products or Substitutions)
   a. Schlage L series mortise locks. 06 or ND Rhodes lever design trim.


   c. Sargent 8200 series mortise locks. L lever design trim.**

   **A/E must confirm with manufacturer that lockset accepts and is compatible with the County’s standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor’s hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

   c. Electric strikes to be used with non electrical mortise locks

   1. Folger Adam 310-2 ¾ series electric strikes

   2. Von Duprin 6211 (HM frame) or 6213 (HM, Alum, or Wd retrofit) series electric strikes

   3. Hes 4500 series electric strikes

F. All hardware for panic exit devices for electronic access doors shall be selected from one of the following manufactures list of electric operation panic exit hardware. This hardware shall be furnished with 6 pin tumbler Large format interchangeable core cylinders for manual key bypass in the event of fire or emergency.

   a. Electric operation panic or fire exit device hardware
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1. Schlage (Von Duprin), Corbin, or Sargent (No Equal Products or Substitutions)
   a. Corbin  ED5200 Series electric rim device
              ED 5600 series electric mortise device w/ Newport design lever trim
   b. Sargent  8800 series electric rim device
              8900 series electric mortise device with L design lever trim
   c. Von Duprin  99EL series electric rim device
              99E electric mortise E7500 device with 06 lever design trim

b. Electric strikes to be used with non electric operation rim latch panic hardware
   1. Folger Adams  310-4 series electric strikes
   2. Hes  9500 series electric strikes (fire rated doors)
   3. Hes  9600 series electric strikes (non fire rated doors)

G. Where handicap accessibility is not required, surface mounted door closers should be Norton #1603 or #1604 or Approved Equal. Handicap accessible closers should be LCN 1461 or Approved Equal.

H. Floor type door closers should be Rixson #27 or #28, or Approved Equal. Where handicapped access is required, use Rixson PH27 or PH28, or Approved Equal.

I. Coordinate panic hardware with ADA requirements to ensure that a minimum of 32" clearance for door opening width, exclusive of hardware, is maintained.

J. Hydraulic actuators should not be used for accessible door openers.

K. Hinges at all doors should be ball bearing type.

L. Fairfax County Fire Prevention Code requires the installation of an approved emergency building entrance system (key box or Knox box) for all buildings with the exception of single-family dwellings. See Fairfax County Fire Prevention Code at https://www.fairfaxcounty.gov/fire-ems/fire-marshall/fire-department-key-boxes

M. Electric Strikes shall meet Underwriters Laboratories burglary resistance specification UL 1034. The preferred electric strike shall be Folger Adam Series 310. All electric strikes shall be US 626 or US 32D finish. Electric strike voltages and functions shall be compatible with access control system requirements.

N. For partial renovations, all door hardware shall be specified to match the existing hardware in finish, style and keyway in order to maintain continuity. A propriety or ole

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source procurement approval must be prepared and identified in the specifications as required.

O. Door Hardware Functions: The door hardware is to be specified with the following functions. Coordinate with BDCD Project Manager for additional variations:

**Door Type** | **Hardware Function**
--- | ---
1. Standard Offices | Push button office or entry function – Allows quick simple locking with no key required.
2. Doors without locking function | Passage lockset- No locking needed just latching.
3. Restroom - Single Fixture Use i.e. family toilet room, unisex toilet rooms) | Bathroom function- Allows privacy but can be opened with any key in emergency.
4. Meeting Rooms, Classrooms in Offices, Group Rooms, Large Suite Public Areas | Classroom lockset- Can only be locked with a key.
5. Storage Room/Mechanical Or Electrical Rooms | Storeroom lockset -Stays locked can only be opened with a key.
6. Public Restrooms- Multi-fixture Use | School house safety deadbolt lock -Can be locked by key only from exterior. Person locked in can release deadbolt but can not lock themselves in, used to lock off bathrooms in case of plumbing problem.
7. Roof Access | Double Sided Storeroom lock- Stays locked on both sides.
8. School Classroom , Child Day Care Centers | Classroom intruder lockset- Always free to exit, locks only by key from inside the classroom, door does not need to be opened to lock from outside as a regular classroom lock.

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9. Exterior accessed mechanical and electrical rooms

Hotel function- provides a self-locking storeroom function lockset and a separate deadbolt to provide extra security

10. Hotel function

Hotel function is specified as it provides a self-locking storeroom function lockset and a separate deadbolt to provide extra security to exterior accessed mechanical and electric rooms. These mortise locks shall be provided with removable core lock cylinders as section A of this specification indicates.

Note:
These functions are for standard finish hardware. Electric hardware on electronic access doors stays locked at all times and opens only with a card access or keypad. The key is only to open the door in an emergency like a storeroom lock. Electric locks can be left "open" at all times but are either powered up and unlocked (fail secure is locked with power off) or they are fail safe and not powered (fail safe is unlocked with no power going to the lock).

III. LOCKSETS AND HARDWARE

All locksets and hardware shall be compatible with Schlage full size/large format interchangeable core lock cylinders to accommodate Owner’s permanent Schlage cylinders. Owner’s permanent Schlage cylinders will be purchased by the Contractor. Permanent full size/large format interchangeable core cylinders in Schlage Classic C, CE, E, EF or F shall be provided by the contractor. Functioning keys and control keys (keys to remove core from lock) shall be provided to FMD Building Security Services/Lockshop immediately after installation. Projects larger than 25 cylinders will require that the contractors order cylinders through FMD Building Security Services/Lockshop at the expense to the contractor, so that the factory can key the new cylinders to the new master key system prior to final installation and turnover of the space to Owner. All perimeter doors and all mechanical doors will be provided with Schlage full size/large format interchangeable cores in Schlage FG keyway.

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I. DESIGN

A. Lath & Plaster

   At a minimum, the industry standard for expansion joints shall be required by the design documents.

B. Gypsum Board


   2. A UL number must be specified for all gypsum fire-rated assemblies.

   3. Access panels must be provided in gypsum board ceilings for maintenance access. See previous section 070000 for roof access door sizing. Panels must be provided for all maintained elements. If provision of the access panels compromises the aesthetics of the ceiling, either relocate the maintained elements to an accessible ceiling or change the design of the ceiling.

   4. Water-resistant gypsum board must be specified for wall and ceiling use in toilet rooms and locker room areas. Durock or equal product must be used in shower areas and wet walls in toilets and lavatories.

   5. The finish levels shall follow the requirements of ASTM C840 and Gypsum Association. The following finish level schedule shall be included in the documents and shall be coordinated with paint types for each area of the building:

      a. Level 1: Above finished ceiling concealed from view.

      b. Level 2: Utility areas and areas behind cabinetry.

      c. Level 3: Areas that will receive heavy grade wall covering.

      d. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.

      e. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

C. Ceramic Tile

   1. The floor and the full height of wet walls in toilet and shower rooms (toilet and urinal areas may be at the toilet partition height) shall be ceramic tile. All ceramic floors shall be sloped to drain. A/E to coordinate to reduce cut tiles. The preferred method for floor tiles is the full mud-set tiles, and thin set mortar for setting wall tiles. Walls not receiving ceramic tile shall have a ceramic tile base of a minimum 6” above finished floor. All grout to be sealed.
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a. Attic Stock- Specify a minimum of 50 SF or 10% whichever is greater, of attic stock of each type and of each color of ceramic tile used. Except for borders and accents where 5% of each type is required.

D. Wall Surfaces

1. All wall finishes at kitchens, food preparation and serving areas are required by the Health Department to be completely smooth and cleanable. No surface texture is permitted at these locations. CMU walls with block filler and paint/epoxy finish systems have been deemed unacceptable due to the reflection of the block texture through the finish system.

2. Wall coverings such as wallpaper are not acceptable unless written approval is provided with concurrence by the Director of Facilities Management Department and Director of the Building Design and Construction Division.

E. Parking Garages

1. Underground, enclosed levels of parking garages shall have the walls and columns painted white to allow better distribution of reflected light.

II. PRODUCTS

A. Acoustical Ceiling Tile

1. Use of any ceiling system other than a 2 x 4 or 2 x 2 lay-in should be brought to the attention of the BDCD Project Manager and will be coordinated with FMD.

2. Access to maintained elements above the ceiling must be provided in any ceiling system used. Use of a ceiling system that does not provide access for maintenance will not be permitted.

3. Recycled content ceiling tile should be specified. Use Humigard or other microbial prevention treated tiles as applicable.

4. The acoustic ceiling tiles must be as follows:
   a. Standard Areas
      ➢ Armstrong 756 for 2' x 2' or Approved Equal
      ➢ Armstrong 755 for 2' x 4' or Approved Equal
   
   b. Standard Areas (for sag/humidity resistance and 90% light reflectance)
      The following should be used for the conditions and the facilities types below:
      ✓ Any building with operable windows.

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✓ At primary entrance doors and bay doors and from those doors to the immediate first interior closed hall fire or security door. If there are no closed hall doors, then up to each room door. In the case of vending and similar areas where there may be no closed access door continue the 1910 or 1913 through the open space.

✓ All fire stations, shelters, detox centers, community centers, labs, negative pressure/sick rooms, day care, residential care, and child care facilities.

- Armstrong ULTIMA Fine Texture or Approved Equal
  - 1910 for 2’ x 2’
  - 1913 for 2’ x 4’

• “Wet” Areas
  - Armstrong Ceramaguard Fine Fissured – Perforated or Approved Equal
    - 607 for 2’ x 2’
    - 608 for 2’ x 4’

d. Kitchens
  - Armstrong
    - 673 for 2 x 2
    - 672 for 2 x 4

5. The use of concealed spline ceiling system is discouraged. The A/E shall coordinate with the BDCD Project Manager for advance approval if the system is proposed for use in selected areas.

6. Attic Stock- Provide the following:

a. Provide two unopened cartons of each type of ceiling tile

B. Paints

1. All interior paints and primers shall be low VOC products. All surfaces shall receive a minimum of two coats of paint, in addition to an appropriate primer coat. Each coat must be allowed to dry completely before application of the next coat. Specify at least three color choices for the walls. Painting of interior surfaces shall be of the following paint types:

a. Walls (Level 4 or 5, see finish level schedule in I.B.5) - Eggshell latex (Semi-gloss in high traffic areas and other appropriate spaces as coordinated with the Owner)

b. Ceilings and bulkheads (Level 4 or 5) - flat latex

c. Doors and frames (metal/wood) - semi-gloss latex (Alkali for exterior)
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2. Attic Stock- Provide the following:
   a. One gallon of each color and type of paint used, with paint information legibly noted on each unopened container. No partial cans accepted.

3. Acceptable manufacturers are:
   a. Sherwin Williams
   b. Benjamin Moore
   c. No Equal Products or Substitutions

4. White-board paint, Scuffmaster or Polymix paints are not acceptable due to increased maintenance.

5. Specifications must note that paint overspray on IT/Telcom cables must be prevented.

C. Resilient Flooring

1. The desired resilient flooring is 12" x 12" (300mm x 300mm) Vinyl Composition Tile (VCT) or 18”x18” or 18” x 36” Luxury Vinyl Tile. Specifications shall include three color choices for tile, base and treads. Other elements shall be coordinated with the VCT/LVT color(s).

2. All telecommunication and audio/video rooms shall use anti-static VCT flooring.

3. Attic Stock- Provide the following:
   a. VCT - 1 unopened carton of each color and type.
   b. Rubber base - 1 unopened carton of each type and color.
   c. Rubber accessories - 50 linear feet (15 meters)
   d. Rubber stair treads - 10 each of each color or type.

D. Carpet

1. Square carpet tiles shall be used. Specify a choice of at least three colors and/or patterns of carpet.

2. If sheet stock is to be specified, prior approval must be obtained from the BDCD Project Manager, who will coordinate with the FMD.

3. Carpet installation shall be by installer approved by the carpet manufacturer.

4. Attic Stock for Carpet Tile- Provide the following:
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a. Specifications shall require provision of attic stock in unopened cartons and matching dye lot, equal to 5% of the carpeted area of the project for each carpet type. In addition, all usable scraps larger than two square feet, or more than 8 inches (200 mm) in width, shall be turned over to the Owner.

5. Low VOC, recycled content carpet shall be specified. Carpet tiles must be specified from the mid range product lines of the following manufacturers:

a. Milliken Modular Carpet Tile
b. Interface Carpet Tile
c. Shaw Contract Group
d. Patcraft Commercial Carpet
e. Specifications must note that No Equal Products or Substitutions for carpet tiles will be allowed.

6. Carpet tile must have a minimum TARR rating of 3.0 for heavily used areas and 3.5 for severely used areas. Heavy rating would be for more administrative functions with minimal public use. Severe rating shall be used for high traffic areas which get a lot of public use such as family / human services, and library functions. Refer to the End Use Application table at http://www.carpet-rug.org/Documents/Factsheets/CRIFactsheetTARR.aspx for guidance.

7. Entryway/Walk-off mat to be glue down, carpet style.

E. Special Flooring

1. Prior approval of special floorings is required and the use of any such flooring shall be brought to the attention of the BDCD Project Manager. Examples of special flooring are hardwood, rubber, concrete, laminate, terrazzo, epoxy or resin floors. Prior approval must be obtained from the BDCD Project Manager for use of wood floors and for design of the support system for the wood floors.

2. Use of linoleum or bamboo flooring, or other rapidly renewable products is encouraged for consideration, at appropriate locations and as coordinated with the BDCD Project Manager.

3. Cork flooring is not acceptable due to increased maintenance.
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4. Specification for concrete or terrazzo flooring shall include information but not limited to the process, grinding, cleaning, mixture ratio and special mix. Discuss specialty flooring with contractor at the pre-construction meeting.

5. Attic Stock – Provide the following:
   
a. Specifications shall require provision of attic stock in unopened cartons, equal to 5% of the special flooring area.

F. Floor surfaces shall be non-slip and non-glare.

G. Kitchens to have scrub-able flooring with cove base.
I. DESIGN

A. Counter top supports shall be designed so as to conform to requirements of the ADAAG. Counter tops shall be either cabinet supported or have front leg and side panel supports. Unsupported spans in excess of 3’6” are unacceptable. Larger spans shall be supported with structural members or vertical support. Counter tops shall have all undersides, edges and cut outs sealed with waterproof coating. Ensure that pipes, etc., do not interfere with recessed mountings.

B. Fire extinguishers shall be hung or cabinet mounted with a maximum permissible mounting height to top of extinguisher of 48”. The certification date tagged on all fire extinguishers shall be the date of substantial completion. Fire extinguishers must be provided at elevator machine rooms, fuel sites, and mechanical equipment rooms. Provide recessed fire extinguisher mounting as required to meet ADAAG access and projection requirements.

C. Flagpoles shall be designed for ease of maintenance, and for simple rope and halyard replacement. Flagpoles shall be anodized aluminum or aluminum and have internal halyard. County facilities that will require 3 flagpoles are courts, fire stations, police stations, and government centers. All other County facilities are required to have one flag pole. Flagpole design must conform to U.S. Flag Standards. All flags shall be lighted and lighting shall comply with the zoning ordinance glare and lighting standards. Use of energy efficient lighting is encouraged.

D. Toilet Rooms

1. Toilet partitions must have both floor-to-ceiling and wall bracing. Urinal screen shall have floor to ceiling pilaster support. Toilet partitions, doors, pilasters and screens shall be constructed of solid Phenolic or similar homogeneous plastic material. Recycled content material is preferred. Overhead bracing is acceptable when partitions are floor mounted. Panels shall be a minimum of ½” thick. All partition finish, including decorative, shall be an integral part of the core material. Doors and Pilasters shall be a minimum of ¾” thickness and all finish including decorative, shall be an integral part of the core material.

2. Design must avoid line of sight from entry door to urinals and to mirror reflections.

3. Wall backing at wet walls of all rest rooms shall be cement board such as Durock (or equal).

4. All staff toilet rooms shall be provided with automatic hand dryers. Installation of hand dryers must meet ADAAG requirements for access and projection clearances.
Guidelines for Architects and Engineers
Fairfax County, BDCD

100000 – SPECIALTIES

5. All public toilet rooms shall be provided with automatic hand dryers. Installation of hand dryers must meet ADAAG requirements for access and projection clearances.

6. All public restrooms shall be provided with baby changing stations. Use of family restrooms shall be considered at lobby of very large, public facilities and as required by code. Installation of changing table must meet ADAAG requirements.

7. At public toilet rooms, specify automatic, infrared sensors for use in automatically activating water flow valves at lavatories. All other fixtures are to be manually operated. Low flow, ultra-low flow, or dual flush water saving fixtures are to be specified for use at all plumbing fixtures.

8. All sink counters to be a solid surface material.

9. Provide floor drains at all toilet rooms and shower areas. Design floors to provide positive drainage to floor drains. (Reference Division 220000 - Plumbing)

E. Janitor’s Closet

1. Janitors’ closets used for storage of any quantity of highly combustible material must have an automatic sprinkler system.

2. Provide one closet per 25,000 square feet gross floor area, at a minimum of one closet per floor (or increase size of closets proportionally). Janitor’s closet must be vented independently.

3. Standard janitor’s closet requirements:
   a. Walls to be water-resistant gypsum board, such as Durock, Hardy Board, or equal, covered with sanitary type vinyl to 48” Above Finish Floor (AFF). Walls to receive coating of Sanitile 550 or equal above the vinyl. Ceiling to receive enamel painted wall board.
   b. Floor shall be slip resistant, sealed concrete.
   c. Provide 24” mop rack with 3 mop holders.
   d. Provide two double coat hooks.
   e. A 110-volt outlet must be provided at all janitors' closets.
   f. Provide 3’-0” x 6’ 8” door (minimum size).
100000 – SPECIALTIES

g. Provide five wall-mounted shelves, 12” deep x 48” long, 12” on center vertically. First shelf to be 18” AFF.

h. Provide heavy duty vinyl or stainless steel corner guards at appropriate locations including the door and door frame.

i. Mop sink to be constructed of monolithic, preformed basin material with stainless steel sill.

j. Include hose and reel as part of mop sink.

k. Faucet shall be type a/b/e specialty mop sink with pail hook and wall brace, or equal.

l. All plumbing connections shall be ½ mnps threads.

m. Light fixture shall be Stonco vapor tight fixture with grill, or equal.

F. Interior Signage and Labeling

1. Signage to comply with requirements of ADAAG as to character, proportion, height, finish, mounting location and Braille content where required.

2. Exact signage requirements will be specified during the design phase.

3. Each room in the facility shall be labeled or numbered to facilitate maintenance and emergency response.

4. Room names in the design documents shall match the final operational room names to ease the coordination of signage preparation and move-in. Room numbers on final plans shall also be the same as room numbers on signs for alarm and security use in the facility operation.

5. Rooms which are identified (labeled) as to use do not need to be numbered, unless there are more than one of each such rooms in a facility. Examples:

   "Men" 
   "Janitor" 
   "Electrical Equipment" 
   “Stair”, etc.

   “Women” 
   "Telephone Equipment” 
   "Mechanical Equipment”.

6. Rooms that are not signed shall have numbers provided on the upper corner of each door or door jamb of main door to each room. Numbers shall be small 3/4” and applied so as to be of use only to County maintenance personnel; or, if the
numbering system is to be referenced on the Building Directory, utilize larger more visible numbers.

7. Rooms shall be numbered from left to right beginning at the suite entrance door, as practical.

8. All workstations shall be numbered independent of room numbers.

9. Any room containing equipment related to the fire alarm system, must have signage meeting the Fire Marshal's requirements in terms of lettering size (1 ½") and contrasting colors. Typical rooms may include but are not limited to Main Electric Room, Fire Control Room, Fire Pump Room, Sprinkler Riser Room and Sprinkler Control Room.

10. All mechanical or electrical equipment located above a suspended ceiling shall be labeled/identified at the suspended ceiling. Fire alarm devices located above a suspended ceiling must have a nameplate identifying the device at the appropriate suspended ceiling location and also at the point of access to the device if different from the suspended ceiling. Nameplates for fire alarm devices shall be ½" minimum height white letters engraved on a minimum 1" wide red plastic laminate plate.

11. The street address number must be provided, clearly visible on the front of the building.

12. For emergency response purposes, all exterior doors in public safety facilities shall be clearly labeled with an identifying door number at the interior and exterior and with door numbers visible from an aerial position. For all other facilities, the A/E shall coordinate with the BDCD Project Manager at the early design phase to determine signage requirements.

13. A/E to provide emergency evacuation plans.

G. Exterior Door Labeling

1. Exterior door designation is recommended for county facilities with three or more public entrances. The following guidelines are based on the National Incident Command System which is used by firefighters and police departments and would benefit many County Human Service facilities. The BDCD Project Manager is to coordinate with FMD and provide written direction to A/E on doors that require the signage.

2. Numbering Sequence
Guidelines for Architects and Engineers
Fairfax County, BCD

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a. All door numbering shall start with the letter A, B, C, or D. This is based on the side of the building on which the door is located.

b. The number will follow, starting from the first door on the right, for that designated side, as A1, and increase sequentially to the left.

c. The front of the structure is Side A. Usually it is the main entrance of the building and is usually the address side.

d. If the main entrance or address side is not identifiable, Side A will be the side facing the street.

e. Side B will be the next side to the left of Side A, and Side C is the back and to the left of Side B. The remaining side is Side D.

f. The first door on the right on Side B will be door B1, and so on.

g. This system will readily identify the side of the building for first responders who will pronounce the letters phonetically, as Alpha, Bravo, Charlie, and Delta.

3. Sign Construction

a. Material: Minimum 1/8” thick aluminum

b. Size: Exterior signs are 18” x 18”. Interior signs matching the number of the exterior are 15” x 15”.

c. Signs have contrasting colors for the background and number with the background being reflective (example: 3M™ Scotchlite™ Reflective Material). Most Fairfax County schools use a black number on a white background. Selected colors must have a strong contrast between the number and the background.

4. Sign Placement

a. All doors will be numbered, but not all doors require a number to be posted. Doors thought to be significant for entry or evacuation should have a number posted. Less significant doors such as storage and utility room doors do not have their numbers posted.

b. The exterior numbers should be placed high enough to be out of reach. They are placed where they can be seen from the greatest distance with the widest line of sight. The signs should not be placed under an overhang because they would be blocked from the view of the police helicopter.
c. The interior numbers are usually placed above the exit door facing down the hall so they can be seen by the greatest number of people.

Fairfax County Security Program
Door Designation Guidelines

Main Entrance, Address Side, or Side Facing Main Street

H. Automated External Defibrillators (AEDs) will be installed in all County worksites as part of the County’s Public Access to Defibrillation (PAD) program. The Risk Management Division manages the PAD program and is responsible for installation of AEDs in accordance with County and ADAAG standards. Appropriate space in the public area of the building must be provisioned and coordinated with Risk Management staff.

I. Portable Fire Extinguishers shall be provided as required per code and certifications dates to be the date of substantial completion.

J. Space for recycled material collection/storage must be provided and designated, preferably near the loading dock or dumpster area.
K. Accessible Design:

1. Evaluate use of Family Restrooms, if applicable to specific building. Include baby changing tables at public area restrooms.

2. Soap dispensers in toilet rooms, shall be provided to the side of the wash bowl in the counter instead of along the rear wall. If automatic soap dispensers are specified, they shall be sensor operated with hardwiring (no batteries permitted).

3. Clearance at paper towel dispensers, trash receptacles and lavatories shall not overlap with common circulation and meet ADAAG standards.

4. Locate hooks no taller than 48” on the back of toilet stall doors, if applicable.

5. Wall mounted objects such as hand dryers, baby changing stations another dispensers, within the toilet rooms, shall met the requirements of ADAAG for protrusion into the accessible path.

6. No shelving shall be provided in restrooms. Where exceptions are requested such as in Libraries, A/E shall ensure compliance with ADA requirements.

7. Accessible drinking fountains shall be provided in an alcove or with wing walls in compliance with ADAAG requirements for protruding objects.

8. Evaluate use of front-loading washer and dryers, where applicable.

9. Evaluate the installation of at least one assistive listening system in each building in an area of assembly such as, classrooms, meeting areas, conference rooms, or theaters.

10. Card access system for entry, must provide for sufficient time for opening of the door for a person to pass.

11. Lettering size for informational signage shall be as large as practical in consideration of those with low vision.

12. Accessible routes and equipment accessibility shall be considered when locating and purchasing vending machines, copiers, kiosks, and other specialized equipment.

II. PRODUCTS
Guidelines for Architects and Engineers
Fairfax County, BDCD

100000 – SPECIALTIES

A. The preferred drinking fountain is as follows. Notify the BDCD Project Manager for alternate model if the one listed below is discontinued or another model proposed (see also 220000 Plumbing):

1. Elkay EZH20 Bottle Filling Station with Integral SwirlFlo Fountain – Model LZWS-LRBM28K

B. The preferred toilet accessories are as follows. Notify the BDCD Project Manager for alternate model if those listed are discontinued:

1. Toilet tissue dispenser Bobrick B-274
2. Toilet Tissue Dispenser and Utility Shelf Bobrick B-2840
3. Sanitary Napkin dispenser Bobrick B-4706 50
4. Napkin Disposal Bobrick B-270
5. Toilet Seat Cover Dispenser Bobrick B-221
6. Waste Receptacles (recessed only) Bobrick B-3644
7. Hand Dryer Dyson Airblade dB, AB14-G
Excel Xlerator
Saniflow Automatic Mediflow
Bobrick B-778 Quiet Dry (for Libraries only) installed to meet ADA

Towel dispensers are not permitted in toilet rooms or kitchenettes unless approved in writing by project manager. If permitted, using agency, not FMD, provides paper towels.

C. All toilet accessories and their installation, must comply with ADA requirements for reach, operation, and wall projection.

D. All toilet accessories model numbers should be confirmed during specifications. Any updates or necessary revisions must be coordinated with the BDCD Project Manager.
Guidelines for Architects and Engineers
Fairfax County, BDCD

110000 – EQUIPMENT

I. DESIGN

A. Clothes Washers and Dryers

1. Specify gas clothes dryers whenever gas service is available, subject to using Agency concurrence. Voltage for clothes dryers shall be 208/277.

2. Coordinate voltages for washing machines and dryers between electrical plans, specifications, schedules, and disconnects.

3. Commercial washing machines and dryers must be bolted to a minimum of a 4” level concrete pad; and must be provided with vibration isolators, as required. Any washing machines which are to be located on an elevated, structural slab must be analyzed for harmonic impacts in conjunction with the structural plans, and the appropriate vibration isolation or dampening provided.

4. Coordinate design of fresh air intake and exhaust flues for dryers with dryer manufacturer.

B. Direct exhaust fumes away from air conditioning intakes.

C. Kitchen Equipment

1. Equipment plans for any kitchen equipment must be closely coordinated with electrical power drawings to ensure consistency between power requirements and power provided. Use gas kitchen appliances when gas service is available, subject to using Agency concurrence.

D. Ranges

1. Gas fired ranges shall use an electric spark ignition – no standing pilot lights.

2. Provide 30” ADA pull-in access adjacent to range.

E. Type I Kitchen Hoods

1. A heat sensor shall serve as an interlock between the kitchen hood exhaust fan and the cooking appliances to automatically activate the exhaust hood system whenever cooking operations occur.

2. Any make-up air systems that are required for the hood exhaust system shall be interlocked with the kitchen hood exhaust fan to automatically operate whenever the exhaust fan is energized.
3. A solenoid valve shall serve as an interlock between the gas piping supplying the cooking appliances below the kitchen exhaust hood and the hood fire suppression system, to automatically activate gas shutoff in the event of a fire. The valve installation shall meet the Fire Marshal requirements.

4. Electric ranges shall comply with similar ventilation requirements as noted for gas ranges.

F. All fixed equipment and appliances shall be high-energy efficiency and carry the Energy Star® label, where available.

G. Dividing Partitions

1. Design of dividing partitions in meeting rooms must be carefully reviewed to accommodate life safety requirements for exiting from all areas as required.

2. Use of automatically operated partitions is acceptable however, must be reviewed with the using agency based on the room conditions to determine if necessary for the size and height of the room. The physical convenience of the day-to-day users/operating staff usually determines the need for automatically operated partitions in lieu of the manually operated ones.

   a. Police Facilities
      There is no strong intention to use automatic partition for police facilities. Police staff are physically capable of operating manual ones.

   b. Library
      There is a desire for automatic partition since some users might have difficulties manually open/close them.

   c. NCS/Community Center
      There is a desire for automatic partition since some users might have difficulties manually open/close them.

   d. Stormwater/Wastewater
      There is a desire for automatic partition since some users might have difficulties manually open/close them.

3. Safety Features of Automatically Operated Partitions

   a. Control Stations
110000 – EQUIPMENT

Provide two (2) single-key-operated, constant-pressure control stations or two (2) Code Protected Touch Pads, with one at opposite end of the partition, which shall be simultaneously activated in order to operate the partition.

b. Pressure Sensitive Leading Edge
Provide contact pressure sensitive safety edge along partition’s leading edge so that as little as 9 lbf of force applied to the leading edge will stop the forward motion.

c. Obstruction Detection Devices
Provide obstruction detection devices such as Infrared obstruction detectors, at each side of the partition to stop the partition movement if people or objects are detected in the path of the partition.

d. Weight Sensitive Floor Mat
Provide weight sensitive floor mat in the storage/stacking area to stop partition movement with as little as 5 lbs of weight applied to the mat.

e. Signage
Post a laminated sign on how to safely and properly operate that particular partition. The sign must be posted at all electric operating stations, along with a strong warning of injury or possible death on the sign as well as the inspection certificate.

H. Security Systems

1. The A/E shall coordinate with the BDCD Project Manager for security requirements applicable per project and if additional on-site monitoring is required.

2. The design shall incorporate the principals of Crime Prevention Through Environmental Design (CEPTED), or equivalent.

3. Exterior cameras, if included, must not be blocked by trees when mature.

4. Exterior cameras, if included, must be coordinated with site lighting to ensure ample night time ambient light and not create hot spots.

5. Site Surveillance System Requirements

Site surveillance will be accomplished using fixed and/or Pan Tilt Zoom (PTZ) Closed Circuit Television (CCTV) cameras. Video from the Visual stations will be routed to the Digital Video Recording (DVR) System. The CCTV system should be designed to provide remote visual surveillance of the building and grounds from the local control

2020 Version, Updated 1/29/2020
post within the building and from offsite locations through the County’s communications infrastructure.

a. Site Surveillance Cameras
Fixed and PTZ cameras will be dome type cameras with smoked, high impact polycarbonate lower sections. The cameras should be visible to gain the deterrent factor; but not obtrusive when being located. The smoked lower section also prevents people from knowing the field of view of the camera, increasing its effectiveness as a deterrent. The cameras will be wall, pole or ceiling mounted.

b. Digital Video Recording System
The system will be designed to digitally record, store and retrieve video images. The capture and storage of video data will be designed with minimum frame rates and resolution settings as established herein. Storage capacity requirements are driven by the frame rates and the resolution of the recording. The current standard for digital video recording systems is the Integral Technologies solution. Integral Technologies Digital Sentry Network Video Recorder (NVR) will accommodate the 4 CIF resolutions at up to 15 ips per camera. This is a network based product that will offer adequate performance locally and allow enterprise functions such as remote (off site) viewing and playback.

c. Security Cameras
The County only uses Pelco, Sony, and Axis for their security cameras. These are generally not sole sourced, but specified as limited procurement; no equal products. It is imperative that the equipment be compatible with the existing security cameras in the County, which is made up of exacqVision DVR’s and NVR’s, and has the capability of switching components and be interchangeable with existing video equipment to assure operability of the existing monitoring and recording systems. Also spare parts will be available in the existing stock and time to troubleshoot and perform maintenance will be minimized. The County also uses Onssi Systems for the software controlling the security cameras in larger facilities.

Fixed cameras should be high resolution, color, ¼” interline transfer CCD cameras with 470 TV lines horizontal (NTSC) minimum resolution in both day and night modes, .45 fc minimum illumination, automatic backlight compensation, automatic gain control, and provided with mounts/housings appropriate to the locations and environmental conditions in which they are mounted.

Pan, tilt and zoom (PTZ) dome cameras should be high resolution, color, 1/4” interline transfer CCD cameras with a minimum of 18X optical zoom lens with up to 12X digital zoom magnification, continuous fulltime auto-focus, day/night operational modes, minimum resolution of 470 TV lines horizontal (NTSC) in
both day and night modes, better than 0.25 lux (slow shutter off) and 0.016 lux (slow shutter on) in day mode, better than 0.031 lux (slow shutter off) and 0.002 lux (slow shutter on) in night mode, and capable of providing detailed images when video frame encompasses areas of bright light and darkness. The pan/tilt drive should be variable speed and capable of 360-degree continuous rotation. Tilt range should be greater than 95 degrees minimum and pan speed, at minimum, 120 degrees per second. The pan/tilt drives should have the ability to store presets. Each preset shall have a preprogrammed position for, at minimum, the pan angle, tilt angle, and zoom lens angle of view.

A darkened distortion-free outer dome to preclude visibility of which way camera is oriented should completely enclose the surveillance device. Housings should be wall, ceiling, parapet, pole, and/or column mountable. Mounts should have a load capacity of at least twice the combined load of the mounted components including the mount itself. Outdoor cameras should be provided with and installed in weather-proof housings equipped with heater/blower and capable of operating up to 122 degrees F and 100% relative, condensing humidity. The digital video recorders being used in the county are exacqVision DVRs (Digital Video Recorders, made by Pelco), which has the capability of handling 32 cameras. Cameras which resemble smoke detectors or other life safety devices shall not be specified per the Fire Marshall’s Office.

II. PRODUCTS

A. Device and Manufacturer Information for Camera Systems. Verify with the County Security Manager for most current manufacturers and models.

<table>
<thead>
<tr>
<th>Device Description</th>
<th>Manufacturer</th>
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<tbody>
<tr>
<td>1. Pan Tilt Zoom Camera</td>
<td>Pelco, Sony, Axis</td>
</tr>
<tr>
<td>2. Fixed Dome Camera</td>
<td>Pelco, Sony, Axis</td>
</tr>
<tr>
<td>3. Camera Power Supply</td>
<td>Pelco, Sony, Axis</td>
</tr>
<tr>
<td>5. Video Encoder</td>
<td>Exacq Technologies (exacqVision)</td>
</tr>
<tr>
<td>6. Video Decoder</td>
<td>Exacq Technologies (exacqVision)</td>
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</tbody>
</table>

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7. Video Acquisition Unit          Exacq Technologies (exacqVision)
8. Ethernet Switch                Cisco
9. System Manager                 Exacq Technologies (exacqVision)
10. Client Work Station           Exacq Technologies (exacqVision)
11. Analog Video Monitor          Pelco, Sony, Axis
120000 - FURNISHINGS (Free Standing and Systems Furniture)

I. DESIGN

A. All system furniture provided on Fairfax County projects is to be specified to have a County standard fabric pattern. The standard pattern is by Steelcase. Fabric specifications must be coordinated with the BDCD Project Manager and FMD. Low VOC fabric shall be specified.

B. The plans must clearly show whether the Contractor or the Owner is responsible for making the final electrical connection of the systems furniture whip (pig tail) to the electrical junction box. This may be performed by the Owner; however, it must be coordinated and clearly shown on the documents. The A/E is required to obtain the permit for the system furniture.

C. All free standing furniture to be specified from products on County furniture contracts.

D. Wire management is to be addressed for all furniture selections, especially in public areas such as libraries.

E. When specifying conference room seating, the A/E is required to specify bariatric chairs. Quantity per room is determined by BDCD project manager.

F. Accessible Design

1. Evaluate use of seating/benches in lobby or main entrance areas, and seating near elevators.

2. Provide adjustable podiums/lectern for accessibility (seated/small persons) where provided. This may be fixed equipment or owner provided loose equipment item.

3. Provide enough circulation space around fixed and loose furniture to enable easy movement by all users, including people with wheeled mobility devices. Evaluate this requirement as part of the schematic loose furniture layout plan.

4. In areas requiring a reception desk, an ADA accessible height counter shall be provided.

II. PRODUCTS

A. Systems furniture shall be designed based on the companies currently under contract with the County:
**120000 - FURNISHINGS**  *(Free Standing and Systems Furniture)*

1. Manufacturer: Steelcase
2. System: Answer
3. Installer: Per County Contract as coordinated by Owner.
4. Electrical: 8 wire, 4 circuit 2+2 Electrical System
5. Colors shall be as follows:
   a. Laminate: Dune
   b. Edge: Mist
   c. Fabric: Sprite Linen

B. Coordinate with BDCD Project Manager and FMD to assure conformance to County space standards and workstation configuration standards.

C. Workstation electrical base infeed needs to be accessible for maintenance purposes.

D. If using Knoll Morrison inventory stock:
   1. Laminate: Fog
   2. Overheads/Files: Fairfax Grey
   3. Fabric: Labyrinth; Pebble

E. Special Glass Stacker Panels to be Knoll Metal Window Frames with Reff Wafer glass “MP3”.

F. All Overhead binder bins are to have Reuter doors.

G. All under shelf lights are to be LED.

H. All work surfaces to be 1-3/4” thick.
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I. DESIGN

A. All elevator equipment shall be “non-proprietary” equipment. Non-proprietary is defined as equipment generally available for purchase by any qualified elevator contracting business, with spare parts available to any qualified purchaser, all equipment or tools necessary for diagnostics/maintenance/adjustment/troubleshooting shall be available to any qualified contractor. Additionally, replacement documentation shall be available to any qualified elevator contractor at a fair and reasonable cost.

B. A machine room will need to be incorporated into the design, regardless of any space constraints within the building or structure footprint. Use of Machine-Room-Less (MRL) Elevators or other similar conveyance technologies, must be approved in writing by BDCD Project Manager with written concurrence from FMD.

C. All service tools, programmers, computers, software chips, etc., necessary to maintain service and/or troubleshoot the elevator system shall be furnished to the County and shall be permanently left on the job site. This hardware and software shall not have any time limits or expiration dates set on them. The elevator equipment shall not require any external proprietary service tool(s). A minimum of three copies of all instruction manuals for these tools, programmers, etc. are to be provided to the County.

C. Copies of all technicians’ manuals, wiring diagrams, training materials, etc. for all elevator components shall be furnished to the County for each model of elevator. A minimum of three copies shall be provided for the main bank of elevators of each model, and one more copy for each additional elevator in the building.

E. All large multi-story buildings shall have a designated “Freight Elevator” with direct and convenient access to a loading dock or freight entrance. The exact requirements for elevators will be determined during the Programming and Conceptual Design phases.

F. A full, two-year warranty for labor, parts, and materials shall be provided for elevators from date of substantial completion. The installer shall provide full maintenance service and inspections during the two-year warranty period for elevators.

G. Provide sump pit and pump in elevator pits as required by elevator code (ASME A17.1) Provide pumping mechanism which prevents oil in elevator pit from being pumped out, as required by code.

H. Provide vandal resistant fixtures and push buttons with directional symbol for all elevator hall station panels and car operating panels.

I. For garage elevators provide water resistant components in areas that are not temperature controlled, to include hall station panels, car operating panels, infra-red door edges/light
140000 - CONVEYING SYSTEMS

screens, position indicators, hall and car lanterns, pit stop switches, hoistway limit switches, interlocks, leveling selector, stainless steel or galvanized selector tape, car top inspection station, car door operating equipment and emergency phones.

J. For garage elevators, to resist corrosion use Type 316 stainless steel or galvanized for car doors, hoistway doors, door bucks, car door operating equipment and fixtures. Use minimum 16 gauge stainless steel or galvanized.

K. Fire service key switches for all elevators in a building, including additions to existing buildings, shall be operable by the same FEOK1 key as required by elevator code.

L. Shunt trip disconnect shall be used in elevator machine room, not panel board, per code requirements.

M. Provide protective cages for light fixtures in elevator machine rooms.

N. Contractor is responsible to provide, install, and wire the emergency elevator phone.

O. Any surfaces that project out into the elevator shaft must be angled from the wall surface down. No flat surfaces in the horizontal plane are allowed in the shaft.

P. Specifications shall require that the contractor comply with County (Facilities Management Department) maintenance protocol for all maintenance and inspection work performed.

Q. Specifications shall require the use of energy efficient AC motor technology for elevator motors.

R. In buildings with more than one elevator, escalator, or lift each piece of equipment shall be assigned a unique identification number as required by elevator code ASME A17.1. When adding an elevator, escalator or lift to an existing building, or when adding equipment in a new wing of an existing building, the new identification numbers shall start at a number higher than the existing numbers (do not start over at #1).

S. Elevator penthouse and/or roof top access shall be limited by key and/or access control card. A method to override the access card or key switch shall be provided to allow unrestricted access during special projects or events.

T. All lighting in elevator cabs, machine rooms, and pits shall be energy efficient LED fixtures.

U. Elevator doors must be double-sided, not single-sided. Door hangers must be separate components from the doors, and not be an integral part of the doors. All elevator anti evacuation devices on car doors are to be collapsible vane type.
V. Accessible Design

1. Evaluate use of verbal communications in lieu of chimes within elevators. Provide required ADA brail.

W. Escalators shall be provided with on-board or built-in diagnostic service tools. All service tools, programmers, computers, software chips, etc. necessary to maintain, service, and or troubleshoot the escalators shall be furnished to the County and permanently left on the job site. This hardware and software shall not have any time limits or expiration dates set on them. A minimum of three copies of all instruction manuals for these tools, programmers, etc. are to be provided to the County.

X. A full, two-year warranty for labor, parts, and materials shall be provided for escalators. The installer shall provide full maintenance service and inspections, during the two-year warranty period for escalators.

Y. Any other conveying systems (wheelchair lifts, dumbwaiters, materials lifts, etc.) shall have a full, two-year warranty for labor, parts, and materials. Other conveying systems shall include full maintenance and inspections by the installer during the two-year warranty period.

Z. Copies of all technicians’ manuals, wiring diagrams, training materials, maintenance manuals and procedures, etc. shall be furnished to the County for each model of conveying system. A minimum of three bound hard copies and two electronic (CDR or DVD) copies shall be provided.

II. PRODUCTS

A. Conveying Systems

1. Below are listed preferred equipment brands for parts of conveying systems (specifications shall include at least three acceptable equipment options for competitive bidding, unless a limited sole source procurement or no substitutions/no equal products is approved in writing by the BDCD Project Manager):

   a. Elevator Motors, Traction Machines, Governors: Non-proprietary equipment such Hollister-Whitney, MEI, or equal. Illustration and notation of non-proprietary equipment at Design Development (DD) submission is required, and if not acknowledged as non-proprietary equipment, then deemed not acceptable. (Note: Major manufacturers, such as KONE, ThyssenKrupp, Otis, and Schindler may be rejected if using proprietary equipment)
Guidelines for Architects and Engineers  
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140000 - CONVEYING SYSTEMS

b. Controllers: One of the following controller manufacturers is required using limited procurement, no substitutions/no equal products: Motion Control Engineering (MCE); Computerized Elevator Control (CEC); GAL Manufacturing. (Note: The listed companies manufacture control equipment, but do not install elevators. If required, most elevator companies can procure “non-proprietary” equipment from one of these manufacturers and do the installation).

e. Hydraulic Pumps: Allweiler (preferred), EECO, or IMO.

f. Sump Pumps: Zoeller Oil Smart System, Seewater Oil Smart System, Stancor Elevator Oil-Minder Control System, or product approved by the Fairfax County LDS Plan Review and Inspections Division.

g. Oil Alert System: Dorlen Oil-Alert Liquid Leak Detector or product approved by the Fairfax County LDS Plan Review and Inspections Division.

h. Hydraulic Valves: Maxton (preferred), Blain, or EECO.

i. Fixtures: Innovation (preferred), GAL, EPCO, Monitor (Janus), or C.J. Anderson.
Guidelines for Architects and Engineers
Fairfax County, BDCD

210000 FIRE SUPPRESSION

NOTE: Fire Suppression Division was formerly included in Division 15000 Mechanical Plumbing, Section D.

1. Sprinkler System shall be designed, installed, and tested in accordance with all applicable codes and reviewed and approved by local authorities having jurisdiction. Contractor is responsible for all shop drawing review fees and permit fees charged by the Fire Marshal's office.

2. Fire protection drawings and calculations shall be prepared by or under the direct supervision of an individual having a NICET Level III or IV certification in water based systems layout or a Professional Engineer that passed the NCEES Fire Protection Engineering exam.

3. Specifications shall include requirement for contractor to provide hydraulic calculations for all new sprinkler systems and any retrofit projects as a submittal. Hydraulic calculations shall be prepared using a commercially available computer model such as HASS or HydraCALC.

4. Hydraulic calculations shall be done using the area/density method as outlined in NFPA 13 over the hydraulically most remote 1,500 sq. ft. The quick response area reduction is not permitted unless otherwise approved by the County for a specific reason.

5. Hydraulic calculations shall utilize hydrant flow test data that is less than 1 year old.

6. De-rate the water supply to the low hydraulic gradient. Provide a minimum 5 psi safety factor on all hydraulically calculated systems.

7. Properly adjust the water flow test data to the building from the effective point of the flow test.

8. Sprinkler systems for shell spaces shall be designed at Ordinary Hazard Group 2 0.20 gpm/ sq. ft. over the most remote 1,500 sq. ft. Head spacing shall be limited to 100 sq. ft. 1” outlets with 1” x ½” reducers shall be used for each sprinkler head. Each branch line shall be sized to allow for an additional two sprinkler heads. The pipe shall be installed as high as possible to avoid the need for relocating the lines during the tenant fit-out.

9. Sprinkler piping is not to be routed over top of electrical panels or equipment, except as specifically permitted by NEC. Route sprinkler lines into electrical rooms above the door. Provide an isolation valve on the lines that serve the main electrical and telecom rooms.

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2020 Version, Updated 1/29/2020
10. The inspectors test valve shall be located in a readily accessible location. This is essential to minimize the impact to the user agencies during the cyclic testing. Provisions for discharging the water during the cyclic system test shall be made by piping the drain to the exterior of the building. The use of buckets for cyclic testing is not acceptable.

11. Sprinkler devices, valves, etc., shall be permanently tagged noting the device and its purpose. Valves or devices that are located above accessible ceilings shall be marked at the ceiling level indicating a device or valve above.

12. The use of McDonnell & Miller flow switches for the sprinkler system is unacceptable. These are not rated for use with fire alarm systems.

13. Do not specify any currently or previously recalled sprinkler heads for use on any Fairfax County project without prior, written approval from the Fairfax County Fire Marshall.

14. Specifications shall require contractor to provide appropriate quantities of spare sprinkler heads and spare sprinkler head wrenches (for each type installed) as required by code.

15. All sprinkler piping shall be Schedule 40. Schedule 10 is not acceptable as it tends to fail after a few years with pinhole leaks.

16. All riser fittings and inspectors test line shall be brass ball valves.

17. All 2” main drain lines shall be piped to the exterior of the building. This is necessary to facilitate the annual testing and maintenance of the lines. The floor drains will not handle the rate of flow required for the Fire Marshall’s annual test and recertification.

18. All miscellaneous drain piping shall be internally and externally galvanized.

19. Coordinate the type and location of the fire department connection with the Fire Marshal.

20. Standpipe and hose valve locations shall be located as necessary to support the required 130’ maximum hose and stream reach pursuant to the requirements of the VCC section 905.3. Distance shall be determined as path of access and not necessarily a straight line between points.

21. Recessed sprinkler heads shall be fully recessed. A maximum +/- ¼” tolerance shall be permitted in a visual area.

22. Changes in direction shall be done with fittings.
23. Do not use tees and plugs as a substitute for elbows.

24. Pipe size transitions shall be made with reducing fittings. Bushings are not permitted.

25. Do not use extended coverage sprinkler heads in Mechanical Rooms or other potentially obstructed locations.

26. Dry sprinkler valves shall be installed so that a proper test, reset, and maintenance can be performed from one location. Pressure gauges, drains and valves shall be installed as required to accomplish this. Line shall be installed with sufficient slope and no pockets to allow line to be completely drained. This shall be indicated on the drawings. A/E shall confirm as part of walk thru.

27. Use of dry sprinkler systems is discouraged and should only be used where required by code or operational requirements due to high maintenance and expensive repairs. Use is subject to FMD review and approval. If used:
   a. Specify self-restorable valves to be reset by County’s FMD staff.
   b. Specify oil-less type air compressor.
   c. Avoid using in unconditioned, hard to access areas, but if absolutely necessary, provide heat trace tape on sprinkler piping.
   d. All dry sprinkler piping and fittings shall be galvanized.

28. Where there are exterior Drum Drips that are exposed to extreme temperatures, they shall be enclosed in an insulated Heat Box to prevent freezing and/or bursting of pipes. Heat tape of any type shall not be permitted. Provided Heat Box shall be red in color, feature secure locking, resistant to corrosion and provide required signage adhering to NFPA guidelines. Heat boxes shall communicate with a remote panel or Fire Alarm system to identify malfunction.

29. Seismic bracing shall be provided in accordance with the VUSBC and NFPA 13.

30. Provide seismic separation assemblies at all building expansion joints.

31. Provide a full-size set of as-built drawings, half size set of as-built drawings, and a flash drive that contains PDFs of all as-built drawings and hydraulic calculations in a locked document box adjacent to the sprinkler backflow preventer or alarm valve.

32. Assure location of key box as required by the Fire Marshall for the Fire and Rescue Department key access to building is located on floor plans. The contractor shall coordinate with Fire Marshall’s office on exact location and provide and install all required key boxes.

33. Ceiling grid shall not be cut/notched to accommodate sprinkler pipe, valves or heads.

34. Dry Sprinkler valves to be TYCO or Viking.
NOTE:
GUIDELINE HAS BEEN CHANGED TO CONFORM TO NEW CSI FORMAT.

- SECTION 15000 – MECHANICAL PLUMBING has been divided into:
  - 210000 – FIRE SUPPRESSION
  - 220000 – PLUMBING
  - 230000 – HVAC

I. DESIGN

A. Submission Requirements

1. The A/E shall send building load letter and plans to the water company with copy to BDCD Project Manager at appropriate times during design.

2. A/E shall submit cut sheets for the major equipment components which form the basis for design, at the Design Development phase. The cut sheets must identify equipment dimensions. Final construction documents shall include detailed part plans and section views (1/4" = 1'-0" or larger scale) dimensioned to show the major equipment, duct work, and piping located within the mechanical spaces. Detailed plans must reflect that adequate space and clearances are provided for inspection, maintenance and replacement access, and all major mechanical equipment. It is preferred that these clearances be indicated by light dashed lines.

3. For building footprints too large to fit on a single plan sheet, provide a key plan on all plan sheets. Provide a key plan on any sheet where partial plans are utilized and indicate in a light hatch pattern for the area(s) of work. Where feasible, maintain same building orientation for all plans and include column lines even on key plans, as applicable.

B. Plumbing

1. In addition to the code required locations, provide sanitary sewer clean-outs at each end of building at main sanitary sewer trunk lines. Provide accessible sanitary sewer cleanouts in all locker rooms and rest rooms.

2. Specifications shall require the contractor to conduct camera inspection of sewer lines to confirm lines are clean of all debris. Provide pictures from camera of sewer lines in the O&M manual. Provided pictures must show the main sewer line from beginning to end.

3. The following criteria is to be included in the Plumbing system specifications and indicated accordingly on the plans:

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2020 Version, Revised 1/29/2020
220000 PLUMBING

a. No plumbing piping is to be installed over electrical panels or other distribution equipment, unless in compliance with NEC limitations.

b. No plumbing piping is to be installed over food service areas, server or data room equipment or books in libraries or within required egress stairs.

c. Freeze proof, lockable/keyed, ¾” hose spigots with backflow prevention shall be provided near outside and rooftop mechanical equipment, to include a shutoff valve with air vent placed upstream of hose spigots. For applications where a roof hydrant is the only option, specify and detail a support system and indicate robust roof sealing so as to prevent pooling and leaks at the roof’s penetration.

d. Make-up water supply for the cooling tower/other mechanical system components, fire station water filling stations and any irrigation systems shall be sub-metered to reduce monthly sanitary sewer costs and meter information shall be sent to EMCS. Provide a manual bypass for the automatic fill. Refer also to Metering, Section 260000 Electrical and https://www.fairfaxwater.org/rules-and-regulations.

e. Lavatories at all publicly accessible restrooms shall have hard wired infrared sensor controls with power backed-up by generator and grid drains. Lavatories and pantry sinks in staff only areas may have manual controls and grid drains.

f. All piping that will gain or lose energy to/from the surrounding atmosphere, or may cause condensation problems, shall be properly insulated to minimize energy costs and condensation problems. Insulate piping in accordance with the International Energy Conservation Code. All roof drain bodies and horizontal piping including the down turn elbow shall be insulated. All pipe insulation joints must be properly sealed.

g. Electric heat trace, tape system shall not be specified for domestic hot water systems.

h. Hot Water Piping

i. Avoid long runs of hot water piping, but where impractical provide hot water circulator pump and recirculation piping of at least ¾” diameter. Unless determined otherwise, it is permissible to control the pump’s operation with an aqua stat and 24/7 time clock.

ii. Recirculation loops shall extend as close to the most remote fixture as practical. Domestic hot water should be delivered at each hot water outlet within 15 seconds of the time of operation. Design hot water velocity of 4 - 5 feet per second (fps).
iii. The heat loss in the domestic water distribution system shall not exceed 6 °F. Size hot water return lines according to the heat loss method in ASHRAE Applications Handbook, Service Water Heating.

iv. Insulation and pump size shall be selected to limit the hot water system temperature loss to 6°F maximum.

v. Show balancing valves on plans and indicate flow rate.

vi. Include requirements in the Specifications to balance the hot water circulating system and test and balance report shall be submitted by the Contractor for approval.

i. Domestic tank type water heaters shall have glass lined tanks. Gas fired instantaneous water heaters are acceptable, but a minimum of two heaters shall be provided at 75% capacity.

j. Storage type water heaters shall utilize DDC EMCS to minimize water heater “standby” losses during the building’s unoccupied schedule.

k. Floor or trench drains shall be installed for intentionally level floors and shall be shown on drawings. Provide floor drains at all toilet rooms and shower areas. Design floors to provide positive drainage to floor drains.

l. Provide pressure gauges at high points of piping branches / points furthest away from building’s source and at building service. Provide an isolation valve up-stream of pressure gauge. Indicate locations on the riser diagrams as well as on plans.

m. In restrooms, coordinate the requirement for a centralized floor drain with the BDCD Project Manager. Utilize a “water saver” type trap primer directly connected to a nearby lavatory tailpiece or water closet vacuum tube to avoid the maintenance associated with mechanical trap primers.

n. Fixture units shall be tabulated on drawings. Where fixtures have been demolished, demolished fixture units shall also be tabulated on drawings.

o. Low flow fixtures shall be used in order to meet minimum water conservation requirements of the EPA’s WaterSense Program. All materials and equipment must be WaterSense labeled or meet or exceed WaterSense program performance requirements.

Plumbing fixtures shall have flow rates/water consumption as follows:

i. Water Closet 1.28 gallons per flush (gpf)

ii. Dual flush water closet 1.6 gpf/1.1 gpf

iii. Urinal 0.5 gpf

iv. Low flow urinal 0.125 gpf

v. Public lavatory 0.25 g per cycle/0.5 (gpm)

vi. Mop sink 2.5 gpm
vii. Kitchenette/pantry sinks 2.2 gpm

p. As a general rule, garbage disposers are not permitted in commercial applications unless required by code. They will be considered and approved by the BDCD Project Manager on a case by case basis for applications such as fire stations and other residential facilities where the end user will be solely responsible for their servicing.

q. Gas piping shall be painted bright yellow with a minimum of two coats of industrial grade enamel and labeled with use. Domestic piping shall be labeled with use and flow directional arrows on the exterior of the insulation. Drainage piping shall be labeled with use and flow directional arrows.

C. Commissioning

1. Requirements for the domestic hot water system commissioning process shall be included in the construction contract. An independent Commissioning Authority may be hired by the Owner through the A/E’s contract. ASHRAE Guideline O or other industry recognized guidelines for commissioning shall serve as the basis for all domestic hot water commissioning and the guidelines will be tailored to the specific requirements of the project.

2. The A/E and Plumbing Engineer and Commissioning Authority will perform reviews of the Plumbing system design from a commissioning perspective at all review phases of the design process and will cooperate fully with the Owner’s Commissioning Authority throughout the design review process as applicable.

3. The contract specifications must clearly spell out the responsibilities of the General Contractor and all appropriate subcontractors relative to commissioning and shall also define the role of the Commissioning Authority.

4. The A/E and Plumbing Engineer shall coordinate and cooperate fully with the Owner’s Commissioning Agent and with DPWES representatives throughout the actual commissioning process prior and subsequent to, system acceptance. The A/E and Plumbing Engineer shall provide all design and or system information that is requested by the commissioning team members and respond to all comments from the Commissioning Authority from design through system acceptance.

5. The final commissioning reports and documents shall be provided in the Operations and Maintenance Manuals.
II. PRODUCTS

A. Plumbing Equipment Preferences

1. For plumbing systems, American Standard, Kohler, or Moen fixtures with Sloan or Zurn flush valves are preferred. Provide ball type shut off valves to isolate individual rest room areas and provide access to valves in janitor's closets adjacent to rest rooms.

2. All plumbing fixtures shall be specified and installed to be compliant with ADAAG requirements.

3. Provide service valves to enable segmented shutdown of building's water lines. Provide repair kit for any non-standard type plumbing fixtures and faucets.

   a. Water Closets:
      Water closets shall be floor mounted. American Standard, Madera 1.1-1.6 gpf ADA Universal Flushometer Toilet or Approved Equal

   b. Urinals
      Low flow as approved by Fairfax County Project Manager and as needed for water savings. Waterless urinals NOT permitted.

   c. Flush Valves:
      Sloan or Approved Equal
      Dual flush or low flow valve as appropriate to meet water savings requirements in water closets and urinals.

   d. Faucets:

   e. Frost Free Hydrants:
      Josam, Woodford, or Approved Equal

   f. Vitreous China Fixtures:
      American Standard, Kohler, Zurn, or Approved Equal
      Integral bowl w/ solid surface preferred.

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2020 Version, Revised 1/29/2020
g. **Garbage Disposals:** Insinkerator (I.E.S.); or Approved Equal (Garbage disposals are typically not allowed except in food prep kitchens)

h. **Valves:** All valves 2” and smaller should be ball type valves

i. **Domestic Water Heaters:**
   - Tank Type - AO Smith, State, PVI, or Lochinvar
   - Gas Fired Instantaneous – Rheem, Rinnai
   (No Equals or substitutions)

j. **Domestic Booster Pumps:**
   - Bell and Gosset, Tigerflow, or Ironheart
   (No Equals or substitutions)

k. **Water Cooler/Bottle Filler:**
   - Elkay EZH2O Model LZWS-LRPBM28K
   (No equals or substitutions) Note: unit requires ~12” clear space in the wall to mount this model.

l. **Water Sub-Metering:**
   - Sensus “OMNI C² Series”

4. Specifications shall identify at least three acceptable plumbing equipment manufacturers for competitive bidding; unless otherwise noted herein, or unless limited source procurement is approved in advance by the owner.

II. **CONSTRUCTION**

**Record Drawings:** As-built drawings indicating the final field installation of the mechanical and plumbing systems shall be provided to the County in the latest AutoCAD and .pdf formats.
NOTE:
GUIDELINE HAS BEEN CHANGED TO CONFORM TO NEW CSI FORMAT.
  • SECTION 15000 – MECHANICAL PLUMBING has been divided into:
    • 210000 – FIRE SUPPRESSION
    • 220000 – PLUMBING
    • 230000 – HVAC

I. DESIGN

A. A/E Coordination

  1. For design of Clinical Facilities with Negative Pressure Rooms refer to Appendix A.

  2. For design of Evidence or Forensic Rooms in Law Enforcement or Public Safety Facilities refer to Police Station Design Manual.

  3. Mechanical Room General Design Criteria:
    a. Mechanical equipment shall be located on the ground floor and provided with double doors, or doors sized to be able to remove the largest piece of mechanical equipment. When conditions require roof mounted mechanical equipment, units shall be mounted on 18” high curbs and never placed directly on roof. Additional clear height is required for larger equipment and shall be in accordance with the recommendations of the American Roofing Contractors Associations latest reference manual. Fans ventilating kitchen hoods: At least 24 inches (610 mm), or more if required to place discharge of fan 40 inches (1016 mm) above roof surface. In addition, all roof mounted mechanical equipment required to be screened (refer to Division 010000) shall be designed to allow required access and airflow.

    b. Paved access for maintenance vehicles shall be as close as possible to the mechanical room access.

    c. Rooms shall be of sufficient size for all required clearances and all proposed piping and duct layouts and must accommodate replacement of each piece of equipment without removing any other piece of equipment or any part of the building. Sufficient space shall be shown on the plans and designated in the room by striping, for the replacement of the largest piece of equipment in the room to allow assembly and testing of the replacement piece of equipment prior to switch over and removal of the piece of equipment being replaced.

    d. Travel paths shall be clearly indicated which present no to minimal obstacles for equipment replacement and servicing.

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2020 Version Revised 1/29/2020
e. Where it is not practical to design equipment rooms on the ground floor level, the room design, and if necessary adjacent spaces, shall incorporate clearly defined provisions for equipment replacement and servicing. Necessary adjacent spaces shall not include spaces critical to the operation of the building function.

f. Mechanical rooms that serve as air plenums shall be designed according to prevailing code, shall be void of combustible materials, and shall not permit untreated outside air delivery into the room.

g. Mechanical room floors shall be painted or otherwise treated with an industrial grade, slip resistant, water-proof type coating of a light gray color and curbs and equipment pads painted/trimmed out in yellow color slip resistant, industrial grade treatment.

h. Rooms shall have proper drainage depending on the type of equipment housed.

i. Where there is equipment to be cleaned, etc., there shall be a ¾” hose bib with backflow protection.

j. Noise attenuation measures shall be incorporated into the design of the mechanical room(s). Provide an NC of 35 for office spaces. A lower value of NC-30 is appropriate for classrooms and sleeping rooms.

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<tr>
<th>Noise Criterion</th>
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<td>Sound Pressure Levels (dB)</td>
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k. Equipment rooms must be weatherproofed and have secured locking hardware.

l. A/E must clearly show HVAC equipment and screening located on the roof and/or on the site on all renderings and elevations to show accurate representation on the overall design.

4. Roof Guards:
   a. Refer to the Mechanical Code for requirements to provide guardrails at the edge of roof areas adjacent to rooftop equipment that require maintenance access at the roof level.

   b. If guard rails are unavoidable, the A/E is to indicate and specify railing that is compatible with the building’s structure and aesthetics.
5. Roof Access to HVAC Equipment:
   a. All roof levels shall be accessible for maintenance – no exceptions. Provide OSHA approved safety tie-off/anchor points on all roofs without code minimum railing/parapet wall.
   b. Roof walkways must be provided in all expected travel areas and around roof mounted equipment.
   c. Provide platforms around cooling towers and other HVAC units elevated above roof surface. Provide permanent ladders with safety cages to access platforms.
   d. Ladders must be provided to all roof levels and interior ladders are preferred where practical. Provide a ship’s ladder with straight steps (no alternating treads) to the main roof levels.
   e. Refer to Accessibility and Maintainability section (I.E.2) for detailed access criteria.
   f. Kitchen exhaust fans must be provided with proper access in accordance with NFPA 96 8.1.1.3

6. Ceiling Access to HVAC Equipment:
   a. In ceiling areas where HVAC equipment, such as VAV boxes, need to be located, A/E shall provide appropriate ceiling space such that equipment, dampers, valves, etc., can be easily accessed for maintenance. Where access to equipment is required maximum ceiling height shall be 9'-0”.
   b. Ceiling access shall be accessed no greater than that required from 8’ step ladder. For ceiling spaces only requiring junction boxes, cabling and other miscellaneous items the ceilings can be up to 10'-0”.

   If there is nothing (including junction boxes) in the ceiling requiring service/maintenance, ceilings can be higher in special areas but shall be specifically requested to FMD in writing no later than the design development submission and the design must illustrate that access above such higher ceilings is not required. VAV boxes and similar equipment can be located in lower ceiling areas (9'-0”), if need be, to allow for limited higher ceiling areas, but specific parameters for this accommodation must be detailed on the drawings.
   c. For inaccessible ceilings, the A/E shall indicate and specify compatible access panels of sufficient size that have been coordinated with the Engineering layout and requirements.
d. It is permissible to specify cable operated volume dampers for individual air devices where access panels may be less desirable.

e. Equipment shall be a minimum of 3’- 6” from a wall. NEC requires 42” to grounded sources from live electrical components. NEC defines walls, ceiling grids, sprinkler piping etc. as grounded source.

f. Where built-in systems (furniture and/or shelving) are planned and basic layout can be determined, VAV boxes/AC equipment shall be located above the walkways and not directly over furnishings that cannot be easily moved.

7. Return Air Paths:
   a. Buildings with tall, vaulted attic spaces require close coordination between Architect and Engineer.

   b. Use of attic space as an air plenum is not permissible.

   c. Design and specify ducted supply/return systems where ductwork must traverse through an attic space or within vaulted elements. Ducts shall be insulated as required by the Energy Code for exterior ductwork in all unconditioned spaces.

   d. For “flat” ceiling applications, plenum returns are preferred unless there are compelling reasons for ducting back to the air mover(s). Extreme caution must be taken when creating a return air plenum in an existing building as all materials within the plenum must be confirmed by the design team in advance of issuance of the design documents to be safe and plenum rated as required by code. This requires observation and testing, and complete removal of materials not allowed per code for plenum use. Do not make it the responsibility of the contractor to determine the suitability of the above ceiling area to meet the code requirements related to return air plenum.

   e. Where ceiling return air plenums are utilized, coordinate the design intent and use of return air light fixtures and other architectural return air measures with the BDCD Project Manager. Ensure replacement light fixtures are equipped with equal return air capacity of the fixtures being replaced (this is particularly important with LED fixtures which are much more compact and do not always have as much room in the housing for return air openings). Add appropriate sizes and quantities of return air grilles if replacement light fixtures reduce the net opening for return air flow.

   f. The A/E shall coordinate all full height walls, obstructions, and prevailing code requirements such that the return air plenum is viable. Provide transfer ducts or openings where necessary with appropriate fire dampers and/or smoke dampers.
If the full height wall/partition is sound attenuated, then “Z” or “U” type sound-lined transfer air ducts as appropriate shall be provided.

**B. Submission Requirements**

1. The A/E shall send building load letters and plans to the electric and gas companies with copy to BDCD Project Manager at appropriate times during design.

2. A/E shall submit cut sheets for the major equipment components which form the basis for design, at the Design Development phase. The cut sheets must identify equipment dimensions. The construction drawings shall include detailed part plans and section views (1/4" = 1’ or larger scale) dimensioned to show the major equipment, duct work, and piping located within the mechanical spaces. Detailed plans must reflect that adequate space and clearances are provided for inspection, maintenance and replacement access, and all major mechanical equipment. These clearances, along with those required by code, NEC etc., shall be indicated by light dashed lines on all plans for all equipment.

3. A/E shall use eQuest, Trane Trace, DOE-2 or other pre-approved equivalent building simulation programs to conduct energy modeling to aid in preparing a life-cycle cost analysis for mechanical system selection, optimized building orientation, architectural shading methods, building envelope characteristics, and day lighting options during the Schematic/ Design Development phases. The BDCD Project Manager and A/E shall meet with the Using Agency to determine actual building operations plan and schedule and what options shall be evaluated and to review costs/benefits of various design alternatives. The A/E shall provide the Owner an annual energy budget model based upon the computer simulation. Report shall include the program outputs and list of input assumptions.

4. A/E shall conduct a Life Cycle Cost Analysis of alternate HVAC systems at Schematic Design Phase. Owner’s selection shall be subject to FMD approval, based on considerations such as reliability, energy consumption, maintenance cost, etc. For maintenance costs, A/E shall request to BDCD Project Manager for FMD to complete applicable equipment maintenance costs in Exhibit 230000-A. Where specific costs are unavailable, RS Means cost data shall be used. The following parameters shall be used for evaluating life-cycle cost analysis.

   a. 5% discount factor for capital costs.

   b. Current utility rates should be confirmed with FMD and the escalation rate should be discussed at the time of the study as they can vary widely and have a big impact on life cycle analysis. 3% escalation rate has been used recently.
230000 – HVAC

c. Study period shall be for 30 years. Use the following for life cycles for replacement for the below listed equipment:

- Packaged roof top equipment – 15 years
- Boilers – 15 years for condensing, 25 years for steel, 35 for cast iron.
- DX equipment – 15 years.
- Air handling units with water coils – 17 years.
- Control Systems – 10 years
- Piping – 30 years
- Ductwork - 30 years

d. All life cycle costs shall be in “Present Worth” format.

5. The A/E shall confirm design conditions early in the project and submit all heating and cooling load calculations for review by the end of Design Development. Revised load calculations shall be resubmitted to the Owner as required to reflect revised loads based on Owner & HVAC Peer Reviewer comments.

6. Provide a points list and sequence of operations for each project.

   a. Within the Sequence of Operations, the A/E shall clearly separate the sequences between those performed by the Energy Management System and those performed by packaged equipment controllers.

   b. Where there is communication between the EMCS and packaged equipment the hard wire points shall be specified and a separate list of points provided for all BACnet mapped points.

   c. Sequences shall be provided at the DD phase.

7. Show true North arrow on all Mechanical plan sheets for all submissions. Provide graphic scales on all sheets including scaled drawings.

8. For building footprints too large to fit on a single plan sheet, provide a key plan on all plan sheets. Provide a key plan on any sheet where partial plans are utilized and indicate in a light hatch pattern for the area(s) of work. Where feasible, maintain same building orientation for all plans and include column lines even on key plans, as applicable.

9. Provide outside air calculations to the BDCD Project Manager by no later than the Design Development review. Calculations to be performed in accordance with the Virginia Mechanical Code, ASHRAE 62.1 and ASRAE 90.1. A-E shall verify any additional requirements from LEED. Fairfax County LDS provides a spreadsheet for
Mechanical Ventilation which shall be submitted with each set of permit application drawings.

10. Equipment schedules shall contain capacities required by load calculations and capacities of proposed equipment. This applies for heating and cooling BTUH’s and GPM. This will allow the county to more easily verify that equipment has not been oversized (requirement of IECC) and facilitate future equipment replacements based on actual required capacities instead of what was installed.

C. Main Fuel Tank, Day Tank & Piping for Diesel Generators
duplex fuel oil pump arrangement is preferred.

1. Primary tanks and day tanks shall not be located or mounted on the same frame as the emergency generator. The Day Tank shall be mounted on a slab on grade, independent of the emergency generator. Simplex Day and Pryco Day Tanks are preferred. For an exterior Day Tank, provide Day Tank heater and heat tape on fuel lines, as necessary. A secondary fuel pump shall be provided for the return line from the Day Tank to the Main Fuel Tank as an integral part of Day Tank, as required. Delete the day tank if an Above Ground Storage Tank is located immediately adjacent to the generator.

2. Packaged units with main fuel tanks, sub-base fuel tanks, belly tanks, on-board tanks or rail mounted tanks are not acceptable. All fuel piping and fuel tank designs should be approved by the system manufacturer of the generator set. Copper piping is not to be used for fuel supply or return. Fuel oil return piping must be provided from the generator to the Day Tank and from the Day Tank to the Main Fuel Tank.

3. The main fuel tank shall be a separate component, and shall either be a buried double wall tank or an approved above ground storage tank (AST) mounted on a slab independent of the generator in accordance with UL listing. The AST shall be securely bolted to the slab and properly grounded.

4. Fuel system piping shall be black pipe and painted with Corrosion-resistant black paint. Fuel return line piping must be properly sized as per manufacturer’s recommendations. The fuel piping and the electrical conduit between the generator and the Day Tank and fuel piping between the Day Tank and the Main Fuel Storage Tank shall be routed to allow easy access around these items without conflict. In the event the fuel piping has to be elevated, provide a set of check valves and a shut-off valve in each of the sections (from main tank to day tank and day tank to generator) in order to be able to maintain the prime at all times.

5. Where a buried fuel tank is used, a foot valve shall be installed at the tank’s lowest point, to prevent air from entering the system.
6. Where a diesel generator set is specified, provide a foot valve in the tank at the lowest point in the piping to prevent the possibility of air getting into the system.

7. The minimum size for the diesel fuel tank to support only the generator shall be sufficiently sized to fuel the generator for a period of 96 hours at full load capacity assuming the tank to be full at ¾ capacity at all times. The installer shall provide a minimum of half tank of fuel at the time of generator startup. The A/E shall include in the specifications that the contractor is required to provide a 4-hour step load bank test and that the contractor is responsible for providing the fuel.

8. The Day Tank shall be specified with a hand pump for emergency operation. The day tank piping shall be provided with unions so that the Day Tank may be isolated and replaced without redoing the piping. The return lines shall have no valves, as required by code.

9. Above ground Fuel Storage Tanks shall be located at or near grade and shall be easily accessible for ease of maintenance and repair. There shall be no obstacles to accessing the generator with dollies and 55-gallon drums.

10. Main fuel tank, Day tank and fuel lines shall be installed by a certified contractor in accordance with manufacturer’s installation requirements and the requirements of the NFPA, IBC, NEC. The main fuel tank and Day Tank may be painted with the same color as that of the generator.

D. Heating, Ventilation and Air Conditioning System Selection (Refer to Energy Efficiency section I.E.1 for additional information)

1. The A/E shall coordinate with DPWES and FMD prior to selection of the mechanical system.

2. Where building size and use (generally greater than 100,000 sf and of a Government Center or other major function) require complex multi-zone comfort systems, central plant configurations are preferred. In such cases, the basis of the heating and cooling system shall incorporate the following:
   
a. Centrifugal chillers above 120 tons and scroll or screw type chillers below 120 tons supplying chilled water, with VAV air handling units are strongly preferred.

b. A four-pipe system is preferred.

c. Firetube hot water boilers supplying hot water to perimeter baseboard or VAV terminal mounted heaters and air handlers (use hot water coils for morning warm-up)
should be used for the heating system. For VAV systems, the decision to use terminal unit electric reheat will be made on a case by case basis.

d. The use of condensing boilers is preferred for new installations. For retrofits, the use of condensing vs. non-condensing boilers will be made on a case by case basis. Multiple boilers should be incorporated for redundancy and shall use cascading controls between the boilers. A minimum of two boilers shall be used and each sized such that when a boiler is out of service, remaining capacity shall produce a minimum of 75% of the total heating load.

e. Temperature controls shall be Direct Digital Control (DDC).

f. Chillers should be located in an enclosed mechanical room. Avoid locating chilled water units above the roof line. Specify glycol and for piping to enter the unit directly below the unit, when no other acceptable options are available. Provide refrigerant monitoring, detection, alarms, and ventilation as required to meet Mechanical Code requirements and ASHRAE standards. Smaller chillers that use scroll compressors can be packaged units located outdoors but must be designed to include glycol to prevent freeze-ups and/or the need to drain/fill the system seasonally. Glycol feeders shall be included for such systems instead of make-up water connections. Heat tracing of the exterior piping shall be included, and the heat tracing shall be monitored through the EMCS. CFC and HCFC refrigerants are not to be used in mechanical equipment on County projects. The County goal is to achieve the LEED Enhanced Refrigerant Management Credit, and the use of HFC refrigerants is strongly encouraged.

g. AHUs located in mechanical rooms are the owner’s preference to achieve extended AHU life cycle. Mechanical rooms shall be sized such that replacement units can be assembled adjacent to the existing operating unit and readily ducted into the existing duct system to allow minimal down times for systems replacements. These added costs shall be accounted for in the Life Cycle Cost Analysis (LCCA).

h. Avoid designs that require boiler operation in the summer. County boilers, typically, are not run during the summer months.

i. Avoid designs that require chiller operation during the winter. Any space that requires 24/7 cooling should use a DX system. County chillers typically, are not run during the winter months.

3. In small, less complex buildings, VAV or constant volume roof top units with fully modulating natural gas heat and DX cooling are preferred as they minimize floor space required for mechanical rooms.

4. Hot water systems designed to be outside the building envelope are not permitted.
5. Where commercially available, DX units shall have multiple compressors or unloading capabilities to avoid excessive cycling of compressor(s). Provide at least one inverter driven fully variable compressor to ensure that humidity is controlled in low load, high OA humidity conditions.

6. VAV systems are preferred for indoor comfort control (humidity). Variable volume and temperature (VVT) systems are not permitted. Constant and variable air volume systems shall utilize modulating hot gas reheat for humidity control. In single zone spaces a space humidity sensor may be used. In multiple zones, a return humidity control system shall be integral with the unit controls.

   a. Ensure that discharge temperature (DAT) reset is coordinated with the hot gas reheat (HGRH) so that the reset is lowered to the point required to maintain humidity levels and minimize any heating required at the VAV boxes; i.e. it shall not automatically set back to the lowest DAT when dehumidification mode is enabled if a higher DAT will dehumidify sufficiently. This will prevent/at least minimize using new energy to reheat any zones that become overcooled.

   b. For conference rooms and other high cooling load spaces, the VAV box(s) serving these spaces and their air distribution system shall be sized for a DAT reset condition of 62 degrees F. vs. the typical peak cooling day DAT (+/- 55 degrees F).

   c. Where constant volume systems are deemed appropriate, design and implementation of a “single zone VAV” approach is preferred.

7. Where natural gas is not available, packaged air to air heat pump units with 100% electric back up are acceptable.

8. If the motor operated damper is in series with a gravity damper, it can be in two positions (open/close). Packaged equipment shall only be specified with a motor operated damper or a barometric backdraft damper, not both.

10. Supply air shall be directed away from thermostat/sensors. Thermostat/sensor locations must be shown on the drawings. Before locating, coordinate thermostat/sensor locations with loose and fixed furniture plans to avoid conflicts and poor sensing capabilities. For exterior zones, avoid locating thermostat/sensor too far from the exterior wall.

11. Interlock exhaust fans with associated AHU to assure they are included in controls package and don’t run continuously. This will also save control points.

12. Provide telecom and elevator machine rooms with independent split system units where appropriate to the facility’s operations. The unit shall be wall mounted, located above the door to maximize wall space available for the intended use of the room.
13. An evaluation of the building criticality shall be completed to determine required redundancy of the heating system. Criteria such as the need for continual occupancy and risk of pipes freezing in event of an equipment failure shall be considered. The system shall be designed to address these concerns.

E. Heating, Ventilation and Air Conditioning Design Criteria

Optimal design will emphasize energy efficiency, accessibility, and maintainability.

1. Energy Efficiency

a. The HVAC system shall meet all building code requirements for heating and cooling loads and shall be designed to meet project target for LEED. The use of VRF systems may be considered but will be subject to approval by the Environmental and Energy Coordination Committee (EECC). Refer to section 010000 General Design Requirements. Building envelope components shall be designed for energy efficiency in compliance with ASHRAE, IMC, and other applicable building and energy codes. Special attention shall be paid to the International Energy Conservation Code requirements for equipment sizing criteria.

b. The HVAC designer shall pay close attention to actual building occupant load patterns and anticipated actual building loads to ensure that the system efficiently meets these requirements. Fairfax County has had problems with systems that meet the code requirements but do not effectively heat, cool or dehumidify the building in actual loading conditions. A/E shall:

i. Use all code approved methods to reduce occupant loads to match actual conditions and to reduce fresh air quantities to lowest possible levels

ii. In buildings with fixed shelving and stacks, such as libraries, such shelving and stack floor areas, must be deducted from the net square foot calculations.

iii. Use occupant averaging, room volume, transfer air techniques or other approved code methods to reduce fresh air requirements. This is mandatory for all meeting rooms, conference rooms, or other assembly areas. Use LDS occupancy load program to calculate outside air quantity reductions for variable and intermittent occupancies where possible. Coordinate with the BDCD Project Manager or contact Building Plan Review in County’s Land Development Services to obtain the most current copy.

iv. In renovation projects, ensure the remaining portions of any mechanical systems that are to be reused are coordinated with the new/planned use of the building. This shall include a detailed evaluation of the exhaust systems to ensure they are not oversized for the new/planned use. Otherwise oversized exhaust systems will often dictate an increase in the amount of fresh air
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required (buildings overall must be designed to be positive) and drastically affect energy use and potentially humidity levels.

v. Size cooling equipment to match actual building occupant load conditions.

vi. HVAC loads shall be based on actual lighting loads wherever possible. If actual lighting loads are not available at the time HVAC loads are calculated, lighting load shall be estimated by maximum lighting power density permitted by space type according to IECC. Do not use 2 W/SF as standard lighting load for all spaces.

vii. Central plant equipment shall be sized for the building peak, not the sum of the zone peaks.

viii. If packaged DX equipment is used, they shall have multiple/variable cooling and heating stages to meet part load conditions for proper humidity control. Design CFM range for DX equipment that serves occupied spaces shall be in the range of 340-360 CFM/Ton. Design CFM/ton for equipment that primarily serves equipment such as server rooms shall be at the equipment manufacturer’s rate to adhere to the cataloged cooling capacity.

ix. HVAC systems shall be designed to limit indoor humidity levels in the cooling mode to an average 50% with an upper limit maximum of 55% per OSHA requirements and recommendations, as levels above 60% promote and support mold growth.

x. Variable speed compressors, hot gas reheat, dedicated outside air units and other active humidity control systems shall be used. New energy reheat shall not be used.

c. Provide HVAC zones for different functional areas and to allow for night use in appropriate areas.

i. Where design loads for a space may vary significantly from actual loads, the system shall be designed with capacity reduction capability.

ii. CO₂ sensors shall be provided to control amount of fresh outside air intake.

Effort should be made to properly design the outside air intake boundaries so that the equipment is not oversized. Outside air (OA) quantity when CO₂ is below setpoint shall be half the calculated code required ventilation. When CO₂ exceeds setpoint, OA shall increase to the calculated code required ventilation rate. If upper and lower limits for OA intake are included, it will allow the TAB contractor to properly setup the outdoor air control on AJ+HU’s and RTU’s. The OA lower limit needs to be calculated based on the amount of exhaust to always keep the building positive. The maximum OA should be the calculated code minimum as it is typically...
more as it based on the calculated occupancy rather than the actual occupancy.

d. Systems designed shall maintain the following temperature settings:

<table>
<thead>
<tr>
<th>Type of Area</th>
<th>Summer Range Occupied 1,2</th>
<th>Summer Range Unoccupied 1,2</th>
<th>Winter Range Occupied 1,5,2</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Office</td>
<td>72-75</td>
<td>85</td>
<td>72 - 75</td>
</tr>
<tr>
<td>Sleeping Areas</td>
<td>71-74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridors</td>
<td>75</td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>Building Lobbies</td>
<td>75</td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>Toilets</td>
<td>75</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>Locker Rooms</td>
<td>73</td>
<td></td>
<td>74</td>
</tr>
<tr>
<td>Electrical Closets</td>
<td>78</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Mech. Spaces</td>
<td>95 3</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Elec. Switchgear</td>
<td>95 3</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Elevator Mach. Room</td>
<td>78</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Emerg. Gen. Room</td>
<td>95^3,4</td>
<td>95^3,4</td>
<td>55</td>
</tr>
<tr>
<td>Transformer Vaults</td>
<td>95 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stairwells</td>
<td>(none)</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Comm./Tel. Frame Room</td>
<td>75</td>
<td>45</td>
<td>72</td>
</tr>
<tr>
<td>Storage Room</td>
<td>74</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Conference Room</td>
<td>72-75</td>
<td></td>
<td>72-75</td>
</tr>
<tr>
<td>Auditorium</td>
<td>72-75</td>
<td></td>
<td>72-75</td>
</tr>
<tr>
<td>Kitchen</td>
<td>72-75</td>
<td></td>
<td>72-75</td>
</tr>
<tr>
<td>Dining</td>
<td>74</td>
<td></td>
<td>76</td>
</tr>
<tr>
<td>Cafeteria</td>
<td>74</td>
<td></td>
<td>76</td>
</tr>
<tr>
<td>Courtrooms</td>
<td>72-75</td>
<td></td>
<td>72-75</td>
</tr>
<tr>
<td>Data Center</td>
<td>65-72</td>
<td></td>
<td>65-72</td>
</tr>
<tr>
<td>Data/Security Equipment Closet</td>
<td>77</td>
<td></td>
<td>77</td>
</tr>
<tr>
<td>Specialty Rooms &amp; Labs</td>
<td>TBD^8</td>
<td>TBD^8</td>
<td>TBD^8</td>
</tr>
<tr>
<td>Apparatus Bays</td>
<td>Heat Exhaust</td>
<td></td>
<td>56</td>
</tr>
</tbody>
</table>

1. Temperatures are degrees Fahrenheit and shall be adjustable within the provided range.
2. Maximum permissible relative humidity is 50 percent in conditioned areas. Data Centers and data closets adjustable range shall be 40%-45%.
3. Maximum temperature. Space to be mechanically cooled if necessary.
4. Room must not exceed temperature with generator running.
5. Minimum temperature in a building and all associated spaces to include mechanical must be 55 °F even when unoccupied.
6. System shall be designed for process cooling. Cooling system shall be a dedicated independent system.
7. Provide independent temperature control.
8. To be determined by end user and certification/licensing requirements

e. Outside Air Design Parameters (temperatures) for General Building Areas.

<table>
<thead>
<tr>
<th>Season</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>13°F</td>
</tr>
<tr>
<td>Summer</td>
<td>95/75°F</td>
</tr>
</tbody>
</table>

(Verify design temperatures with ASHRAE Standards.)

f. The building thermal envelope shall be maximized as these items are static and the added thermal performance does not add maintenance and directly saves energy no matter the efficiency of the HVAC system. In any case, the minimum values shall be per the Energy Code or as listed below, whichever is more stringent:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window U-Factor Metal Frame</td>
<td>0.50 Max</td>
</tr>
<tr>
<td>Window U-Factor Nonmetal Frame</td>
<td>0.40 Max</td>
</tr>
<tr>
<td>Window Solar Heat Gain Factor</td>
<td>0.40 Max</td>
</tr>
<tr>
<td>Mass Wall U Factor</td>
<td>0.104 Max (R9.5 c.i.)</td>
</tr>
<tr>
<td>Steel-Framed U Value</td>
<td>0.064 Max (R-13 + R-7.5 c.i.)</td>
</tr>
<tr>
<td>Metal Building</td>
<td>0.084 (R-19)</td>
</tr>
<tr>
<td>Soffit/Floors U-Factor</td>
<td>0.10 Max</td>
</tr>
<tr>
<td>Roof Insulation entirely above Deck</td>
<td>0.048 (R-20 c.i.)</td>
</tr>
<tr>
<td>Roof Metal Building</td>
<td>0.055 (R-13 + R-13)</td>
</tr>
<tr>
<td>Roof Attic and Other</td>
<td>0.027</td>
</tr>
</tbody>
</table>

g. Warehouses, garages and Fire Station Apparatus Bays should be provided with infrared tube heating systems and should not be air-conditioned. All infrared heat systems which have more than five burners shall be “Co-Ray-Vac” Class I serpentine infrared system manufactured by Roberts Gordon or approved equal. Infrared heat systems with less than five burners can be specified as a Class II, open to several manufacturers. Whenever possible, eliminate or reduce the use of make-up air heaters. Use single bulb temperature sensors (Accustat) set at 65 degrees in lieu of factory infrared controls. Bring in un-tempered air at the ceiling level, with the infrared systems sized for the additional load. If make-up air heaters are used, specify modulating burners with a 65-degree discharge air temperature introduced at the ceiling level. Exhaust systems shall be automatically controlled by exhaust gas
sensors. For maintenance garages, provide ceiling mounted commercial grade propeller fans for summer ventilation. For all bay doors provide EMCS interlock to shutdown conditioning system in bay area(s) when a bay door is open and to re-energize heat when the space is in danger of freezing if doors remain open and initiate EMCS or local alarm. Provide Co-Ray-Vac compatible local temperature controls with EMCS monitoring and override controls.

h. Energy recovery shall be used whenever possible to reduce energy use. The use of air to air heat exchangers should be used when airstreams cannot be mixed, otherwise energy recovery wheels shall be used. Energy recovery devices can be integral to air handling equipment or be separate units to pretreat the outside air. Generally separate energy recovery units are preferred.

i. All air handling units/cooling equipment (including DOAU/energy recovery units) with outdoor air intake greater than 20% of the supply air volume shall be sized to meet both the peak cooling on a 0.4% day and the peak dehumidification on a 0.4% day. Each of these required capacities shall be included on the equipment schedules.

j. All control dampers critical to emergency systems operation shall fail to the position required to allow this system to operate (fail safe operation).

2. Accessibility and Maintainability

a. Planning and coordination are required during design and construction to assure accessibility to new mechanical equipment. The long-term equipment maintenance requirements must be evaluated so that reliable, sustainable, maintainable and replaceable mechanical systems are installed. This will help the systems operate efficiently and safely throughout the life of the building.

b. Design shall provide for adequate access and work space to all HVAC equipment for maintenance, inspections, repairs, cleaning and replacement. Clearances shall be sufficient so that any piece of equipment can be replaced without the removal of any other equipment.

c. Mechanical rooms shall, to the degree possible, be located on the ground level, at an outside wall with maintenance vehicle parking spaces and loading zone immediately adjacent to the mechanical room door. All major HVAC equipment shall be located in the mechanical room(s).

d. Maintenance, repair, and replacement requirements must be carefully considered and evaluated, during the design phase, for all equipment mounted on the roof or located in the attic to assure reasonable and appropriate access.
e. All HVAC equipment located in the ceiling such as VAV boxes shall have unimpeded access from an 8’step ladder and the bottom elevation of the equipment shall be designed to be at 9’- 4” AFF. Maximum ceiling height shall be 9’-0” in areas with equipment above the ceilings.

f. All HVAC equipment shall have accessibility details noted on the mechanical and architectural plans and specifications, including, but not limited to: walk-ways, cat-walks, access doors, maintenance areas, electrical disconnects, electrical control panels, VAV box maintenance areas, equipment coil, filter and belt access locations.

g. The manufacturer’s minimum clearance requirements shall be provided. At least 42 inches of clearance is required for maintenance around all mechanical equipment, unless otherwise recommended by the manufacturer, and allowed by NEC.

h. Avoid locating ceiling mounted HVAC equipment over areas that would be adversely affected by daytime service, such as a kitchen or other equipment and furnishing or office cubicles.

i. Air conditioning condensate drain piping shall discharge to a storm drain or directly outdoors by gravity. Liquid combustion byproducts from fuel fired boilers and furnaces shall discharge to an approved location in accordance with the appliance manufacturer’s instructions. All condensate piping shall discharge to a location where it will not cause a nuisance. Piping shall be properly anchored. Condensate drains from rooftop equipment shall terminate directly at roof drain and be supported by premanufactured piping supports compatible and suitable with the roofing. Provide drainable P-traps for systems subject to freezing.

j. Non-curbs mechanical equipment shall be supported by platforms with pipe columns with umbrella flashings where applicable. Height of column should be a minimum of 8” above roof membrane. Additional clear height is required for larger equipment and shall be in accordance with the recommendations of the American Roofing Contractors Associations latest reference manual.

F. Heating, Ventilation and Air Conditioning Specifications

1. Boilers - The specifications shall include:

   a. **Outside Air Reset** - For non-condensing units, provide hot water reset based on outside air temperature by the use of a three-way mixing valve.

   b. **Combustion Efficiency Test** - Burner shall be tuned up for maximum performance, including correct nozzle size, flame shape, and air damper adjustment for minimum excess air. Performance shall be verified via written results of an instrumented combustion efficiency test, including test data net stack temperature, percentage
CO₂ or O₂ oil smoke spot or percentage CO, and total combustion efficiency percentage.

c. **Boiler Water Flow** - Consider boiler re-circulation pumps or injector pumps for boilers to maintain water flow. Re-circulation pumps shall maintain minimum flow in the boilers as recommended by boiler manufacturer. The water flow can be a problem where three-way valves are used for outside air reset at warmer OA air temperature when most water is by-passed, and the boilers have very low flow. Systems shall also be designed to avoid thermal shock to boilers at start-up.

2. Where removable printed circuit boards are provided, an extra set shall be furnished including description, manufacturer, and source of supply identified.

3. Provide spare relays for A/C units and identify manufacturer and source of supply (include in Operations and Maintenance Manual).

4. Specify direct drive fans when possible as they are more efficient and require less maintenance/adjusting and replacement of belts.

5. Provide one extra set of belts for each belt driven unit including axial HVAC fans, centrifugal HVAC fans, and/or HVAC power ventilators.

6. In designs where the number of similar sized VFD units exceeds 10 units, provide a spare VFD to minimize spare parts and to obtain parts and service from one source and provide with communication between VFDs similar to Smartlink.

7. Use of lining for ductwork shall be limited and will be determined on a case by case basis and all ductwork lining shall include perforated metal liner. If possible, where required for acoustics, use perforated metal liner for inner wall or sound attenuator.

8. Provide two extra changes for each type filter, 2" pleated are preferred. Install new filters at Substantial Completion in addition to supplying the two spare sets for attic stock.

9. Provide proper set of any non-standard test tools/equipment and appropriate training for installed equipment. Avoid specifying non-standard test tools/equipment, as applicable.

10. The temperature control system and the energy management control system shall be provided by one manufacturer.

11. An instructional session shall be held after systems are functional to familiarize Fairfax County staff (FMD) mechanics with the design and construction of the system. Time shall be set up during the warranty period for "shake down" meetings as needed. Total
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instructional and "shake down" time provided by the design engineer and installing Contractor shall be coordinated with the Owner prior to bidding but shall not be less than six hours. Contractor shall video record all instructional sessions and provide the DVD to the Owner.

12. The specifications shall provide for a full one-year warranty period for all HVAC systems equipment and associated controls, in addition to more extensive standard warranties carried by the specified systems and equipment. Require a minimum 10-year warranty of gas fired heat exchangers. Additional special or extended warranties must be evaluated and approved by the Owner during the design process. Include a separate consolidated list of all warranties including duration, vendor and contact information in the O&M Manual and in the Mechanical room framed under glass.

13. If roof mounted A/C units are used, provide a power receptacle, an interior stepladder with handrails, steps 12” apart and top step no more than 15” from opening up of roof hatch.

14. Provide wall mounted control diagrams in all boiler and mechanical rooms. The diagrams shall be framed and covered with Plexiglas or laminated.

15. Provide engraved equipment labels for the newly installed HVAC equipment. Lettering on labels shall be ¾” tall for equipment designation and 1/2” tall for the installation date (mm/dd/yy format), warranty, and contact information. Plastic laminated engraved labels shall be black with white lettering and be permanently affixed in a conspicuous location approved by the BDCD Project Manager. Provide label submittal with full scale drawing(s) of labels for review prior to fabricating/ordering.

16. All valves shall be numbered with brass tags and referenced to operational instructions.

17. Provisions shall be made for metering of heating fuel oil consumption. Provide back flow preventers in fuel lines, as required. Exposed exterior fuel lines must be insulated/heated.

18. Coordinate with DPWES to notify FMD staff when system balancing is scheduled so FMD HVAC mechanics can observe the procedure.

19. Access panels or doors must be provided for any equipment located in all wall or ceiling spaces that may require maintenance, repairs, or modifications.

20. All equipment, smoke detectors, heat detectors, etc., HVAC equipment which are located above a suspended ceiling must be clearly labeled at the appropriate location on the ceiling.
21. CFC and HCFC refrigerants are not to be used in mechanical equipment on County projects. The County goal is to achieve the LEED Enhanced Refrigerant Management Credit. Use of HFC refrigerants is strongly encouraged.

22. In DX units that have multiple compressors, cooling coils shall be intertwined.

23. All motors are to be NEMA Premium efficiency.

24. A minimum of three-foot- six inches (42") clearance is required at electrical elements at VAV boxes, fan coil units, etc. per National Electric Code (NEC.)

25. All ductwork and piping that will gain or lose energy to/from the surrounding atmosphere, or may cause condensation, shall be properly insulated per ASHRAE 90.1 2010 to minimize energy costs and condensation. All duct and pipe insulation joints must be properly sealed. Insulation shall be continuous through hangers, supports, and building construction elements such as walls, floors and ceilings.
   a. Exterior ductwork shall be completely sealed and waterproofed and tapered insulation used on any surface, which shall be installed and shall prevent water from collecting. The entire duct system shall be covered with an approved weatherproof cladding with overlapping seams, on the underside of the duct only.
   b. Specification shall include requirement for the contractor to request a pre close-in inspection and sign-off by Owner-M/E/P consultant for duct and pipe insulation for walls and ceilings.

26. All hydronic piping shall be run in conditioned space to avoid freezing. Where it is unavoidable to run in spaces subject to freezing, thermostatically controlled electric heat tape shall be provided on piping. In cases where emergency generators are specified, the electronic heat tape shall be connected to the emergency generator. All heat tape shall be monitored by the EMCS and an alarm sent when a failure is detected.

27. Provide Aegis grounding rings for all motors controlled by a VFD.

28. Fire dampers shall be type B (out of the air-stream) and are to be dynamic type and shall be mounted in accordance with their UL Listing and per SMACNA.

29. VAV Systems
   a. VAV systems are the preferred systems in buildings of any significant size depending on the size and building layout they can either be chilled & hot water central air handlers or gas-fired/DX roof-top units.
   b. For smaller buildings gas fired single zone RTUs are acceptable.
30. VRF Systems

a. Zone sizes shall be limited, and systems overlapped for some redundancy. Additionally, valves to isolate parts of the system shall be used as allowed/recommended by the manufacturer.

b. The life-cycle cost analysis should factor in the life expectancy of the equipment i.e. ASHRAE lists DX/Air to Air Heat Pumps as 15 years. VRF life expectancy should therefore be assumed to be 15 years.

c. If VRF systems are approved, the systems shall have isolation valves so separate sections can be taken down for repair and testing without impacting an entire system. In addition, the systems shall be equipped with a receiver system so the refrigerant can be pumped down quickly without using external storage tanks. The project must include an attic stock of spare boards and other parts so that the systems can be repaired quickly. System testing must be clearly documented and separate and additional to other testing, balancing or commissioning. An overnight test will not be sufficient, longer testing (nitrogen or vacuum) is required.

31. For design of Clinical Facilities with Negative Pressure Rooms refer to Appendix A.

32. For design of Evidence or Forensic Rooms in Law Enforcement or Public Safety Facilities refer to Police Station Design Manual.


1. In all buildings, a DDC Energy Management and Control System (EMCS) shall be installed. Refer to Division 260000 Electrical I.H for the design requirements of the BAS/EMCS system.

2. The energy management and control system shall control HVAC operations and conditions, alarm abnormal conditions and index control modes and provide AHU optimized start/stop operations, AHU/RTU fan optimization options, and provide reporting and trend logs. The specific system requirements shall be reviewed with the County during design.

3. The plans and specifications for the mechanical system must include a detailed points list showing all monitor and control points and must also include a sequence of operations for all equipment and systems.

4. The EMCS must be capable of performing the following functions:
The details and requirements of how the EMCS should monitor and control equipment shall be elaborated in the specifications based on the specific building/system requirements. There are differences between hardwire points and mapping points through BACnet.

a. **Monitor and Alarm Selected Conditions**: Temperature; Pressure; Flow; On/Off, Start/Stop Status; Safety Control Status (Fire, Freeze, Smoke); all critical applications.

b. **Initiate Selected Control Sequences**: AHU/Chiller/boiler/pump; Start/Stop; Occupied/unoccupied modes; Optimized Equipment Start/Stop operation, unoccupied night set-back/set-up, monitor total building electric usage and provide demand limiting routines as determined by Owner. The A/E should note that if required, the sequence of operations should include keeping the DOAH HW valve open at all outside air temperatures in order to allow the freeze protection pump to run continuously.

5. **Natural Gas Metering**: Install gas in-line submeter in addition to the utility company’s meter and integrate with the building’s EMCS. Where at all possible, tenant utilities should be directly connected to the utility provider. If this is not practical due to installation costs, a utility grade submeter must be installed to allow Fairfax to bill tenants for actual utility consumption and demand.

**H. Commissioning**

1. **Requirements for the HVAC system commissioning process shall be included in the construction contract**. An independent Commissioning Authority may be hired by the Owner through the Architect’s contract. ASHRAE Guideline 0, or other industry recognized guidelines for commissioning shall serve as the basis for all HVAC commissioning and the guidelines will be tailored to the specific requirements of the project.

2. **The Architect and Mechanical Engineer and Commissioning Authority will perform reviews of the HVAC system design from a commissioning perspective at all review phases of the design process and will cooperate fully with the Owner’s Commissioning Authority throughout the design review process as applicable.**

3. **The contract specifications must clearly spell out the responsibilities of the General Contractor and all appropriate subcontractors relative to commissioning and shall also define the role of the Commissioning Authority.**
Guidelines for Architects and Engineers
Fairfax County BDCD

230000 – HVAC

4. The Architect and Mechanical Engineer shall coordinate and cooperate fully with the Owner’s Commissioning Agent and with DPWES representatives throughout the actual HVAC system commissioning process prior and subsequent to, system acceptance. The Architect and Mechanical Engineer shall provide all design and or system information that is requested by the commissioning team members and respond to all comments from the Commissioning Authority from design through system acceptance.

5. The Architect or BDCD Construction Manager shall include the final commissioning reports and documents provided by the Commissioning Agent in the Operations and Maintenance Manuals supplied by the Contractor. This shall include the final Testing and Balancing Report for the air and water of the entire HVAC system, and the final control drawings and sequences.

II. PRODUCTS

I. Mechanical Equipment Preferences

1. Below are listed preferred equipment brands for which supply of repair parts exist (specifications shall include at least three acceptable equipment options for competitive bidding, unless a limited source procurement is approved in advance by the owner):

   a. **Chillers:** Trane, Airstack by Multistack (air cooled) or Carrier (coordinate with the Owner for the most recent updates) (No Equals or Substitutions)
      Provide modular chillers with factory accessories to allow individual modules to be isolated for servicing and cleaning, both on the water side and electrically, all while the other modules remain in full service.

   b. **Cooling Towers**
      Baltimore Aircoil, Evapco, or Approved Equal

   c. **Pumps:**
      Bell & Gossett, Taco, Goulds, or Approved Equal

   d. **Non-Condensing Boilers:**
      Natural gas/#2 oil Fired Burnham 4F or Approved Equal

   e. **Condensing Boilers:**
      Lochinvar, Veissmann; or Approved Equals presented by the A/E during the design phase (based on technical specs including turndown ratio and cascading abilities)

   f. **Air Handlers:**
      Trane, Carrier, Air Enterprises (AEI), Liebert, Valant or Aaon

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g. **VAV Boxes:**
   Titus, Trane, Nailor, or Approved Equal
   (Electronically controlled)

h. **EMCS:**
   1. Trane
   2. Siemens
   3. Automated Logic
   4. Delta
   (No Equals or Substitutions)

i. **Rooftop Units:**
   Trane, Carrier, Valant, Air Enterprises (AEI), AAON and Innoveent

j. **Variable Frequency Drives:**
   Yashikawa, Danfoss ABB, or Square-D

k. **Baseboard Heaters:**
   Trane without Dampers, or Approved Equal

l. **Underground Storage Tanks:**
   Double wall, urethane coated steel. Act 100U, Type II, and approved by U.L.58 for underground storage of motor fuel. Double wall welded steel with a primary (internal) tank and a secondary (external) tank; as manufactured by (Highland, General Industries or Approved Equal). UST shall include quick release filler neck; 9 watertight raised access to filler neck; and shall support accessory equipment including drop tubes, two tank sumps, and submersible removable pumps. UST design shall allow for continuous monitoring of the interstitial spaces between the two walls and the two manways.

m. **Fuel Storage Monitoring and Leak Detection System:**
   Veeder Root Model TLS-350
   (No Equals or Substitutions)

n. **Submersible Fuel Pump:**
   Redjacket (submerged turbine); or Approved Equal

o. **Fuel Dispensers:**
   Gas Boy (No Equals or Substitutions)

p. **UST Fill Caps and Overflow Devices:**
   Ohio Pipe Works (OPW) Model 2100 overfill containment basin (5 gallon); or Approved Equal

q. **Fire Station Diesel Exhaust**
230000 – HVAC

Extraction System: Plymovent (No Equals or Substitutions) A/E to specify appropriate temperature rating for pneumatic grabber.


s. Airflow Measuring Stations: Ebtron or Kele (No Equals or Substitutions).

t. Gas Sub-Metering: Onicon with flow conditioner

u. VRF (VRV) Systems: Daikin (No Equals or Substitutions)

III. CONSTRUCTION

A. Record Drawings: As-built drawings indicating the final field installation of the mechanical and plumbing systems shall be provided to the County in the latest AutoCAD and .pdf formats.
Guidelines for Architects and Engineers
Fairfax County BCD

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EXHIBIT 230000-A
FAIRFAX COUNTY MAINTENANCE COST
FOR
LIFE CYCLE COST ANALYSIS

Notes:
1. BDCD Project Manager to coordinate with Facilities Management Department (FMD) to provide the current staff rates.
2. BDCD Project Manager to coordinate with Facilities Management Department (FMD) to confirm the Parts Cost are current.
3. Maintenance costs are per year.

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<tr>
<th>Equipment</th>
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<th>Hours</th>
<th>Total</th>
<th>Parts</th>
<th>Parts Cost (2018 Costs) Note 2</th>
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<td>Parts</td>
<td>Parts Cost (2018 Costs)</td>
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<td>FMD staff make sure the panels are clean and check alarms</td>
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I. DESIGN

A. Electrical Main Services

1. Main Service:
   a. Where appropriate a three-phase four wire 277/480 volt main service is preferred.
   b. A circuit breaker coordination study shall be provided when the complete single line diagram is established and with the final sizing of the main service.
   c. Two (2) sets of spare fuses for each phase shall be provided for the Main Service served by a Fusible Main Service Disconnect.
   d. Site Plans shall indicate the routing of the incoming electric utility lines from the supply source to the electric room in the building.
   e. A spare underground conduit shall be provided from the utility pole to the pad mounted transformer for high voltage lines, as required by the utility.
   f. A spare conduit shall also be provided from the utility pad mounted or pole mounted transformer to the CT cabinet for future use.
   g. All building wiring shall comply with the requirements of the Fairfax County adopted version of the National Electrical Code (NEC).
   h. The A/E shall send building load letter and plans to the electric company with copy to BDCD Project Manager at appropriate times during design.

2. Main Switchboards/Switchgear:
   a. Main Switchboard/Switchgear or the Main Distribution Panel (MDP) shall be provided with at least 25% spare capacity and space for future use.
   b. Provide a spare breaker corresponding to each nominal panel board size such as 100A, 225A, and 400A for building greater than 50,000 square feet.
   c. In all buildings less than 50,000 square feet in size, provide two spare breakers in the switchboard for future use as a replacement or addition for renovations.
   d. For 480 Volt systems, provide a spare 100 amp-42 circuit-120/208 Volt panel board with a built-in step down transformer.

   a. The emergency power distribution system (Life Safety), without an emergency generator, battery back-up or UPS system, shall not be permitted.
   b. The designated emergency service must be an entirely separate service, and sufficiently remote from the main to minimize the possibility of simultaneous interruption of power supplied.
   c. Emergency power systems shall comply with the requirements of the Fairfax County adopted versions of the NEC and NFPA 110.

4. To comply with OSHA’s lock out and tag out requirements disconnects, panel boards and all other electrically powered equipment shall have a means of de-energizing and locking out the equipment for service and repairs.
5. Trapeze Mounted Transformers:
   a. Trapeze mounted transformers are discouraged.
   b. Trapeze mounted transformers 75 kVA and above, shall not be permitted.
   c. Trapeze mounted transformers should have supporting structure that has been
designed by a structural engineer.

6. Equipment rooms where switchboards, panel boards or transformers are installed
shall be properly ventilated and conditioned to prevent ambient temperature from
exceeding the listed environmental limits of the equipment residing in the space.
Refer to Division 230000 for specific room temperature requirements.

7. Data and Communications Rooms:
   a. Data and communication rooms shall be designated as separate rooms from the
      electrical rooms. This is necessary to keep cable clutter, risk of electrical shock,
      heat, and EMF interference to a minimum.
   b. Data and communications rooms shall be provided with receptacles that are
      powered by standby generator circuit.
   c. No electrical transformers or distribution panels shall be permitted in
      telephone/data or communications rooms or closets.

8. Working Space and Access for Electrical Panels and Other Electrical Devices:
   a. The working space around electrical panels and other electrical devices must
      meet NEC requirements for clearance, and provide necessary space for access,
      although, the standard NEC required clearances may not be sufficient in all
cases.
   b. The working space in front of electrical panels and other electrical equipment
      shall be sufficient to provide safe working space to minimize exposure to flash
      hazard.
   c. Access to the electrical panels and other electrical equipment shall be limited to
      qualified electrical staff by providing locks and appropriate signage to restrict
direct entry and prevent flash hazards.

9. Arc Flash Analysis
   a. An arc flash hazard analysis shall be performed on all panels, switchboards,
      motor control centers and control panels, and an arc flash hazard warning label
      shall be posted on the equipment in accordance with the Fairfax County adopted
      versions of the NEC and NFPA 70E.
   b. A circuit breaker coordination study and an arc flash analysis are required for all
      new and modified services.

10. Specifications shall require installation of electric demand meters/monitors as part of
    the Building Automation System.

11. Main Electrical Room lighting in non-generator or UPS powered emergency systems
    shall have a self-contained battery back-up or a separately mounted (wall or ceiling)
unit rated for a minimum of 90 minutes. Provide one 20 ampere duplex receptacle for all indoor main service room fed from the Emergency System.

12. The use of motor control centers is discouraged and shall require approval in writing by BDCD Project Manager and FMD if requested to be used.

B. Riser Diagrams and Panel Schedules on Electrical Drawings

1. Specifications shall require the installing Electrical Contractor to provide 1/4"=1' scale layouts of all electrical and data/communications rooms showing dimensioned Switchboard/Switchgear, MDP, panel boards and transformers prior to installation. This shall also be required as a submittal in the Submittal part of the applicable specification sections.

2. Indicate on each panel schedule as “Fed from --------“. This designation shall be required to be shown on typed panel schedules posted inside the panels and labeled on the panel’s front cover with an engraved phenolic plate. Phenolic plates shall be red background for emergency power systems and black background for normal power, both with white filled lettering. Plates shall be installed in the field by the Electrical Contractor.

3. Provide computed NEC demand load on all panels and sub-panels utilizing NEC demand factors as per panel schedule attached as 260000 - Exhibit #1. In addition, show the load corresponding to the “feeder ampacity” and the “connected load” to determine the adequacy of the panel per NEC. A “Total Facility Load Analysis Table” based on the connected loads shall also be provided on the riser diagram at 100% Construction Documents submission.

C. Emergency Generator and Transfer Switches

1. The A/E shall coordinate the requirements for the connection of building systems to the generator per project. New buildings shall have emergency equipment and distribution above grade and comply with Article 708 of the NEC for Critical Operations Power Systems requirements for equipment and materials used in the project. Existing facilities with new or reused equipment shall be installed above grade, in locations as allowed in Article 708 of the NEC. Branch feeders and circuits in existing facilities shall be installed in a method allowed by NEC 708.10, exclusive of the 2 inches of concrete requirement. In police stations and fire stations, all facility systems shall be on the generator including the air cooling system. Coordinate with the BDCD Project Manager for all other facilities.

2. The emergency generator system for new construction projects shall be designed such that load shedding is not required in order to pick-up the required connected emergency loads. Generator Systems to be refurbished or upgraded from the existing
systems, where physical size constraints limit the generator size and/or the fuel tank capacity, load shedding shall be permitted (subject to FMD direction) only to ensure critical operations portion of the building shall be energized by emergency power during an outage. Connected loads on the emergency system shall be limited to the minimum code requirements and other operational requirements. Provide generator sizing calculations and projected run time utilizing any of the manufacturer’s available generator sizing programs at 75% load.

3. The one-line diagram and specifications for the generator is to only have one circuit breaker and not three. The County cannot rent a portable generator with three separate circuit breakers in the event that the fixed generator fails. The engineer can use a trough and disconnects to feed the loads separately from one larger circuit breaker on the generator. The double throw switch is also required.

4. Where load shedding is permitted, the operation of life safety emergency egress and exit lighting, alarms and alerting systems, communications systems, sump pumps, automatic door operators shall be Priority Level I. Loads of refrigeration equipment, elevators, supplemental security systems and supplemental communication systems, critical operations lighting and power, and disaster shelters shall be Priority II. Cooking equipment and non-essential operations shall be Priority Level III.

5. All lighting in electrical and mechanical rooms shall be connected to the emergency system. All but one fixture in the room shall be switched to reduce electrical load and extend lamp life. Use illuminated toggle switch.

6. Where it is not feasible to size the replacement generators and associated fuel supplies to power the entire facility, the generator shall power the emergency life safety system and designated standby power for elements of the facility in accordance with the Priority Levels established in the above paragraph. BDCD Project Manager in coordination with FMD shall designate which elements will receive direct emergency standby power and which elements shall be subject to load shedding.

7. Generator Day Tank shall contain a duplex pumping system and a single manual back up pump. Duplex pump size shall be capable of delivering the required fuel volume to the generator for 96 continuous hours.

8. Where an Uninterruptible Power Supply (UPS) or any non-linear loads are connected to the generator, proper allowances shall be made for such loads in the generator sizing computer program. Leading power factor equipment (such as UPS systems) shall not comprise more than 40% of the generator capacity. Provide approximately ten percent (10%) spare capacity in the generator to carry future loads.

9. Evaluate emergency generator system to determine whether or not an air permit will be required based upon Virginia Department of Environmental Quality standards. Where it is found necessary, the A/E shall make the application and obtain the permit.
10. Generators shall not be placed within the building envelope without BDCD Director approval. Locate the generator exhaust as far away as possible from the building air intakes and/or any operable windows. The minimum separation distance shall be 25 feet. If not feasible to provide the minimum 25 feet, written approval is required from FMD and the BDCD Project Manager. The generator muffler shall be located inside the outdoor generator set enclosure.

11. The specifications for the generator shall include the following items:

   a. Provide fuel leak detection system. The International Fire Code (IFC) Paragraph 3404.2.7.10 requires there be immediate reporting to the fire department, code official and other AHJ’s. Underground double walled tanks are required to have an approved method of leak detection per IFC 3404.2.11.5.2.

   b. The Jacket Water Heater shall be provided with a set of water shutoff valves for all units greater than 50 kW to facilitate jacket water hose and heater replacement without the necessity of draining the engine coolant system.

   c. The main circuit breaker shall be provided with auxiliary contacts to indicate light and alarm on the engine generator control panel and the Remote Generator Annunciator Panel (RGAP) when the main circuit breaker is in “OFF” position. Also provide a Red Mushroom “Emergency Stop Button” on the engine control panel. Depression of this emergency stop button shall trip the main circuit breaker and initiate generator shutdown.

   d. Provide a break glass type of “Emergency Stop Button” at the egress point of the generator room or enclosed space. If located outdoors, a NEMA Type 3R enclosure shall be provided for the “Emergency Stop Button.”

   e. Specify that EPA Emission Levels shall be in accordance with a minimum of Level III of the EPA New Source Performance Standards (NSPS) regulations. Indicate manufacturer’s published emissions for the style, model and capacity of the generator provided on the drawings.

   f. The mode switch located on the generator control panel shall be labeled “Run-Off-Auto” per NFPA 110. Provide contacts to indicate light and alarm when the mode switch is “not in Auto position” on the generator control panel and the RGAP. Provide for remote monitoring of the generator status to the fire alarm panel and be compatible with incorporation into and reporting to the County EDGAR software program.

   g. The batteries shall be 4-D, sized for the generator used. Maintenance Free batteries are not acceptable.
h. The generator shall be required to meet Fairfax County Noise Ordinance Requirements at the property line. A/E shall stipulate what the maximum allowed db level is within the specifications.

i. Manufacturer’s recommended electronic interface device shall be provided to the Owner, by the contractor, for diagnostics on all new generators. Manufacturer’s representative shall fully train FMD O&M staff designees on new generator’s diagnostics.

j. A 100 amp, single phase Generator Accessory Panel (GAP) with 8 (eight) circuit capacity, including the main circuit breaker integral to the generator shall be specified and mounted nearest to the engine control panel inside the protective housing for units 100 kW and greater and all units with Day Tanks. The GAP shall be factory hard wired to provide power circuits for the jacket water heater, battery charger, generator service lighting, and the 20-amp duplex receptacle which shall be also located on the side of the engine control panel inside the generator housing. Provide two spare 15 ampere circuit breakers – (one for wiring the day tank controls and other for future use). Provide the remaining two slots in the generator panel as spaces for future use. Provide a 1-1/2” conduit from the designated Life Safety panel to provide power conductors for the GAP.

k. Specifications for 250 kW and larger shall require data from a factory reactive load bank test and a resistive load bank test prior to shipment. The Contractor shall conduct an on-site field load bank performance test with unity power factor in accordance with NFPA 110 requirements for all new emergency generators. Final mechanical (Generator, Main Fuel Tank and Day Tank) inspections shall have been completed prior to initial start-up of the generator. Two weeks’ notice shall be given to the Project Engineer to coordinate the initial start-up tests. Approval of preliminary electrical inspection shall be a pre-requisite for the start of performance and acceptance (Load Bank) tests. Load Bank Test shall be witnessed by the BDCD Project Manager (Construction Project Engineer or FMD Project Engineer). Two weeks’ notice shall be given to the Construction Manager to coordinate the performance and acceptance tests. The performance test results shall be signed off by the Owner (Construction Project Engineer or FMD Project Engineer). The building loads shall be transferred to the generator system after the load bank tests have been accepted.

l. All new or replacement generators shall have a non-fusible 3 position double throw disconnect and a connection box for a roll up temporary generator, installed for units up to 1200 amperes. Generators rated at or greater than 1200 amperes shall be provided with a tap - box to facilitate the connection to a manual transfer switch. Refer to Exhibits in 260000.

m. Provide a 24 (twenty four) light LED Remote Generator Annunciator Panel (RGAP) next to the Fire Alarm Control Panel (FACP) or in another location as
determined by specific needs of the facility. A separate 1” 1-1/4” conduit with 2 4 twin axial 4 conductor shielded cables (Beldon 9413 8404 or equivalent) and twelve (12) #12 stranded copper conductors shall be provided from the generator control panel to the RGAP. The RGAP shall comply with the requirements of NFPA 110 with the following extra lights as optional on all projects (Additional lights may be added as necessary):

- Day Tank Trouble Alarm
- Normal Power
- Generator Running
- Generator Fault (Trouble)
- Main Circuit Breaker “OFF” position
- Green Light indicating “Panel Disarmed Temporarily”
- Fuel Supply Leak Detection System
- Spare
- Spare

n. Provide a separate 1-1/4” conduit with 16- Cat 5 control wires from the Automatic Transfer Switch (ATS) to the Generator Engine Control Panel (GECP) for the purpose of providing start-stop controls and ATS position indication, other required controls, and future controls.

o. Provide a separate 1” conduit from the generator control panel for connecting the Day Tank control wires. This conduit may be buried under gravel to provide mechanical protection between the Day Tank pad and the generator.

p. Provide a separate 1-1/4” conduit from the 60 amp GAP to the Day Tank for the power conductors. This flexible conduit may be buried under gravel to provide mechanical protection in the space between the Day Tank pad and generator pad in order to avoid a tripping hazard.

q. Provide an RS Generator Alarm Panel.

r. The generator must be designed to run on ultra-low sulfur diesel fuel.

s. The emergency generator shall include an independent fuel tank and fuel delivery system. When serving dual systems (such as heating equipment), the generator fuel quantity for Life Safety loads must be an identified dedicated reserve within the tank

t. The fuel tank shall be sized to provide dedicated emergency generator fuel for 96 hours, plus any other ancillary use. Coordinate with the BDCD Project Manager to determine the required loads on the generator in each project. See HVAC Division 230000
u. Provide a Generator Connection Box per attached 260000– Exhibit #2 with separate 1” conduits from each ATS and the Generator containing 2 sets of 48 conductor Biaxle Cable Belden #8404 or equivalent number #20 eight (8) #12 stranded copper control wires. Provide conduit and wiring for the two receptacles in the Generator Connection Box to be fed from the Life Safety and Standby panels respectively. Life Safety Panels shall be designated as EHLS & ELLS for 480 Volt Systems and ELS for 120 Volt Systems with corresponding Automatic Transfer Switches as EHLS and ELS respectively. For the Stand-by Panels the designation shall be EHSB & ELSB for 480 Volt Systems and ESB for 120 Volt Systems. Corresponding Automatic Transfer Switches for the standby panels shall be designated as EHSB and ELSB for 480 Volt and 120 Volt respectively.

v. Provide a roll-up generator feeder connection point with appropriately size connection lugs and approved quick connect cable connectors. Feeders shall connect to the emergency manual transfer switch.

w. The generator and automatic transfer switch shall be covered by the full one-year warranty for the project, in addition to a five-year warranty more extensive warranties offered by the specified manufacturers for equipment and labor. The contractor shall respond within two hours for any generator failures or problems that occur during normal or after hour timeframes during the one-year contractor warranty period, including weekends and holidays.

x. The Automatic Transfer Switch shall be specified and provided complete with a bypass-isolation feature to facilitate the equipment servicing without shutting off normal or emergency power to the facility. The bypass and isolation feature allows inspection, testing, and maintenance of the automatic transfer switch without interrupting power to the load.

y. Final inspection of the Emergency generator and the fuel tanks (main and Day Tanks) and fuel piping associated with the emergency generator system shall be performed by the Fire Marshall’s office and the County’s mechanical and electrical inspectors after the start-up of the generator has been completed, all wiring has been installed, and prior to the performance of the load bank test. After the load bank test has been accepted, the building loads are to be transferred to the generator system. A generator schematic detail shall be provided indicating all conduit stub-ups emanating from the generator pad to the Three Position Switch, Generator Connection Box, any Equipment Rack, Day Tank and Electric Room similar to illustration shown as 260000 – Exhibit #3.

z. O&M training for Emergency Standby Generators and Automatic Transfer Switches shall be conducted by a certified training instructor provided by the manufacturer and shall be performed on-site after the startup and acceptance tests of the generator have been completed.

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aa. Generator pad shall be minimum 12” 6” above grade monolithic pad. Outside dimensions of the pad shall exceed that of the generator set a minimum of 12” 6” on all sides with ¾” chamfer.

bb. Specialized maintenance servicing tools (diagnostic tool, laptop computers, I-pads or android pads, etc.) required for Emergency Standby Generators and Automatic Transfer Switches shall be provided by the installer and shall be transmitted to the Construction Manager then provided to FMD. IT equipment shall have prior approval by Fairfax County DIT and be compatible with the Fairfax County network.

D. Grounding and Bonding

1. Provide grounding as per NEC. Additional grounding rods may be required to achieve ≤ 10 ohms or less. Single point ground system may be required in a portion of the building. A test well shall be provided for one of the main grounding grid rods and the location of the test shall be marked on the Site Plan. Furnish a copy of the ground test report to BDCD Project Manager prior to substantial completion and include in O&M documents.

2. Under no circumstances is an isolated ground to be installed. All grounds shall be bonded.

3. A green insulation ground conductor is required in all raceways. Conduit or cable tray is not to be relied upon as the ground path.

4. Fully rated circuit breakers shall be used. Series connected rated circuit breaks are not to be used.

5. Switchboard construction shall be utilized for electrical distribution of 400A or greater.

6. A main grounding bar shall be installed inside the electrical room, and connected to the grounding rods, lightning protections system (where necessary), building steel, counterpoise and main water pipe. All secondary transformer neutrals shall be connected to this grounding bar.

7. Main service neutral shall be bonded at the service entrance disconnect and the grounding bar in accordance with NEC requirements.

8. A counterpoise or grounding grid around the entire generator is required as per 260000 – Exhibit #4. The generator and the Main Fuel Storage Tank and the Day Tank shall be grounded and this grounding grid shall be bonded with any other building grounding grid or the Lightning Protection System grounding.
E. Receptacles

1. GFCI and ARCH FAULT receptacle circuits shall not share neutral wires with normal circuits or multiple receptacle circuits. Sharing of neutral wires should also be avoided on receptacles that may be used for any type of computer or equipment with a switch-mode power supply. Each branch circuit shall be provided with its own neutral wire.

2. Use of outdoor receptacles shall be minimized. Where provided, outdoor receptacles shall be GFCI and designed to limit access to authorized personnel, only. Provide receptacles adjacent to exterior mechanical equipment for maintenance purposes per NEC requirements.

3. Use Arc Fault Circuit Interrupters (AFCI) to protect all circuitry (excluding smoke alarms) in sleeping and living areas (except for those with GFCI protection). Protection may be circuit breaker or receptacle type. Receptacle based protection shall have code compliant branch circuitry.

F. Fire Alarm System

1. The installer of the fire alarm and Fire Suppression Systems (see Section 230000) shall provide four complete sets of Maintenance and Operation manuals, parts manuals, and list of local vendors for the system to the Owner at Substantial Completion.

2. Provide a locked document box adjacent to the main fire alarm panel that contains a full size set of as-built drawings, ½ size set of as-built drawings, a flash drive with PDFs of the as-built drawings, and all product data and calculations. The box shall be keyed to match the fire alarm panel.

3. The Contractor shall turn over fire alarm system keys, operations and maintenance manuals, and as-built drawings to Owner at or before Substantial Completion.

4. The Contractor shall provide as-built drawings prints, as-built schematic diagrams and wiring diagrams, keys to cabinets, panels, and manual stations and any access codes shall be provided to the Owner at Substantial Completion.

5. The contractor shall provide a non-proprietary system for which repair parts and service is readily available to the County from local vendors. The County shall not be bound to an exclusive vendor for repair, maintenance or material procurement for the system or its components.
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6. Fire alarm devices vary widely in their electrical characteristics and must be carefully matched with suitable control panel to assure proper performance. Fire alarm devices, control panel and annunciator panel must be from the same manufacturer. Modifications to existing fire alarm systems shall utilize equipment that is compatible with and by the same manufacturer as the existing system.

7. Provide a graphic annunciator in accordance with the Fire Marshal’s requirements.

8. Ensure all addressable interface modules are located in a conditioned space.

9. Verify if a voice fire alarm system is required by the VUSBC.

10. Provide 20% space capacity in NAC and AMP panels. Provide calculations for the NAC and AMP panels with the shop drawings.

11. Provide 20% spare capacity on each circuit. Provide circuit calculations with the shop drawings.

12. Provide 20% spare battery capacity. Submit battery calculations with the shop drawings.

13. All fire alarm devices shall be readily accessible for testing, repair and maintenance purposes. All fire alarm devices located above a suspended ceiling must be clearly labeled as such on the ceiling. An LED light must be provided at the ceiling to show annunciation of that device, and access must be provided through the ceiling.

14. Smoke detectors shall be provided in accordance with NFPA 72 and the applicable text and tables. Avoid specifying and locating smoke detectors in addition to that required by Code.

15. Carbon monoxide device detectors shall be located in each space where fossil fuel equipment/appliances are located. All carbon monoxide detectors and devices shall directly interface with and be monitored by the fire alarm system. Fire Alarm system shall provide master control for all devices.

16. The contractor shall be required to provide the County with replacement initiation devices and audio-visual devices, equaling 10 percent of the total number of installed devices but not less than one of each type device, within seven days of Substantial Completion.

17. The specifications shall require that the contractor notify the Owner (Project Engineer to coordinate with FMD) at least 7 days in advance of the final complete test of the entire system to witness the testing prior to the acceptance by the County. Testing shall consist of, at a minimum: smoke and alarm, each smoke and duct detector, pull
and reset, each pull station. Specifications shall require that the Contractor provide a complete overview of the system at the time of this system test.

18. The installer shall maintain the color-coding established by the manufacturer throughout the system. The terminations or connections in the control panels or junction points shall be clearly marked and the corresponding field wiring shall be permanently tagged.

19. Two dedicated telephone outlets are required for each auto-dialer. A jack shall be provided for each line to facilitate maintenance and testing.

20. Auto-dialer program and format codes shall be transmitted to Owner at the Substantial Completion walk-through, and a copy shall be included in the operations manual for the fire alarm system.

21. An auto-dialer shall be provided and connected to support the Fire Alarm Control Panel (FACP). The auto-dialer, which serves the FACP, shall not serve any other equipment.

22. The auto-dialer for the fire alarm shall be connected to the County’s contracted monitoring service as directed by the Owner.

23. The auto-dialer, which serves the security system, shall not serve other equipment.

24. Facilities with an elevator shall be provided with an auto-dialer for the elevator, connected to the emergency phones in the elevator cabs and elevator lobbies. The auto-dialer shall connect to the County’s contracted monitoring service as directed by the Owner.

25. The FACP, the Fire Alarm Annunciator Panel, and auto-dialer shall be programmed to automatically reset once a trouble or fault is cleared, as required by the Fairfax County Fire Marshall.

26. The auto-dialer for the Fire Alarm system and the elevator emergency phones shall have manual onsite reset capabilities and shall automatically reset once the trouble or phone line or power interruption has cleared.

27. The auto-dialers shall automatically restore and or reset upon power or phone line interruption, once the power or the phone line restores and or stabilizes.

28. The auto-dialers shall be programmed to monitor/report events as required by the Fairfax County Fire Marshall’s office. These events shall be sent via the dedicated phone lines to the County’s contracted monitoring company as directed by the Owner.
29. The auto-dialer test timer test shall be programmed to perform between 7:00 A.M. and 1:00 P.M.

30. The contractor shall be required to arrange to receive and respond to all trouble and alarms received by the County’s monitoring service prior to building occupancy by the County.

31. Duct detectors shall be programmed for Supervisory alarm as required by code.

32. Shelters and drug treatment facilities sleeping quarter’s smoke detectors shall be programmed for Supervisory alarm as required by code.

33. The contractor shall transmit a copy of the Fire Marshall’s final inspection report to the owner for transmittal to FMD prior to building occupancy by the County.

34. A key box is required by the Fire Marshall’s office for the Fire and Rescue Department key access to buildings. The contractor shall coordinate with the Fire Marshall’s office for the location and provide and install all required key boxes.

35. A/E shall obtain the most current copy of the Code Reference Package (CRP) for Architects, Engineers, Designers and Installers from the Fairfax County Fire & Rescue Department, Fire Prevention Division, Engineering Plans Review Section, and shall incorporate all requirements CRP into the design documents. All requirements of the CRP which are intended to be the responsibility of the Contractor shall be clearly identified as such in the contract documents.

36. Specifications shall clearly state that the Contractor is responsible for paying for all shop drawings, review fees, and permit fee associated with the review, approval and permitting necessary for a complete fire alarm system. The Contractor shall also pay any additional costs for Fire Marshall’s inspections beyond those paid for by the Owner as part of the building permit and inspection fees.

37. All FACP auto-dialers shall have external surge suppression to protect the systems from lightning and voltage surges both from the line voltage and the phone lines. The surge suppression shall be in addition to the manufacturer’s built-in suppression system. The surge suppression shall be installed and located adjacent to the FACP and the auto-dialer. A separate surge suppressor shall be installed for each of the FACP’s and the auto-dialers.

38. Warranty for Fire Alarm Systems, shall be the system manufacturer’s standard warranty (one year minimum parts and labor), with options to purchase additional coverage.
39. Owner training (4 hours) for the Fire Alarm Systems shall be conducted by a certified
training instructor provided by the manufacturer and shall be provided on-site after
startup, and final Fire Marshall’s inspections are completed and accepted.

40. Provide access panels to duct detectors for routine service and testing in a readily
accessible and safely serviceable location. The access panel shall be located to allow
for clear access with no obstructions such as, ducts, conduits, pipes or wires. The use
of removable fixtures is not acceptable for access.

41. Fire Alarm System maintenance servicing tools (device programmer/diagnostic tool,
interface devices etc.) shall be provided by the installer and shall be transmitted to the
Owner for use in servicing, testing and maintaining the systems.

42. The contractor shall be responsible for all Fire Alarm System service and trouble calls
on the equipment during normal and after normal work hours with a maximum
response time of two hours, until the system is turned over and accepted by the
Owner.

43. A plan of the fire alarm initiating devices and the corresponding device address shall
be provided and installed adjacent to the FACP. These locations shall also be shown
on the as-built floor plans for the fire alarm system. A copy of this plan shall be

44. Automatic HVAC shut down shall occur during fire alarm when alarm is initiated by
automatic devices. HVAC shall not shut down if there is a manual trip of the alarm.

45. Provide interface wiring and conduit connection between fire alarm control panel and
the remote generator alarm panel. Program Fire Alarm Control Panel to annunciate
generator status alarms and have ability to connect into the County EDGAR system.

46. Fire alarm wiring protection for new critical operation facilities shall comply with
NEC 708.14. Fire Alarm control panels and automatic dialers shall be on generator
back-up powered systems where generators are available.

47. Fire alarm drawings and calculations shall be prepared by or under the direct
supervision of an individual having a NICET Level III or IV certification in fire alarm
systems or a Professional Engineer that passed the NCEES Fire Protection
Engineering exam.

48. On renovation/expansion and capital renewal projects, AE must verify that existing
Fire Alarm Control Panel and annunciator panels are capable of interfacing with new
devices and has the capability of being modified or expanded based on renovation or
expansion plan. AE shall include existing FACP model and make in the contract
documents.
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G. Lighting

1. Lighting shall be designed for the foot candle levels per the table listed in paragraph I.G.15 below with task lighting provided to supplement where higher levels are desired. For any space type not listed, follow the illuminance recommendations in the latest edition of the Illuminating Engineering Society (IES) Lighting Handbook.

Interior lighting fixtures shall be: LED 2’ x 2’ or 2’ x 4’ lay-in with A15 for A19, as preferred by Owner/ prismatic lenses with minimum thickness of 0.15” and overlay to diffuse LED diode image or 2’ x 4’ lay-in indirect with reflector surfaces. (277 volt preferred). Color temperature for indoor applications shall be 4000K. Outdoor LED fixtures shall have a color temperature of 4000K lumen output shall not be achieved by overdriving LED lamps to produce high lumen ratings at the expense of lamp life; LED driver current shall be 500mA [or 700mA, as preferred by Owner] or lower. LED fixtures shall be rated for a minimum 70% lumen maintenance (L70) at 50,000 hours of operation, or higher. Lighting loads shall comply with the requirements of the most recently-adopted version of the International Energy Conservation Code. Provide an energy use calculation at 95% CD drawings. Complete Electrical Energy Certification Form at https://www.pdffiller.com/55503276-electrical-energy-certification-nec-2011pdf . Exhibit 260000 A shall be reviewed by the BDCD Project Manager before submission to the County with Permit set submission.

Other fixture types should be considered, such as recessed “volumetric” troffers with microprismatic lenses (where ceiling height is limited) and linear direct/indirect pendants (where ceiling height is tall enough). Consider warmer color temperatures (3000K or 3500K) for some interior applications be used instead of the 4000K. Follow IES handbook recommendations for specialty spaces.

Specified Holophane Washington post-top fixture is called out as 4000K; specified Elumen 100WX fixture is 5000K. Recommendation is to maintain consistent color temperature throughout site, unless special circumstances warrant otherwise. Recommended CCT is 4000K for exterior. See above for exterior lighting requirements of 4000K.

2. Light fixtures used as HVAC diffusers are not acceptable. Return air lighting fixtures are allowed with specific BDCD Project Manager approval.

3. Atrium areas, libraries, workspaces, and high ceiling areas shall utilize LED fixtures with Class A sound ratings. Alternately, remote drivers located in a properly vented area are acceptable. Ready access to all light fixtures is essential to properly maintain the designed lighting levels. Fixtures in high ceiling areas such as libraries shall be accessible from a ten-foot stepladder or capable of remote or manual
lowering to a minimum of three feet from the ground. Fixtures should be laid out so that it does not require the use of specialized personnel lifts with articulating booms or build up scaffolding. Fixtures that are not readily accessible are not acceptable.

4. The use of incandescent fixtures, HID, and induction is prohibited. Lamps shall be a common stock trade item standardized so that bulbs lamps need not be special ordered. LED fixtures shall have drivers and LED boards/modules that are easily field replaceable.

5. Lighting control systems shall be designed to meet project target for LEED (refer to section 010000 General Design Requirements) and shall be provided with local control through occupancy, dimming and harvesting sensors that do not communicate over the network or Building Automation System (BAS). Automatic dimming or switching systems shall be utilized in areas where "daylight" harvesting may provide all or most of the required light level, and/or where required by code. Coordinate with BDCD Project Manager for prior approval of any proposed dimming system when using energy conserving lighting systems.

6. Decorative, accent and neon lighting shall not be used, without specific approval from BDCD Project Manager and FMD.

7. All exterior lighting shall be controlled by photocell on and time clock controls. The time clocks shall be located in the main electrical room and photocells shall be located on the roof, installed and oriented as recommended by the manufacturer. Parking lot lighting may be provided and maintained by the local utility or included as part of the project. Coordinate with the BDCD Project Manager prior to selection. Outdoor walkway lighting will be provided and maintained by the Owner and included as part of the design documents. Bollard type and in ground fixtures are strongly discouraged and must be approved by BDCD Project Manager and FMD. Plans must show Contractor provided conduit for all site lighting circuits. The use of UF cabling for exterior lighting is not acceptable. All circuits for exterior lighting shall be routed in conduit.

8. Provide a small mulch bed installed around in ground light fixtures such as flag poles or building sign lights such that a lawn mower will not come into contact with the fixture head.

9. Where appropriate, the fuel site lighting and the power shall be on the emergency generator.

11. Lighting fixtures with self-contained battery backup, fluorescent or LED, are not acceptable, except where specifically identified in this document. Where buildings are served by Emergency Generators, battery backup light fixtures shall not be permitted. Existing battery backup lighting shall be removed, except those serving the generator equipment room, or facilities not served by Emergency or Standby Power. Those in
generator rooms shall be provided with dual head LED battery pack flood type fixtures for ease of maintenance.

12. In libraries where stack lighting is accepted for use by Owner to be used, locate the lights where they are accessible for maintenance or repairs.

13. Where low voltage controls are incorporated for local switching, a layout of the relays shall be permanently placed in the facility's main electrical room and panels and circuits shall be clearly identified.

14. Fire station hose towers shall be properly illuminated for safe use for storage. The fixtures shall be water tight and accessible for repairs.

14. Day lighting and indoor lighting shall comply with ANSI/IESNA RP-1-04. Target maintained illuminance values are as listed below for spaces or tasks not listed, refer to the latest edition of the IES Lighting Handbook. These values may need to be modified to suit the specific application in each facility. Submit documentation of the light loss factor(s) used in illuminance calculations.

   a. Corridors 10 foot candles
   b. Lobbies 10 foot candles
   c. Means of Egress Per Code
   d. Storage Area 10 foot candles
   e. Waiting Rooms & Lounge Areas 30 foot candles
   f. General Office Areas 40 foot candles
   g. Desktops 30 foot candles
   h. Conference Tables 30 foot candles
   i. Secretarial Desks 30 foot candles
   j. Filing Cabinets 30 foot candles
   k. Book Shelves 30 foot candles

Public Spaces:
   l. Library Reference Areas 50 foot candles
   m. Library Reading Areas 50 foot candles
   n. Auditoriums 30 foot candles dimmable to 1 FC
   o. Cafeterias 30 foot candles
   p. Multipurpose Rooms 30 foot candles
   q. Parking Structures (Varies with area of structure, level of use, and security. Follow recommendations in IES RP-20-14 and review with the BDCD Project Manager.)

16. High bay areas such as garages, gymnasiums or warehouses shall use pendant type LED fixtures with durable lenses. All fixture lenses shall be easily removable for repair or replacement. Cord and plug connection is preferred. Safety chains must be
provided on each fixture. Where emergency generators supply the power, connect adequate quantity and layout of LED fixtures to emergency circuits for instantaneous illumination in accordance with Life Safety Code requirements for emergency egress

17. The A/E shall coordinate with the BDCD Project Manager prior to selection of the site lighting. The site lighting shall be provided and installed by the general contractor using Fairfax County approved site lights or by Dominion Virginia Power (DVP) under DVP and NOVEC Municipal Street Lighting contract. Subject to advance approval by the Owner, Contractor installed Induction or Light Emitting Diode (LED) site lighting fixtures may be used. See Products section for more details. The lights are to be used on small to medium size parking lots where cobra-head type fixtures are not appropriate and appropriate types and sizes of fixtures may not be available thru DVP.

18. Occupancy Sensors shall be installed in areas with automatic lighting control requirements, such as parking garages (dependent on security requirements), warehouses, conference rooms, offices, rest rooms, data centers, cafeterias, etc.

a. Occupancy sensors shall be set to remain “on” for a minimum of 15 minutes before cycling off. They shall be adjustable to 30 minutes or more of “on” time.

b. Life Safety Lighting may be controlled with occupancy sensors, provided they have a fail-safe design and comply with the Life Safety Code and the Fire Marshal’s requirements. Emergency lighting equipment shall comply with UL 924.

c. Occupancy sensors shall be approved by BDCD Project Manager.

19. In facilities that do not operate 24/7, the lighting levels must be reduced after the facility closing hours, to meet the Fairfax County Zoning Ordinance Performance Standards. The A/E shall specify appropriate equipment to comply with the Zoning Ordinance.

20. All site and open garage lighting shall be provided with full cut-off to limit light pollution. Locate exterior fixtures to minimize light spill onto adjacent properties and comply with all local ordinances regarding light trespass. Exterior lighting fixtures shall have glass lenses. Plastic acrylic or polycarbonate are not acceptable as these degrade the light output by becoming yellow and are a maintenance burden.

21. Exterior building and walkway lighting not installed and maintained by DVP must be durable and vandal resistant. Metal bollard fixtures are not acceptable.
22. All wall mounted lighting control switches (and other similar wall mounted control switches) shall be toggle type switches. Rocker type switches for energy saving lighting control systems is acceptable.

23. Provide occupancy sensors to automatically shut off lights for offices, conference rooms, storage rooms, gymnasiums, and other appropriate spaces. Coordinate with the owner/occupier for specific rooms in a given building. The occupancy sensor must be located in an appropriate location for optimum operation.

24. Emergency Exit lights shall be LED type.

25. Track lights, Mono, Twin Rail, Low Voltage Decorative lights are not permitted as they are a high maintenance item and should be avoided and provided only if absolutely necessary.

26. Remote drivers shall be grouped in a space with sufficient size and ventilation to support the equipment and shall be readily accessible for maintenance purposes. Remote drivers located above ceilings requiring ladder access are not considered readily accessible.

H. Parking Garage Lighting

1. Independent lighting control systems shall not be used in parking garages. Garages shall be designed with LED fixtures augmented with integrated photo cells and motion sensors.

2. The lighting controls within each fixture shall require only initial programming, which shall be pre-set at the factory before installation.

3. The fixtures shall permit fine tuning adjustments by maintenance personnel without the use of proprietary equipment or programming.

4. All control parameters shall be adjustable via a wireless configuration device capable of storing and transmitting sensor profiles. The device shall meet Fairfax County Department of Information and Technology standards and requirements. The devices shall be no larger than a cellphone. Three devices shall be provided to the Owner.

5. The occupancy sensors and the photo sensors addition improve the energy efficiency of the LED’s by 50 to 80% more, depending on the configuration. The brighter fixtures are used to highly illuminate the entrances and exits to aid the human eye in adjusting from daylight to a garage interior without significantly increasing the fixture density. Some of the entrance and exit fixtures shall be reverse programmed to reduce the unnecessary brightness that occurs at night. The fixtures shall also contain 0-10Volt dimmable LED drivers. Selected fixtures in the project shall be bi-
level fixtures that remain on at a lower lighting level for the entire evening and switched to a high level when motion is sensed.

I. Building Automation Systems (BAS)/Energy Management Control Systems (EMCS)

1. In all buildings, a DDC Energy Management and Control System (EMCS) shall be installed. Computer based EMCS that interfaces, monitors, and automatically controls heating, ventilating, and air conditioning is critical to the efficient operation of modern public buildings. The consultant shall integrate the building automation systems, with the exception of fire alarm, security and lighting systems, which must function as stand-alone systems.

2. For new control systems, the protocol shall be based on BACnet. System Database shall host on a server, and use Microsoft to remotely view system graphics, and monitor, control, and configure the HVAC system and its properties. EMCS shall include Owner approved graphics including Floor-level graphics with links to equipment for each building system.

3. The main EMCS building controller and the workstation computer shall have UPS backup for 24 hours and shall be connected to generator power where available. When connected to a generator the UPS duration can be reduced to 2 hours.

4. All necessary provisions shall be made in the design of electrical systems to support the implementation of a BAS. These include sensors, control devices, instrumentation, motors, wiring and conduit.

5. The BAS design concept is to automatically control the operation of the building’s mechanical systems in order to optimize energy efficiency, reduce operating costs, provide preventive maintenance programs and aid in environmental protection and control. It includes the efficient monitoring, calculating and displaying of all utility energy sources used in the building. Energy usage shall be metered and captured by the BAS system as required to meet LEED requirements. LEED Prerequisite is to install Building Level Energy Metering of all energy sources. Additional credit can be achieved for sub-metering. Review recommendations for submetering with Environment and Energy Coordinator. It requires individual metering of electricity used for the total building and HVAC, natural gas, and chilled and hot water supply sources. The concept is also to communicate to the central host computer.

6. Provide a single-web-based command center from a single-source supplier. A building shall have no more than one BAS system. Multiple BAS manufacturers or models shall not be permitted in a building. Where a renovation requires the
installation of a BAS in an existing building the legacy BAS shall be completely replaced to ensure that the building is provided one BAS with the same manufacturer, model and program.

7. The EMCS shall not be directly involved in the local loop controls, and the local loops shall continue to operate if the EMCS fails.

8. Provide individual control modules and any special/critical equipment with battery back-up for normal/non-critical sites. Provide battery/UPS back-up for all control components for critical sites.

9. All EMCS components shall have surge suppression devices. Building controllers shall provide a service communication port for connection to a portable Operator’s terminal (furnished by contractor). Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of communication failure.

10. The EMCS must be capable of alarming to and allowing interface and programming by any compatible personal computer via the County’s LAN. EMCS shall be expandable and be compatible with the electronic equipment controls. EMCS must have a security password/code for system entry and programming with multiple security access levels with different password. A network RJ45 jack shall be provided for network communications over the County’s LAN. The DPWES project manager shall coordinate these requirements directly with DIT.

11. Specifications shall require contractor to provide on-site operator display LCD panel for local interface and all required interface devices that may include laptop computer, and/or handheld devices. Provide submittal for interface device hardware and software to confirm system configuration and operating system for approval by Owner. Remote processing units shall be capable of communicating with the local terminal. Integrate the new site into the County’s existing EMCS workstation server. Provide licensed software for the EMCS. Provide CD copy of graphics package and programming software to Owner and install at Owner’s central EMCS control station. All hardware including, but not limited to, laptop computers, desk top computers and/or handheld devices shall meet Fairfax County Department of Information Technology requirements. The BDCD Project Manager shall provide requirements to the design firm and contractor.

12. Refer to Division 230000 for additional requirements and approved BAS manufacturers and systems.
J. Lightning Protection Integrated with the Main Grounding System

1. Lightning protection system is not a requirement for every facility. A risk analysis shall be conducted per NFPA 780 to verify the level of risk. The results of this analysis shall be provided to the Owner in the design narrative. The decision to include the lightning protection system shall be made based on the risk level and cost.

2. Direct contractor to submit detailed as-built drawings for the lightning protection system with UL certification. As-built drawings must show down-lead locations, conductor routing and conductor connections sites. A copy of the UL Master Label certification of the lightning protection system must be included in the O&M manuals. Provide a bond for the lightning protection system with the main grounding grid or main grounding bar.

3. Require contractor to also provide as-built drawings for the building grounding system including rod sizes, locations, and configuration and connection details.

4. Specifications shall require that the contractor obtain a UL certification for the grounding system and submit a copy of the certificate to the Architect/Engineer and FMD for review and approval before final submission to the Owner.

K. Telecommunications Guidelines:

1. Refer to Appendix B; DIT Infrastructure Guidelines

II. PRODUCTS

A. Electrical Main Services

1. Main distribution panels, sub panels and disconnects shall be Cutler Hammer, Square D or Siemens. FPE and Challenger are not acceptable. Cutler Hammer CH-PRL1a panels are preferred with bolt in breakers. The type PB panels give flexibility by accepting both bolt-in and push-in breakers. Provide one stock circuit breaker for each type installed.

2. Main distribution panels and sub panels shall be constructed with tin plated copper terminations and distribution bus hard drawn copper.

3. The use of aluminum cable is unacceptable. Provide only copper cable. All branch circuits and feeder conductors #6 and larger shall have manufacturer applied phasing color for full length. (SIM PULL by South Wire manufacturer as a reference). Use of phase colored tape is not acceptable.

B. Wiring Systems

1. Where a floor wiring system is required, a walker duct type floor system with separate trough for electrical, computer and communication wiring is recommended. Flat wire systems are not permitted and shall not be included in the design.

C. Emergency & Standby Generator and Automatic Transfer Switch Set

1. The acceptable manufacturers for emergency standby generators are: MTU Onsite Energy, Cummins and Caterpillar.

2. The use of a Detroit V-12 engine in generators is not acceptable.

3. Automatic transfer switch manufacturers shall be Zenith, ASCO, Cummins (no equal products).

4. All new transfer switches shall be isolation and bypass type with independent manual switch to facilitate easier maintenance and online reliability. Isolation and bypass ATS shall be maintainable while energized and not have hazardous exposure to the staff.

D. Fire Alarm System

1. Manufacturers for fire alarm devices, control panels, and annunciator shall be Silent Knight 5820 XL, Notifier, and Fire Light or other non-proprietary system. Only listed graphic fire alarm annunciator panels (IEC; NFPA 72A 1-2.2) are to be installed. All fire alarm devices connected to the Fire Annunciator Control Panel (FACP) shall be by the manufacturer of the FACP.

2. System extensions, renovations, or replacements shall be with components wholly compatible with the FACP. Zone or booster panels and power supplies shall be provided as necessary.

E. Site Lighting

1. LED Lights (Verify with the BDCD Project Manager for current manufacturers and models)
   a. Manufacturer: Elumen (www/elumen.ca) or approved equal
   b. Lamp Type: LED
   c. Mounting Height: 20’ at parking lot, direct mounted.
   d. Pole and Fixture Color: Square Squat steel pole, grey pole and fixture
e. Voltage: 277

2. LED Lights-Decorative (Verify with the BDCD Project Manager for current manufacturers and models)
   a. Manufacturer: Holophane (www.holophane.com)
   b. Model: WFL/Washington Postlite Glass
   c. Lamp Type: 100 W LED
   d. Mounting Height: 20’ Base Mounted
   e. Pole and Fixture Color: Black
   f. Voltage: 120 Volts
   g. Optics Specified: Asymmetric full cutoff flat glass
   h. Ball Finial

3. Motion Sensors
   a. Lutron occupancy sensors are preferred.

F. Metering

1. Energy Meter Standards

Install dedicated water, electric and gas meters for monitoring of utilities on each utility feed on new construction and significantly renovated facilities:

Purpose:
1. To provide real time energy and water consumption data for immediate demand management, peak demand and flow alarms, to ultimately reduce energy-water consumption and costs.
2. Provide real-time information for remote monitoring of facilities during off hours and emergency situations.
3. Comply with LEED requirements.

General:

In addition to utility meters, dedicated electric, water and gas meters shall be installed to provide accurate consumption and demand data for real-time energy tracking and automated demand management and alarming. These meters shall be fully integrated with the building’s EMCS and the FMD Central Energy Meter System. If the facility is not equipped with an EMCS the meter data may be transmitted to the Central metering system utilizing a Tritium Jace system (as used in several Fairfax County Fire Department installations). Where at all possible, tenant utilities should be directly connected to the utility provider. If this is not practical due to installation costs, a utility grade submeter must be installed to allow Fairfax to bill tenants for actual utility consumption and demand.
2. Water Meters

Facility main water meter: Install utility meter plus EMCS integrated submeter. Irrigation water, cooling tower water feeds, and architectural water features: Install Utility and EMCS integrated submeter. The utility meters servicing a cooling tower or irrigation shall be installed to ensure Fairfax County is not charged for Sewer charges on irrigation or cooling tower water feeds.

Note: utilities generally do not accept owner provided meters for sewer credits. Most water providers will provide water meters at a reasonable cost but these meters are generally not compatible with EMCS remote metering systems.

The EMCS submeter may be a separate meter installed in line or a device that reads the utility meter and provides 95%+ accurate water consumption data to the EMCS and the FMD central energy meter system.

If a water pressurization pumping system is utilized to feed the entire facility, if so equipped, the digital meter output from the Water pumping system can be used to feed EMCS and the central metering system instead of a separate in line meter. Tigerflow manufactures flow controller and pump systems equipped with a BacNet output. This controller can be integrated with most EMCS.

3. Electric Meters

Main electric services: Install utility meter equipped with axillary pulse outputs fully integrated to the EMCS and central energy meter system. As an alternative, a BacNet meter can be installed after the utility meter and fully integrated with the EMCS and Central metering system. Note the electric utility will generally provide the pulse output connections on an electric utility for a reasonable fee.

Demand management scenarios shall be programmed as part of the EMCS design and installation.

Submeters: Install Utility quality electric meters for all tenant areas, these meters shall be fully integrated with the EMCS and the central energy metering system. Install electric sub meters for all significant loads over 150 KVA. Examples of areas requiring submeters include large data centers, cooling systems for large data centers, central HVAC plants, air cooled chillers exceeding 100 tons, vehicle charging stations large electric kitchen installations, athletic field and court lighting.

a. Electric Sub-Metering: Schneider “PowerLogic” PM5000 Series
| LOAD TYPE | LOAD DESCRIPTION | FDR SIZE | LOAD (KVA) | BKR (A) | CTK NO | LOAD (KVA) | BKR (A) | LOAD (KVA) | BKR (A) | LOAD (KVA) | BKR (A) | LOAD (KVA) | BKR (A) | LOAD (KVA) | BKR (A) | LOAD (KVA) | BKR (A) | LOAD (KVA) | BKR (A) |
|-----------|------------------|----------|------------|---------|--------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|
| N         |                  |          | 1          | 0.0     | 2      | 0.0        | 4       | 0.0        | 6       | 0.0        | 8       | 0.0        | 10      | 0.0        | 12      | 0.0        | 14      | 0.0        | 16      | 0.0        | 18      |
| N         |                  |          | 19         | 0.0     | 20     | 0.0        | 22      | 0.0        | 24      | 0.0        | 26      | 0.0        | 28      | 0.0        | 30      | 0.0        | 32      | 0.0        | 34      |
| N         |                  |          | 29         | 0.0     | 30     | 0.0        | 32      | 0.0        | 34      | 0.0        | 36      | 0.0        | 38      | 0.0        | 40      | 0.0        | 42      | 0.0        | 42      |

Notes:
1. KVA/PHASE: 0.0 0.0 0.0
2. TOTAL CONNECTED: 0.0 0.0
3. **LOAD TYPE CODE LETTERS**
   - C: CONTINUOUS LOAD (125% OF CONTINUOUS LOAD)
   - K8: KITCHEN DEVICES (SIX OR MORE AT 65% OF LOAD)
   - LM: LARGE MOTOR LOAD (LARGEST MOTOR x125%)
   - M: MOTOR LOAD (100% OF LOAD)
   - IM: INTERMITTENT MOTOR LOAD (75% OF LOAD)
   - N: NON-CONTINUOUS LOAD (100% OF LOAD)
   - R: RECEPTACLE LOAD (FIRST 10KVA AT 100%, REMAIN AT 50%)
   - Feeder Size: 1 2 3 4 5 6 7 R X E

**FAIRFAX COUNTY @ (100% OF LOAD)**
**REMAINING LOADS**

**PANELBOARD SPECIAL FEATURES**
- SURGE PROTECTION DEVICE (SPD)
- OTHER
EXHIBIT #2

8/12 STRANDED COPPER CONDUCTORS IN 1” CONDUIT.

ATS-ELS
ATS-ESB

20”x20”x6” NEMA 3R ENCLOSURE WITH SINGLE DOOR, STAINLESS 3 POINT LATCH AND PADLOCK HANDLE ASSEMBLY, HOFFMAN CAT#20R206CR.

2/12 1/2# STRANDED COPPER CONDUCTORS IN 3/4” CONDUIT.

I7”x17” UNPAINTED ALUMINUM SUB-PANEL HOFFMAN CAT#20P20AL.

12 CONDUCTOR, 600 VOLT TERMINAL STRIP, HOFFMAN NO. A-10, ENSURES TERMINAL STRAP AND BRACKET ASSEMBLY. (TYPICAL FOR 9)

BRACKET ASSEMBLY (TYPICAL FOR 2)

2” INVERTED NIPPLE WITH SCREW PLUG (TYPICAL FOR 2)

8/12 STRANDED COPPER CONDUCTORS IN 1” CONDUIT TO GENERATOR.

1/4” FIELD INSTALLED NON-METALLIC DIVIDER

GRACE

GENERATOR CONNECTION BOX

NOT TO SCALE
1. Coordinate stub-up and equipment connection location for all underground feeders with generator manufacturer prior to rough-in. Run conduits all 24" below finished grade.

2. Connect power conductors to generator main circuit breaker from rack mounted 3pot disconnect switch with inverted nipples. See riser diagram for continuation, conduit and wire sizes.

3. 4" conduit from generator gap panel to 154Aa Xfmr via enclosed CB.

4. Extend 1" conduit with 12/3/12 and 20/TRS twisted pair ('Belden' #413) from control panel to remote generator annunciator panel (RGAP).

5. 1" conduit with conductors to exterior wall mounted generator connection box as required to paralleled generator remote start and stop controls at ATS--GEN. Provide screw down wiring strip in enclosure for parallel connection of roll-up generator control wiring.

6. #20 in 3/4"C from generator control panel to day tank for control.

7. #4/0 AWG BTO BTO GROUND CONDUCTOR TO GROUND ROD. GADWELD CONDUCTORS TO GENERATOR FRAME AND GROUND ROD.

8. 10' by 3/4" STEEL COPPER CLAD GROUND BAR DRIVEN 30' BELOW GRADE AND CONNECTED TO GROUND ROD CONDUCTOR.

9. 20"--1/0 BTO UFER GROUND GENERATOR TRANSFORMER FOUNDATION FOOTING.

10. EQUIPMENT RACK, SEE 4/E5 FOR DETAILS.

11. 4#:500+4#:30 in 3" C from generator to double throw, center off switch.

12. 3#:6+1#:10G in 1" C from 200A FSS to 'ATS--FP'.

13. 4#:1+1#:6G in 2" C from 100A FSS to 'ATS--EHBB'.

14. Extend 4#:500+1#:40 in 3" C from 400A FSS to 'ATS--EHLS'.

15. 1" conduit with conductors to exterior wall mounted generator connection box as required to paralleled generator remote start and stop controls at ATS--GEN. Provide screw down wiring strip in enclosure for parallel connection of roll-up generator control wiring.

16. WALL MOUNTED REMOTE MANUAL STOP STATION WIRED TO GENERATOR CONTROL PANEL TO PROVIDE EMERGENCY SHUT DOWN OF THE GENERATOR.

17. 2#:12+1#:12G in 1" C from gap to day tank

18. 2#:12 in 1"C from generator control panel to day tank

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**EXHIBIT #3**

**GENERATOR SCHEMATIC DETAIL**

[Diagram of generator schematic detail with various labels and connections.]
GENERATOR GROUNDING DETAIL
NOT TO SCALE

NOTE: ALL EQUIPMENTS SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE 2008 EDITION ARTICLE 250, GROUNDING AND BONDING.

3/8" STEEL GROUND TEST WELL DETAIL
NTS
I. DESIGN

A. All site design must conform to the requirements of the Fairfax County Public Facilities Manual (PFM), Fairfax County Zoning Ordinance (ZO), Americans with Disabilities Act Accessibility Guidelines (ADAAG), and other governing codes and ordinances. All references for site construction and site details shall be to the PFM and/or to Virginia Department of Transportation (VDOT) standards.

B. Drainage

1. All storm sewer systems shall be designed for the 10-year storm event. It is recommended that all storm sewer pipes shall have no less than 1% slope, and all designs shall conform to PFM requirements. If slopes less than 1% are required, these storm sewers need to be highlighted and noted for special construction attention.

2. Drainage systems shall be designed to convey water to a natural watercourse or to an existing storm drainage facility on or off site. Outfalls of drainage systems which discharge onto adjacent property shall be in easements from the property line to either an existing easement or to a natural watercourse with bed and banks, per the PFM.

3. Overland relief shall be provided so that buildings will not be flooded during major storms. Overland relief shall be evaluated using the 100-year storm event.

4. The drainage system, including overland relief, shall be designed to account for flows from both on site and off site areas.

5. Grate inlets are prohibited on County maintained facilities unless approved in writing by DPWES-Maintenance and Stormwater Management Division (MSMD).

6. No buildings or parts of buildings, including overhangs and footings, retaining walls, or other building structures shall be constructed or placed within, or encroached upon, County storm drainage, sanitary sewer, or utility easements, unless prior approval received. In some cases, utilities can be “sleeved” under a retaining wall to prevent future maintenance issues.

7. All storm drainage pipes shall be reinforced concrete pipe with a 15” diameter minimum, unless otherwise approved in writing by the BDCD Project Manager and MSMD. For heavy traffic bearing surfaces or deep excavation applications, RCP is required to be used.
C. Grading

1. Buildings must be sited so that no flooding will occur even if there is a failure of the piped system.
2. The site must be graded such that if the piped system did not exist, there would be no flooding of any buildings. The site plan will be reviewed against the above standard and must conform to it.
3. The first-floor elevation of the building shall be at least 18" above the 100-year water surface elevation of the flood routing. NOTE: This is in Zoning Ordinance 2-905.2. A/E design must comply or LDS will not approve.
4. The building shall be sited on a pad that slopes away from the building at a slope of 5% for a minimum of 10 feet, except for hardscape areas which should be sloped at 2%.
5. All paved and/or formed surfaces excluding equipment pads shall be designed to slope throughout their entire area for positive drainage unless otherwise noted. Sloped surfaces shall include all indoor and outdoor vehicle storage, maintenance, and parking facilities as well as pedestrian walking areas exposed to outdoor weather.
6. All intentionally level surfaces shall include provisions for drainage such as floor or trench drains.
7. Grading will be designed to provide convenient access to the storm sewer and sanitary sewer facilities for maintenance and use.
8. No plants or landscaping shall be placed where they will interfere with the drainage patterns or where they will block inlets or access. When planting trees 20 feet or closer to a building adhere to Public Facilities Manual Section 12 (vegetation, preservation and plating).
9. All grassed areas shall have a minimum slope of 2% unless otherwise approved in writing by the BDCD Project Manager.

D. Stormwater Management

1. All Stormwater Management (SWM) and Best Management Practice (BMP) facilities shall be designed for 2-year and 10-year storm events and shall pass the 100-year storm event as required by the PFM.
2. Building Design and Construction Division (BDCD)/DPWES encourages the use of innovative stormwater detention and water quality provisions including the use of rain gardens, sand filters, bioretention ponds, vegetated dry ponds, porous
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pavement, and conservation easements, where applicable and subject to MSMD and LDS approval. Landscaped dry ponds are preferred, subject to approval of MSMD.

3. Landscaping at all SWM and BMP must be coordinated with and approved by BDCD Project Manager (PM to coordinate with MSMD and LDS).

4. Refer to the latest edition of the PFM for acceptable soil mix and planting materials in the bioretention facilities:

5. Where feasible, use of curb and gutter at on-site roadways and parking areas should be minimized to encourage sheet flow to lawn areas and minimize concentration of stormwater to structures and pipe.

6. Refer to PFM for the design criteria relating to the maintenance of stormwater management facilities (detention and water quality), including the following:

   a. Access ways to be cleared, graded, or constructed with the facility construction.
   
   b. Proximity to a public right-of-way to minimize the length of the access way.
   
   c. Multiple access ways for major facilities.
   
   d. No plantings, fences, or other obstructions to access.
   
   e. No plantings on the dam or berm of any stormwater management pond, without specific approval of the BDCD Project Manager and MSMD.
   
   f. No slopes greater than 3:1 along the edge of the access ways.
   
   g. One all-weather roadway for access to major facilities.
   
   h. A concrete trickle ditch is not recommended;
   
      i. Type 20 “Do Not Mow” signs have been revised. The new size is 7” x 12” and shall be mounted at a height of 48” above finished grade.

7. Underground stormwater detention and BMP chambers are shall be reviewed and approved by the BDCD Project Manager and the Maintenance and Stormwater Management Division.

8. Spot elevations should be provided in sufficient numbers to indicate to the Contractor the clear intent of the design for site grading and top of curb elevations.

9. On parking lot islands, top of curb elevations shall be provided as shown below:

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Width <5'

Width > 5'

Irregular shape

E. Accessibility

1. All site design shall comply with the requirements of the most current ADAAG. Any potential variance shall be brought to the attention of the County Project Manager before incorporation into the plans.

2. Accessible travel ways can not exceed a 2% cross slope, or a 5% running slope. Slopes in excess of 5% must be designed as ramps per ADAAG requirements.

3. Accessible path of travel shall be noted on the site plan from public street point of access and other site features to the main entrance.

F. Landscape Development

1. Designer Credentials

Any firm or individual charged with the preparation of landscape plans for new or existing public facilities must submit to the BDCD Project Manager the name of the person or persons who will be responsible for the plan preparation.

2. Plant Recommendations on Fairfax County Properties

The selection of plant materials will, in general, be made from the approved list of plant materials included in the PFM. Plant materials appropriate for the particular site and location should be reviewed and selected to promote short and long term survival and not require irrigation. Common names of plants shall be included in the planting schedule for the site. Additional species may be used with approval of the BDCD Project Manager.


3. Spacing

a. Plants shall normally be spaced so that they will touch when they achieve 2/3 of their largest potential size. This rule varies according to specific design.
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objectives, but over-planting to achieve a premature "finished" look is not acceptable; nor is expanded spacing that results in permanent, unplanted, mulched areas.

b. No woody shrub is to be planted closer than three feet from a building wall. No tree, other than columnar evergreens should be within 15 feet from a building wall.

c. Maintain 10 feet clear around siamese connections and four feet clear around fire hydrants.

4. General Suggestions

a. Locate plants in areas that are compatible with their growth requirements, i.e., azaleas should be used in a semi-shaded, well-drained locations rather than in sunny, pavement surrounded areas.

b. Large mass planting beds or plants that will achieve a natural height or more than 3 feet shall not be used, except by roads, parking lots, etc. In general, such mass planting beds shall not be greater than 10 feet wide at any given continuous mulched bed. A/E shall consider CPTED principals and sight distance requirements in the site design.

c. Beds planted solely with low ground cover plants, such as vinca minor, hedera helix, or pachysandra, are not acceptable, except on slopes too steep to mow. Such plants (except hedera helix) shall be used in conjunction with woody shrubs. Woody ground covers such as horizontal junipers, cotoneaster, helleri holly, germander, or herbaceous materials such as liriope, sedum, etc. are acceptable, provided no planting of a single species exceeds 12 feet in bed width. Exceptions can be made depending on specific site conditions.

d. All plants specified must be hardy to U.S.D.A. Zone 6. Specifications for all plant materials shall include adherence to the latest Landscape Specifications for the Baltimore-Washington Metropolitan Area.

e. Specifications shall identify proper preparation of beds for trees, shrubs and ground cover in order to promote best chances for survival of plantings.

f. Specifications shall identify a standard schedule of landscape maintenance activities required during the warranty period.

5. Locations for trees and shrubs must be coordinated with wet and dry utilities, utility easements and street/site lighting (including conduit), prior to submission to LDS.

6. Specifications shall provide that all trees, shrubs and lawns are to be have warranty and be maintained by the Contractor (watered, fertilized, pruned, weeded, etc.) to ensure
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survival and to support the warranty for a minimum of one year after installation and acceptance of the landscaping, but not less than one year from date of substantial completion. Upon completion of the maintenance and warranty period, the Facilities Management Department (FMD), Building Design and Construction Division (BDCD) and the Contractor shall conduct a final walk-through of the site to ensure all plantings and lawn areas (grass) are acceptable. Minimum maintenance shall include weekly watering, as required, and spring and fall mulching.

7. The first approximately ten feet of lawn area nearest to the building on all sides shall be planted with sod. The requirement must be clearly reflected on the site plan, with an appropriate specification section included. Sod should be further extended as appropriate on a site-to-site basis to avoid narrow gaps of seeding.

8. All project specifications shall require full lawn maintenance during the one year warranty/maintenance period from the date of substantial completion including watering, fertilizing, mulching, grass cutting, pruning, pest control, weeding of plant beds, edging, etc.

9. All new or disturbed drainage swales are to be sodded; or seeded, mulched and stabilized with biodegradable mat or fabric. Specifications for seeding and mulching must include straw mulch, to protect seed during germination period. Use of rip rap is acceptable if the stormwater volume and/or velocity may necessitate such material.

G. Fire Lanes and Signage

1. All fire lanes and locations of signs shall be marked on the site plan per applicable edition of the Fairfax County Fire Prevention Code and the FRD Code Reference Package. See http://www.fairfaxcounty.gov/fr/prevention/fmpublications.htm#crp. Contractor is to provide required signs, curb markings and pavement striping.

H. Screening

1. If barrier fencing is required, coordinate with Owner for acceptable fencing, that must also comply with Zoning Ordinance requirements. Black, vinyl coated chain link fencing is generally preferred at rear and side yards, where acceptable.

2. If block, masonry, stone or rubble screening or retaining walls are used, all wall elements must be securely anchored in place to prevent vandalism.

3. Screening walls and fence surfaces shall be treated with an anti-graffiti coating.

I. Pavement Design

1. All pavement sections for parking lots and roadways shall be designed based on CBR tests to be performed at appropriate locations during the initial geotechnical
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investigation. Specifications shall require the contractor to obtain additional CBR test results from soil samples at actual subgrade, and submit CBR results to engineer for final pavement design. Design of the pavement section must accommodate the specific facility needs for types of traffic.

2. Any exterior architectural brick or stone pavers are to have a rough texture finish to minimize risk of slipping. Use of pavers is discouraged along the exterior, accessible path due to risk of displacement leading to ADA non-compliance.

3. Provide a concrete pavement extension at the dumpster pad for truck tires. Include bollards at rear and sides of dumpster location. Refer to PFM for design guides.

J. Site Lighting

1. Site lighting may be installed by Dominion Energy or Northern Virginia Electric Cooperative (NOVEC) under the County's Municipal Street Lighting Contract; or by the General Contractor if County standard site lighting fixtures are used as approved by FMD for operation and maintenance. Coordinate with the BDCD Project Manager. The site lighting design shall be prepared by the Architect as coordinated with the BDCD for County standards. After approval by the County and Dominion Energy (or NOVEC or FMD), the site lighting is to be incorporated into the site plan by the Architect. The empty conduit for the underground cables is to be included in the construction contract in projects where light poles, fixtures and wiring are to be installed by Dominion Energy or NOVEC. Architect is to prepare plats for easement locations based on approved site lighting layout, if required. All site lighting designs must comply with Zoning Ordinance Glare Standards and shall utilize sharp cut-off fixtures.

2. All site lighting is to be LED. Refer to Section 260000 for preferred fixtures.

K. General Requirements

1. The Architect is to notify adjacent property owners of submission of site plan per LDS and Zoning Ordinance requirements.

2. Specifications shall require that the Contractor retain a testing agency to perform all site work testing and inspections more than 5' outside the building footprint. The Contractor shall not use the same inspection firm as the County retains for Special Inspections program.

3. The water meter must be properly sized to avoid unnecessary cost of purchasing an oversized meter. The plans must note that the Owner will pay for the water meter and gets a receipt, and the contractor is responsible for the pick up from the Water agency and the installation.
4. The minimum horizontal between water mains and appurtenances (including but not limited to service lines, meter boxes, valve boxes, and hydrants) and gas mains shall be 5 feet. When a water main or appurtenance crosses a gas main, either above or below, a minimum vertical clearance of 12 inches is required. When a concrete pad is required by the pipeline company, the water main shall be routed around the concrete pads, using 4-45° horizontal bends. The requirements shall further be coordinated and verified with the water authority and utility companies as applicable on a project by project basis.

5. If the geotechnical report identifies problem soils, the report must be submitted for the review and approval by Land Development Services (LDS) prior to completion of the Design Development phase.

6. All utility company easements, new and existing, must be shown on the site plan. The A/E shall prepare and submit to LDS signed and sealed originals for all on-site and off-site easement plats for review and approval as part of the Not for Recordation (NFR) Plat process by the end of the design development phase. All easement plats are to be prepared in the LDS standard easement plat format, and all plats must be finalized and approved by Land Acquisition Division (LAD) by the 50% CD stage. It should be noted that easement plats are required for sanitary and storm sewer facilities located on Fairfax County owned properties that convey off-site flow. Fairfax Water (or the appropriate water agency) easements must be recorded before inspections will be made by Fairfax Water (or the appropriate water agency). Easements are also required for Dominion Energy, Verizon, Cable and telecommunications lines, but not during site plan review. All easements must be coordinated with site improvements including landscaping.

7. Building corners are to be tied to property lines, using survey coordinates on the site plan (geometric layout plan).

8. Identify the service entry conduits for telephone, cable television (CATV), computer/data (I-NET), and electric into the appropriate room of the building. Provide two four-inch conduits each for all Verizon (telephone) and Cox (CATV and I-NET) from the main telephone room to the property line. Coordinate with utility company all new utility services and relocations, and identify all existing and proposed utility locations on the site plans, and coordinate with all landscaping.

9. Utility meters, transformers, generators, and service yards and the like are not to be located at the front of the facility, and must be screened from view, where appropriate.

10. Delivery doors must be heavy duty and provided with curb cut for materials delivery.
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1. A minimum of two (2) feet is required between the trail edge and any vertical obstructions such as trees, utility poles, signs, or other obstacles.

2. All vegetative material within a clearing envelope of at least 10 feet high by 10 feet wide shall be removed prior to trail construction.

3. The minimum allowable longitudinal slope for trail construction shall generally be no less than one percent (1%). Maximum longitudinal slopes shall meet ADA standards and shall not exceed 5%, or 8.33% if designed as a ramp with handrails. The allowable transverse (cross) slope is 2.0%.

4. If longitudinal slopes on concrete sidewalks are equal to or in excess of three percent (3%) and when the underlying soil has 34% or more passing the No. 200 sieve and has a PI of 13 or less, Fairfax County Standard UD-3 sidewalk under-drain shall be installed.

5. Side slopes adjacent to sidewalks and trails shall not exceed 2:1.

6. All storm pipes associated with sidewalks and trails shall be reinforced concrete pipe, except for UD-3 sidewalk under-drains, where required by PFM.

7. Generally, 20 feet shall be the minimum allowable turning radius on sidewalks and trails. However, the actual minimum allowable turning radius shall be computed by the design engineer based on expected use and site conditions.

8. Provide a paved surface from all emergency exits leading away from the building to a paved area of refuge.

M. Termite Control

1. The A/E shall provide recommendation whether the termite control may be necessary for each project.

2. If termite control is necessary, the specifications shall require that under the slab termite control be provided with a one-year warranty from the date of substantial completion.

N. Accessible Design

1. Provide easy and direct access to all facilities.

2. Provide proper accessible circulation in/around a bus shelter.

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3. Provide continuous accessible path of travel from building entrance to immediately adjacent bus stops and streets crossings.

4. Consider line of sight issues, including signs and sign placement, in all pedestrian access to and from the building.

5. In buildings with multiple functions and where separate entrances are provided for each function, each function shall have an accessible route and entrance.

6. When providing alternate accessible entry points to a room or building, consider the proper signage directing people to the ramp or entry point.

7. Consider two or more exterior accessible evacuation routes for emergency egress away from building.

8. Pavers shall not be used for accessible routes. If a textured surface is desired, consider other materials such as stamped concrete.

9. Consider population to be served when determining amount of accessible parking spaces to be provided. (Example: Senior Centers).

10. Provide accessible parking spaces adjacent to, or as close as possible to the building.

11. Consider accessible seating at the site/parking lots for rest areas. Consider accessible picnic tables to double for lunchtime/break use. Be mindful of curbs surrounding the area (access from parking lot by wheelchairs).

12. Accessible routes through a parking lot must comply with ADA slope requirements. Parking lots may have up to 10% grades but the accessible routes are limited to 5% running slope, 2% cross slope and 8.33% slope if ramped with handrails.

13. Design curb ramps so that drainage and debris do not collect at bottom of ramp. Do not place obstructions (drainage grates/inlets, trash cans) in the travel path. Pay careful attention to passenger drop off areas.

14. Any crossing signals adjacent to a County facility should be reviewed and coordinated with VDOT for length of crossing time.

15. Replace older (non-compliant) curb ramps that provide direct access to County facilities, including those immediately adjacent in the VDOT right-of-way.

16. Sidewalks should be a minimum width of 5’ from the accessible parking area to the entrance(s) of the building.
17. Consider raising any crosswalk elevation to meet the sidewalk elevation. (Creates a subtle speed bump for drivers).

18. All crosswalks should be perpendicular to the roadway.

19. Provide an accessible path and parking for each program area of buildings with multiple entrances for different programs.

O. Natural Landscaping

1. The Fairfax County Natural Landscaping Policy (adopted in September 2007) should be incorporated into all proposed Capital Improvement projects that include landscaping designs.

2. Natural Landscaping is defined as landscaping that improves the aesthetic and environmental function of formal and restored areas by recreating land features and plant communities found in nature.

3. Sustainable landscapes should seek to maximize the use of native plants, remove invasive plant species, reduce turf grass and chemical inputs, improve soils, and retain rain water on-site.

4. Use only locally common native plant species to provide the greatest possible ecological benefits whenever feasible.

5. Non-invasive exotic plants may be used where appropriate, but the majority of plant cover should be composed of native species that support wildlife.

6. When possible, utilize Low-Impact Development (LID) practices that use trees, vegetated swales, rain gardens, and other natural features instead of concrete structures to treat stormwater.
Appendix A – Clinical Facilities with Negative Pressure Rooms

I. General

A. The room shall be completely sealed (walls, ceiling, light fixtures, etc.)

B. The room shall have full height partitions that are sealed “deck to deck” at the top and bottom. It shall be interior to the facility (i.e., not in a perimeter location with windows or outside walls.

C. Wall gaskets shall be provided for all light switches, power receptacles, and data drops (T-stats and fire alarm devices are not to have gaskets).

D. Level five finished walls as defined by the Gypsum Association (GA 214-10) and incorporated into ASTM C 840 with semi-gloss finish paint shall be provided.

E. Acoustical ceiling tiles shall be non-perforated and cleanable such as Armstrong vinyl Clean Room VL ceiling tiles. Gypsum board ceilings will be considered if they are finished to the wall standards and there are no above ceiling items that require access. Access panel should be avoided. Where unavoidable, they shall be sealed with latex vinyl adhesive caulk and painted.

F. VCT flooring shall be provided.

G. All plumbing and other piping penetrations associated with the fixture itself shall be sealed at the wall(s).

H. Accessories and/or wall furnishings (such as white boards, posters, etc.) shall be avoided unless affixed using non-penetrating methods such as “double sided” tape.

I. The door shall be sealed to the frame utilizing non-pervious and cleanable edge seals or weather stripping.

J. The door shall have an automatic closer.

II. HVAC

A. Doors shall have static sweeps unless an undercut is deemed appropriate for makeup air purposes; however, the undercut shall not be greater than ½” above the finished floor. The mechanical designer shall ensure there is sufficient makeup air available for transfer from the corridor. Where an undercut is incorporated (i.e. not door sweep), visual airflow aids are required such as Davis “Air-Flow Tels” 950. Provide three (3) equally spaced along the bottom of the door with the tips 1/8” above the finished floor. Refer to paragraph B below for additional makeup air information.

B. If makeup air is required beyond what a door undercut will provide, the approach is to be from an adjacent return air plenum. The makeup air shall be introduced into the room via an air device similar to the supply air device and immediately adjacent to it.
Appendix A – Clinical Facilities with Negative Pressure Rooms

It shall communicate with the plenum other than directly above the room and be connected via rigid ductwork with a barometric backdraft damper. The duct shall be sealed where it penetrates the room’s full height partitions. The mechanical designer shall ensure there is sufficient makeup air for transfer from the plenum.

C. The exhaust shall be directly to the outdoors.

D. The room air shall be continuously exhausted during business hours.

E. There shall be a redundant exhaust fan. If the building has an automation system, the fans shall be programmed to operate in a lead/lag fashion where the lag fan will automatically operate upon the lead fan failure. The fans’ daily operational schedule shall be adjustable by the building operators through the automation system.

F. The exhaust fans shall be direct drive and be on generator power.

G. Unless the designer can establish a roof mounted location where exhaust can be discharged straight up and away from building elements, and at high velocity, the exhaust air shall be routed through a HEPA filter assembly. The HEPA filter assembly shall be located in an easily accessible location, such as elevated on a flat portion of the roof and shall incorporate differential pressure monitoring. In all cases, the discharge shall be directed away from the building and not near any air intake sources such as windows, doors, louvers, etc. per local building code requirements. It should be noted that a HEPA filter assembly may be required regardless of the intended discharge condition and will need to verify this with the BDCD Project Manager during design.

H. Round exhaust ductwork is preferred. In rectangular ducts, turning vanes are to be avoided and specify standard or long radius elbows (inside mitered elbows are unacceptable).

I. Provide permanent (stenciled) warning signs every six (6) feet on both sides of horizontal exhaust ductwork and labeled “NEGATIVE PRESSURE EXAM RM EXHAUST”. The lettering shall be 2” high. Airflow direction arrows shall also be provided of the same size on either end of the warning labels. Vertical ducts shall be labeled similarly, but on ALL sides for potentially exposed to view such as if a drywall chase were to be removed.

J. There shall be a minimum of 2 outside air changes per hour.

K. There shall be a minimum of 12 total room air changes per hour.

L. The minimum pressure differential (with door closed) shall be 0.01” water column with respect to immediately adjacent areas and as measured at the room’s door. (Room shall not exceed -0.02” water column.) It is recommended that measures (VFDs, speed

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Appendix A – Clinical Facilities with Negative Pressure Rooms

ccontroller(s), volume dampers, etc.) be incorporated for adjusting and setting of the airflow to achieve the pressure differential.

M. Adjacent to the door, specify electronic monitoring of airflow utilizing Siemens SRCM Room Pressure Monitor 547-323A 9 and tap plates) with a 45 second delay (adjustable) to prevent nuisance alarms. Specify a Siemens remote annunciator module (547-199) with acknowledged switch to be tied into the pressure monitor and located in a conspicuous location where operational staff normally reside, such as behind a reception desk.

N. When there is a building automation system, the room pressure monitor shall be tied into it for monitoring, trending/logging, and alarming. Where possible, an alarm condition will send emails to the building’s operation’s staff alerting them to the problem.

O. The airflow path within the room is to be “top down” and maximized such that it flows from behind where the health care worker would normally position their self to behind the patient examination area. This is generally thought of as flowing diagonally from the door side of the room to the wall opposite the door.

P. The exhaust air shall be captured through a wall grille centered 18” above the finished floor. The A/E shall specify a clear wall cavity of sufficient size to house the required ductwork. The supply air shall be located in the ceiling and be via a register or diffuser.

Q. It is preferred that the room be serviced by a constant volume system. When there is a VAV system, a dedicated shut-off VAV box shall supply constant airflow (i.e. the VAV box shall be programmed and balanced such that the minimum airflow shall match the maximum airflow.

R. Light fixtures shall not have return air “slots” nor other openings that allow air passage other than what is factory standard and for cooling and ventilation of the fixture itself.
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1.0 Introduction

1.1 Overview: Communications technologies are a critical element in the design of all new construction and renovation building projects. Whether it is voice, data, building automation systems (energy management, lighting), door access, security, camera, or other communications technologies. It is important that a team of experienced professionals be involved in the design of these complex systems from the onset.

1.2 General: For all construction projects for Fairfax County, construction budgets are required to fund all internal and external telecommunication assets. This includes all wiring, telecom rooms, connectivity products, electronics, etc. Department of Information Technology (DIT) shall have the responsibility of recommending the computer hardware and software required to operate these systems. This process will ensure that all computer hardware and software are in compliance with DIT standards and ensures the compatibility required for the County’s IT infrastructure.

1.3 Codes and Standards: Fairfax County communications systems shall follow all applicable codes and standards set forth in the following: National Electrical Code (NEC); National Fire Safety Council (NFSC); National Fire Protection Association (NFPA); American National Standards Institute (ANSI); Telecommunication Industries Association (TIA); Electronic Industries Alliance (EIA); Telecommunication Building Wiring Standards; Federal Communications Commission (FCC); Institute of Electrical and Electronic Engineers (IEEE); and Building Industry Consulting Service International (BICIS) - Telecommunication Distribution Methods Manual. These standards are to be used as reference when designing telecommunication systems.

These standards are not intended to be used as the final specification or bid document for any specific project. The standards are to be used as a starting point in a process of collaboration between the architect/designer, owners and DIT.

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2.0 Telecommunication

2.1 Overview: The main telecommunication room provides demarcation between the per-floor horizontal service distribution cabling and the building voice, data, and video backbone cabling. Furthermore, it provides the connection point between the building backbone and horizontal distribution pathways. These securable room shall be dedicated to this purpose with no other building service sharing the space.

2.2 Conduit and Jack Requirements:

A. Minimum of four (4) 4” conduits must be provided from the Quazite pull boxes located near the property line to the telecommunications equipment room. Each conduit must have mule tape with footage markings.

B. Intra-building conduits (connecting communication rooms) shall have minimum of two (2) 4” empty conduits with mule tape identified with footages. Intra-building conduits must be provided vertically and horizontally between all communications rooms that are wired in a series. The number, locations and routing of these conduits are to be approved by the DIT Project Manager.

C. A one-inch conduit with drawstring must be provided to each communication device location and stubbed towards the telecommunications room. The 1” conduit must be stubbed to the nearest drop ceiling area. Cable trays may be required based on the overall density of the voice and data cabling. Only metallic conduit or PVC (schedule 40) smooth conduit are allowed.

D. Co-located voice and data communications cables may utilize the same 1” conduit into a single gang box.

E. Inaccessible or secure areas must have an entire conduit system from communication jack to the telecommunications equipment room.

F. Provide a conduit for all plenum and/or hard ceiling areas.

G. Empty conduits and boxes in concrete slabs or an under-slab duct /conduit distribution system, are required for systems furniture and/or freestanding furniture requiring communications outlets. Provide sleeves through floors and ceilings as required for cable pathways.

H. Provide a pull box every 200 feet and at each 90-degree bend.

I. Turn up under floor duct (UFD) three inches from the wall and at least three inches above the finished floor.
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J. Accessible pull boxes which can be used as a junction point for several one-inch conduit runs, and which provide an empty three-inch conduit with mule tape having footage markings home run to the nearest Telecommunications Equipment room must be identified and detailed.

K. Provisions for dedicated voice and data jacks at mechanical EMCS stations and the direct dialer in the Telecommunications Equipment room for remote emergency monitoring must be made.

L. All voice and data jacks, wiring and cover plates will be furnished and installed by Fairfax County or its authorized vendors and contractors. Empty conduits with pull strings, pull boxes, junction boxes and fit-up of Telecommunications Equipment room with plywood, ground wire and buss bar, and electrical outlets as described in these guidelines, shall be included in the design and provided to the contractor.

2.3 Telecommunication Equipment Room: For telephone, data, video (CATV), etc., must be separate from electrical room.

A. Telecommunications Equipment rooms must be of adequate size to accommodate requirements for County telephone, data and CATV, but in no instance shall they be smaller than 10’ X 12’.

B. All four walls shall be covered with 4’ x 8’ x ¾” fire retardant plywood for County telephone, data and cable television equipment. Plywood shall have two coats of white paint and installed from floor to ceiling. (6ft x 4ft.). Additional backboards may be required for telephone or CATV equipment. Fire retardant stamp on the plywood must be in full view for inspection.

C. Provide anti-static VCT flooring in the room.

D. Door shall be minimum of 36” wide, opening outward. The door shall be secured by lock and key or access card reader.

E. Minimum of one Telecommunications Equipment room must be provided at each floor of a facility with additional rooms as required to accommodate the communications equipment and wiring requirements. The Telecommunication Rooms should be located above each other on the different floors. If the Telecommunications Rooms are not stacked, they shall have a means of access on the floor above and below via metal conduits or sleeves.
F. Adequate floor space for two (2) 19” wide by 26” deep by 84” high Cable Talk racks. Maintain minimum of three feet of clear space on all sides of electrical/communications equipment.

2.4 Cabling: Interior wiring on all new building shall be CAT-6 or better. Any deviation must be pre-approved by DIT.

A. Station Jacks Standard
   1. CAT 6 Siemon 1-CT-6-A4-A4-02 Dual Jacks with a white icon for voice and a red icon for data, 568B 8-pin, RJ45’s.

   2. CAT 6 Siemon 1-CT-6-A4-A4-02 Dual Jacks with white icon for voice and a red icon for data, 568B 8-pin, RJ45’s to be used upon request only.

B. Station Cabling Standard
   1. Data – Mohawk MegaLAN 400 CAT 6 24 AWG 4PR (blue in color). All cables should be plenum rated.
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2. Voice – Mohawk CAT 6, 24 AWG 4PR, Yellow in color and plenum rated.

C. Connecting Blocks Standard
   1. 110 Type CAT 6 Siemon # 100PR Voice Termination 110 Type CAT 6 Siemon# 300PR.
   2. 110 Type CAT 6 Siemon # 100PR Data Termination.
   3. 110 Type CAT 6 Siemon # 300PR.
   4. 66 Type CAT 6 Siemon # S66M1-50 Data Termination.
   5. 66 Type CAT 6 Siemon # S66M1-50 Voice Termination.

D. Patch Panels Standard
   1. Siemon CAT 6 24-port-Blank #CT-PNL-24 48-port-Blank #CT-PNL-48 Inserts. Dual RJ45 #CTS-A4-A4-02 (red icons for data).

E. Patch Cords Standard
   1. RJ45 to RJ45 8-pin-to-8-pin 568B CAT 6 (voice patch cables to be yellow in color).
   2. RJ45 to RJ45 8-pin to 8-pin 568B CAT 6 (data patch cables to be grey in color).

F. Racks Standard
   1. All new/future facilities.
   2. Cable Talk rack 84” by 19” rack with minimum 5” cable management on both sides, electrical power strip and top panels.

G. Under Floor Duct Systems

H. Raised Floors
   1. Twenty-four inch raised floor BICSI Telecommunications Distribution Methods Manual Volume I.

2.5 Standard Numbering Plan for Cabling Systems:

   A. All vendors working on County IT projects shall maintain Fairfax County’s Numbering Plan for wiring. Station cables shall be labeled by the
communications room that they pull to, then by sequential numbering. For example, TC01-001 is station cable 001 connected to telephone room 01. The station end shall terminate in a dual jack with a white icon insert for voice and a red icon insert for data. The telephone room end shall terminate in wall-mounted blocks (AT&T 110 or Siemon 66 type) for voice cable, and directly to the CAT 6 patch panel for data cable.

B. Workstation cable runs cannot exceed 290 feet from the Telecommunications Equipment room. County buildings that exceed 290 feet from station set to the Telecommunications Room will require more than one Telecommunications Equipment Room.

C. All cables, circuits and facilities shall be clearly identified and labeled at all County sites. Cable shall be labeled at terminating points by use of durable self-laminating wire and cable markers. Patch panels, station jacks, terminal plates, etc., shall have typed labels. The AT&T 110/66 Siemon blocks shall be equipped with designation strips, which will be used to mark county cable and identify use. At the station jack, a label shall be placed at each cable, inside the outlet box, and on the jack faceplate.

2.6 Grounding:

A. All cabling systems and electronics-distribution equipment shall be grounded for both safety and minimization of electromagnetic interference. A 12-inch buss bar with an insulated number 6-ground wire shall be installed from the buss bar to the main building ground using a double lug nut, in accordance with the NEC guidelines. All building wiring, pathways and spaces, grounding and bonding shall meet or exceed the ANSI/EIA/TIA Telecommunications Infrastructure Standards as well as the NEC Electrical code (NFPA 70).
2.7 Electrical:

A. For every rack included in the design, there shall be one 120Vac/20A quadplex outlet at 90” AFF behind the proposed rack location(s) or installed on the rack. Each of these outlets shall be on a dedicated circuit connected to emergency power (UPS and generator).

B. Among all walls there should be one 120Vac/20A electrical duplex outlet every 6 feet at 18” AFF.

C. Minimum of two ceiling mounted, LED tube light fixtures with cover guard and a separate wall mounted switch to provide a minimum of 50-foot candles at 3’ above finish floor and connected to emergency power (UPS and generator).

2.8 HVAC: All Telecommunications Equipment rooms shall be provided with HVAC systems capable of maintaining the temperature of the room between 64 to 75 degrees F with the humidity being kept between 35 and 55 percent non-condensing. Separate split system units are acceptable.

2.9 Industry Standards and References: All building wiring, pathways, space grounding and bonding shall meet or exceed industry codes, Government Regulatory standards, and references current as of the time of the project design.


B. TIA/EIA-568-B.1-1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements - Addendum 1 – Minimum 4-Pair UTP and ScTP Patch Cable Bend Radius (May 2001)


E. TIA/EIA-568-B.1-4 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements > Addendum 4 – Recognition of

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Category 6 and 850 nm Laser Optimized 50/125 Multimode Optical Fiber Cabling (February 2003)


J. TIA/EIA-568-B.2-2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 2, Revision of Sub-clauses (December 2001)


L. TIA/EIA-568-B.2-4 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 4, Solderless Connection Reliability Requirements for Copper Connecting Hardware (June 2002)


P. TIA/EIA-568-3 Optical Fiber Cabling Components Standard (April 2002)


R. TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces (October 2004)

S. TIA-570-B Residential Telecommunications Infrastructure Standard (April 2004)

T. TIA-598-C Optical Fiber Cable Color Coding (January 2005)

U. TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure (May 2002)

V. J-STD-607-A Commercial Building Grounding (Earthling) and Bonding Requirements for Telecommunications (October 2002)

W. TIA-758-A Customer-owned Outside Plant Telecommunications Infrastructure Standard August 2004


3.0 Energy Management and Control Systems

3.1 Overview: Direct Digital Control (DDC) and Energy Management and Control System (EMCS) shall be installed on all new buildings. The control systems shall be based on Building Automation and Control (BACnet) protocol (ISO 16484-5) using County’s secured V-LAN network and approved Internet browser to remotely view system graphics, and monitor, control, and configure HVAC system and its properties. EMCS shall include Owner approved graphics including floor-level graphics with links to equipment for each building system.

3.2 Industry Standards and References: All systems shall meet or exceed industry codes, Government Regulatory standards, and references current as of the time of the project design.

A. American Institute of Architects (AIA).

B. ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

C. Edison Electric Institute (EEI).

D. National Electronic Contractors Association (NECA).
4.0 Lighting Control Systems

4.1 Overview:

A. The following guidelines have been established for contractors to install and configure Lighting Control Systems (LCS). The standardization of LCS hardware, server, PC operating systems, databases, and networking will enable DIT to provide a controlled environment. This will ensure the LCS systems are well protected from cyber security threats and are physically secured, maintained and backed up. Secure access to these systems will be provided to the FMD staff and its contractors in order to manage and troubleshoot LCS issues and upgrade these systems.

B. The County has not standardized on a single Lighting Control System (LCS). There are several comprehensive lighting management software systems used in our buildings which provides intelligent control of the building’s lighting. The lights turn on and off automatically, brighten or dim to match different needs in different areas of a building or office. In addition, it turns on the outdoors lights when night falls, dim or brighten to meet light level requirements for spaces that have access to natural light through windows (daylighting). Lights should turn off when no one is in the area in order to save energy and reduce costs, respond to movement, and can come on in response to an alarm or emergency. Some spaces have multiple, preset scenes that offer staff the ability to quickly set lighting level in response to what activity is taking place.

C. Applications need to have a web interface that allows staff the ability to control, monitor, and schedule lights from a graphical floorplan. This building floorplan must include visual representation of the status of lights, indicate occupancy, and alarm on any fixtures that are failing. It must allow FMD staff the ability to easily set lighting levels, tune individual lights, and troubleshoot problems quickly by identifying fixtures that have raised alerts.

4.2 Industry Standards and References: All systems shall meet or exceed industry codes, Government Regulatory standards, and references current as of the time of the project design.

A. ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

B. Illuminating Engineering Society (IES).

C. International Energy Conservation Codes (IECC).
5.0 Building Access Control Systems

5.1 Overview:
A. Scope and installation requirement for Building Access Control Systems (BACS) at each facility shall be evaluated with FMD during design phase. The County’s standard access control system for all facilities is Honeywell WIN-PAK PE software. All facilities must integrate with the County’s use of Honeywell WIN-PAK PE software.

B. Honeywell WinPak is an Integrated Security Management System (ISMS). The BAC system shall function as an electronic access control system and shall integrate the alarm monitoring, CCTV, digital video, ID badging and database management into a single platform. It shall function as a one-stop gateway for all the access control needs. A modular and network-enabled architecture shall allow maximum versatility for tailoring secure and dependable access and alarm monitoring solutions.

5.2 Industry Standards and References: All systems shall meet or exceed industry codes, Government Regulatory standards, and references current as of the time of the project design.

A. Federal Communications Commission (FCC):
   1. FCC Part 15 – Radio Frequency Device
   2. FCC Part 68 – Connection of Terminal Equipment to the Telephone Network

B. Underwriters Laboratories (UL):
   1. UL294 – Access Control System Units
   2. UL1076 – Proprietary Burglar Alarm Units and Systems

C. National Fire Protection Association (NFPA):
   1. NFPA70 – National Electrical Code

D. Electronic Industries Alliance (EIA):
   1. RS232C – Interface between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange
   2. RS485 – Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multi-Point Systems
APPENDIX B: INFRASTRUCTURE GUIDELINES

E. Federal Information Processing Standards (FIPS):
   1. Advanced Encryption Standard (AES) (FIPS 197)
   2. FIPS 201: Personal Identity Verification (PIV) of Federal Employees and Contractors

F. Homeland Security Presidential Directive 12 (HSPD-12)

5.3 System Components:

A. The Building Access Control System shall run on a single computer or on multiple computers, allowing flexibility in configuring a networked system. System components are divided into following six components:

1. Database Server: The database server is used for storing the database tables. This data is accessible to communication server and user interface for retrieving and generating the reports. The database server shall be installed on the client computer or any other computer connected to the network.

2. Archive Server: The archive server is used to obtain data from the archive database (the archive database consists of the backup details of the WINPAK main database).

3. Communication Server: The communication server routes user interface requests as well as the access transactions to the panel. The panel in-turn processes the transactions and sends the information to the database server as well as responses to the user interface through the communication server. When the communication server is sending information to the database server, it can also receive a request from the user interface. In this scenario, the communication server considers the user request as a higher priority and stops the panel-database server communication until the user request is processed. The communication server shall be installed on the client computer or any other computer connected to the network.

4. User Interface (Building Access Control System Client): The user interface helps Building Access Control System operators to communicate with the access control system. The user interface shall be installed on the computer where the database server or the communication server is installed, or any other computer connected to the network. Several client computers can be run simultaneously and can access the single database server simultaneously. The number of client computers varies based on the licensing information of Building Access Control System.
5. WIN-PAK API Server: The API server is used to obtain and set the details in the WIN-PAK database using the Application Programming Interface (API).

6. WIN-PAK Web: The WIN-PAK Web application is an extension of the WIN-PAK host application with limited operations. The operations such as Adding Cards and Adding Card Holders that are common to both WIN-PAK host and WIN-PAK Web application are saved on a common database server.

B. System Services: addition to above six components, the Building Access Control System includes the following four components, also called Building Access Control System services

1. Command File Server: A command file server provides text files containing device instructions that shall be stored in the command files database. The commands in the command files can be sent to the devices automatically on receiving, acknowledging, or clearing an alarm. Also, the command files can be manually executed.

2. Guard Tour server: A guard tour is a defined series of check points a guard must activate within a given amount of time. The check points are readers or input points where the guard presents the card or presses the button.

3. Tracking and Muster Server: A muster server is enabled in the event of an emergency and allows the card holders to swipe the readers. Muster areas are logical areas that contain readers to be used by the card holders, only if there is a call for muster (in the event of a disaster, for example).

4. Schedule Server: A schedule server schedules the list of events to be performed at a predetermined time and intervals such as hourly, daily, or monthly.
6.0 Building Security Surveillance Camera System


6.2 Industry Standards and References

A. The Security Industry Association (SIA)  
   https://www.securityindustry.org/

B. The Physical Security Interoperability Alliance  
   https://psialliance.org/

C. Open Network Video Interface Forum (ONVIF)  
   https://www.onvif.org/

D. American Society for Industrial Security (ASIS International)  
   https://www.asisonline.org/

E. Department of Homeland Security System Assessment and Validation for Emergency Responders (SAVER)—CCTV Technology Handbook  
7.0 General Guidelines for EMCS, LCS and BAC Systems

7.1 Overview: All systems shall be isolated from the general County network and segmented on the FMD_VRF network. IT and FMD Energy Management staff shall access these systems only after Firewall Rules have been documented, approved, and set in place. FMD HVAC staff will have access through FairfaxNET’s FMD Department webpage under “FMD Internal – Employees Only” link.

7.2 Remote Access to Systems: Remote monitoring or remote-control access to any of the County’s systems is granted to the FMD staff and/or its contractors via the FFX Remote Portal to provide a gateway. The additional use of Symantec VIP Access is required to access Fairfax County network resources from outside the County network. This multifactor authentication (MFA) solution provides a more secure network environment, thus reducing the likelihood of a data breach via a compromised password.

7.3 County Standards and References:

A. Any computer hardware and software that is being provided must comply with the DIT Standards which are provided in Section 5 of the IT Plan—Section 5: Architecture and Infrastructure Foundation.

https://www.fairfaxcounty.gov/informationtechnology/it-plan

B. All proposed systems must comply with the County’s DIT Information Security Policy in order to be accepted by the County.

https://www.fairfaxcounty.gov/informationtechnology/sites/informationtechnology/files/assets/security/pm70-05_01.pdf

C. The Policy defines the minimum security requirements necessary, based on the most up-to-date information available, to protect Fairfax County Government IT Assets, including the managerial, operational, and technical protection requirements and controls to ensure the confidentiality, integrity, and availability of County IT Assets; compliance with requirements of applicable federal, state, and local law and County’s policies and regulations (e.g. FIIPAA, PCI-DSS, PII and other specific privacy regulations current or established later); and standards and guidelines established by the National Institute of Standards and Technology (NIST), US Department of Homeland Security Cyber security guidelines, US CERT, and any other in the future. The Policy applies to all existing and future implementations of technology.

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D. The Policy defines the acceptable use and management of internal and remote systems, services and information, and technical controls and procedures that govern the design, acquisition, implementation, administration and use of County systems. The Policy also discusses steps to assist in mitigating risks due to evolving cyber threats and vulnerabilities caused through use of IT Assets, through the internet, or perpetrated by those with malicious intentions. This Policy applies to all County agencies, employees, volunteers, service providers, vendors, contractors, and commercial entities (may be referred to as 'users' in county IT policy and procedure documents) that develop, implement, administer, or use Fairfax County information and communications systems, data and information.

E. Policy provides for and shall enforce protective measures and compliance actions for the county technology eco-system. This includes all County information and internal/external communications systems, and supporting infrastructure that support government interactions, operations and transactions, and that transmit, receive, or store confidential, sensitive, internal use, or public use County data and/or information regardless of media format, processing method, mobility, or platform.

F. All agencies and persons that may develop, implement, or use Fairfax County information systems shall abide by the requirements and procedures established by the County's Information Technology Security Office as authorized by the County Executive. The County Executive grants authority to the Chief Information Security Officer (CISO) to immediately apply mitigation actions to shut off the source of a cyber-attack through penetration or unauthorized installation including terminating use privileges and/or confiscating suspicious source technology components, conduct cyber forensics on IT Assets, investigate breach and/or unauthorized use activities, and make recommendations related to appropriate disciplinary measures. The CISO may monitor systems and use, and conduct security scans and audits at its discretion. Further, the CISO is deemed the County's subject matter expert to support legal matters related to IT and cyber matters supporting the Office of the County Attorney.

G. Any information, data, or any other content that is in or transmitted through Fairfax County IT platforms, communications systems and infrastructure including through County external sources such as the Internet, County Social Media venues, subscription and 'Cloud' services are the property of Fairfax County. Therefore, users should not expect that personal information conducted through the county is private other than data explicitly covered by confidentiality and privacy laws.
H. All proposed computer hardware and software must be submitted to DIT for approval before it is purchased.

I. System’s architecture, configuration and network requirements must be submitted to DIT for approval before it can be installed in the County’s IT Infrastructure.

7.4 Procedures - Process Outline

A. Initial meeting with Capital Facilities (CAP), Facilities Management (FMD), Information Technology (DIT) and Contractor(s) to discuss new capital or renewal project to review/discuss the project.

- Review IT Standards required for system hardware and software.

- Discuss secure network requirements for County EMCS systems.

- DIT must review and approve all computer hardware and software recommended by Contractors to ensure compliance with the current version of IT standards at the time of installation.

- Discuss County IT environments during the implementation life cycle (Development, Test, Acceptance, and Production).

- Explain the DIT Services Provider Consultant/Contractor Agreement concerning access to and use of information systems and communications technology at Fairfax County, Virginia

- Explain process for obtaining Contractor User ID's/Passwords.

- Contractor is responsible for conducting the required Background Checks of employees when the contractor is requesting a County User ID and Password. The contractor shall submit Employee Background checks to the hiring County agency.

- The County Agency who is hiring the contractors must have their Agency Information Security Coordinator (AISC) submit the necessary completed forms and Contractor Employee Background checks to INFOSEC so that the Contractor employees’ User ID’s and Passwords are created and issued. No sharing of user accounts is permitted.
• Explain onsite installation requirements and Remote Access for necessary support after installation.

• Agree on procurement method for buying new hardware and software for the EMCS system. Recommend CAP set aside the funding for hardware and software and let DIT purchase EMCS hardware and software to ensure all County IT standards are met.

B. Project Kick off meeting with CAP, FMD, DIT, Contractor(s) for the project.

• Discuss and review requirements for EMCS systems.

• Discuss and review EMCS hardware and software system configuration, storage disk space and database requirements. Ensure that the Systems Platform staff is involved in this process, reviews and approves what hardware to be purchased.

• Discuss and review supporting software required for the EMCS system (Java, Glassfish, etc.). Ensure that the INFOSEC staff is involved in this process and reviews and approves the required supporting software so that it can be installed on the new EMCS server(s) or workstation(s).

• Discuss and review requirements for EMCS systems access for FMD staff and contractors.

• Complete the Purchase Orders for CAP or FMD so that the hardware and software of the EMCS system are ordered.

• Discuss and review EMCS networking requirements and network schematics, number of required IP addresses, required ports to be opened, and network protocol(s) to be used.

• Discuss and review the number of required network jacks.

• Setup a site visit to inspect network requirements.

• Submit request to Telecomm Help Desk for the required data jacks for the EMCS system.

• Submit necessary Firewall Ruleset Requests to INFOSEC to ensure that the EMCS devices can talk to each other.
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APPENDIX B: INFRASTRUCTURE GUIDELINES

• When the hardware has arrived, submit the necessary Server forms to the DIT Systems Platforms staff so they install and configure all the hardware and software required for the EMCS system.

• Have Capital Facilities or FMD submit the User ID/Password request for contractor staff along with the signed IT Services Provider Consultant/Contractor Agreements.

• Once DIT Systems Platform staff notifies the General Business Applications Branch staff that the server(s), database, storage disk space and all other system components for the EMCS system are ready for the EMCS application to be installed, setup meetings with Contractor, DIT and FMD staff for the EMCS system installation.

• Setup meetings with Contractor, FMD and DIT staff to ensure that EMCS systems meets FMD’s needs.

• Setup system training for the FMD and DIT EMCS Administrators.

• Setup systems training for the FMD EMCS users.

• Setup commissioning meetings for the EMCS system.

• Provide all the project documents (Design document, User manual, etc.) to System Administrators.

C. Post Installation requirements.

• FMD to establish post warranty period Service Maintenance Contracts for EMCS system.

• Review the need for EMCS system access for contractors to maintain and support the system and remove unneeded access. (Note: some contractors work on the project for the initial installation and configuration only and will not provide system maintenance and support after turning over the system to FMD).

7.5 DIT Forms Required for Installation of Systems

A. IT Services Provider Consultant/Contractor Agreement: Signed document by consultant/contractor and the company agreeing to the proper use concerning access to and use of Information Systems and Communications Technology at Fairfax County, VA

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B. INFOSEC form for requesting County UserID and Password: This shall be completed by County agency.

https://infoweb.fairfaxcounty.gov/iprotect/

C. INFOSEC Firewall Ruleset Form is used to request access through County firewalls. Identify the IPs (or group of IPs) addresses that are needed to communicate to other areas on the network, what protocol, and what port(s) are being utilized for communication between the equipment.


D. INFOSEC Waiver/Exception to Policy Form outlines what software or hardware (not standard to Fairfax Count) is requiring an exception and why it is required. Must provide computer information you are installing on, documentation on the system and/or hardware, and be signed off by the agency director.

8.0 Radio System

8.1 Overview: Contractor shall provide and install roof curb, weather sealed aluminum vault with conduits on the roof close to the Telecommunication room. This shall be provided for all public safety buildings and/or as requested by DIT. The vault shall serve as the centralized entry point for the installation of conduits to house antenna wires for public safety radio system.

8.2 Curb, Vault and Conduits:

A. Roof Curb
   1. Provide a roof curb manufactured of 14 gage galvanized steel with continuously welded seams and mitered corners providing air and watertight construction. The curb shall be minimum of 8” high. Internally reinforced as needed for the installation of the vault.

B. Aluminum Vault
   1. The vault shall be minimum of 0.080-inch-thick aluminum with gaskets and stainless-steel hardware.
   
   2. It shall have a UV protected powder coating.

   3. Vault at minimum should be 12” (L) x 12” (H) x 20” (H).

C. Conduit
   1. Install two (2) 4” PVC conduits.

   2. Vault shall have tight exit seals with inserts for the three (3) 4” conduits. This shall be constructed of aluminum or stainless-steel flange.

   3. The conduits shall be installed from the vault to a pull box located to the closet restroom or wet area. From the pull box install two (2) 4” conduits and terminate them into the telecommunication room. Third exit seal will be a spare for future use.

   4. Each conduit must have mule tape with footage markings.

   5. Conduits shall be installed with minimum fitting consisting of 45- and 90-degree bends. All 45-degree bends shall be sweeping bends, and at each 90-degree bend install a pull box.
8.3 Industry Standards and References: All systems shall meet or exceed industry codes, Government Regulatory standards, and references current as of the time of the project design.

A. Construction Industry Specifications (CSI)
   a) Section 077200 – Roof Accessories