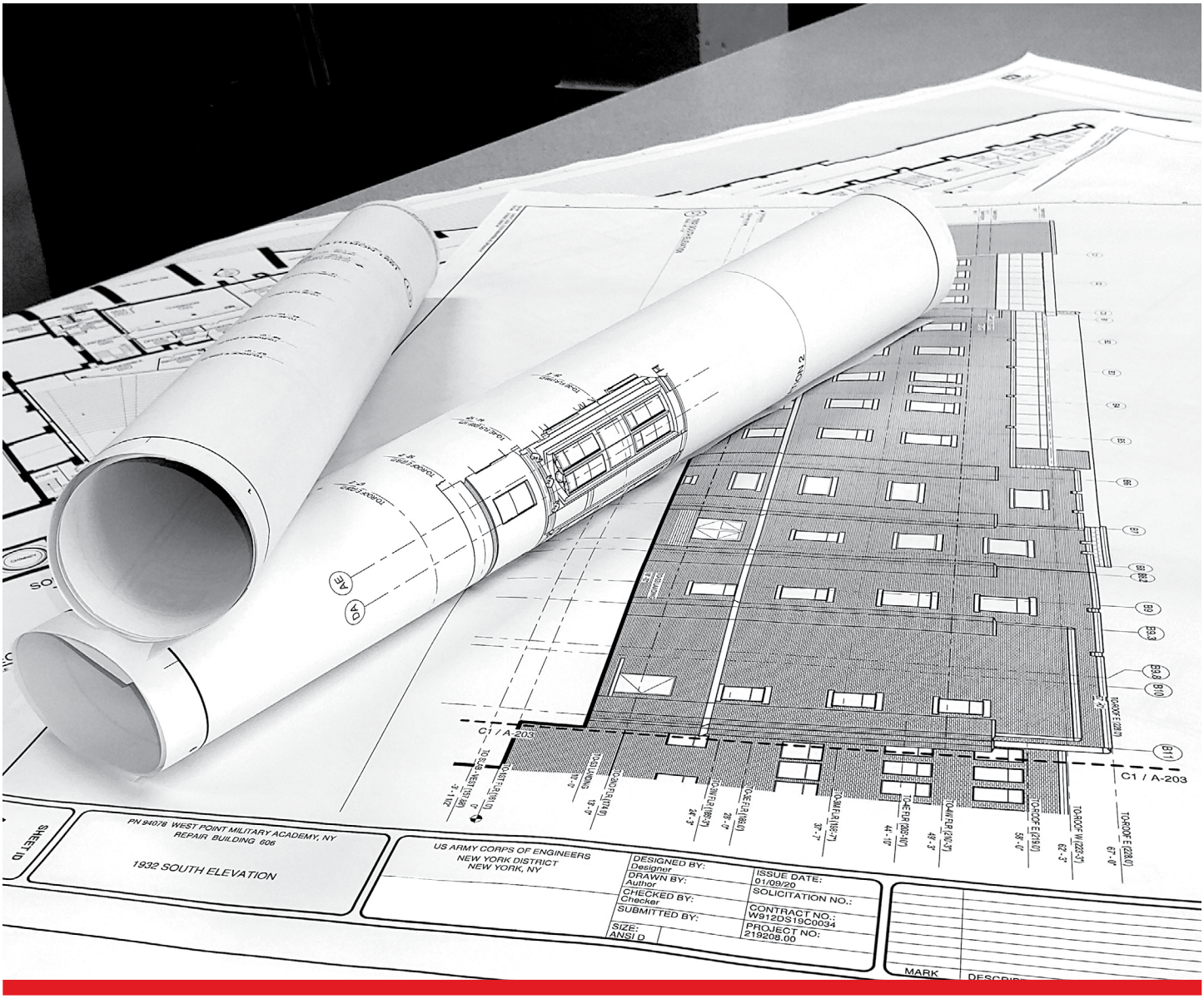

Engineering Planning Standards

United States Army Garrison West Point, NY

Publication Date: October 9, 2020

QPK DESIGN
ARCHITECTURE
ENGINEERING
SITE+PLANNING

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The EPS was Prepared by:

QPK Design Engineering Site & Planning
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EwingCole
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ENGINEERING PLANNING STANDARDS (EPS) - INTRODUCTION

I.1 MISSION & BACKGROUND

The West Point Directorate of Public Works (DPW) commissioned this update of the Engineering Planning Standards (EPS) in coordination with development of the Academic Building Planning Standards (ABPS). The ABPS guides facility planning and construction for the Academic Building Upgrade Program (ABUP) and future academic projects.

The EPS provides procedures and standards developed specifically for West Point to provide consistency in quality and West Point characteristics across the Garrison. The EPS technical criteria supplement other governing standards and regulations pertaining to planning, design, construction, operation, and maintenance for all West Point facilities across the Garrison.

This manual replaces the prior Engineering Planning Standards 2016.

I.2 USING THE EPS

The Designer of Record (DOR) is responsible to ensure that design and engineering comply with these Engineering Planning Standards (EPS) and all regulatory requirements. The Designer shall request approval from the designated DPW Project Manager (PM) for any deviation from these standards.

Engineering details are provided in the EPS as illustrations for West Point preferred installation assemblies. EPS details shall not be copied into contractual construction documents. The DOR is responsible for appropriate detail application to provide integrated design and engineering for a project.

I.3 AUTHORITY

Army Regulation (AR) 420–1 “Army Facilities Management” ” provides guidance for establishing facilities maintenance and repair standards and policies for planning and executing facilities projects. Local standards ensure consistency in good engineering and design practices for those planning or designing facilities within West Point.

The EPS aids and supports this facilities management process.

I.4 MAINTAINING THE WEST POINT EPS

The West Point Engineering Services Division of the Directorate of Public Works (DPW) maintains the EPS. The EPS is a "living document" which will be revised by the DPW as mission, budget, standards, and other conditions generate new planning and design requirements. Feedback from staff, tenants, maintenance personnel, and facility users should inform revisions. Proposed changes or variances shall be presented to the Chief of the Engineering Services Division for review and approval.

Refer to the West Point Installation Planning Standards for general design requirements.

I.5 THE EPS AND THE UNIFIED FACILITIES CRITERIA PROGRAM

The Department of Defense (DOD) established the Unified Facilities Criteria Program to unify technical guidance and specifications for federal properties via The Unified Facilities Criteria (UFC) publications and The Unified Facilities Guide Specifications (UFGS). These documents are available through the Whole Building Design Guide (WBDG), prepared by the National Institute of Building Sciences to foster and advance high-performance buildings across all federal properties. Additional resources in the WBDG provide recommendations on planning, project management, and commissioning and access to federal standards publications.

UFC 1-200-01 “DOD Building Code” summarizes the UFC documents and their applications.

The UFGS provides technical performance specifications as guidelines for construction projects.

The EPS contains information and preferences specific to West Point design and construction projects on the US Army Garrison (USAG),which includes the US Military Academy (USMA). The EPS augments the UFCs and the UFGS to provide consistent guidance and standards across the West Point Garrison.

I.6 RESPONSIBILITIES

I.6.1 Installation Management Command (IMCOM)

1. Responsible for determining the organizational structure and providing public works services at garrisons under its control in accordance with AR 420-1.

I.6.2 Garrison DPW

2. Responsible for complying with good engineering practices; applicable Federal, State and local statutes; and applicable Army regulations in performing Maintenance and Repair and construction projects executed by the IMCOM garrison public works activity.
3. Responsible for insuring compliance with the Installation Planning Standards and garrison facility standards.
4. The Chief of the Engineering Services Division is responsible for the review and approval of the EPS

GENERAL CRITERIA

GC-1 - GENERAL PROCEDURES

GC-1.1 Introduction

1. At commencement of each project, refer to specific requirements in the General Criteria and Technical Divisions of the EPS to assess related project scope and procedures with potential project impacts.
2. The DOR is responsible for reviewing and confirming the Scope of Work (SOW) with the DPW Project Manager (PM) at the onset of any project.
3. At the initiation of a project, the DPW (and the USACE for Corps-managed projects) will assign a Project Manager (PM) to act as the Point of Contact (POC) for consultants and stakeholders.

GC-1.2 Stakeholder Involvement

The PM shall provide the project team with a list of stakeholders and provide a POC directory for each stakeholder group and the consultants. The PM will define and coordinate stakeholder involvement.

GC-1.3 Guidelines, Standards, Criteria, and Regulations

1. Applicable Regulations:
    a. United Facilities Criteria (UFC)
    b. International Building Code (IBC), edition and sections as applicable per UFC
    c. National Fire Protection Association: NFPA 101 as applicable per UFC
    d. NANP-1110-1-1, US Army Corps of Engineers, New York District (NAN) Manual of Standard Procedures for Planning and Design applies to USACE–managed projects and is optional for DPW-managed projects.
2. The following guidelines and standards have been developed for West Point:
    a. USAG West Point Installation Design Guide (IDG)
    b. USAG West Point EMCS Systems
    c. USAG West Point Academic Building Planning Standards (ABPS)
    d. City Light and Power Electric Service Connection Standards Manual, U.S. Army Garrison, West Point, N.Y.
    e. Facility Design Criteria for the United States Military Academy, West Point, New York by Enterprise Services Group; Information Systems Engineering Command (ISEC).
    f. West Point Real Property Master Plan (RPMP) - Refer to Appendix for Installation Framework Plan for boundary map:
        i) Clinton District Area Development Plan
        ii) Proctoria District
        iii) Putnam & Ladycliff District Area Development Plan
        iv) Queensboro District
        v) Stony Lonesome District
        vi) Warner District

GC-2 - CULTURAL RESOURCES AT WEST POINT

GC-2.1 Introduction

1. West Point has considerable legal responsibilities established by Federal laws and regulations relating to the identification, preservation, and management of cultural resources within its limits.
2. Cultural resource surveys and assessments conducted to date have resulted in the identification of a wide range of resource types at West Point, including a National Historic Landmark District (NHLD) of approximately 2,000 acres. The West Point Cultural Resources Manager (CRM) maintains an up-to-date inventory of cultural resources across the installation, including the following resources types:
   a. Known archeological sites
   b. Historic buildings and structures
   c. Historic monuments
   d. Historic structure
   e. Historic landscapes
   f. Vistas and viewsheds
   g. Other artifacts and associated records

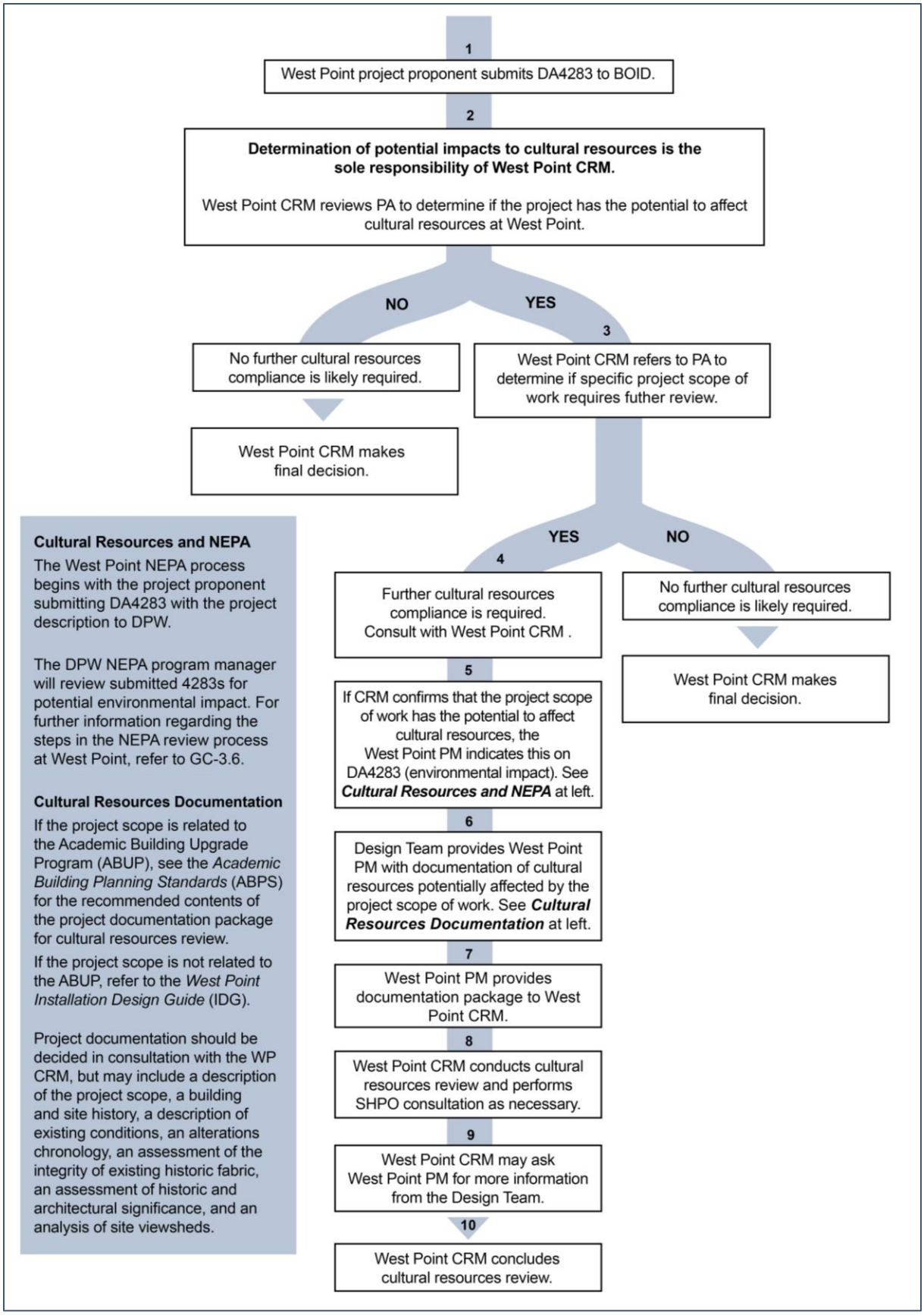
GC-2.2 Cultural Resources and Project Planning

1. Consider project impacts on cultural resources early in the project planning process to identify probable effects and potential project changes needed to avoid delays to the proposed action.
2. Any project with the potential to affect cultural resources at West Point shall be designed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preservation, Restoration, Rehabilitation, and Reconstruction*.
3. Refer to the West Point Installation Design Guidelines for the use of indigenous materials (e.g., gneiss, granite, limestone, sandstone, and slate) consistent with the campus' architectural history.
4. Where historic masonry requires repair or replacement, repair or replace masonry units in kind. Many historic West Point stones are no longer quarried, and an exact match may not be possible. New replacement stone should match existing historic stone in terms of aesthetics and performance. Alternative replacement materials may be considered where appropriate, subject to CRM approval. Non-historically designated stone may be replaced with alternate materials if architecturally appropriate in accordance with the *Standards*.
5. Evaluate existing/proposed mortar(s) on historic buildings for the appropriate aesthetic and performance criteria on a building-by-building basis.
6. Analyze exterior and interior finishes on a building-by-building basis. Buildings that were historically painted, or which have been painted since their construction, should be repainted to match the existing colors or historic colors that can be documented to have been used on that building.
7. The CRM operates within the West Point DPW Master Planning Office managing cultural resources to ensure compliance with applicable Federal laws and regulations, including the *Standards*.
8. To appropriately allocate budgets for Cultural Resources, the CRM can help determine if projects warrant additional professional assistance or resources due to size, complexity, or historical sensitivity.

9. Refer to EPS Section GC-3 for the National Environmental Protection Act (NEPA), with Environmental Check List (ECL) components that include Cultural Resources.

GC-2.3 Cultural Resources Review Process

1. The West Point cultural resources review process is governed by a Programmatic Agreement (PA) with the New York State Historic Preservation Officer (NY SHPO), the Advisory Council on Historic Preservation (ACHP), and relevant consulting parties.
2. Based on the stipulations of the PA, the following flowchart outlines the steps in the cultural resources review process at West Point.


1
West Point project proponent submits DA4283 to BOID.
2
Determination of potential impacts to cultural resources is the sole responsibility of West Point CRM.
West Point CRM reviews PA to determine if the project has the potential to affect cultural resources at West Point.
NO
YES
No further cultural resources compliance is likely required.
3
West Point CRM refers to PA to determine if specific project scope of work requires futher review.
West Point CRM makes final decision.
YES
NO
4
Further cultural resources compliance is required. Consult with West Point CRM .
No further cultural resources compliance is likely required.
West Point CRM makes final decision.
5
If CRM confirms that the project scope of work has the potential to affect cultural resources, the West Point PM indicates this on DA4283 (environmental impact). See Cultural Resources and NEPA at left.
6
Design Team provides West Point PM with documentation of cultural resources potentially affected by the project scope of work. See Cultural Resources Documentation at left.
7
West Point PM provides documentation package to West Point CRM.
8
West Point CRM conducts cultural resources review and performs SHPO consultation as necessary.
9
West Point CRM may ask West Point PM for more information from the Design Team.
10
West Point CRM concludes cultural resources review.
Cultural Resources and NEPA
The West Point NEPA process begins with the project proponent submitting DA4283 with the project description to DPW.
The DPW NEPA program manager will review submitted 4283s for potential environmental impact. For further information regarding the steps in the NEPA review process at West Point, refer to GC-3.6.
Cultural Resources Documentation
If the project scope is related to the Academic Building Upgrade Program (ABUP), see the Academic Building Planning Standards (ABPS) for the recommended contents of the project documentation package for cultural resources review.
If the project scope is not related to the ABUP, refer to the West Point Installation Design Guide (IDG).
Project documentation should be decided in consultation with the WP CRM, but may include a description of the project scope, a building and site history, a description of existing conditions, an alterations chronology, an assessment of the integrity of existing historic fabric, an assessment of historic and architectural significance, and an analysis of site viewsheds.

GC-3 – NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

GC-3.1 Introduction

1. NEPA is required for “major federal actions”, any action where federal funds are involved, and where Federal decisions are required.
2. NEPA is not subject to the Commander’s discretion. NEPA requires a hard look at the environmental impacts of reasonably foreseeable actions and alternatives.
3. Proper and early NEPA coordination will allow decision makers and project stakeholders to be able to make informed decisions and sound trade-offs between alternatives, agency requirements, public concerns and environmental impacts.
4. The Designer of Record (DOR) shall support the NEPA process during the 30% submission phase and provide West Point with any information necessary to complete the NEPA process including, but not limited to, the 30% submission documents on which the NEPA determination will be based.
5. The DOR shall include such things as wetland delineations, archeological/cultural resource reports, traffic engineering reports, viewshed visibility analysis, stormwater analysis, etc.
6. Refer to Section GC-2 of this EPS document for Cultural Resources Management (CRM).

GC-3.2 USAG West Point NEPA Process

1. The West Point NEPA process begins with the proponent submitting a DA 4283 to the Project Manager. The DPW Work Management Board reviews all 4283 submissions on a bi-weekly basis.
2. The DPW NEPA program manager will review submitted 4283’s for potential environmental impact.
3. If it is determined that there is a potential environmental impact, the Environmental Management Division (EMD) completes the Environmental Checklist (ECL) with input from the proponent. Once complete, EMD determines the appropriate level of NEPA through a review of the project and the requirements of 32 CFR.
4. Refer to the Project Environmental Factor Checklist (ECL) provided by the project PM. Checklist elements to be considered as part of the environmental review:
    a. Geology & Soils
    b. Cultural Visual Resources
    c. Water Resources
    d. Air Quality
    e. Noise
    f. Fire
    g. Land Use
    h. Facilities
    i. Wastewater
    j. Waste Disposal
    k. Vegetation
    l. Wildlife
    m. Safety
    n. Social
    o. Recreation
    p. Urban Forest and Landscape
    q. Coastal Zone

r. Unexploded Ordnance (UXO)
s. Energy Conservation
t. Storm Water
u. Petroleum Bulk Storage

5. Following completion of the ECL review process, the EMD prepares a Record of Environmental Consideration (REC) for the proponent signature and EMD chief ratification. A REC has no prescribed format, but it must include the following:
   a. A signed statement.
   b. Project documentation.
   c. Briefly documents the environmental review.
   d. Describes the proposed action and timeframe.
   e. Identifies the project proponent and approving official.
   f. ECL comments from the SME's must be restated in the "Conditions" section of the REC.

6. The ECL, the REC, and all other associated project information will be sent to the DPW PM with a properly completed USMA Form 5. The DPW PM will then review and provide comments.
7. The REC must be completed prior to project construction. Depending on the extent of the environmental impact, the proponent may need to complete and submit an Environmental Assessment (EA).
8. Actions normally requiring an EA:
   a. Special Field Training Exercises in excess of five acres of greater magnitude than training cycle.
   b. Military construction greater than five acres
   c. Changes to the land that impact the Environment
   d. Alteration of historically significant structures, archeological sites, or National Register of Historic Places (NRHP) properties
   e. Significant increase in soil erosion, affect prime or unique farmland (off Army property), wetlands, floodplains, coastal zones, wilderness areas, aquifer or water supplies, prime or unique wildlife habitat, or wild and scenic rivers
   f. Weapon system lifecycle if the action produces a new hazardous or toxic material or results in a new hazardous or toxic waste, and not adequately addressed by existing NEPA documentation
   g. Testing, production, fielding, and training involving natural resources and disposal/demilitarization
   h. Development and approval of installation Master Plans
   i. Implementation of Integrated Cultural Resource Management Plans (INRMPS) and Integrated Cultural Resource Management Plans (ICRMPS)
   j. Field activities not controlled by the military
   k. Substantial adverse local or regional effects on water availability
   l. Production of hazardous or toxic materials
   m. Changes to airspace – impacts to environment or socioeconomic systems or create a hazard to non-participants
   n. Installation pesticide, fungicide, herbicide, insecticide, and rodenticide- use program/plan
   o. Acquisition, construction, or alteration of or space for a laboratory that will use hazardous chemicals, drugs, or biological or radioactive materials

p. An activity that affects a Federally listed threatened or endangered plant/animal species, a Federal candidate species, species proposed for Federal listing or critical habitat
q. Substantial proposed changes in Army-wide doctrine or policy that potentially have an environmentally adverse effect
r. Impacts to old landfills and ranges when used for staging or other construction purposes.

9. The EA determines whether possible impacts are significant, thereby warranting an Environmental Impact Statement (EIS). When an action clearly has significant impacts or when an EA cannot be concluded by a Finding of No Significant Impact (FNSI), an EIS must be prepared.

GC-4 – SECURITY & AT/FP STANDARDS

GC-4.1 Introduction

1. The Engineering Planning Standards (EPS) defines requirements that are specific to the United States Military Academy (USMA) at West Point. These standards build upon the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this design standard.

GC-4.2 Codes, Regulations and other Standards Specific to West Point

1. Below is a partial list of directives, policies, instructions, and manuals that are associated with the construction of Department of Defense (DOD) facilities. For the purposes of this EPS, the listed references pertain to the baseline Antiterrorism Force Protection (AT/FP) Standards. The Project Delivery Team (PDT) will ensure that these references, this guidance, and all applicable guidance and requirements are applied, as appropriate to DOD construction projects.
   a. UFC 4-010-01 - DOD Minimum Antiterrorism Standards for Buildings
   b. DOD Directive 4270.5 - Military Construction
   c. Title 10 U.S.C. Sec. 2807(b), Architectural and Engineering Services and Construction Design. Defense Federal Acquisition Regulation Supplement 236.601, September 20, 2011
   d. AR 190-13 - The Army Physical Security Program
   e. AR 190-11 - Physical Security of Arms, Ammunition, and Explosives
   f. AR 190-51 - Security of Unclassified Army Resources
   g. Army Standard for Access Control Points
   h. Army Access Control Points Standard Design
2. Where project-specific directives or guidance in these EPS conflict with baseline guidance in the above references, the more stringent shall apply.

GC-4.3 Applicability

1. New Construction
   a. Security and AT/FP requirements discussed herein and in identified references are applicable to all new construction projects unless otherwise determined by the Antiterrorism Officer (ATO)/USMA, ATO/Garrison, Physical Security Officer (PSO), or other Authority Having Jurisdiction (AHJ).
2. Existing Construction
   a. Applicability of security and force protection requirements discussed herein and in identified references shall be determined consistent with guidance presented in UFC 4-010-01 (Section 1-5.2) unless otherwise determined by the ATO/USMA, ATO/Garrison, PSO, or other AHJ.

GC-4.4 AT/FP and Historic Preservation

1. The Department of Defense (DOD) remains the lead federal agency in balancing security threats with the protection of historic properties. The DOD abides by federal legislation on protecting cultural resources and issues its own complementary policies for stewardship.
2. Implementation of security and force protection standards will not supersede DOD's obligation to comply with federal laws regarding cultural resources to include the National Historic Preservation Act (NHPA) and the Archeological Resources Protection Act (ARPA). Conversely, historic preservation compliance does not negate the requirement to implement other Department of Defense policies. Preservation considerations and security/antiterrorism standards are not mutually exclusive, and any compliance conflicts should be quickly and effectively resolved.
3. Installation personnel [ATO, PSO, Directorate of Public Works (DPW), or other], with support provided by outside consultants as appropriate, must determine possible adverse effects to historic structures and/or archeological resources during initial project development and planning stages and consult accordingly with West Point Cultural Resources stakeholders on a project-by-project basis.

GC-4.5 Antiterrorism/Force Protection Considerations

1. Where applicable for new and existing construction, comply with current editions of UFC 4-010-01.
2. Unless otherwise determined by the United States Military Academy (USMA) or United States Army Garrison (USAG) West Point Antiterrorism Officer (ATO), provide blast hardening to withstand the WII vehicle-borne Improvised Explosive Device (IED) threat and achieve a Low Level of Protection. The WII vehicle-borne IED threat is the explosive charge weight associated with screened vehicles at parking or roadways within a controlled perimeter.
3. Consult with the USMA or USAG West Point ATO and refer to the West Point Installation Threat Assessment to identify existing buildings as "critical" or "typical". Buildings identified as "critical" require a project-specific threat and asset assessment, compliant with UFC 4-020-01, to be completed as part of development and planning stages to frame force protection requirements that may exceed UFC 4-010-01 minimum standards.

GC-4.6 Perimeter Protection Considerations

1. Vehicle Barriers
   a. Where crash-rated barriers are determined to be required, impact and penetration rating shall be determined by a condition-specific vehicle trajectory analysis that considers acceleration of a 15,000-lb vehicle along existing or known future pathways. The vehicle trajectory analysis shall adhere to methods for estimating kinetic energy at impact outlined in UFC 4-022-02 (2010 or more current edition).
   b. Where crash-rated active or static barriers are determined to be required, a preferred barrier product shall be selected from the current "DOD Anti-Ram Vehicle Barriers List". Installation of alternative barrier products requires case-by-case approval by the ATO and PSO.

c. Where crash-rated active barriers are determined to be required, wedge/plate and retractable bollard systems are preferred.
d. Due to the weather conditions, all active/operable barriers shall be pneumatic or electric unless otherwise approved by the PSO. Hydraulic barrier systems are not permitted.
e. Selection of active and static barrier systems shall consider below-grade conditions to determine the need for shallow mount systems in advance of installation.
f. The barrier's architectural finish (sleeve or cover) may vary depending on the location. Some existing barriers have no architectural finish (just exposed steel pipe) and some have "inverted cannon" sleeve. For some locations, West Point Cultural Resources representatives and/or State Historic Preservation Officer (SHPO) may need to be consulted through Department of Public Works.

2. Fencing
   a. Fences are used as protective measures against project-specific threats. They are most appropriately used to define boundaries and to deter penetration of a secure area. A fence will assist in controlling and screening authorized access to a secured area. Fences also serve the purposes listed below:
      i) As a platform for the Intrusion Detection System
      ii) As a screen against explosive projectiles
      iii) To stop moving vehicles if they are designed to do so
   b. Determination of appropriate fence construction shall consider requirements outlined in the "Army Tactics, Techniques, and Procedures" (ATTP 3-39.32) manual.

3. Security Lighting
   a. Lighting is a functional requirement of installations that also impacts the visual environment. The installation lighting system conveys a sense of order and organization. There are four primary types of lighting on military installations. They are:
      i) Roadway Lighting
      ii) Parking Lot Lighting
      iii) Outdoor Architectural Lighting
      iv) Security Lighting

   b. Lighting systems for security operations provide illumination for visual and closed-circuit television (CCTV) surveillance of boundaries, sensitive inner areas, and entry points. When CCTV is used as part of security operations, the lighting system will be coordinated with the CCTV system. The specific installation environment and the intended use determine lighting system requirements. Often two or more types of lighting systems are used within a single area. Determination of applicable criteria, design analysis and solution implementation shall be made consistent with guidance provided in current editions of related UFC documents. .
   c. Refer to USMA Installation Design Guide (IDG) for more information.

4. Landscaping
    a. Landscaping design and maintenance shall adhere to applicable antiterrorism/force protection (AT/FP) requirements. Although this is a challenge at USAG West Point, due to the density of some facilities, this can be achieved. The landscape design can enhance the overall attractiveness of the facility while still providing or enhancing the objective level of security while utilizing the natural environment. Refer to applicable UFC standards (UFC 4-010-01 and UFC 4-020-03) for a more detailed discussion of minimum requirements and general guidance.

GC-4.7 Security & Access Control Considerations

1. Intrusion Detection Systems
    a. Integrated Commercial Intrusion Detection System (ICIDS 4) is implemented at USAG West Point. DAQ Electronics holds the proprietary software used at West Point. IDS is monitored at the Provost Marshal Office (PMO) and Physical Security Inspector's office. The system used is mandated by the Office of Provost Marshal General and is used to protect assets under the care of the US Army. Physical Security maintains maintenance and services on the system. Only Physical Security and those on the Value Added Resellers (VAR) List may perform work on the system. Anyone not certified by the "owner" of the system, DAQ, is not authorized to perform any work on the system or its components.
    b. Unless otherwise determined by the PSO and/or ATO, integration of intrusion detection systems shall be limited to Arms and Ammunitions, drug storage and buildings not situated along the perimeter fence line.

2. Electronic Physical Access Controls / Common Access Card Systems
    a. The Electronic Physical Access Controls (EPACs) system being used currently is Velocity from Hirsch. The system uses a FIPS-201-1 compliant standard on the NIPR net and utilizes Common Access Cards (CACs) to verify access to an area. CAC readers are supplied by Hirsch CR-SCM-CCKL, this is a sole-sourced product. The CACs are connected to the NIPR net. The Physical Security Office maintains control of maintenance and services and corrective action on the system.

3. Closed Circuit Television (CCTV) System / Video Surveillance Systems
    a. There are no standards for security lighting, besides what is available in the USMA Installation Design Guide (IDG), and CCTVs. The current CCTV systems include Brocade and Aventure. However, all systems are hardwired and connected to a central location. CCTV system is used across USAG West Point and USMA. The requirement is to observe high risk areas as needed to maintain security and safety of employees and cadets. It is maintained on a closed fiber network and is accessible to law enforcement and security elements on West Point. The Physical Security Office maintains control of maintenance and services as well as corrective action on the system.

GC-5 - SUSTAINABLE DESIGN, LEED

GC-5.1 Introduction

1. Federal agencies are required to promote sustainable Federal infrastructure as mandated by The Energy Policy Act of 2005 and Executive Orders (EO) 13423 and 13514. The purpose is to develop environmentally-sound, economically-sound and fiscally-sound design, construction, and operating decisions.
2. Sustainability objectives and procedures are mandated by the Army Sustainable Design and Development Policy Update (SDD) available under the DOD Whole Building Design Guide (WBDG); and by the UFC 1-200-02 High Performance and Sustainable Building Requirements.
3. The project designers must be aware of the following concerns when evaluating sustainable strategies for incorporation at West Point:
   a. Historic nature of the facility;
   b. Viewshed;
   c. Nature of soil and rock in the area (geotechnical); and,
   d. Coordination with the area development plan.

4. Project designers shall reference the West Point Area Development Plan (ADP) from the DPW Master Planning Office for acceptable facades, historic implications and setbacks when evaluating sustainable design strategies.

GC-5.2 LEED

1. The Army Standard for high-performance sustainable building/project rating and certification is the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) rating system.
2. Per the SDD, when applicable, the project goal for sustainable design will be the equivalent of LEED® Silver certification.
3. The DOR shall perform the following tasks during the 30% design phase:
   a. Review sustainable design requirements (SDD Policy).
   b. Select proposed rating system as part of Concept Development.
   c. Obtain PM approval for the proposed LEED credits.
   d. Prepare LEED® Credit Checklist for proposed sustainable components and coordinate with the Energy Compliance Analysis (ECA) and Life Cycle Cost Analyses (LCCA) in the 30% Design Submittal.
   e. Incorporate potential sustainable design and alternative energy options in the LCCA in accordance with SDD.
   f. For design submissions beyond the 30% Design Phase, as established in the PDR 1391, the DOR will track conformance with the LEED® credits, updating the LEED® Credit checklist at each submission.
   g. Where the project DD 1391Form requires a particular feature or system, such feature or system must be included in the design. In such cases, a LCCA for that feature or system is not required during design. Include a statement in the documentation regarding this.

4. Based on approval of the PM, design the project to meet the agreed upon components to achieve LEED® Silver Certification.

5. Review compliance at each phase of design documents (30/+60/90) with the DPW to verify compliance with LEED® Silver standards.

GC-5.3 West Point Sustainable Planning Design and Construction Requirements

1. Exceptions to the SDD may be authorized by The Garrison Commander (GC) as determined in accordance with the SDD.
2. Energy Performance and Security
   a. Outdoor Water Use:
      i) Designers shall prioritize use of native, drought-resistant plant species to eliminate reliance on permanent irrigation systems.
      ii) Alternative water reclamation systems, as defined in the SDD, are not desired at West Point.
      iii) Use of landscape species requiring permanent irrigation systems must be approved by DPW.

   b. Metering, Monitoring and Subsystem Measurement:
      i) Submetering systems shall be provided as defined in Divisions 22, 25 & 26.
      ii) If installation of sub-metering systems is not deemed practical, include requirements for future adaptation in the design.

GC-6 - ACOUSTICAL DESIGN

GC-6.1 Introduction

These standards supplement the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and referenced codes and standards. Project Designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes, and standards along with the requirements of this design standard. These Acoustical Standards are subject to further development on a project specific basis.

GC-6.2 Applicable Codes and Standards

1. Refer to the Academic Building Planning Standards (ABPS) for West Point academic buildings acoustical guidelines
2. For non-academic Buildings, application of additional standards is on a per project basis in conjunction with the PM
3. GIB ACES (General Instruction Building Army Continuing Education System)
4. United Facilities Criteria (UFC): UFC 3-101- 01; UFC 3-120-10, UFC 3-540-01
5. Unified Facilities Guide Specifications (UFGS)
6. ANSI/ASA S12.60 Part 1 – American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools.

GC-6.3 Acoustical Design Parameters

1. The Designer of Record (DOR) shall incorporate controls for acoustical performance of individual spaces.
    a. Vertical construction (floors/ ceilings) shall be designed to reduce the transfer of impact sound from adjoining floors and airborne sound transmission. This is required to provide acoustical separation between adjoining spaces, which may include the integrated design of isolated acoustical ceilings/ floors for specialist applications.
    b. Horizontal construction shall be designed to reduce airborne sound transmission to achieve acoustic privacy requirements between adjoining spaces. In addition to UFC 3-101-01:
        i) For buildings or spaces where classified materials will be housed, managed and discussed, major demising partitions and interior partitions shall be designed to provide a confidential level of speech privacy to adjoining spaces.
        ii) Where mechanical rooms, TER or TR rooms are situated adjacent to noise sensitive spaces:
            - The partition shall provide minimum NIC 50.
            - Ensure that all major penetrations and air ducts are not routed directly over the noise sensitive rooms, otherwise acoustical treatment may be required to control sound flanking or duct breakout noise.
        iii) All doors to mechanical rooms and TER/ TR rooms shall be provided with fully adjustable rubber type acoustic seals at the perimeter and automatic door bottom. Acoustic rated doors may be required and shall be assessed by the project Acoustical Engineer.

iv) Horizontal construction is also applicable to meet any Building Code requirements for acoustics.

c. Sound absorbing finish materials shall be designed to control reverberation within specific spaces (NRC Rating) and shall include ceilings, floors and wall finishes or a combination of these depending on the specific room's usage and requirements.

d. The requirement for a sound masking system shall be reviewed and directed on an individual project basis.
   i) For academic buildings, sound masking is addressed further in the ABPS.
   ii) For non-academic buildings, sound masking is not a requirement but may be considered in specific applications where increased speech privacy between adjoining areas is needed.

e. Noise generated by mechanical equipment is addressed in Division 23. In addition:
   i) Standby (emergency) engine generators shall be located away from noise sensitive spaces and buildings as much as possible and take advantage of acoustic screening provided by topography for example, in efforts to mitigate noise impacts to adjacent buildings/ uses.
   ii) Minimum Level 1 acoustic enclosures for the engine generator will be required. The project Acoustical Engineer shall undertake assessment and provide recommendations necessary such as upgraded acoustical enclosures/ noise barriers to comply with established internal and or external noise criteria.

f. Room adjacencies shall be arranged to minimize the proximity of particularly noisy functions with sensitive uses requiring sound control.

g. All specialist spaces requiring a high level of sound separation to/ from adjoining spaces shall be assessed by an Acoustical Engineer to ensure that specific design is provided to meet the acoustic requirements of that use.

GC-7 - VALUE ENGINEERING

GC-7.1 Introduction

1. Value Engineering (VE) provides a systematic process for review and analysis of the requirements, functions and elements of programs, projects, products and processes. The purpose is to achieve essential functions consistent with required levels of performance, reliability, quality, and/or safety at the lowest life cycle cost.
2. The VE job plan is a systematic procedure for implementing the necessary tasks associated with the VE study. Adherence to a definite job plan is essential to achieve the best value alternatives. The job plan is a variation of a scientific method usually used for solving routine engineering problems. The VE job plan provides:
   a. A vehicle to carry the study from inception to conclusion;
   b. A convenient means for maintaining a written record of the effort as it progresses;
   c. Assurance that consideration has been given to facts that may have been overlooked in the creation of the design; and,
   d. A logical separation of the study into units that can be planned, scheduled, budgeted, and assessed.
3. For U.S. Army Corps of Engineers (USACE) managed projects, VE studies shall be conducted at the 30% Design phase for projects with a total programmed amount of $2M or greater, unless specifically waived by organizations in Engineering Regulation 11-1-322.
4. Army sustainability goals require Life Cycle Cost Analyses (LCCA) of proposed sustainable components or objectives and shall be included in the VE process.

GC-7.2 Applicable Codes and Standards for USACE Managed Projects

1. USACE NY District, Design Submission Requirements Manual.
2. USACE Regulations and the USACE VE Workshop Standard and Evaluation Index.
3. The USACE VE Standard is a compilation of the ASTM Standard E1699 standard and the SAVE International® VM Standard and the COVE#2015-02 document.

GC-7.3 Value Engineering Process

1. Value Engineering for USACE managed projects shall follow the applicable codes and standards, subject to the applicable project value thresholds.
2. Application of Value Engineering requirements for non-federally funded projects is not required.

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 01 – GENERAL REQUIREMENTS

01.1 Introduction

1. DOR shall coordinate General Requirements with PM for incorporation into Division 1 Contract Documents as applicable.

01.2 West Point's Smoke-Free Workplace

1. Refer to West Point Policy Memorandum 17-15, which stipulates West Point policy for the installation and all agencies and tenant activities.
   a. West Point Restrictions apply to ALL tobacco products, including e-cigarettes.

2. Refer to West Point Civilian Personnel Bulletin 196-07 which includes reference to West Point Policy Memorandum 17-15 and provides a list of designated outdoor smoking areas.
   a. The Central Post Area is designated as non-smoking corridor for all employees.
   b. Restrictions include no smoking within 50-ft of commonly used entry points.
   c. Restrictions prohibit faculty and cadre from use of tobacco products in the presence or view of cadets while on duty. Cadre is defined by Provost Marshal's Office to include civilian personnel interacting with cadets in leadership or mentoring roles while on duty.

01.3 West Point Maintenance Contracts

1. West Point's Construction and Contract Service Branch (CCSB) is responsible for ongoing maintenance service contracts.
2. The DOR may obtain the current list of relevant maintenance contracts through the project PM.

01.4 Aerial Drone Procedures

1. The proponent for the operation shall file for a Commercial Part 107 COA through the FAA Drone Zone Website.
   a. The proponent must also obtain either DoD or HQDA permission (ETP / Waiver) to operate a COTS UAS on the US Army Garrison West Point IAW the following references:
      i) Memorandum, Deputy Secretary of Defense, 23 May 18, subject: (U//FOUO) Unmanned Aerial Vehicle Systems Cybersecurity Vulnerabilities.
      ii) Memorandum, Deputy Secretary of Defense, 01 Jun 18, subject: (U//FOUO) Commercial-Off-The-Shelf Unmanned Aircraft Systems Implementation Guidance.
      iii) Memorandum, Deputy Secretary of Defense, 16 Nov 18, subject: (U//FOUO) Delegation of Authority to Approve Exemptions for Using Commercial-Off-The-Shelf Unmanned Aerial Vehicle Systems in Support of Urgent Needs.
      iv) HQDA EXORD 193-18, "Army Use of Commercial Off the Shelf (COTS) Small Unmanned Aircraft Systems (SUAS), 23 Jun 18.
      v) HQDA ALARACT 029/2019, "Consolidated DoD-Army COTS UAS Cyber Security Waiver Business Rules, 161937Z Apr 19.

2. The proponent shall work with the Garrison to obtain an ETP from the Garrison CDR allowing access to the West Point National Defense Airspace (SSI 99.7 TFR)
    a. References on the memo should include:
        i) Notice to Airman (NOTAM), Flight Data Center (FDC) 8-3277, 19 Dec 18, Security: Special Security Instructions for Unmanned Aircraft Systems (UAS) Operations for Multiple Locations Nationwide
        ii) FAA / DOD J-SOP for UAS-Specific SSI, Version 1.0, 06 Apr 17.
        iii) Addendum to the FAA / DOD J-SOP for UAS-Specific SSI, nd.
        iv) 18 U.S. Code § 795.Photographing and sketching defense installations.

3. The proponent shall obtain their DoD or HQDA COTS ETP/Waiver and provide that to the West Point Project Manager for distribution prior to commencing operations on the installation.

01.5 Project Permitting

1. The designated Project Manager will provide forms, with instructions, for applications to be processed through WP DPW, which may require the following permits:
    a. West Point Dig Safe Application.
    b. Air Permitting Requirements for increased emissions, generators, boilers
    c. Radioactive materials permit
    d. Hot work permit

01.6 Contractor's Parking, Storage Yard, and Haul Routes

1. Construction phase access and logistics shall be evaluated and coordinated during the planning/design phases. The designer shall develop a project logistics plan and include identified haul routes and stagging/laydown areas on the plans. DPW-PM shall ensure the project logistics plan is coordinated with appropriate West Point stakeholders.
2. There is no designated Privately Owned Vehicle (POV) parking for contractor personnel on the Army Garrison West Point.
3. The DOR, in conjunction with the PM, shall establish the following:
    a. The Contractor's storage yard at a site acceptable to DPW that is within the overall limits of the Project and shown on the Drawings.
    b. Project contract documents shall indicate that POV parking is not allowed on the Garrison.
    c. A project logistics plan and include identified haul routes and stagging/laydown areas on the plans. DPW-PM shall ensure the project logistics plan is coordinated with appropriate West Point stakeholders.
    d. Contractor haul routes shall be depicted on a drawing and submitted for acceptance by DPW prior to the start of the work
    e. Contractor haul routes shall be depicted on a drawing and submitted for acceptance by DPW prior to the start of the work. The Contractor shall be responsible for maintenance, daily cleaning, snow removal and repair of haul routes during construction.

01.7 As-Built Documents

1. As-builts shall be completed by the construction contractor and verified for accuracy by the DOR. All as-builts shall be archived in the GIS. These requirements shall be included in the project Specifications.
2. Specifications shall require the construction contractor to provide electronic copies of all as-builts in source file format (.dwg, .rvt, .nwf, etc.) and .pdf format.
3. Drawing source files shall be exported to AutoCAD format. Verify compatible version with DPW.
4. As-builts shall be labeled in accordance with DPW's requirements and all files shall be bookmarked by system.
5. Provide (2) paper copies and (2) electronic (CD/ROM) copies.

01.8 Unexploded Ordnance (UXO) Safety Requirements

1. The DPW will provide information for Unexploded Ordnance (UXO) awareness the Contract Documents regarding procedures for s for incorporation into the project Construction Documents.
2. The information will include a copy of the UXO Safety Sheet as provided in the Appendix.

DIVISION 02 – EXISTING CONDITIONS (ENVIRONMENTAL STANDARDS)

DIVISION 02 – EXISTING CONDITIONS (ENVIRONMENTAL STANDARDS)

The DOR shall incorporate Contractor requirements into the Contract Documents and Division 1 specifications as appropriate.

02.1 - Environmental Impacted Soils and Groundwater

02.1.1 Introduction

1. The proposed development sites will be free of environmental contamination. In the event of a release of petroleum or other chemical/fluid or solid that presents a hazard to the site, environment and human health, this event will be treated as a spill in accordance with the New York State Department of Environmental Conservation, (NYSDEC). Refer to Section 2.6, Spill Control and Countermeasure Plan. In the event of a of a spill or release of petroleum or hazardous chemical, the following codes and standards will apply:

02.1.2 Codes and Standards

1. NYSDEC Spill Reporting and Initial Notification Requirements
2. NYSDEC CP-51 Soil Cleanup Guidance Policy
3. NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation
4. 6 NYCRR Part 360 Solid Waste Management Facilities
5. 6 NYCRR Part 364 Waste Transporter Permits
6. 6 NYCRR Part 370,371, 373 Hazardous Waste Management
7. 6 NYCRR Part 375 Environmental Remediation Programs
8. USACE Public Works Technical Bulletin 200-1-144 30
9. 29 CFR 1910 Occupational Safety and Health Standards
10. 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations
11. TOGS 1.1.1 Division of Water Technical and Operational Guidance Series.

02.1.3 General Design/Construction

1. In the event of a spill or release of petroleum or hazardous chemical or encountering conditions that indicate the presence of petroleum or hazardous materials the Contractor shall cease all work, notify immediately; the Contracting Officer, Department of Public Works Project Manager, Environmental Management Division (EMD) and West Point Fire Department. The EMD will provide further notifications as required with the New York State Department of Environmental Conservation (NYSDEC) or direct the Contractor to do so. The requirements for release notification are included in Spill Reporting and Initial Notification Requirements and include location, content, and volume of release material. At the direction of EMD, the Contractor shall undertake measures to mitigate or contain the release.
2. Released material shall be recovered and soils and or groundwater impacted by the spill, shall be remediated in accordance with the NYSDEC codes and standards. Remedial activities must be completed by individuals and firms knowledgeable with the remedial activities and having proper health and safety training and certifications to manage and transport environmental contaminated media as required by the codes and standards.

02.1.4 Existing Landfills and Ranges

1. Existing landfills and ranges, if used for staging or other construction activities, should be evaluated following the National Environmental Policy Act (NEPA) process due to the potential for contamination.
2. Refer to Section GC-3 in this EPS for the NEPA process at West Point.
3. If approved, the Contractor must maintain and restore the integrity of any landfill caps and perform repairs at conclusion of the project. Landfills and ranges may also require Unexploded Ordinance (UXO) support during any activity that will disturb the site soils.
    a. UXO poster is included in the Appendices of this document.

02.1.5 Groundwater Control in Excavations

1. Should a Contractor need to pump impounded water from an excavation, the Contractor will follow the guidelines outlined in NYSDEC DER-10.

02.2 Spill Prevention Control and Countermeasure Plan (SPCC)

02.2.1 Introduction

1. A Spill Prevention Control and Countermeasure Plan **(**SPCC) is required under federal regulation if the project meets the following three criteria:
    a. It stores, uses, transfers, or otherwise handles oil;
    b. It has a maximum aboveground storage capacity greater than 1,320 gallons of oil (which includes both bulk and operational storage volumes) OR total underground storage capacity greater than 42,000 gallons of oil; and,
    c. There is a reasonable expectation (based on the location of the site) that an oil spill would reach navigable waters or adjoining shorelines of the United States.

2. The Contractor will be required to provide a plan showing all work locations and staging areas and note location for storage of equipment, oil, petroleum fuel and hazardous materials. All materials specified shall be stored in accordance with applicable state and federal regulations as well as the Installation Spill Prevention Control and Countermeasure Plan.
3. The SPCC is a requirement of the NYSDEC State Pollutant Discharge Elimination System (SPDES).

02.2.2 Codes and Standards

1. Environmental Conservation Law (ECL) Article 17, Title 10
2. 6 NYCRR Parts 595-599, 613, 370, 374-2 Bulk Storage of Petroleum and Chemicals; Management of Used Oils

02.2.3 General Design/Construction

1. The SPCC Plan is prepared to design storage and transfer operations (engineering controls, locations, equipment, and methods) that will reduce the risk of spills; and, design and implement countermeasures to mitigate the effects of spilled oil product on the environment for volumes that exceed the threshold storage capacity.
2. When calculating storage capacity, the SPCC plan will include the capacity of the fuel and fluid tanks on planned mobile and operational equipment (e.g., fuel tanks on bulldozers, cranes and backhoe/excavators of greater than 55 gallons).

3. The SPCC Plan shall be prepared by the Contractor and reviewed by the Contracting Officer and the EMD.
4. The EPA allows for facilities with 10,000 gallons or less aggregate oil storage capacity, with a maximum individual storage capacity of 5,000 U.S. gallons, and for the 3 years prior to SPCC certification, has had no single oil discharge greater than 1,000 gallons, or no two discharges greater than 42 gallons, within any 12-month period to navigable waters, to self-certify the SPCC Plan. If these criteria are not met, the SPCC must be certified by a Professional Engineer.
5. The fluids that may be stored, dispensed and used on-site, will typically range from motor oils and hydraulic fluids to diesel fuel and gasoline. The SPCC Plan provides designated petroleum storage areas for containers of petroleum products, types of containers and containment, locations for implementing spill control measures, and location of spill response supplies and equipment.

02.3 Site Generated Demolition, Renovation and Construction Waste

02.3.1 Introduction

1. It is a policy of West Point to apply sound environmental principles in the management of site-generated waste and the use of materials during the design and construction of facilities. As part of that policy implementation, the Contractor shall:
   a. Practice efficient waste management when sizing, cutting, and installing products and materials, and
   b. Use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

2. The current goal for military institutions is to divert at least 60% of non-hazardous construction and demolition solid wastes from landfills. The Contractor should establish with the EMD a minimum goal for the project.

02.3.2 Codes, Regulations and Other Standards Specific to West Point

1. ASTM E 1609: Development and Implementation of a Pollution Prevention Program (1994; R 2001)
2. USGS Div. 01: Section 01 74-19 Construction and Demolition Waste Management
3. 6 NYCRR Parts 370, 371, 372, 373, 374, and 376

02.3.3 General Design/Construction

1. Waste Management: Develop and implement a Waste Management Plan, WMP, in accordance with ASTM E 1609 and as specified. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort.
   a. The Contractor shall assign an Environmental Monitor who shall be responsible for instructing workers and overseeing and documenting results of the WMP for the project. Construction and demolition waste include products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates.

b. The Contractor is responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Government. Ensure that firms and facilities used for recycling, reuse, and disposal are appropriately permitted for the intended use to the extent required by federal, state, and local regulations. Provide on-site instruction on appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
c. All hazardous waste generated during this contract shall be managed in accordance with applicable NYSDEC hazardous waste regulations and USAG West Point Policy 26. Coordinate Hazardous Waste Manifests with the DPW Environmental Management Division. Only authorized West Point personnel shall sign manifests as the generator. A draft copy of the manifest must be submitted for review by EMD at least 5 days prior to waste pickup. Coordinate the waste pickup date with the EMD to ensure an authorized representative will be available to sign the manifest.

2. Lead Management: For lead-painted waste being recycled, the Contractor shall submit a letter from a licensed scrap metal recycler, stating that the facility will accept painted metal containing lead, and that the facility will recycle this material. In addition, Contractor shall submit a Bill of Lading for the recycled material.

3. The Waste Management Plan must include at a minimum:
   a. Periodic meetings with Contracting Officer to review the WMP and progress.
   b. Methods of solid waste recycling and re-use by on site separation or mixed waste.
   c. Contact information and certifications for landfills and recycling/re-use facilities receiving waste.
   d. Transportation Methods.
   e. Record keeping and inventory for all wastes removed from the project.
   f. Justification for materials that required disposal at landfills.

02.4 Asbestos-Containing Materials (ACM)

02.4.1 Introduction

1. During the project design phase, an ACM investigation must be performed to determine if ACM will be disturbed by proposed project activities. The ACM survey must be conducted by EPA-certified Asbestos Inspectors in accordance with the standard procedures outlined in 40 CFR 763 (AHERA). When available, refer to prior reports to determine materials that have been previously sampled and analyzed for asbestos.
2. Note that the West Point HAZMAT Contracting Officer's Representative (COR) has asbestos information for buildings on post and a remediation requirement contract in place.

02.4.2 Codes and Standards

1. UFGS Section 02 82 16.00 20 Engineering Control of Asbestos Containing Materials
2. ANSI/ASSP Z88.2 (2015) Practices for Respiratory Protection
3. ASTM E1368 (2014) Standard Practice for Visual Inspection of Asbestos Abatement Projects

4. 29 CFR (Code of Federal Regulations) Part 1926.1101, U.S. Occupational Safety and Health Administration (OSHA) - Asbestos Standard for the Construction Industry
5. 29 CFR 1926.103 Respiratory Protection
6. 29 CFR 1926.200 Accident Prevention Signs and Tags
7. 29 CFR 1926.51 Sanitation
8. 29 CFR 1926.59 Hazard Communication
9. 40 CFR 61-Subpart A General Provisions
10. 40 CFR 61-Subpart M National Emission Standard for Asbestos
11. 40 CFR 763 Asbestos

02.4.3 General Design/Construction

1. The ACM survey shall include the collection of bulk asbestos samples of suspect ACM within specific areas anticipated to be impacted during construction. ACM samples shall be analyzed for asbestos content using Polarized Light Microscopy (PLM) in accordance with EPA Method 600/R-93/116. For non-organically bound (NOB) materials such as caulks, floor tiles, mastics, waterproofing membranes, and roofing materials, samples shall be gravimetrically reduced prior to PLM analysis. NOB samples that are determined to contain less than one percent asbestos through PLM analysis shall be further analyzed for asbestos content using Transmission Electron Microscopy (TEM). All samples must be analyzed by an independent laboratory accredited by the American Industrial Hygiene Association (AIHA), and the National Voluntary Laboratory Accreditation Program (NVLAP).
2. Based on the results of the asbestos survey, design drawings and specifications shall be developed by an EPA-certified Asbestos Project Designer for all materials identified as ACM to be removed, enclosed, encapsulated or managed in place.
3. The design should include Unified Facilities Guide Specifications (UFGS) Section 02 82 16.00 20 Engineering Control of Asbestos Containing Materials.

02.5 Lead-Containing Materials

02.5.1 Introduction

1. The EPA Lead Renovation, Repair and Painting (RRP) Rule (40 CFR 745) establishes requirements for contractors who disturb painted surfaces in housing, apartments, and child-occupied facilities built before 1978. The EPA RRP Rule includes specific training, certification, and work practice requirements. For all construction projects, even those that do not impact child-occupied facilities, compliance with the OSHA lead in construction standard (1926.62) and EPA waste disposal standards is required.
2. Only painted surfaces that contain lead in a concentration equal to or greater than 1.0 milligrams per square centimeter (mg/cm2) or 0.5% by weight (defined as “lead-based paint”) are regulated under the EPA RRP Rule. Surface coatings include paint, shellac, varnish, or any other coating, including wallpaper which covers painted surfaces.
3. Unlike the EPA RRP rule, OSHA lead regulations are applicable whenever lead-containing materials are being disturbed, even if the lead concentration is below 1.0 mg/cm2 or 0.5% (defined as “lead-containing paint”). This means that work impacting any detectable level of lead based on laboratory analysis or in-situ x-ray fluorescence (XRF) instrument testing requires OSHA compliance. OSHA requirements also apply to work that impacts other materials that contain lead including lead coated copper flashing, lead-contaminated soil at firing ranges, and batteries.

4. Prior to commencement of work, a lead inspection shall be performed by an EPA-certified Lead Inspector to identify the presence of lead that could be disturbed during the project.
5. Note that the West Point HAZMAT COR has lead-containing material information for buildings on post and a remediation requirement contract in place.

02.5.2 Codes and Standards

1. UFGS Section 02 83 13 Lead Remediation
2. ANSI/ASSP Z88.2 (2015) Practices for Respiratory Protection
3. HUD 6780 (1995; Errata Aug 1996; Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing
4. 29 CFR 1926.103 Respiratory Protection
5. 29 CFR 1926.21 Safety Training and Education
6. 29 CFR 1926.33 Access to Employee Exposure and Medical Records
7. 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists
8. 29 CFR 1926.59 Hazard Communication
9. 29 CFR 1926.62 Lead in Construction
10. 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
11. 40 CFR 745 Lead-Based Paint Renovation, Repair and Painting
12. SSPC Guide 6 - Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations
13. SSPC Guide 7 - Guide for Disposal of Lead-Contaminated Surface Preparation Debris
14. NYSDEC 6 NYCRR Part 360 - Solid Waste Regulations
15. NYSDEC 6 NYCRR Part 364 - Waste Transportation Regulations
16. NYSDEC 6 NYCRR Part 370-374 and 376 - Hazardous Waste Regulation

02.5.3 General Design/Construction

1. Suspected lead-containing materials shall be sampled prior to design by collection of representative paint chip samples for laboratory analysis or in-situ XRF testing. Paint chip samples shall be analyzed by U.S. EPA SW-846 Test Method 7000B using Flame Atomic Absorption (FAA) by an AIHA accredited laboratory. The designer shall identify lead-containing materials to be abated prior to renovation/demolition and materials to be managed by the contractor during the project.
2. OSHA compliance during construction requires ensuring that worker lead exposures do not exceed permissible exposure limits (PELs). Depending on the means and methods employed by the contractor, abatement of lead-painted surfaces may be required prior to demolition or construction. The design for projects impacting lead-containing materials must include UFGS Section 02 83 00.
3. All waste streams potentially containing lead from non-residential projects shall be characterized prior to disposal by lead toxicity characteristic leaching procedure (TCLP) analysis. Wastes determined to be lead hazardous waste shall be properly containerized and disposed in accordance with NYSDEC and EPA regulations.

02.5.4 Renovation, Repair and Painting (RRP)

1. A “child-occupied facility” is defined by the EPA RRP Rule as a building, or a portion of a building, constructed prior to 1978, visited regularly by the same child, under 6 years of age, on at least two different days within any week (Sunday through Saturday period), provided that each day’s visit lasts at least 3 hours and the

combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. For child-occupied facilities, a lead inspection must be performed in accordance with the EPA RRP Rule. UFGS Section 02 82 33.13 20 Removal/Control and Disposal of Paint with Lead shall be used for abatement or control of lead hazards in child-occupied facilities or target housing.

2. In accordance with EPA policy, lead-based paint waste generated by residential renovation projects can be disposed of as municipal household waste. This exemption does not apply to residential demolition projects.

02.6 Universal Waste

02.6.1 Introduction

1. In an existing structure requiring demolition/renovation, a visual universal waste survey must be performed to locate and quantify other regulated materials such as batteries, pesticides, thermostats, lamps, switches, smoke detectors, and tritium exit signs.
2. New York State requires recycling of all fluorescent lamps or High Intensity Discharge (HID) lamps (including low mercury lamps) as universal waste.

02.6.2 Codes and Standards

1. UFGS Section 02 84 16 Handling of Lighting Ballasts and Lamps Containing PCBs and Mercury
2. 29 CFR 1910.1000 Air Contaminants
3. 40 CFR 260 Hazardous Waste Management System: General
4. 40 CFR 261 Identification and Listing of Hazardous Waste
5. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
6. 40 CFR 263 Standards Applicable to Transporters of Hazardous Waste
7. 40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
8. 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
9. 40 CFR 268 Land Disposal Restrictions
10. 40 CFR 270 EPA Administered Permit Programs: The Hazardous Waste Permit Program
11. 40 CFR 273 Standards for Universal Waste Management
12. 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
13. 49 CFR 178 Specifications for Packaging
14. 6 NYCRR, Subpart 374-3: Standards for Universal Wastes
15. Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136-136y)

02.6.3 General Design and Construction

1. The universal waste survey must locate and quantify the universal waste materials that are impacted by the scope of work and need proper management. A universal waste design must be prepared that will address characterization, containerization, transport, and disposal in accordance with applicable regulations.
2. The design documents must include UFGS Section 02 84 16 Handling of Lighting Ballasts and Lamps Containing PCBs and Mercury.
3. The universal waste survey must include an evaluation of lighting ballasts for the presence of PCBs. Ballasts with a “non-PCB” label can be assumed to be non-PCB

containing and disposed of as universal waste. Ballasts that do not have a “non-PCB” label must be presumed to be PCB containing and noted as such. During construction, the contractor must properly characterize, store, transport and dispose of all universal waste.

02.7 Polychlorinated Biphenyls (PCBs) In Building Materials

02.7.1 Introduction

1. PCB’s (other than universal waste addressed in Section 12.10) can be present in materials such as caulks, sealants, paints, transformers, and capacitors. PCB-containing materials present a risk to individuals handling the material and can be a persistent source of PCB’s to the environment if disposed at a landfill. PCBs are regulated as hazardous waste by New York State and the EPA.

02.7.2 Codes and Standards

1. UFGS Section 02 84 33 Removal and Disposal of Polychlorinated Biphenyls (PCBs).
2. 29 CFR 1910.1000 Air Contaminants.
3. 29 CFR 1910.145 Accident Prevention Signs and Tags.
4. 40 CFR 761 Polychlorinated Biphenyls Manufacturing, Processing, and Use Prohibitions.
5. 49 CFR 171 General Information, Regulations, and Definitions.
6. 49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.
7. 49 CFR 173 Shippers - General Requirements for Shipments and Packaging.
8. 49 CFR 174 Carriage by Rail.
9. 49 CFR 175 Carriage by Aircraft.
10. 49 CFR 176 Carriage by Vessel.
11. 49 CFR 177 Carriage by Public Highway.
12. 49 CFR 178 Specifications for Packaging.
13. 49 CFR 179 Specifications for Tank Cars.
14. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC).
15. 6 NYCRR, Parts 370-373, Hazardous Waste Management System.

02.7.3 General Design and Construction

1. Representative sampling of suspected PCB-containing materials that will be impacted by the project shall be performed prior to demolition/construction and samples shall be submitted for polychlorinated biphenyl (PCB) analysis. Samples must be analyzed by a NYSDOH ELAP-accredited laboratory in accordance with EPA Method 8082. Analytical results shall be compared to the current classifications for PCB materials included in the Toxic Substances Control Act (TSCA) and EPA regulation 40 CFR Part 761. PCB Containing materials will require removal, containment and disposal in accordance with EPA and NYS regulations. The design must include UFGS Section 02 84 33 Removal and Disposal of Polychlorinated Biphenyls (PCBs).

Reserved for West Point Future Development

DIVISION 03 – CONCRETE

DIVISION 04 - MASONRY

DIVISION 04 - MASONRY

04.1 Historic Stone Sources

1. The *Installation Design Guidelines* (IDG) calls for the use of indigenous materials (e.g., gneiss, granite, limestone, sandstone, and slate) in building projects at West Point, consistent with the campus' architectural history. Where historic masonry requires repair or replacement, repair or replacement of masonry units in kind is preferred approach. New stone used for repairs should match the existing stone in terms of aesthetics and performance.
2. Identification of specific stone sources and quarries/trade names is limited because many of the historic stones used at West Point are no longer quarried.
3. Geological characteristics and mineral composition of some West Point stone formations:
    a. At least three buildings at West Point were constructed from gneiss quarried within the boundaries of the West Point National Historic Landmark District (NHLD) (reportedly quarried from the hill behind the Superintendent's Quarters):
        i) The Cadet Chapel,
        ii) Thayer Hall, and
        iii) North Barracks.

    b. Three forms of gneiss can be found on the West Point campus (United States Geological Survey, Geological Map of New York: Lower Hudson Sheet, 1970):
        i) Rusty-Gray,
        ii) Horneblende granite, and
        iii) Garnet-bearing

04.2 Historic Preservation Regulations

1. Refer to West Point Cultural Resources guidelines and IDG Appendix M. Appendix M offers guidance for the appropriate restoration treatments at West Point, including masonry repairs and cleaning, based on the *Secretary of the Interior's Standards*.

04.3 Repairs to Existing Buildings

1. Possible methods of approval of stone and/or masonry samples. Determine methodology with PM.
    a. During project design: with the PM, preselect material for approval by CRM.
    b. During construction:
        i) Create a general performance specification for contractors to identify and submit sample(s) of stones to the project team for review that might be otherwise unknown to the team.
        ii) The approval process during construction is subject to the approval of the Project Manager and Cultural Resources and may only be appropriate for smaller projects or where flexibility is available for contract changes.

04.4 Construction of New Buildings

1. For construction of additions or other alterations requiring a stone match in a new masonry assembly, the use of commercially supplied products such as cladding is necessary.
2. Commercial stone products could have a different procurement process than salvaged stone utilized for repairs.
3. Develop a process with the Project Manager for approving stone products prior to construction.
4. The following stone may be considered for use in projects contingent on appropriateness and USAG West Point approval. For example:
   a. Fletcher granite
   b. Kitledge Tapestry granite (used for the 2008 Jefferson Hall).

04.5 Salvage and Reuse of Stone and Masonry

1. The DOR working with PM shall consider opportunities for the salvage and possible reuse of suitable stone available on site, particularly granite/gneiss, for use in the current project or a future project.
2. Consider following possible sources of salvaged stone or masonry:
   a. On site stone surveyed through borings and collected from site excavation
   b. Stone selectively removed from areas of a building or site
   c. Masonry units demolished at existing buildings

3. Include consideration for storage in planning and budgeting.

Reserved for West Point Future Development

DIVISION 05 – METALS

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07.1 Steep Slope Roofing

07.1.1 Slate Shingles

1. Description – Select features of slate shingles as appropriate to project requirements and building characteristics, meeting Cultural Resources approval where required.
   a. Color(s) to match existing to the extent possible.
   b. Weathering characteristics:
      i) Unfading
      ii) Semi-weathering
      iii) Weathering
      iv) Other

   c. Roof style:
      i) Standard: one length and one thickness of shingle
      ii) Textural: various sizes, thicknesses, textures and colors of shingles
      iii) Graduated: a greater range of sizes, thicknesses and exposed lengths of shingles.
      iv) Other.

   d. Shingle size:
      i) 8 inches
      ii) 10 inches
      iii) 12 inches
      iv) Other.

   e. Shape:
      i) Rectangular
      ii) Octagon
      iii) Scalloped
      iv) Custom

   f. Slate fasteners: Copper nails per manufacturer's fastening requirements. Verify use of copper nails with substrate and underlayment compatibility. Use of corrosive fasteners is prohibited.
   g. Slate underlayment: self-sealing waterproof underlayment or other underlayment as appropriate for substrate and roof assembly.

2. Sources: Potential sources for slate shingles:
   a. Buckingham Slate Company, 715 Arvon Road, Arvonia, VA 23004 (434-581-1134) [www.buckinghamslate.com].
   b. North Country Slate, 8800 Sheppard Avenue East, Toronto, Ontario, Canada M1B 5R4 (800-975-2835) [www.ncslate.com].
   c. Vermont Structural Slate Company, 3 Prospect Street, Fair Haven, VT 05743 (800-343-1900) [www.vermontstructuralslate.com].

07.1.2 **Composite Shingles** (faux slate)

1. Description - Select features of slate shingles as appropriate to project requirements and building characteristics, meeting Cultural Resources approval where required.
   a. Lightweight, authentic look, 50-year warranty.
   b. Roof style:
      i) Standard: one length and one thickness of shingle
      ii) Textural: various sizes, thicknesses, textures and colors of shingles
      iii) Graduated: a greater range of sizes, thicknesses and exposed lengths of shingles.
      iv) Other.

   c. Shingle size:
      i) 8 inches
      ii) 10 inches
      iii) 12 inches
      iv) Other.

   d. Shape:
      i) Rectangular
      ii) Octagon
      iii) Scalloped
      iv) Custom

   e. Composite shingle fasteners: Non-corrosive fasteners meeting manufacturer's fastening requirements. Verify use of fasteners with substrate and underlayment compatibility. Use of corrosive fasteners is prohibited.
   f. Slate underlayment: self-sealing waterproof underlayment or other underlayment as appropriate for substrate and roof assembly as recommended by shingle manufacture and as design conditions require.

07.2 Roofing and Siding Panels

07.2.1 Standing Seam Metal Roof Panels

1. Introduction
   a. Standing seam roof profiles must match the standing seam roofing on several existing campus buildings (West Point Club, Cullum Hall, parts of Bartlett Hall & Pershing Barracks) or as appropriate for project, meeting Cultural Resources approval where required.

2. Description
   a. Vertical-Rib, Snap-Joint, Standing-Seam Copper Roof Panels or other approved metal appropriate to project. Formed with vertical ribs at panel edges and a flat pan between ribs.
      i) Sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

07.3 Membrane Roofing

07.3.1 Modified Bitumen Membrane Roofing

1. Introduction
   a. Basis of design: Siplast Paradiene 20/40 FT TG 3-PLY BW or equivalent product by Tremco U.S. Roofing. Follow UFGS as supplemented herein.
   b. Consider products with the following characteristics to comply with sustainability guidelines:
      i) Heat island reduction
      ii) Energy star label for top coating
      iii) Type III Environmental Product Declarations
      iv) Health Product Declarations

2. Roofing Membrane
   a. SBS-modified asphalt-impregnated and coated sheet
      i) 3-ply system: base sheet, interply sheet, and cap sheet with factory-applied mineral granules of light color.

3. Adhesive
   a. Provide adhesive as determined by manufacturer's requirements, appropriate conditions, and performance and as allowed by UFGS.

4. Wind uplift resistance
   a. Provide a complete roof system assembly that is rated and installed to resist wind loads for West Point special wind region as calculated per UFC, IBC, ASCE and other applicable codes.

5. Warranty
   a. Provide roof system material and workmanship warranties. Provide revision or amendment to standard membrane manufacturer warranty as required to comply with the specified requirements. Provide a manufacturer's warranty that has no dollar limit, covers full system water-tightness, and has a minimum duration of 20 years.
   b. Provide the following warranty requirements as stipulated in the UFGS for Modified Bitumen Membrane Roofing. Must include:
      i) Roof Membrane Manufacturer Warranty
      ii) Roofing System Installer Warranty
      iii) Continuance of Warranty
      iv) Conformance and Compatibility

DIVISION 08 – OPENINGS

DIVISION 08 – OPENINGS

08.1 Doors and Frames

08.1.1 Metal Doors and Frames

1. Introduction
   a. Comply with applicable requirements in UFGS in addition to supplemental requirements below.
   b. Conform door and frame sizes and details to industry stock standards where possible.
2. Doors
   a. Exterior (where use of Fiberglass reinforced doors is not appropriate or not suited to project requirements)
      i) Galvanized
      ii) Seamless
   b. Interior
      i) Galvanized: High-humidity areas and doors subject to moisture exposure (e.g. mop sink rooms, shower rooms, service areas with floor drains):
      ii) Face welded and ground smooth
      iii) Seamless at offices, classrooms, and doors opening on to public corridors or spaces and where visible to the public.
3. Frames
   a. Exterior:
      i) Galvanized
      ii) 14 gauge
      iii) Full profile welded and ground smooth
   b. Interior
      i) Galvanized: High-humidity areas and doors subject to moisture exposure (e.g. mop sink rooms, shower rooms, service areas with floor drains)
      ii) 16 gauge at openings up to and including 4’-0” wide
      iii) 14 gauge at openings over 4’-0”
      iv) 14 gauge at MK profile frames
      v) Face welded and ground smooth

08.1.2 Wood Doors

1. Introduction:
   a. Comply with applicable requirements in UFGS in addition to supplemental requirements below.
   b. Provide at interior locations at academic classrooms and at barracks unless project parameters warrant a different material.
   c. Consider certified sustainably harvested wood in LCC where suitable for application to comply with sustainability guidelines.
   d. Conform door sizes must conform to industry stock standards where possible.
2. Finish: Provide prefinished doors unless otherwise warranted.

08.1.3 Fiberglass Reinforced Plastic Doors

1. Provide fiberglass reinforced plastic doors at exterior locations where project parameters permit.

08.2 Hardware

08.2.1 Materials and finishes: as appropriate for project

08.2.2 Butts

1. Provide butt hinges for swing doors. Obtain approval for use of continuous hinges as butt hinges are preferred.

08.2.3 Closers

1. Basis of Design: Allegion LCN 4040XP. Review for compatibility with project conditions and applications.
2. Avoid floor closers at exterior door locations Concealer closers:. Review any proposed use of concealed closers with DPW prior to specification. Avoid floor closers at exterior door locations.
3. Where conditions require a hold open, preference is for magnetic hold open separate from door closer.

08.2.4 Locksets

1. Mortise locksets: provide at the following locations:
   a. Level 3 doors other than residence hall and barrack sleeping rooms
   b. Level 4 doors
   c. At rooms with occupant loads over 10 people with continuous use
   d. At classrooms, assembly spaces, IT rooms, egress doors, main entrance doors, corridor doors
   e. Rooms or spaces requiring high level of security

2. Magnetic locks: Preference is for surface mounted magnetic locks where magnetic lock type is most appropriate solution for access control. Review proposed use of magnetic locks, including use of magnetic locks concealed in doors and frames.

08.2.5 Electric Strikes

1. Provide electric strikes on doors requiring access control where feasible in lieu of electronic locksets. Coordinate with access control and fire safety control systems.

08.2.6 Exit Devices

1. Provide concealed cable panic devices at door pairs, subject to review by DPW.
2. Electric Latch Retraction: For doors or pairs of doors requiring electric latch retraction provide motorized latch retraction type devices. Coordinate with access control and fire safety control systems.

08.2.7 Interchangeable Cylinder Cores

1. Proprietary product: Best Small Format Interchangeable Core (SMIC); 7-pin design only.

08.2.8 Thresholds

1. Provide stainless steel fasteners in aluminum thresholds and other thresholds where aesthetics allow. Provide appropriate non-corrosive fasteners to prevent galvanic corrosion if stainless steel fasteners are not appropriate.

DIVISION 09 – FINISHES

DIVISION 09 – FINISHES

09.1 Introduction

1. Finish selections and materials in historic buildings are subject to Cultural Resources review and approval.
   a. In historic areas, finish colors may be required to match original or current colors.
2. The color palette, shown below in Section 09.2, is provided to assist the Designer of Record where the design intension is to reflect USMA or US Army aesthetics.

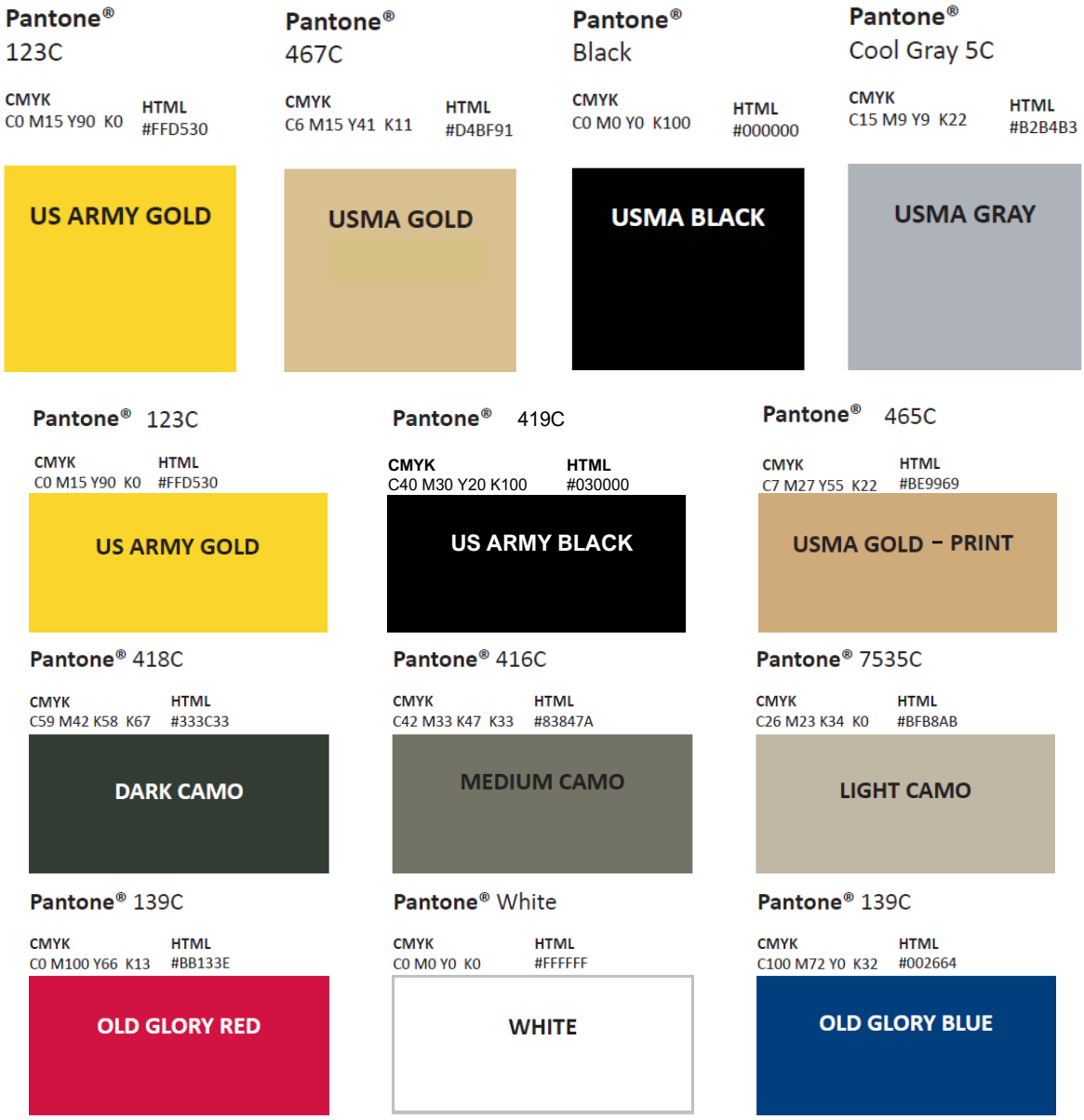
09.2 Color Palette

09.2.1 General Use

1. Preferred use: fFor printing of spot color, the Pantone Matching System (PMS), should be used. However, if printing in process color, CMYK should be used.
2. Prior to printing of any kind, obtain and view a color-match to ensure accuracy and quality. Contact the USMA Marketing Office for further details.
3. Reference USMA | Publication Standards Manual & Style Guide 2013

09.2.2 Description

1. US ARMY GOLD – Pantone 123C.
2. USMA GOLD – Pantone 467C.
3. USMA BLACK – Pantone Process Black.
4. USMA GRAY – Pantone Cool Gray 5C.
5. US ARMY BLACK – Pantone 419C.
6. USMA GOLD-PRINT – Pantone 465C.
7. DARK CAMO – Pantone 418C.
8. MEDIUM CAMO – Pantone 416C.
9. LIGHT CAMO – Pantone 7535C.
10. OLD GLORY RED – Pantone 139C.
11. WHITE – Pantone White.
12. OLD GLORY BLUE – Pantone 139C.



09.3 Painting and Coatings

1. Basis of Design: Sherwin-Williams: Provide highest quality paint system available meeting UFGS and project specific performance requirements for substrate and conditions.
2. Interior Painting
   a. Ferrous metals: Provide shop applied alkyd primer for ferrous metals scheduled to receive a painted finish.
   b. Mechanical, Electrical, Utility Service Rooms:
      i) Provide an epoxy floor coating in rooms with concrete floor substrates.
      ii) Paint walls with appropriate durable washable paint or coating.
      iii) Paint ceilings with white or light-colored paint with appropriate durable, washable paint coating.

09.1 Floor Finishes

1. Elevator Cabs
    a. Utility Elevators:
        i) Floors: Walk off Carpet matting or resilient sheet depending on traffic
    b. Primary Elevators:
        ii) Flooring – Dependent on building design:
            1) Carpet (walk-off mat carpet tile type)
            2) Porcelain
            3) Ceramic tile
            4) Terrazzo tile

Reserved for West Point Future Development

DIVISION 10 - SPECIALTIES

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

DIVISION 13 - SPECIAL CONSTRUCTION

DIVISION 14 – CONVEYING EQUIPMENT

DIVISION 14 - ELEVATOR STANDARDS

14.1 Introduction

1. West Point prefers NOT to employ MRL (machine-room-less) elevators due to the difficulty in maintaining these units.
2. Manufactured assemblies with proprietary control systems are unacceptable due to unsatisfactory installations which do not accommodate future maintenance.
3. In addition to meeting below standards, comply with UFGS and other project specific performance and regulatory requirements.

14.2 Equipment

1. Components shall be supplied from standard, easily acquired sources with readily serviceable operating software. The following product sources are acceptable.
2. Controllers:
   a. Smartrise
   b. GAL – Galaxy
   c. Motion Controller Engineering
   d. Elevator Systems
   e. Peele

3. Door Equipment: (Interlock, hanger track, Door operators, etc.)
   a. GAL

4. Hoist Machine:
   a. Hollister Whitney.
   b. Torin

5. Traction Elevator Equipment:
   a. Hollister Whitney

6. Hydraulic Elevator Equipment:
   a. Canton Elevator
   b. Delaware Elevator
   c. Minnesota Elevator

7. Elevator Push Button Fixtures:
   a. EPCO
   b. GAL
   c. Innovation Industries.

14.3 Minimum Installation Performance Criteria:

1. Capacity: 3500#.
2. Speed: 100 fpm.

14.4 Cab Construction and Finishes

14.4.1 Utility Elevators

a. Shell: Steel
    i) Finish: powder coat or stainless steel.

b. Handrails all sides (confirm need)
    i) Handrails – 6” flat bar, stainless steel. Choice of:
        1) None
        2) One at the back
        3) Two at sides or three sides

c. Bumpers at base – 6” flat SS bar.
d. Ceiling, basic flat with LED, Color:
    i) Smoked silver
    ii) Toasted Almond
    iii) Upgrade to suspended panels backlight with LED.

e. Cab front panel brushed SS
f. Cab door finish brushed SS
g. Hall side brushed SS doors with jamb
h. Provide pegs for wall protection pads in matching metal finish.
i. Flooring: Refer to Division 9; provide for floor finish thickness.

14.4.2 Primary Elevators

a. Shell steel with vertical panels
    i) Panels:
        1) Basic plastic laminate
        2) Upgraded custom option to include but not limited to:
            - Wood
            - Solid surface
            - Decorative glass
            - Light weight stone veneer
            - Woven perforated
            - Decorative sheet metal

    ii) Reveals:
        1) Natural metal finish
        2) Custom

b. Handrails (1, 2, or 3 sides)– Choice of finish per project design:
    i) 1.5” Cylindrical or flat bar option
    ii) Finish natural metal
    iii) SS or custom bronze or brass

c. Ceiling:
    i) Downlight with LED

ii) Base grade as stainless finish
iii) Other natural metal finish
iv) Custom design option

d. Cab Front Panel:
i) Brushed SS
ii) Other natural metal finish

e. Cab Door Finish:
i) Brushed SS
ii) Other natural metal finish

f. Hall Side:
i) Brushed SS doors and Jamb SS
ii) Other natural metal finish
Provide pegs for protection pads in matching metal finish.

g. Flooring: Refer to Division 9; provide for floor finish thickness.

RESERVED for future CSI or UFGS Division Development

DIVISIONS 15-20

DIVISION 21 – FIRE PROTECTION

DIVISION 21 – FIRE PROTECTION PLANNING STANDARDS - SPRINKLER & STANDPIPE SYSTEMS

21.1 Introduction

The Engineering Planning Standards define requirements specific to the United States Army Garrison West Point. These standards build upon the baseline requirements defined in the Unified Facilities West Point Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this EPS document.

21.2 Codes, Regulations and other Standards Specific to West Point

1. New York State Department of Health Guidelines for Designing Backflow Prevention Assembly Installations.
2. Division 23 – Mechanical Design Standards for references to piping materials, etc.
3. West Point Installation Design Guide (IDG) for references to architectural, landscape and street visual themes specific to West Point.
4. American Water Backflow Prevention Requirements - all proposed backflow prevention devices must be coordinated with the West Point Water Utility Privatization Contracting Officer's Representative for purchase and installation by American Water. American Water will purchase and install all new backflow prevention devices in accordance with the Utility Privatization Contract and applicable standards and specifications.

21.3 General Requirements

1. Follow the requirements outlined in UFC 3-600-01 except as supplemented below:

21.3.1 Materials and Equipment

a. All materials, equipment, and appurtenances shall be labeled by Underwriters Laboratories, Inc. (UL) or a similar organization acceptable to the Government.

21.3.2 Backflow Prevention

a. Backflow prevention at the fire service to the building is required and shall be either a double check detector assembly (DCDA) or reduced pressure zone detector assembly (RPZD). Both types of backflow preventers are required to be provided with a bypass meter for monitoring of unauthorized use or system leaks. The bypass shall also be provided with a backflow prevention device per American Water guidelines.
b. Outside stem and yoke (OS&Y) valves installed on both sides of the backflow preventer assembly with monitored tamper switches.
c. American Water is responsible for the installation and maintenance of all backflow prevention devices and isolation valves on either side and all work associated with such devices should be coordinated with American Water.

21.3.3 Fire Department Connection

a. Fire department connection shall be 4-inch "Storz" type and shall be provided with the appropriate escutcheon and label. Fire department connection must be located

within 150-feet of a fire hydrant and coordinated with the West Point Fire Department.

21.4 Fire Pump

1. Follow the requirements outlined in UFC 3-600-01 except as supplemented below:

21.4.1 General Requirements

a. Fire pump shall be horizontal split case centrifugal only. Vertical fire pumps are not permitted.
b. Fire pump shall be electric motor driven when reliable power source is available. Diesel or electric motor driven with emergency generator and automatic transfer switch are options when power source is NOT reliable. At the time that this Engineering Planning Standard was published, documentation has not been provided as required to indicate compliance with reliable power requirements as outlined in UFC 3-600-01, Section 2-1.26. Since documentation has not been provided, power is deemed unreliable until proven otherwise, therefore diesel or electric motor driven with emergency generator fire pumps are the only permitted options. Engineer of record is responsible for verifying compliance with reliable power requirements.

21.5 Sprinkler System

1. Follow the requirements outlined in UFC 3-600-01 except as supplemented below:

21.5.1 Piping Requirements

a. Piping smaller than 2-inches must be minimum Schedule 40 with threaded, welded or grooved fittings.
b. Piping larger than 2-inches must be minimum Schedule 10 with welded or grooved fittings. Threaded Schedule 10 piping shall not be permitted.
c. The use of flexible sprinkler hose with fittings intended for direct connection to sprinklers shall be permitted (Approved by West Point Fire Department).

21.5.2 Zoning Requirements

a. Sprinkler systems shall be zoned on a floor-by-floor basis with zone valve on each floor. Special hazard protection to be provided with a separate zone such as storage vaults, elevator machine rooms, etc. All zones to be provided with necessary valves, valve tamper switches, water flow alarms and drains to make it a separate sprinkler system.

21.5.3 Sprinkler Guard Requirements

a. Sprinkler guards shall be provided on all sprinklers subject to mechanical damage, including, but not limited to, in mechanical equipment rooms and under stairs.

21.6 Standpipe System

1. Follow the requirements outlined in UFC 3-600-01 except as supplemented below.

21.6.1 General Requirements

a. A Class I standpipe shall be provided in facilities less than four stories in height where all portions of the building (on any floor) cannot be reached from an exterior door in less than 300 feet.
b. Class I standpipe pressure requirement of 100 psi can be reduced to 65 psi due to the availability of fire apparatus on campus.

21.7 Equipment Manufacturers

21.7.1 Proprietary Manufacturers

a. None

21.7.2 Preferred Manufacturers

a. Steel Piping

    i) U.S. Steel.
    ii) Koppel Steel Corporation.
    iii) Wheatland Tube Company.
    iv) Sharon Tube Company.

b. Steel Fittings

    i) The Viking Corporation.
    ii) Weldbend Corporation.
    iii) Anvil International.
    iv) Ward Manufacturing.

c. Hangers and Supports

    i) Anvil International.
    ii) Empire Industries.
    iii) Grabler Manufacturing Co.

DIVISION 22 – PLUMBING PLANNING STANDARDS

DIVISION 22 – PLUMBING PLANNING STANDARDS

22.1 Introduction

These Engineering Planning Standards define requirements that are specific to the United States Army Garrison West Point. These standards build upon the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this design standard.

Load letters are required for all projects that include gas and water service upgrades, whether new construction or renovations, and shall be signed by a licensed Professional Engineer. Primary contact shall be the Project Manager.

Refer to the requirements of Division 33 for coordination of building utility connections with site utilities.

22.2 Codes, Regulations and other Standards Specific to West Point

1. Relevant sections of the Unified Facilities Criteria (UFC).
2. International Building Code – When referenced by the UFC but shall not take the place of the UFC.
3. Occupational Safety and Health Administration (OSHA) Parts 1910 & 1926.
4. NFPA 54 – National Fuel Gas Code.
5. New York State Department of Health Guidelines for Designing Backflow Prevention Assembly Installations.
6. Orange County Department of Health requirements for connection to potable water systems.
7. New York State Design Standards for Intermediate Sized Wastewater Treatment Systems
8. American Water Military Services Group Design Guide for Water and Wastewater Facilities
9. American Water Standard Specifications
10. NSF 61 -Standard for Potable Domestic Water Piping and Components

22.3 General

1. Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of such products. Specified equipment shall have a track record of performing satisfactorily for at least two (2) years prior to bid opening.
   a. Plumbing system energy usage and equipment efficiencies shall comply with the UFC, per Executive Order 13423.
   b. Metering shall be provided for all-natural gas and potable water use for all new construction or substantial renovation, or for temporary services provided to facilities with significant energy demand or consumption, or facilities that service reimbursable tenants. Meters shall be equipped for communicating with the NEMAS metering network via MODBUS or pulse output. Meters shall be submitted to the MDCC for consideration and approval.
   c. All pipe, valves, fittings, stops, faucets, and domestic water pumps shall comply with the Federal "Reduction of Lead in Drinking Water Act" NSF/ANSI 61 for lead content of 0.25%.

d. Plumbing seismic bracing shall comply with the requirements of the UFC.
e. Piping identification shall be in accordance with ASME A13.1.
f. Piping insulation type shall be Glass Fiber or Elastomeric Material and comply with ASTM E84, NFPA 255, and UL 723 standards. Service hot water piping and storage shall meet the more restrictive minimum requirements of either the UFC or ASHRAE Standard 90.1, Energy Standard for Buildings except Low-Rise Residential buildings." Chilled water piping from a central drinking water cooling system shall have ½-inch thick Elastomeric insulation.
g. All floor-mounted equipment shall be provided with a concrete housekeeping pad. Housekeeping pad shall be sized to extend at least 6-inches beyond the equipment and shall be a minimum of 4 inches thick.
h. Fire-rated floor and wall penetrations shall be provided for pipes passing through fire-rated construction.
i. Reliability: Where interruption of a service cannot be tolerated or where failure of a system would drastically reduce the efficiency of a facility, provide dual-fuel capability and/or redundant system components.
j. Expansion Compensation: Provide swing joints, anchors, expansion loops or other devices where required to control pipe expansion and contraction without causing undue stress.
k. Motors one half horsepower and larger shall be three phases unless indicated otherwise.
l. Isolation valves shall be provided on all service piping connections to equipment, including utility-provided metering, to allow servicing and replacement.

22.4 Domestic Water System

1. Water service:
   a. Large Buildings will be provided with two or more domestic water services. DPW and American Water shall be consulted to determine whether a building is sufficiently large to require a second service. The domestic water service into building can be Ductile Iron Cement Lined or Copper Type K. For copper piping below 3", provide protective coating. If the water pressure exceeds maximum allowed by code or the UFC, provide a pressure reducing valve assembly suitable for a range of flows.
   b. Each incoming service shall be provided with a water meter, supplied and installed by the contractor.
   c. Due to the varied conditions of underground water service piping in some areas of the West Point campus, building-wide water filtration systems may need to be installed on the water services to new and renovated buildings. The need for such systems shall be evaluated for each project, with final confirmation required by the O/M Chief.

2. Water meter:
   a. The domestic water service inside the mechanical room shall include a water meter with remote readout capability. Meters shall be equipped for communicating with the NEMAS metering network via MODBUS or pulse output. The MODBUS or pulse output wire from each building's water meter shall run in a conduit back to the building's Shark 200 electric meter and provided to DPW. The water meter shall be similar to Badger Turbo Meter flowmeter, or a water meter approved by MDCC for future connection to site-wide water monitoring program. The water meter shall be lead free. A strainer shall be installed upstream of each water meter with pressure gauges installed upstream of the strainer and downstream of the backflow prevention

assembly. Provide a full-sized bypass line with isolation valve for water meter/strainer servicing.

3. Backflow Prevention Assembly:
   a. Design is to follow the New York State Department of Health Guidelines for Designing Backflow Prevention Assembly Installations and the AWWA Manual M14, Recommended Practice for Backflow Prevention and Cross Connection Control. Backflow prevention devices at the building water service entrances, either in exterior hot boxes or interior utility rooms, shall be provided and installed by American Water and funded by the Contracting Officer. Backflow prevention devices downstream from the water service entrance are either Double Check Valve or Reduced Pressure Zone Assemblies and shall be approved by DPW and American Water. Acceptable manufacturers include Watts, Febco and Zurn/Wilkins. For buildings with hazardous fixtures, provide Reduced Pressure Zone backflow prevention devices. For the main service to the building, provide parallel backflow prevention devices for redundancy. Use of backflow prevention devices 6" or less is preferred. Duplex units shall be sized to each handle 50% of the peak flowrate. Individual back flow prevention devices shall be located throughout the facility in accordance with the UFC, and FCCHR-01 "Manual of Cross connection Control".

4. Booster pumps:
   a. Pumps can be ITT Goulds or similar manufacturers that meet the requirements of the "Made in America" act. Pumps shall be bronze, duplex (or triplex), variable speed and be provided with a full sized valved bypass. Pumps from manufacturers other than ITT Goulds must be capable of being direct replacements to existing ITT Goulds installations without modifications.

5. Domestic water piping:
   a. No piping shall be located inside exterior wall cavities, unheated attics, or other areas subject to freezing. Water piping shall be Type "K" copper below the slab and type "L" above the floor. Press fittings can be used for domestic water inside building. Piping shall extend 5-feet outside of building to civil portions of the work. All water piping above ground shall be insulated. Provide water piping velocities not to exceed 8 feet per second (fps). If pressure reducing valves are required, provide similar to Golden Anderson or equal.

6. Shut off and Drain valves:
   a. Shut off valves on domestic cold, hot and hot water recirculation piping should be located liberally at key system points and around equipment to provide isolation for maintenance. Each bathroom, kitchen, laundry room, etc. shall have its own shut off valves and each riser shall have shut off valves on the main takeoff to each floor. Every water riser shall have shut off valves and drain valves.
   b. Drains will be installed on the fixture side of all service valves located inside the building.

7. Exterior wall hydrants:
   a. Hydrants shall be non-freeze, recessed, anti-siphon self-draining type, with integral vacuum breaker, ¾-inch hose thread spout, removable key and stainless steel box. Provide additional shutoff valve inside the building. Exterior hydrant spacing shall meet the requirements of the UFC, with a maximum spacing interval of 150-feet around the exterior wall of the building. Supply piping should not be located on an exterior wall.

8. Exterior hose bibs:
   a. Bibs on the roof shall be non-freeze, exposed, anti-siphon self-draining type, with integral vacuum breaker, ¾-inch hose thread spout and removable key. Provide additional shutoff valve inside the building. One hose bib shall be provided on each main roof at a maximum spacing not more than 150-feet from the corner of the roof.

9. Interior hose bibs:
   a. Interior bibs shall be chrome plated, ¾" hose thread spout, and equipped with anti-siphon device (integral or as attachment) in conformance with ANSI/ASSE 1011. Hose bibs shall be installed in each Mechanical room.

10. A dedicated cold water faucet:
    a. Required for water sampling purposes shall be provided in one main bathroom of each building.

11. Cold-water makeup:
    a. Required for HVAC glycol systems shall be by use of a hose bib equipped with an anti-siphon device to manually refill the system. No direct water connection shall be made to the glycol system.

12. Water hammer arrestors:
    a. WHAs shall be installed in accordance with ANSI A112.26.1 and the UFC. Provide access doors or removable panels when concealed.

13. Sub-metering:
    a. To be provided for certain processes such as kitchens and HVAC makeup water on an as needed basis. The project designer shall discuss with USAG West Point for each project whether inclusion shall be warranted to achieve certain LEED credits for energy monitoring.

22.5 Domestic Water Heating System:

1. Design shall be based on the latest version of the "American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbook".
2. Water heaters:
   a. Water Heaters shall be capable of providing 140° F water with 40° F water entering the water heater. Provide a life cycle cost analysis for selection of heater type and size of storage tank as per the UFC. Where steam supply is available, water heaters can be steam fired water heater(s) with storage tank or steam instantaneous water heaters. If instantaneous water heaters are used, all stainless steel construction and coils are to be used similar to PVI CSX water heaters. Electric tank type water heaters shall typically only be used for delivering hot water to remote plumbing that require excessive runs of piping. Per the requirements of the Energy Independence and Security Act of 2007, solar water heating with conventional back-up heating equipment

can be used to offset a minimum of 30% of the building's annual hot water demand when they are shown to be life cycle cost effective. The water heater shall carry a minimum 5-year warranty.

3. Venting:
   a. Shall be as recommended by the manufacturer. Masonry chimneys shall not be used.

4. Domestic water heating storage tanks:
   a. Tanks shall be cylindrical, ASME Code steel, glass or cement-lined with cathodic protection. A pressure/temperature relief valve and drain shall be provided.

5. Expansion tanks:
   a. Must be provided to mitigate the thermal expansion and the pressure increase of the heated water.

6. Hot water temperature:
   a. HW will be stored at not less than 140° F and delivered to the plumbing fixtures at 110° F through the use of a thermostatic water mixing station (except where higher temperatures are required by specialized equipment or by the UFC). Strainers shall be provided to the cold and hot water inlets of the mixing valve to protect the orifice from debris. A bypass line and shutoff valves on the cold and hot water supply and tempered water connections to the mixing valve shall be provided to allow servicing. Provide hot water circulation systems to maintain hot water within the piping. Recirculation systems should have appropriate controls installed to limit operation as appropriate. Heat maintenance tape is to be avoided where possible.

7. Circulating pumps:
   a. Pumps for domestic hot water shall be electrically driven, single-stage, centrifugal type. Pumps shall be of bronze construction. Service valves shall be installed on the inlets and outlets of the circulating pumps.

8. Hot water return piping:
   a. HW piping shall be provided with a calibrated balancing valve and thermometer well. Required hot water return gpm setting shall be shown on the water riser diagram.

22.6 Sanitary and Storm Sewer Systems

1. Sanitary and Storm Sewer Piping:
   a. Below Slab systems shall be service weight cast iron with hub and spigot, compression joint gaskets or HDPE (High Density Polyethylene) pipe. Above ground joint connections within the building greater than 2" shall be service weight cast iron with no-hub joint and lined stainless steel couplings or hub and spigot and compression joint gaskets. Piping shall be extended 5-feet outside the building to civil portion of the work. The sanitary sewer system will be vented in accordance the UFC. Indirect waste and condensate piping system shall be type "M" copper, insulated and must discharge through an air gap. Condensate drain lines from air conditioning units, cooling coils, etc. can be Sch 40 PVC pipe with socket weld fittings. Sanitary building drains shall be sized appropriately for the size, occupancy and use of the building(s). If connection manhole is not at the 5-foot offset of the building line, all storm and sanitary sewer piping shall require a cleanout at 5-foot building line.

2. Pumped systems piping
    a. Shall be galvanized or stainless steel pipe schedule 40 with threaded drainage fittings. Mechanical (Victaulic) fittings with grooved piped for 2” and larger pipes is also permitted.

3. Ejector pumps
    a. Ejector Pumps are preferred to be grinder or non-clog type pumps. In heavy use areas, specify grinder or macerating type pumps.

4. Cleanouts
    a. Cleanouts shall be provided at each change in direction of sanitary and storm sewers lines, at the intervals specified in the UFC, and at the building(s) service entrance. All cleanouts shall be permanently accessible. Provide access panels or cover plates in exposed areas. External ground cleanouts shall be installed in a 12” x 12” concrete pad, flush with grade.

5. Floor drains
    a. Shall be installed in mechanical rooms, toilet rooms, and janitor rooms, for equipment requiring drainage, and in the vicinity of ice machines. Floor drains with sediment buckets shall be installed in mechanical rooms. Floor drains shall be cast iron body and grate with tamper proof screws. All toilet rooms with more than one (1) urinal or water closet shall be provided with floor drains. Floor drains in toilet rooms shall have a polished brass grate. All floor drain traps shall be automatically primed by single trap primers or where appropriate, with distribution unit type trap primers.
    b. All floor drains and other non-stormwater drain inlets shall discharge to the sanitary drainage system.

6. Adequate drainage for RPZ (Reduced Pressure Zone) Device
    a. Backflow preventers to be provided. Gravity drain systems shall be sized large enough to handle the catastrophic failure of the RPZ device based on the available street pressure.

7. Central acid neutralization treatment
    a. CANT is preferred for laboratory usage or acid waste disposal. Polypropylene Schedule 40 piping to be used. Provide sampling tanks, alarms and monitoring station. Laboratory or academic system designs shall depend on the specific requirements of the area being served.
    b. Acid neutralization tanks shall be provided for condensate discharge from high efficiency condensing type boilers and filled with limestone chips to maintain the neutralized effluent pH within the approved limits. Two replenishments of the limestone chips are also required. Provide an independent 4” acid vent line for the system.

8. Central manual grease traps
    a. Grease Traps located inside building to be specified where possible. Grease traps shall comply with the American Water Military Services Group Design Guide for Water and Wastewater Facilities, American Water Standard Specifications, and the NYS Design Standards for Intermediate Sized Wastewater Treatment Systems (March 2014), Section D.5 – Fats, Oils and Grease (FOG) Removal and Grease Interceptors and the New York City Plumbing code Chapter 10 – Traps, Interceptors and Separators.

9. Plumbing vents
    a. Plumbing vents through pitched roofs shall have a minimum height of 24-inches, and shall be located as close to the roof ridge as possible and provided with adequate supports as necessary to resist forces from sliding snow and ice during winter conditions (No more than 5-feet away from ridge).
    b. Plumbing vents through flat roofs shall be located a minimum 5 feet away from the edge of the roof and parapet or further if necessary, based on view shed requirements.
    c. The Plumbing design engineer shall verify that vent terminals are installed a minimum of 10 feet away from any building HVAC air intakes during construction site visits.

10. Roof drains
    a. Roof drains shall be installed on all flat roof areas. Provide overflow roof drains where required by the International Plumbing Code requirements.

22.7 Plumbing Fixtures

1. Fixtures:
    a. Fixtures will be water conservation type in accordance with the International Plumbing code. Water Sense registered fixtures shall be specified where possible. Fixtures shall be provided complete with fittings, and chromium or nickel-plated brass (polished bright or satin surface) trim.

    b. Individual Shutoff or Stop Valves:
        i) Valves shall be provided on water supply lines to all plumbing fixtures. All individual shutoff or stop valves must have IPS threaded inlets.

    c. Hard-wired, sensor activated faucets and flush valves shall be provided on new construction and large renovation projects, except for Barracks or other housing. Battery-powered, sensor activated faucets and flush valves with turbine-actuated battery recharging will be allowed on smaller renovation projects subject to PM approval.

    d. Faucets
        i) Faucets shall be single-control type, with seals and seats combined in one replaceable cartridge.

    e. Water Closets:
        i) Water Closets shall have vitreous china elongated bowl. Toilet seats with open front and self-sustaining check hinges are required. If flush valves are provided, manufacturers can be Sloan, Kohler or similar.

    f. Urinals:
        i) Urinals shall be vitreous china and shall be wall mounted. Waterless/water free urinals shall not be considered.

    g. Shower Stalls:
        i) Shower receptor, stall and accessories shall be installed by others. Showers shall be equipped with a combination pressure balanced valve and flow control device to limit the flow to a maximum of 2.5 gallons per minute. The plumbing contractor shall coordinate the drain connection to the shower receptor with the receptor and waterproofing installers.

h. Mop Sinks:
   i) Mop Sinks shall be floor-mounted, precast terrazzo construction, minimum 24-inches x 24-inches x 10-inches high in size with stainless steel rim guard. Slop sinks shall be cast iron. Faucet shall be wall-mounted, chrome-plated with a vacuum breaker, integral stops, adjustable wall brace, pail hook, ¾-inch hose thread on spout, 30-inch long, flexible, heavy-duty rubber hose and hose bracket.

i. Electric Water Coolers:
   i) EWCs shall be wall-mounted, barrier-free, stainless steel, lead-free with a bottle filling station, front and side push bars, and have a capacity of 8 gallons/hour. Water coolers shall conform to the requirements of ARI 1010 and the Lead Contamination Control Act of 1998. Drinking fountains can be Haws, Halsey Taylor or Elkay.

   ii) A central drinking water system should be evaluated as an alternative to unitary water coolers in facilities where 15 or more drinking stations are required. Evaluation should include potential heat recovery from central condenser, addition of heat to building envelope by unitary condensers, differences in anticipated energy usage, and differences in first cost.

j. Emergency Shower and Eyewash Stations:
   i) Emergency shower/eyewash stations (where required) shall be provided with a floor drain. Eyewash shall be fitted with a tailpiece and P-trap with piped drains. Refer to the UFC for required design guidelines. Eyewash stations shall be provided with 65° to 95° F potable water in accordance with the latest ANSI standard. Provide calculations to verify that the capacity of the hot water heater can provide the tempered water for the required flush time.

k. Ice Machine in Vending Areas:
   i) A recessed cold water valve box outlet and floor drain shall be provided for ice machines in the vending areas.

22.8 Gas Systems

1. Site distribution consists of high pressure gas in most areas.
2. Gas service mains are not permitted within the perimeter of foundation lines. Raise supply connections from the gas service mains above grade outside the foundation wall and pass through a full swing joint or loop of metallic tubing before entering the building. This will avoid pipe rupture in the event of differential settlement or earthquake. Any natural gas service line entering a building must have a manual ¼ turn lubricated plug shut off valve installed to isolate the building from the natural gas service supply line.
3. Location of Gas meters can be external or inside the building, although external locations would be preferred. No additional protection such as a fence is required on external gas meters. Bollards may be required for prevention of vehicular damage. Gas meter design shall comply with the requirements of Central Hudson Gas Company.
4. Gas Meters shall be equipped for communicating with the NEMAS metering network via MODBUS or pulse output. The MODBUS or pulse output wire from each building's natural gas meter shall be run in a conduit back to the building's Shark 200 electric meter and provided to DPW. Gas meters shall be approved by MDCC for future connection to site wide utility monitoring program.

5. Locate building service and any high pressure regulators outside of buildings or vent to the outside. The gas piping within the building shall be reduced to 14” WC or less by service pressure regulators unless distributed for major equipment such as boilers.
6. Motorized shutoff valve(s) on the gas system mains downstream of the gas meter shall be linked to the fire alarm. When the fire alarm goes off, the gas distribution system to the building is to be shut down. Coordinate the fire alarm connection with the fire alarm contractor and power requirement for the motorized shutoff valve(s) with the electrician.
7. Mechanically operated valve(s) shall be provided for the gas supply to kitchen equipment located under the kitchen hood and tied to kitchen exhaust hood fire suppression system.
8. Gas piping shall be standard weight, schedule 40 black steel pipe. Minimum gas pipe size shall be ¾”.
9. Gas valves shall be AGA (American Gas Association) approved ball valve type. Gas valves shall not be installed above ceilings or be concealed. Shut off valves should be located at key system points and around equipment to provide isolation for maintenance.

DIVISION 23 – MECHANICAL PLANNING STANDARDS

DIVISION 23 – MECHANICAL PLANNING STANDARDS

23.1 Introduction

These Engineering Planning Standards define requirements that are specific to the United States Army Garrison (USAG) West Point. These standards build upon the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this design standard.

23.2 Codes, Regulations and other Standards Specific to West Point

1. Relevant sections of the Unified Facilities Criteria (UFC)
2. International Building Code – When referenced by the UFC but shall not take the place of the UFC
3. Building Code of New York State as modified by the UFC
4. Mechanical Code of New York State as modified by the UFC
5. NFPA 90A “Standard for Installation of Air-Conditioning and Ventilating Systems” as referenced by UFC 3-600-01.
6. SCAQMD Rule 1146 and 1146.1 for low NOx equipment
7. New York Title V for air permitting
8. New York Code, Rules and Regulations Title 10, Part 4: Protection Against Legionella
9. ANSI/ASHRAE Standard 188: Legionellosis: Risk Management for Building Water Systems (most recent version)
10. Standard Details – Section 23.12. Standard details are provided for reference only. Designer of record is responsible for reviewing details and revising as necessary to meet the needs of the specific project. All revisions to standard details must be reviewed with DPW.

23.3 HVAC Design Parameters

23.3.1 Outdoor Design Conditions

a. Systems shall be designed by either utilizing site-specific weather data from the UFC for Dutchess County/Hudson Valley Regional Airport, or the designer may elect to use ASHRAE data in lieu of UFC weather data. If utilizing ASHRAE data, the most recently issued version of the ASHRAE Fundamentals Handbook shall be utilized with weather data for Dutchess County/Hudson Valley Regional Airport.
b. 99% heating and 1% cooling outdoor conditions shall be utilized for general designs. Designers shall consider both the 1% dry bulb and mean coincident wet bulb condition along with the 1% humidity ratio and mean coincident dry bulb temperature for system sizing.
c. Systems serving spaces deemed as “critical” by West Point during the programming meetings or spaces with specialized technical requirements in accordance with the UFC shall be designed for the 0.4% outdoor cooling conditions.

23.3.2 Indoor Design Conditions (Temperature and Humidity)

a. The indoor temperature and humidity conditions shall meet the requirements of the latest edition of *ASHRAE 55 – Thermal Environmental Conditions for Human*

Occupancy. Designs must account for design air speed, expected activity, clothing levels for occupants and activities specific to West Point. Conditions must be determined using a thermal comfort computer tool; use of graphical methods for typical indoor environments as indicated in ASHRAE 55 are not acceptable.

b. In general, dormitory, classroom, office, administration and general gathering areas shall be designed for the following interior conditions:
   i) Summer: 75°F_{db}, 50% maximum relative humidity.
   ii) Winter: 68°F_{db}, no minimum relative humidity requirement.

c. In general, indoor practice facilities shall be designed for the following interior conditions:
   i) Summer: Ventilated to 5°F above outdoor ambient.
   ii) Winter: 55°F_{db}, no minimum relative humidity requirement.

d. Main Distribution Frame (TER) rooms shall be designed for the following interior conditions:
   i) Year Round: 64-75°F_{db}, 30-55% relative humidity.

e. Intermediate Distribution Frame (TR) rooms shall be designed for the following interior conditions:
   i) Year Round: 72°F_{db}, 20-60% relative humidity.

f. Mechanical and Electrical rooms shall be designed for the following interior conditions:
   i) Summer: 95°F_{db} maximum, noncondensing.
   ii) Winter: 60°F_{db}, no minimum relative humidity requirement.

g. Entry vestibules shall be designed for the following interior conditions:
   i) Summer: No requirement.
   ii) Winter: 50°F_{db}, no minimum relative humidity requirement.

h. Humidification for general comfort applications is not permitted. Humidification shall only be provided in areas requiring elevated humidity levels due to activity or storage requirements (i.e. archival storage) or laboratories where equipment requires an elevated humidity level. Areas requiring elevated humidity levels, to the greatest extent practical, shall be located on the building interior to minimize impact to exterior walls. Where humidification is included, a clean steam generator with pre-treatment shall be provided. Direct use of plant steam for humidification purposes is not permitted.

23.3.3 Load Calculations, Energy Modeling and Life Cycle Cost Assessment

a. Load calculations shall be performed utilizing computer software in compliance with ANSI/ASHRAE/ACCA Standard 183. Acceptable load calculation software is the Carrier Hourly Analysis Program (HAP) or Trane Trace. Energy modeling shall be performed in the same software as the load calculations. The most recent version of the software at the time of project start shall be utilized.
b. The calculated HVAC design parameters for each space shall be shown in an EXCEL type spreadsheet. Provide a spreadsheet for each air-handling unit for in-depth review.

c. All air-handling unit coils shall be sized based on the calculated peak system cooling load, which is the maximum cooling load on the air-handling unit due to room sensible, latent and ventilation cooling loads at the peak time. Sum of individual peak loads shall not be utilized for air-handling unit sizing.
d. All air-handling unit fans shall be sized based on the peak supply air flow rate, which is the maximum air flow rate on the fan at the peak time. Sum of individual peak air flows shall not be utilized for air-handling unit fan sizing.
e. Fans shall be sized based on a minimum filter loading of two times the initial (clean) condition and then rounded up to the nearest 0.5" w.g. per filter bank. Provide all filter banks with differential pressure sensors to report actual pressure drop across the filters to the building automation system. Magnehelic gauges shall also be provided at each filter bank for manual monitoring of the filter loading at the unit.
f. All ductwork upstream of the VAV boxes shall be sized based on peak supply air flow rate. All ductwork downstream of VAV boxes shall be sized based on individual room peak supply air volumes. The return air duct mains shall be sized based on peak return air flow rate. The return air duct branch from the room shall be sized based on individual room peak return air volumes.
g. Calculated air-handling unit peak supply air volume shall be rounded off to the next 100 cfm (10 L/s) and increased by 5% to account for air leakage from the ductwork and system components. An additional 5% safety factor shall be included on the air-handling unit sizing for a total safety factor of 10.25%.
h. All air systems shall be sized to maintain a minimum +0.02" w.g. of positive building pressure with relation to the building exterior.
i. Provide a psychrometric analysis for each air-handling unit from the load calculation software showing the following, at a minimum:
    i) Indoor and outdoor design conditions.
    ii) Mixed air conditions.
    iii) Coil leaving air conditions.
    iv) Heat gain due to supply and return fans.
    v) Effects of energy recovery (if included).

j. Building envelope characteristics shall be based on existing conditions and proposed upgrades or new construction details. Calculation of U-values must include provisions for thermal bridging with appropriate backup from ASHRAE 90.1 or a thermal modeling software program.
k. Lighting characteristics shall be based on design drawings from the electrical engineer or lighting designer. Load calculations shall utilize full wattage of the design fixture. Energy models shall include wattage reductions informed by the day lighting model where automatic dimming systems are installed. Diversities may also be taken for occupancy sensors in the building energy model.
l. Equipment heat gains shall be calculated based on the planned equipment located in each space based on the room equipment list. Watt per square foot "rules of thumb" are not permitted. The design engineer shall calculate the equipment heat gain by one of the following methods, listed in descending order with the preferable approach listed first:
    i) Actual heat gain data (watts or btu/hr) published by the manufacturer:
    ii) Estimated heat gain data based on equipment type listed in the *ASHRAE Fundamentals Handbook*, latest version.
    iii) Calculated heat gain based on nameplate electrical data with appropriate diversity factors applied.

m. Occupancy shall be based on expected occupancies as discussed with West Point representatives during the planning process. In the absence of expected occupancy data, default occupancy listed in ASHRAE 62.1 shall be utilized.
n. Designers shall use an energy model to aid in determining the most energy efficient design of the project and to provide inputs into the life cycle cost analysis. The energy model shall be updated at each design phase and included in the project deliverables. Documentation must clearly list all parameters and assumptions used in the model (inputs and outputs).
o. Inputs to the energy model shall be representative of the project as designed. Use of default scheduling, occupant densities, equipment efficiencies or lighting densities is not permitted. The modeling inputs shall be reviewed by DPW, USACE (for Corps managed projects) and the user groups at the planning charrette and the agreements shall be memorialized in the charrette report. A preliminary energy model shall be included with the 35% submission and any changes to the inputs or additional information requests shall be highlighted and discussed.
p. Energy modeling shall be performed in accordance with ASHRAE 90.1, Appendix G.
q. Life cycle cost assessment (LCCA) shall be completed in accordance with UFC requirements using the latest version of the NIST Building Life-Cycle Cost (BLCC) software at the time of project start. Utility rates shall be established by DPW to ensure consistency across the project.
r. If a more recent version of ASHRAE 90.1 is available but has not been adopted for the project design, the LCCA shall include analysis of options to improve certain aspects of the design to meet the latest issuance of ASHRAE 90.1. The analysis shall include improving to the latest version's criteria for the following, at a minimum:
    i) Wall & Floor U-value
    ii) Roof U-value
    iii) Glazing & Door U-value and SHGC
    iv) HVAC equipment efficiency

s. An energy and cost impact study shall be performed on increasing ventilation rates throughout the facility by 30% above code minimum values at the associated system level. The study shall include impact on equipment sizing, first cost, ongoing utility costs and energy use intensity (EUI). The results shall be presented at the 35% design conference for discussion on path forward for incorporation.

23.3.4 Acoustic Criteria

a. Acoustic levels attributed to the HVAC system shall meet the design guidelines listed in the *ASHRAE Applications Handbook*, latest version, with the following exception:
    i) Barracks shall be designed for NC30.
b. For acoustically sensitive areas, defined as areas having NC ≤ 30, an acoustician shall be engaged to review and calculate the appropriate noise mitigation measures to meet the design guidelines. These spaces include, but are not limited to:
    i) Private offices
    ii) Conference rooms
    iii) Classrooms
    iv) Lecture Halls
    v) Barracks/Dormitories
    vi) Libraries

c. For small projects without acoustically sensitive areas, defined as areas having NC ≥ 35, the mechanical design engineer may perform, certify and submit the calculations in lieu of an acoustician.
d. For acoustically sensitive areas, noise-generating HVAC equipment shall be located outside the sensitive space. Where this is not feasible, the acoustician must evaluate both the discharge and radiated noise from the equipment and the design engineer shall include required noise mitigation measures for both sound paths in the design.
e. Sound power levels used for the acoustic analysis, by octave band, shall be scheduled on the drawings for all motor-driven equipment.
f. Sound data for air volume control boxes shall be scheduled on the drawings and shall include both discharge and radiated NC levels. The air volume control box noise data shall be scheduled at the expected inlet pressure based on the fan system design.
g. At the completion of project balancing and with HVAC systems operating in occupied mode, but prior to occupancy, all acoustically sensitive areas shall be acoustically tested by the acoustician to ensure target NC levels are met. If spaces fail to meet the NC target, the acoustician shall recommend remediation measures to be taken to bring the spaces into compliance and these measures shall be incorporated by the design and construction team.

23.4 Acceptable Systems by Space Type

23.4.1 General

a. Variable refrigerant volume (VRV/VRF) systems are not permitted at West Point.
b. For systems utilizing refrigerants, do not use ozone depleting substances (ODS) or high Global Warming Potential (GWP) chemicals where EPA's Significant New Alternative Policy (SNAP) has identified acceptable substitutes.

23.4.2 Dormitory Facilities/Barracks

a. Dormitories and Barracks shall be provided with four-pipe fan coil units in either a modular high-rise or horizontal configuration. The optimal configuration shall be determined by the designer with input from DPW based on available floor space and available ceiling clearance.
b. Ventilation air shall be provided through dedicated outside air system(s) (DOAS) located on the roof or within mechanical rooms. Refer to the Equipment section for additional information on the DOAS unit.
c. Toilet rooms shall be conditioned as required to maintain design indoor conditions. All toilet rooms shall be exhausted in accordance with the referenced ventilation code.
d. Laundry room dryers shall have secondary lint filters and dedicated exhaust fans with static pressure control.

23.4.3 Headquarters/Academic/Athletic

a. Headquarters, academic and athletic facilities shall be provided with variable air volume (VAV) air-handling units serving all office, classroom, dining and public areas. The air-handling units shall be located on the roof or within mechanical rooms. Return fans shall be either integral to the unit or duct-mounted depending on unit

location and availability of space. A separate DOAS unit shall be provided, where life cycle cost effective, in accordance with UFC requirements. Refer to the Equipment section for additional information on the air-handling unit.

b. Systems shall be single duct, pressure independent with terminal reheat coils.
c. Systems shall be zoned to provide optimal comfort. Zoning considerations shall include:
    i) Exposure – thermal zones shall not include more than one exposure except where the thermal zone serves one space.
    ii) Occupancy – occupancy patterns and type shall be consistent within the same thermal zone.
    iii) Proximity – thermal zones shall be defined to minimize extent of ductwork downstream of the VAV box.
    iv) Space Function – space functions shall be consistent within the same thermal zone. Each conference room shall be on a dedicated VAV box. No more than four offices may be served by a single VAV box.
    v) Schedule – occupancy schedules shall be consistent within the same thermal zone.
    vi) Maximum Air Flow – VAV boxes serving multiple spaces shall not exceed 1,200 cfm and shall be limited further by established acoustic targets. VAV boxes serving large, open areas (dining rooms, lobbies, etc.) may exceed 1,200 cfm as limited by established acoustic targets.

d. Perimeter heat shall be provided in all areas where calculated heating load cannot be offset by raising the air temperature a maximum of 20°F above the indoor design condition when the VAV box is at calculated minimum heating air flow. Designer must consider reduction in diffuser throw velocity when not including a perimeter heating system.
e. Use of alternate systems, including radiant systems and active chilled beams, may be considered if life cycle cost effective and if reviewed and approved by DPW.

23.4.4 Kitchens

a. Kitchens shall be provided with make-up air through a dedicated make-up air unit with preheat coil and variable speed supply fan with terminal VAV boxes at each kitchen hood make-up air plenum. The kitchen exhaust hoods shall be provided with a UL listed demand-control ventilation system that automatically adjusts the exhaust rate based on smoke and heat generation at the cooking surface.
b. Modulation of the make-up air VAV box and exhaust fan shall be controlled by the demand-control system to ensure negative pressure in the kitchen is maintained at all operating conditions. The demand-control ventilation system shall be integrated to the building's direct digital control (DDC) system.
c. A separate fan and exhaust system shall be provided for dishwashing exhaust.

23.4.5 Auditoriums/Gymnasiums

a. Auditoriums and Gymnasiums shall be provided with variable air volume (VAV) air-handling units with demand-controlled ventilation. The unit shall be configured in a single-zone, variable volume configuration. All units shall include a reheat coil for dehumidification control.

23.4.6 Indoor Practice Facilities

a. Outdoor air for ventilation shall be provided by a variable speed heating and ventilating (HV) unit with natural-gas fired furnace and demand-controlled ventilation. Provide space relief louvers with motor-operated and gravity-operated backdraft dampers.
b. Space heating shall be provided through a vacuum operated, natural gas fired, infrared heating system utilizing low intensity radiant heating.

23.4.7 Chemistry Storage/Classroom Ventilation

a. Chemistry storage areas, classrooms and laboratories shall be exhausted at a minimum of 8 air changes per hour. Hood-intensive classrooms and laboratories shall utilize a combination of energy recovery and/or variable volume strategies as required to meet performance requirements of the energy code.
b. If a variable volume strategy is utilized, the system must be designed for laboratory applications and provide constant space pressurization at all operating conditions. The project designer shall analyze the air streams being exhausted and determine if variable flow control will negatively impact material entrainment or system performance.
c. Energy recovery strategies must provide total separation of the supply and exhaust air streams when including fume hood exhaust.

23.4.8 Mechanical Rooms

a. Mechanical rooms shall be exhausted based on calculated heat load to maintain design conditions. Unit heaters shall be provided where space temperatures are calculated to fall below design conditions. All exhaust fans 2 horsepower and larger shall be variable speed.
b. All mechanical rooms shall be designed to provide full access to the housed equipment. Designer shall indicate manufacturer's recommended clearances on all mechanical room plans to indicate adequate clearance. Provide a minimum of two drawing sections for each mechanical room to illustrate accessibility. Design drawings shall also indicate service pathways and major equipment removal pathways.
c. Project specifications shall require the construction contractor to submit coordination drawings detailing all equipment, ductwork and piping to be installed within the mechanical rooms. Service clearances shall be clearly defined on the drawings. Elevation views shall be provided at all service areas to show clearance to overhead obstructions.
d. A portion of the mechanical room shall be secured and dedicated to "Emergency Parts Reserve". Required size of the space shall be coordinated with DPW.

23.4.9 Mailrooms

a. For mailrooms receiving initial deliveries of mail or supplies, provide a dedicated HVAC system and dedicated exhaust fan to provide negative pressurization in accordance with UFC requirements.

23.4.10 Electrical and Elevator Equipment Rooms

a. Provide main electrical, telecommunication and elevator equipment rooms with split-system, direct-expansion type air-conditioning units. Split systems shall be designed for low ambient operation to -10°F.
b. Smaller electrical closets may be provided with exhaust only if indoor design conditions can be maintained with transfer air alone.
c. Hydraulic elevator machine rooms shall be exhausted and maintained at negative pressure for odor control.

23.4.11 Intermediate Distribution Frame (TR) Rooms

a. Provide Intermediate Distribution Frame (TR) rooms with independent, redundant split-systems, direct-expansion type air-conditioning units with dedicated thermostats and redundant exterior condensing units. Split systems shall be designed for low ambient operation to -10°F.
b. Maintain positive pressure within the room by supplying a minimum of one air change per hour from the main air-handling system or DOAS.
c. Where air-conditioning units are located outside of the room, provide fire dampers at wall penetrations.
d. Power for cooling equipment shall be provided from a separate electrical panel than critical IT equipment. Cooling shall be connected to the building's emergency power system, if available.
e. All TR rooms shall be monitored by the HVAC control system and shall alarm when any component of the system fails or when spaces fall outside of temperature or humidity range.

23.4.12 Main Distribution Frame (TER) Rooms

a. Provide Main Distribution Frame (TER) rooms with independent, redundant computer room air-conditioning units with dedicated thermostats. Provide fully redundant, year-round sources of cooling. Split systems shall be designed for low ambient operation to -10°F.
b. Maintain positive pressure within the room by supplying a minimum of one air change per hour from the main air-handling system or DOAS.
c. Where air-conditioning units are located outside of the room, provide fire dampers at wall penetrations.
d. Power for cooling equipment shall be provided from a separate electrical panel than critical IT equipment. Cooling shall be connected to the building's emergency power system, if available.
e. All TER rooms shall be monitored by the HVAC control system and shall alarm when any component of the system fails or when spaces fall outside of temperature or humidity range.
f. The TER room design shall comply with the recommendations listed in ASHRAE TC9.9 except for thermal guidelines, which shall comply with this engineering standard.

23.4.13 Campus Steam

a. Portions of the campus are served from an existing steam loop. The designer shall obtain an updated steam utility map from DPW and determine available steam

capacity at the site.

b. A life-cycle cost analysis shall be performed to determine if utilization of the campus steam or standalone hot water generation is more optimal.
c. Campus steam is not available for approximately 4 weeks during the summer. Systems relying on a summer source of steam for dehumidification or temperature control must be designed to address this outage. The designer shall submit a narrative with their design deliverables identifying how the steam outage will be addressed in their design.
d. All steam and condensate piping located outside of the building shall be installed within accessible piping vaults. Use of direct-buried steam piping is not permitted unless approved by DPW. Provide steam and condensate isolation valves at the building piping entry to permit complete isolation of the building.
e. If campus steam is utilized, provide a new pressure reducing station inside the building with pilot-operated regulating valve and mechanical relief. Do not exceed 50 psig of pressure drop over a single reducing valve. Provide 1/3 and 2/3 valves where large variations in load are expected and for all applications exceeding 2,000 lb/hr.
f. Steam and steam condensate piping shall be constructed of steel and welded; flanged connections shall be avoided to the maximum extent possible. All welds shall be radiographically examined. Any non-welded connections must be approved by DPW.
g. For each piece of steam equipment, provide an isolation valve on the inlet and outlet piping connection. Prior to the isolation valve on the condensate return side, provide additional ¾" test valve with hose bib and cap.
h. The preferred building heating medium is hot water. Steam for heating may only be utilized with specific approval by DPW. When using hot water, provide steam to water, shell and tube type heat exchangers with variable speed pumping system in an N+1 configuration.
i. Steam condensate shall be collected to a central receiver and pumped back to the central steam plant.
j. All steam condensate piping shall be schedule 80 thickness.
k. Fabricate, assemble, weld, solder, braze, and install piping and pipe system in accordance with ASME B31.1.

23.4.14 Local Boilers

a. Where life cycle cost effective, or where campus steam is not available, building heating shall be provided through a hot water boiler system in an N+1 configuration.
b. Where natural gas service is available, the boilers shall be gas-fired. If natural gas is not available, the boilers shall be either #2 oil-fired or propane with an on-site storage tank. Sizing of the tank and fuel type shall be reviewed with DPW.
c. All information relating to gas and oil-fired boiler emissions shall be calculated and forwarded to the Air Program Manager at the West Point Environmental Management Division (WP-EMD) for incorporation into the Title V air permit. Calculation methodology shall conform with the requirements of WP-EMD.
d. While high-efficient, gas-fired, condensing type boilers are the preferable technology, their suitability for the specific application shall be proven through a life cycle cost analysis. The designer shall consider the benefits of a low temperature distribution system with relation to the boiler efficiency and evaluate this against the heating needs of the facility to determine the optimal configuration.
e. Where possible, boilers shall be direct-vented to prevent freeze-ups within the boiler room. Where direct-vented options are not available, a heating and ventilating unit

with hot water preheat coil shall be installed to provide required combustion air and heating.

f. All rooms containing fuel-burning equipment shall be provided with natural gas leakage and carbon monoxide gas monitoring with remote alarm. The sensors shall be connected to the building's direct digital control (DDC) and fire alarm systems. In addition, provide a fuel-burning equipment shutdown switch at each boiler room exit and hard wire directly into the equipment's safety circuit.
g. The boiler flue system shall be a double-wall, prefabricated, positive pressure type with stainless steel or AL29-4C super ferritic stainless-steel inner liner as dictated by the appliance manufacturer. When located outside of the building, both the interior liner and exterior shell shall be constructed of stainless steel. The flue system shall be pre-insulated to limit exterior surface temperature to a maximum of 50°F above ambient temperature. Boiler vents exiting through the roof shall not terminate more than 5'-0" from the roof ridge and shall be anchored at a minimum of two points within the building.

23.4.15 Emergency Boiler Hookup

a. All buildings shall be provided with capped and valved piping for an emergency boiler hookup. Piping shall be extended to the exterior wall and location of temporary boiler shall be shown on the design drawings. Piping can either extend through the exterior wall or be terminated on the inside face of the wall if nearby access for temporary piping is provided. Termination location shall be reviewed with DPW.

23.5 Central Cooling Systems

23.5.1 Campus Chilled Water

a. Portions of the campus are served from an existing chilled water loop. The designer shall obtain an updated chilled water utility map from DPW and determine available chilled water capacity at the site.
b. If campus chilled water with appropriate capacity is available at the site, it is preferable to connect to the campus chilled water system. Coordinate any requirements for building pumps with DPW. Provide chilled water isolation valves at the building piping entry to permit complete isolation of the building.

23.5.2 Local Chiller Plant

a. When using a local chiller plant, the designer shall evaluate the most optimal configuration and technologies based on a life cycle cost analysis. This shall include evaluation of air-cooled versus water-cooled plants and screw, centrifugal and magnetic bearing chiller technologies. Other technologies may be considered upon review with DPW.
b. Pumping configuration shall be primary-secondary or variable flow primary based on the life cycle cost analysis and approval by DPW.
c. In a primary-secondary configuration, one variable speed primary pump shall be provided for each chiller and multiple, variable speed secondary pumps shall be provided in an N+1 configuration.
d. In a variable flow primary configuration, multiple primary pumps shall be provided in an N+1 configuration.
e. All pumps serving building distribution shall be provided with multi-point differential

pressure sensing.

f. Provide a dedicated condenser water pump per cooling tower cell (minimum one cell per chiller). Condenser water pumps shall include variable speed drives for balancing purposes. Automatic isolation valves shall be provided at the inlet and outlet of each cooling tower cell and on the inlet of each chiller evaporator and condenser for multi-chiller plants. Provide an equalizing line between all cooling tower cells.
g. All water-cooled plants shall include a plate and frame heat exchanger for waterside economization. The cooling towers shall be freeze protected with electric pan heaters and all exterior piping shall be heat traced. Equipment requiring year-round chilled water shall be selected at an elevated winter entering water temperature to maximize economizer run hours. The designer shall determine the optimal water temperature to serve the system.
h. Air-cooled chillers shall be provided where water-cooled plants are not lifecycle cost effective or are not feasible. Air-cooled chillers shall include economizer coils to permit free cooling and operation down to -30°F. The chilled water system shall utilize a propylene glycol solution for freeze protection. All chillers, cooling coils and pumps shall be appropriately de-rated for systems utilizing glycol.
i. Where feasible, electronically controlled, double-effect absorption chillers utilizing hermetic refrigerant and absorbent pumps may be considered. Low pressure steam shall be supplied to the generator as the heat source.
j. Where feasible, steam turbine centrifugal chillers using high pressure steam in lieu of electricity may be considered.

23.5.3 Emergency Chiller Hookup

a. All buildings shall be provided with capped and valved piping for an emergency chiller hookup. Piping shall be extended to the exterior wall and location of temporary chiller shall be shown on the design drawings. Piping can either extend through the exterior wall or be terminated on the inside face of the wall if nearby access for temporary piping is provided. Termination location shall be reviewed with DPW.

23.6 Ground Coupled Geo-Exchange Heat Pumps

1. The use of ground-coupled, closed-loop, geo-exchange systems may be considered to aid in meeting the sustainability and energy targets for the project and if determined to be life cycle cost effective and if reviewed and approved by DPW. Designers must consider the availability of site area for the well field and the geotechnical nature of the site. All designs must conform with the requirements of the UFC for ground-coupled systems.

23.7 Equipment

23.7.1 Air Handling Units & Dedicated Outside Air Units

a. Units shall be indoor or rooftop mounted as available space permits and as dictated by the NEPA review. Units shall be of double wall, galvanized construction with insulation thickness as required to prevent condensation on the exterior surfaces of the unit at design ambient humidity conditions.
b. Multiple fans or fan arrays with VFD-driven, direct drive motors shall be utilized to provide a level of redundancy and easier motor removal. One VFD shall be provided for each fan.

c. Units shall be a draw-through configuration with mixing box, return fans, MERV 8 pre-filters, MERV 13 intermediate filters, air blender, preheat coil, cooling coil, supply fans and discharge plenum.
d. Incorporation of ultraviolet germicidal irradiation (UVGI) technology within the air-handling unit or downstream ductwork shall be reviewed at the design charrette. UVGI technology shall be considered to neutralize airborne pathogens.
e. The inner liner at the cooling coil section shall be constructed of stainless steel. Cooling coil supports shall also be constructed of stainless steel.
f. Rooftop units shall be custom construction with a full-height (minimum 84" tall) service vestibule. The service vestibule shall be sized to house all unit components (valves, pumps, etc.) and electronics (variable speed drives, control panels, etc.). Proper clearance shall be provided to meet the equipment manufacturer's recommendations and the National Electric Code. Indicate all clearances on the design drawings.
g. All rooftop units shall include a preheat coil regardless of calculated mixed air temperature.
h. All rooftop equipment, including air-handling units, DOAS units, chillers and cooling towers must be analyzed for both accessibility and visibility. Provide screen walls, walking paths, access ladders and platforms to provide full serviceability and acceptable visibility in accordance with the NEPA review. Refer to the Cultural Resources section of this Standard for additional information.
i. Indoor units may be custom or commercial grade, modular type at the designer's option.
j. Return fans shall be mounted within rooftop units. Indoor units may have the return fans duct or unit mounted.
k. Preheat coils shall be hot water with a circulation pump in accordance with the standard detail. Coils shall be selected for a minimum tube velocity of 3 feet per second. Use of steam preheat coils must be reviewed with DPW.
l. Where steam preheat coils are approved for use by DPW, provide integral face and bypass dampers with a two-position steam valve. Elevate unit to the appropriate height to permit installation of the steam trap.
m. Provide a manual-reset, low-limit thermostat on the incoming side of the cooling coil.
n. Dedicated outside air systems (DOAS) shall include two air tunnels (exhaust and supply) with a heat recovery device. Enthalpy wheels are the preferred heat recovery technology; other technologies may be evaluated through a life cycle cost analysis. Enthalpy wheels must be capable of transferring both sensible and latent energy by using a matrix core coated in a desiccant material with a 3-angstrom molecular sieve. Wheel performance shall be certified in accordance with AHRI 1060 with a minimum total heat transfer effectiveness of 75% at 700 feet per minute face velocity at standard rating conditions. Supply and exhaust fans shall be configured to eliminate exhaust to supply crossflow leakage. The wheel shall include an air purge section to limit carryover leakage to 1% maximum. Adjust fan sizing to accommodate additional purge air flow.
o. Use of a second wheel or sensible recovery device downstream of the primary heat recovery device should be considered to provide a "free" source of reheat.
p. Exhaust air streams must be analyzed for the appropriate heat recovery technology. For air streams where no cross contamination is permitted as defined in the *International Mechanical Code*, sensible-only type recovery systems shall be considered.

23.7.2 Cooling Towers

a. Cooling towers shall be induced draft, crossflow type and include variable speed fans. Towers shall be constructed of stainless steel with stainless steel hardware and PVC fill. The spray nozzles shall be designed to permit flow reduction to 50% of design flow. Provide the cooling tower with a vibration cutout switch interlocked with the fan motor, OSHA compliant stairs and handrails and work platforms at all locations in the tower that require periodic maintenance access.
b. Cooling towers shall be designed in accordance with the most recent version of ASHRAE 188 and NYCRR Title 10, Part 4. The project designer must consider siting of the tower and shall include an automatic chemical treatment system with the tower. Requirements for periodic legionella testing shall be incorporated into the project Specifications to meet state regulations. All drainage from the cooling tower shall be disposed to the sanitary sewer system.

23.8 Air Distribution

23.8.1 Duct Construction

a. All ductwork shall be constructed of minimum 24-gauge thickness.
b. General supply, return and exhaust ductwork shall be constructed of ASTM A653 G90 galvanized steel or ASTM B209 aluminum, except:
    i) Exhaust ductwork for laundry and shower areas shall be ASTM B209 aluminum.
    ii) Dishwasher exhaust shall be ASTM480 Type 304 stainless steel with welded joints.
    iii) Grease exhaust shall be UL listed grease duct, ASTM A366 carbon steel or ASTM A480 Type 304 stainless steel. All exposed grease duct indoors and all outdoor ductwork shall be stainless steel. All grease duct joints shall be welded.
    iv) Chemistry laboratory exhaust from hoods shall be ASTM480 stainless steel, type 304 or 316 as dictated by the chemicals used.

c. Ductwork transverse joints shall be a prefabricated slide-on joint or formed-on flange equivalent to SMACNA Type T-24 or T-25. Flat drive joints are only permitted on low pressure systems were specifically approved by the design Engineer due to clearance limitations.
d. Ductwork longitudinal joints shall be Pittsburgh lock with polymer sealant.
e. The designer shall determine the appropriate ductwork pressure class by evaluating the maximum total fan pressure at the expected minimum flow condition due to closing of dampers in the system. In no case shall pressure class be below the following values:
    i) Supply duct between AHU and VAV box: +4” w.g.
    ii) All other supply ducts: +2” w.g.
    iii) Outside air ducts: -2” w.g.
    iv) Return ducts between return fan and AHU: +4” w.g.
    v) All other return ducts: -2” w.g.
    vi) General exhaust ducts: -2” w.g.
    vii) Fume hood exhaust ducts: -3” w.g.

f. All ducts shall be sealed to achieve Seal Class A, leakage class 6 for rectangular duct and leakage class 3 for round duct.
g. Industrial ventilation systems shall be provided in areas designated during the

planning process and where indicated by DPW and the user groups. All industrial ventilation system shall comply with the Industrial Ventilation UFC.

23.8.2 Duct Accessories

a. Provide dynamic fire dampers and electric fire/smoke dampers where required by Code. Fire dampers shall be designed for “out of airstream” applications. Fire/smoke dampers and fire dampers located within the airstream shall have airfoil blades to minimize pressure drop. Provide all fire/smoke dampers with integral status feedback contact for remote monitoring by the building DDC system.
b. Acoustic lining is not permitted. All noise mitigation shall be done through sound attenuators and/or exterior mounted sound lagging.
c. Polyisocyanurate insulation is not permitted within the building.
d. Variable air volume boxes shall include thermal insulation with a foil-faced liner. Provide an insulated access door in the bottom of the box for access to the damper and upstream side of the reheat coil. Provide access panel in downstream ductwork for access to temperature sensor and downstream side of the reheat coil.
e. All ductwork shall be labeled in accordance with ANSI A13.1. Minimum lettering height shall be 1-1/4” for ducts 6” and smaller and 2-1/2” in height for ducts 8” and larger.

23.9 Piping Systems

1. Hydronic piping systems in sizes 2” and smaller shall use Type L copper piping with either brazed or press-connect joints. All piping joints in concealed spaces (within shafts, above inaccessible ceilings or where joints are otherwise inaccessible) shall be brazed.
2. Hydronic piping systems in sizes 2-1/2” through 10” shall use Schedule 40 steel piping with either welded or grooved joints. All piping joints in concealed spaces (within shafts, above inaccessible ceilings or where joints are otherwise inaccessible) shall be welded.
3. Hydronic piping systems in sizes 12” and larger shall use 0.375” thick wall steel piping with welded joints.
4. Isolation valves for hydronic service 2” and smaller shall be 2-piece, copper-alloy ball valves with stainless steel ball and stem. Valve shall include full port and PTFE seats conforming with MSS SP-110.
5. Isolation valves for hydronic service 2-1/2” and larger shall be lug type, ductile iron butterfly valves capable of providing bubble-tight, bi-directional dead-end service at full pressure rating of the valve without the need for a downstream flange. Valves 6” and smaller shall be lever operated with 10-position throttling plate, valves 8” and larger shall have worm-gear operator. Valves shall comply with MSS SP-67.
6. Balancing and triple duty valves shall not be utilized for isolation service. Provide an additional isolation valve downstream of all balancing and triple duty valves for dedicated isolation service.
7. All valves installed in insulated piping systems shall have extended stems to raise the valve handle above the level of the adjacent insulation.
8. All automatic air vents and pressure relief valves shall be piped to the nearest code-compliant disposal point; do not discharge onto the floor. High pressure steam relief valves and refrigerant relief valves shall discharge to the building exterior in accordance with the *International Mechanical Code.*
9. Polyisocyanurate insulation is not permitted within the building.
10. All piping shall be labeled in accordance with ANSI A13.1.

23.10 Chemical Treatment

1. All systems shall be provided with chemical treatment and disinfection to prevent from freezing, scale formation, corrosion, algae, bacteria, legionella and slime growth.
2. For open systems, water treatment contractor shall implement routine and continuous microbiological control practices as outlined in "Cooling Technology Institute (CTI) Guideline Best Practices for Control of Legionella" to minimize the risk of legionella growth. The service program shall maintain legionella count below detectable levels. Testing for legionella is required to evaluate the effectiveness of the disinfection procedures and to identify whenever other factors external to those procedures may have contributed to a loss of microbiological control for an extended period of time.
3. Conform to applicable EPA and New York State codes for the addition of non-potable chemicals to build water systems and for delivery to public sewage systems.
4. The chemical treatment contractor shall be an experienced service provider capable of analyzing water quality, installing water-treatment equipment and applying water treatment to open and closed loop HVAC systems. The contractor shall have a New York State licensed Professional Engineer (PE), Certified Industrial Hygienist (CIH) or Certified Water Technologist (CWT) on staff that is trained in the cooling tower certification requirements of New York state. All chemicals shall comply with the requirements of the New York Department of Environmental Conservation (NYDEC) and all technicians shall be Category 7G NYDEC certified applicators. The project specifications shall require approval of the proposed contractor by DPW.

23.11 Equipment Manufacturers

23.11.1 Proprietary Manufacturers

a. None

23.11.2 Preferred Manufacturers

a. Steel Piping
   i) U.S. Steel
   ii) Koppel Steel Corporation
   iii) Wheatland Tube Company
   iv) Sharon Tube Company

b. Steel Fittings
   i) The Viking Corporation
   ii) Weldbend Corporation
   iii) Anvil International
   iv) Ward Manufacturing

c. Piping Insulation
   i) Johns Manville
   ii) Armacell, LLC.
   iii) Knauf Insulation

d. Pipe Escutcheons
   i) Zurn Industries, Inc.
   ii) McGuire Manufacturing Company

e. Strainers
   i) Hoffman Specialty ITT; Fluid Handling Division
   ii) Spirax Sarco
   iii) Anvil International
   iv) Metraflex Company

f. Dielectric Unions
   i) Mueller Industries
   ii) Epco Sales, Incorporated
   iii) Eclipse, Incorporated

g. Expansion Compensators
   i) Mason Industries
   ii) Metraflex Company
   iii) Victaulic Company of America

h. Flexible Pipe Connectors
   i) Flex Hose Company
   ii) Metraflex Company
   iii) Flexonics

i. Pipe Alignment Guides
   i) Metraflex Company
   ii) Anvil International
   iii) Flex Hose Company

j. Hangers and Supports
   i) Anvil International
   ii) Empire Industries
   iii) Grabler Manufacturing

k. Saddles and Shields
   i) Pipe Shields, Incorporated
   ii) Elcen Metal Products Company
   iii) Value Engineered Products, Incorporated

l. Thermostatic Traps
   i) ITT Hoffman Specialty
   ii) Spirax Sarco
   iii) Nicholson

m. Float and Thermostatic Traps
   i) ITT Hoffman Specialty
   ii) Spirax Sarco
   iii) Nicholson

n. Steam Terminal Inlet Valves
   i) Spirax Sarco
   ii) American Air Filter Company
   iii) MEPCO Marshall Engineered Products Company

o. Steam Vents
   i) Spirax Sarco
   ii) Nicholson
   iii) ITT Hoffman Specialty

p. Self-Contained Thermostatic Steam Valves
   i) Danfoss, Incorporated
   ii) Honeywell – Brankman Controls
   iii) Tour and Anderson, Incorporated

q. Steam Vacuum Breaker
   i) ITT Hoffman Specialty
   ii) Spirax Sarco
   iii) Watson McDaniel

r. Flexible Water Tube Boilers
   i) Cleaver Brooks
   ii) Unilux Boiler Corporation
   iii) Bryan Steam Corporation

s. High Efficiency Condensing Boilers
   i) Patterson Kelly
   ii) Weil McLain
   iii) Hydrotherm
   iv) Rinnai
   v) Lochinvar
   vi) Fulton

t. Chillers
   i) Trane
   ii) Johnson Controls, Incorporated
   iii) Carrier
   iv) Daikin

u. Cooling Towers
   i) Baltimore Air Coil (BAC)
   ii) Evapco
   iii) Marley

v. Packaged Air-Conditioning Systems
   i) Trane
   ii) Johnson Controls, Incorporated
   iii) Carrier

w. Chemical Treatment
   i) NALCO

23.12 Standard Detail Index

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2. M-2 – Pipe Support Details

3. M-3 – Double Steam Pressure Reducing Station
4. M-4 – Float and Thermostatic Trap Assembly
5. M-5 – Thermodynamic Trap Assembly
6. M-6 – Steam Main Dirt Leg Detail
7. M-7 – Drip Pan Elbow and Exhaust Head
8. M-8 – End Suction Pump Piping (Without Isolation Base)
9. M-9 – In-Line Pump Piping
10. M-10 – Double Suction Pump Piping (Without Isolation Base)
11. M-11 – Condensate Return Pump Piping (Electric)
12. M-12 – Expansion, Purge and Vent System
13. M-13 – Water Treatment Bypass Feeder Piping
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21. M-21 – Hot Water Finned Tube Radiation Piping
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23. M-23 – Hot Water Cabinet Unit Heater Piping
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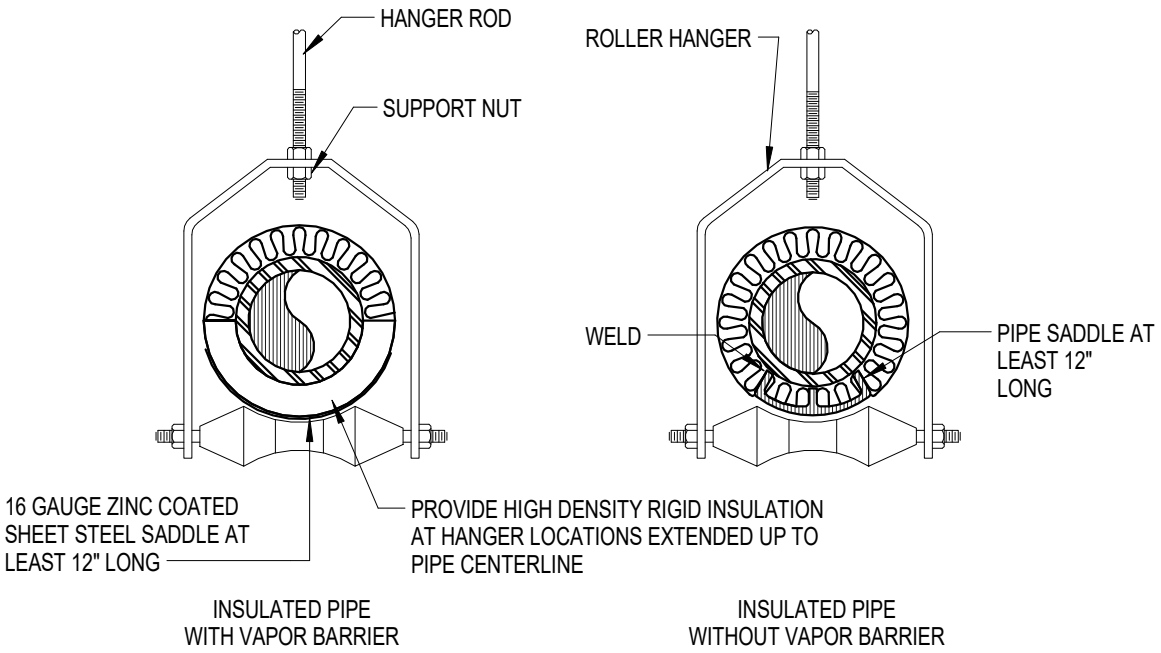
25. M-25 – Supply Air Volume Control Box (With Heating Coil)
26. M-26 – Insulated Duct Hanger Detail
27. M-27 – Diffuser Installation
28. M-28 – Draw-Thru Unit Drain Pan Piping
29. M-29 – Steam Control Valve Assembly
30. M-30 – Two-Way Water Control Valve Assembly



TYPICAL ROLLER HANGER SUPPORTS

1 PIPE SUPPORT DETAILS

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

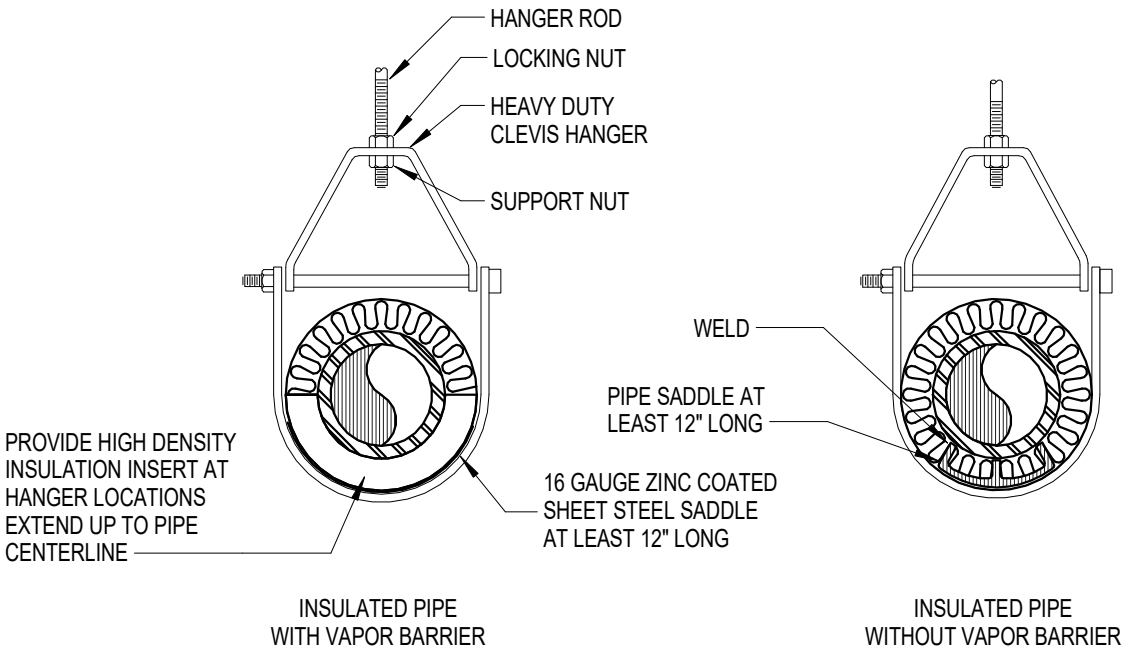
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
PIPE SUPPORT DETAILS

DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-1



TYPICAL CLEVIS HANGER SUPPORTS

1 PIPE SUPPORT DETAILS

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

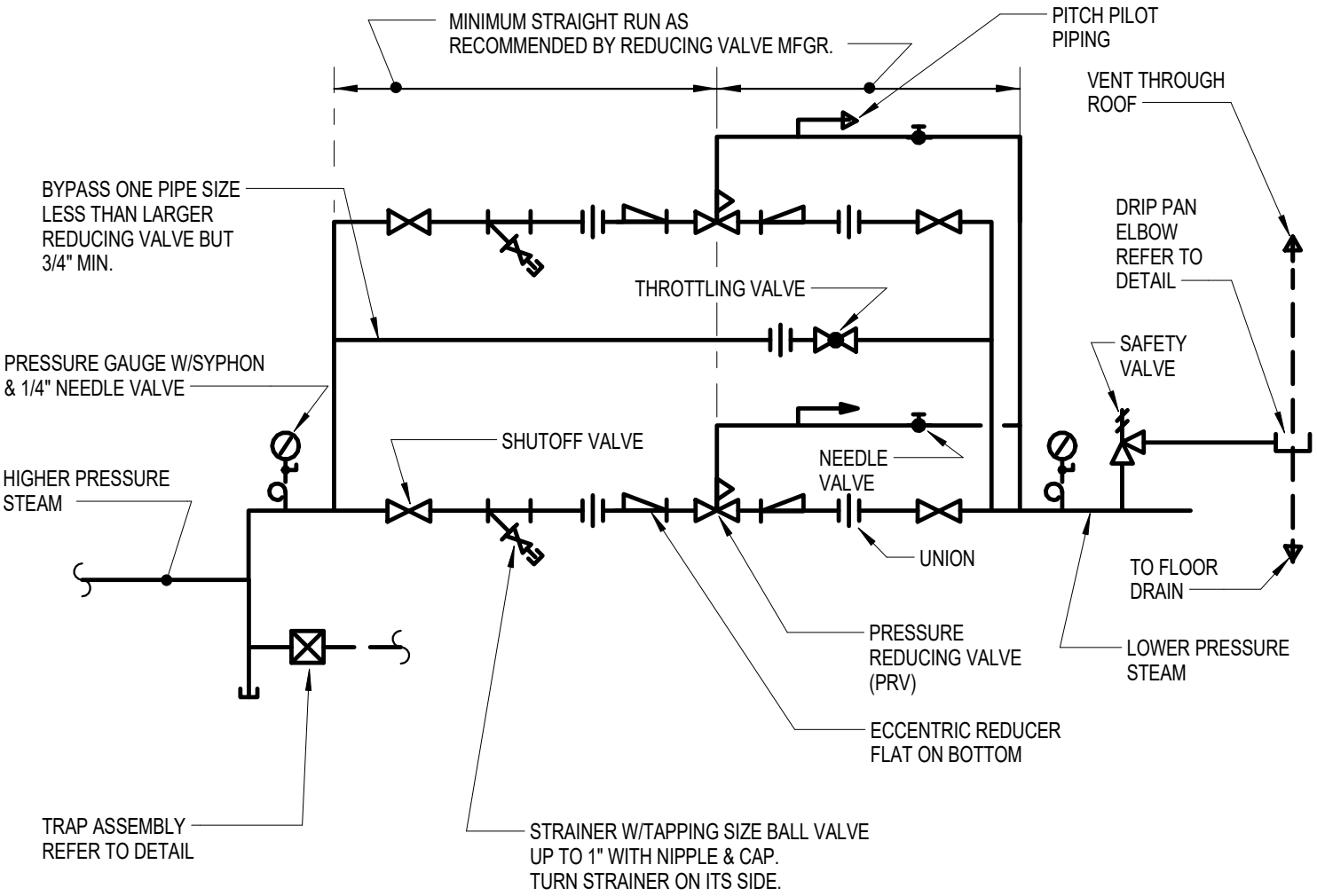
DRAWING TITLE
PIPE SUPPORT DETAILS

DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-2

NOTE: DETAIL IS DIAGRAMMATIC. INSTALL BOTH PRV'S AT SAME ELEVATION.



1 DOUBLE STEAM PRESSURE REDUCING STATION

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

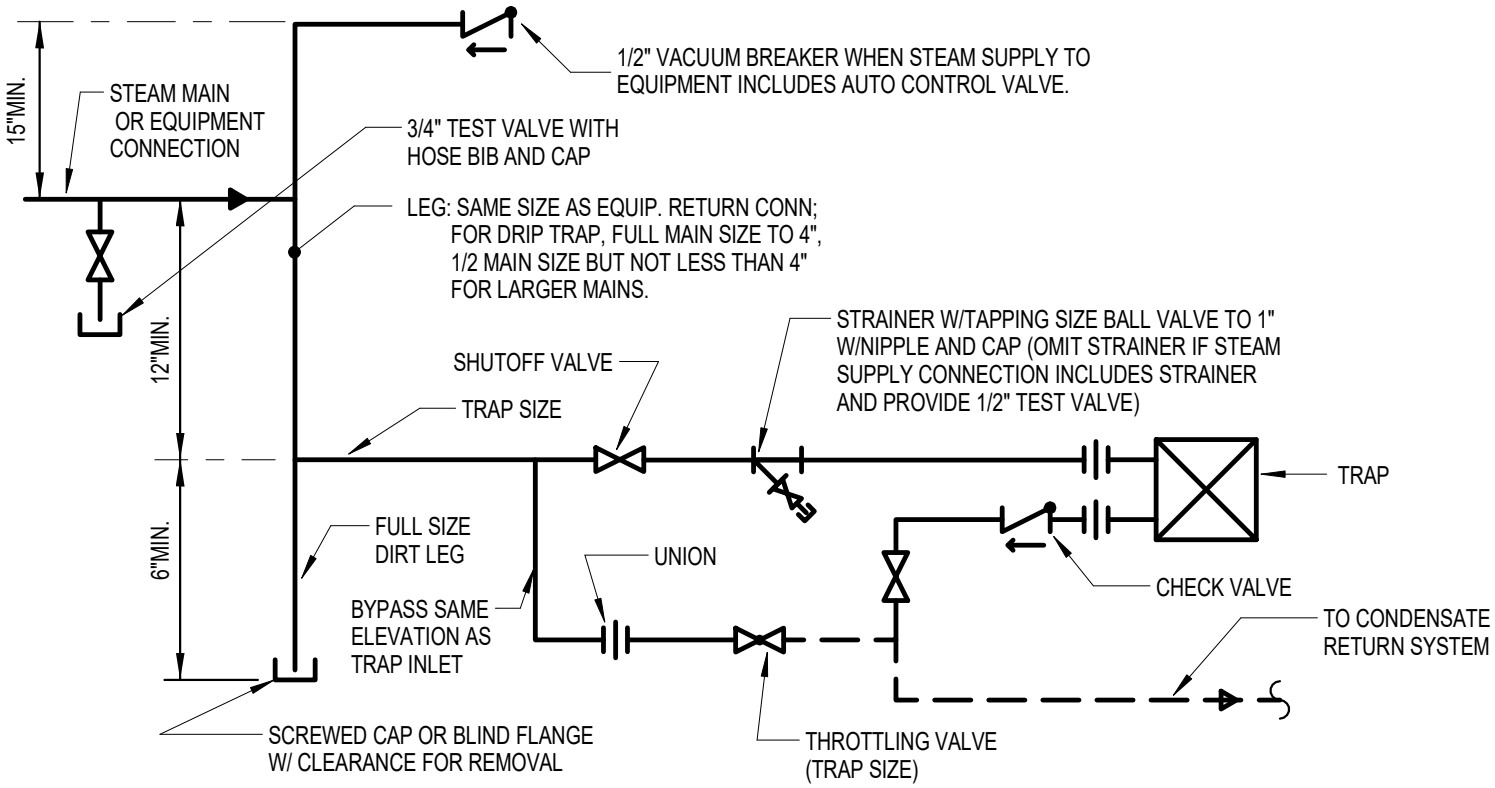
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: DOUBLE STEAM PRESSURE REDUCING STATION

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-3



NOTES:
1. STEAM MAIN DRIP TRAP TO BE 3/4" UNLESS OTHERWISE NOTED.
2. OMIT CHECK VALVE IF STEAM PRESSURE IS 15 PSIG OR LESS AND CONDENSATE IS NOT LIFTED.
3. FOR PREHEAT COIL ONLY, PROVIDE THERMOSTATIC DRAIN VALVE AHEAD OF BYPASS, PIPE TO F.D.
4. PROVIDE ELEVATED SUPPORTS/LEGS AS REQUIRED FOR FLOOR MOUNTED EQUIPMENT TO OBTAIN MINIMUM TRAP LEG HEIGHT AS SHOWN AND PITCH OF CONDENSATE RETURN TO TERMINATION.
5. INSTALL TRAP ASSEMBLIES IN PARALLEL WHEN MORE THAN ONE TRAP REQUIRED FOR LOAD.

1 FLOAT AND THERMOSTATIC TRAP ASSEMBLY
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

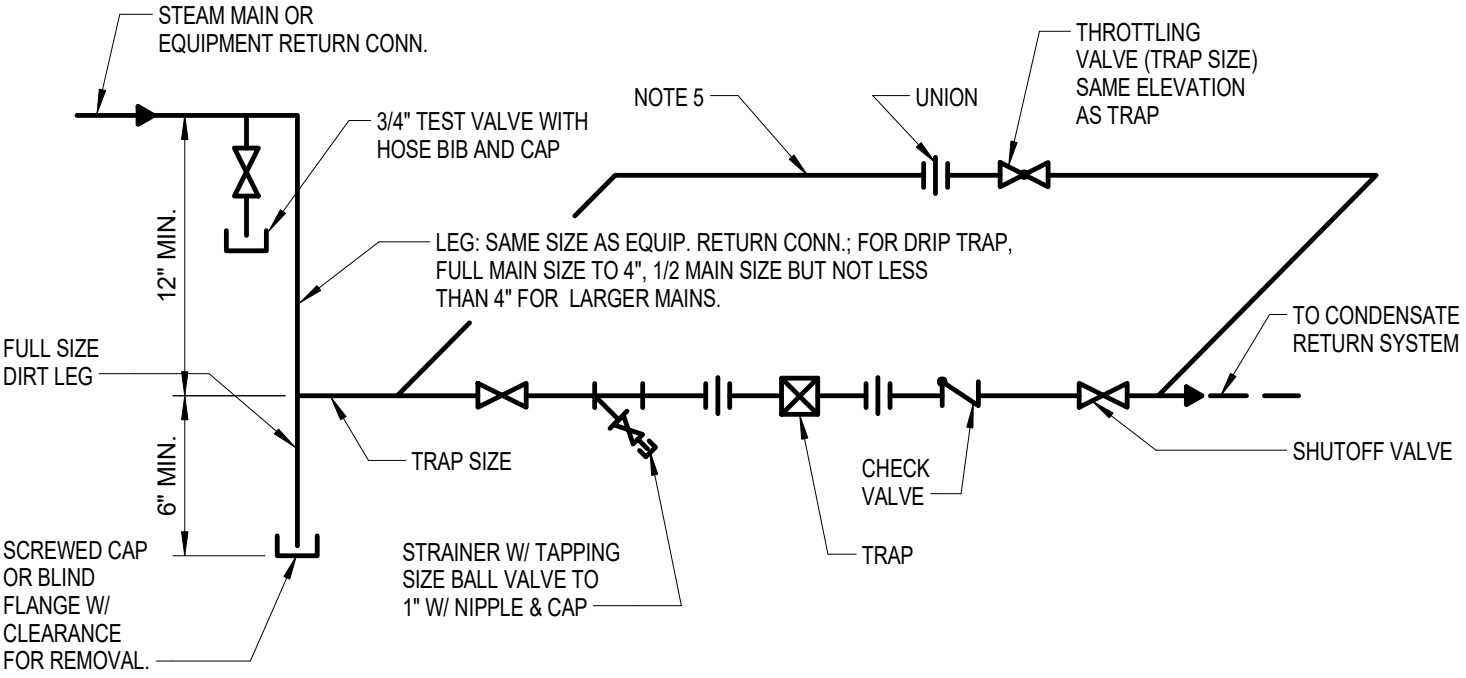
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: FLOAT AND THERMOSTATIC TRAP ASSEMBLY

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-4



NOTES:
1. STEAM MAIN DRIP TRAP TO BE 3/4" UNLESS OTHERWISE NOTED.
2. PROVIDE ELEVATED SUPPORT/ LEGS AS REQUIRED FOR FLOOR MOUNTED EQUIPMENT TO OBTAIN MINIMUM TRAP LEG HEIGHT AS SHOWN AND PITCH ON CONDENSATE RETURN TO TERMINATION.
3. INSTALL TRAP ASSEMBLIES IN PARALLEL WHEN MORE THAN ONE REQUIRED FOR LOAD.

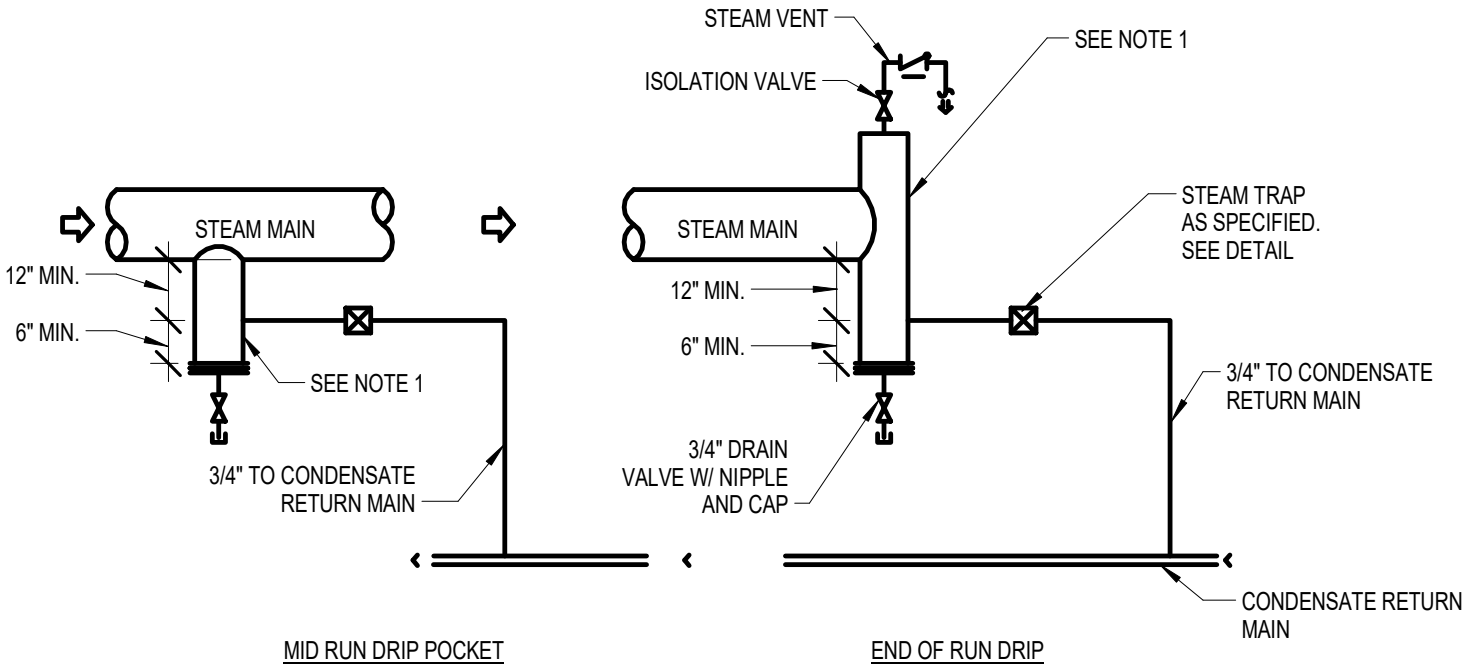
1 THERMODYNAMIC TRAP ASSEMBLY
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
THERMODYNAMIC TRAP ASSEMBLY

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-5



NOTE:
1. FULL LINE SIZE UP TO 4" MAIN. FOR LARGER MAIN SIZES, 2 TO 3 SIZES SMALLER THAN MAIN SIZE, BUT NOT LESS THAN 4"

1 STEAM MAIN DIRT LEG DETAIL

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

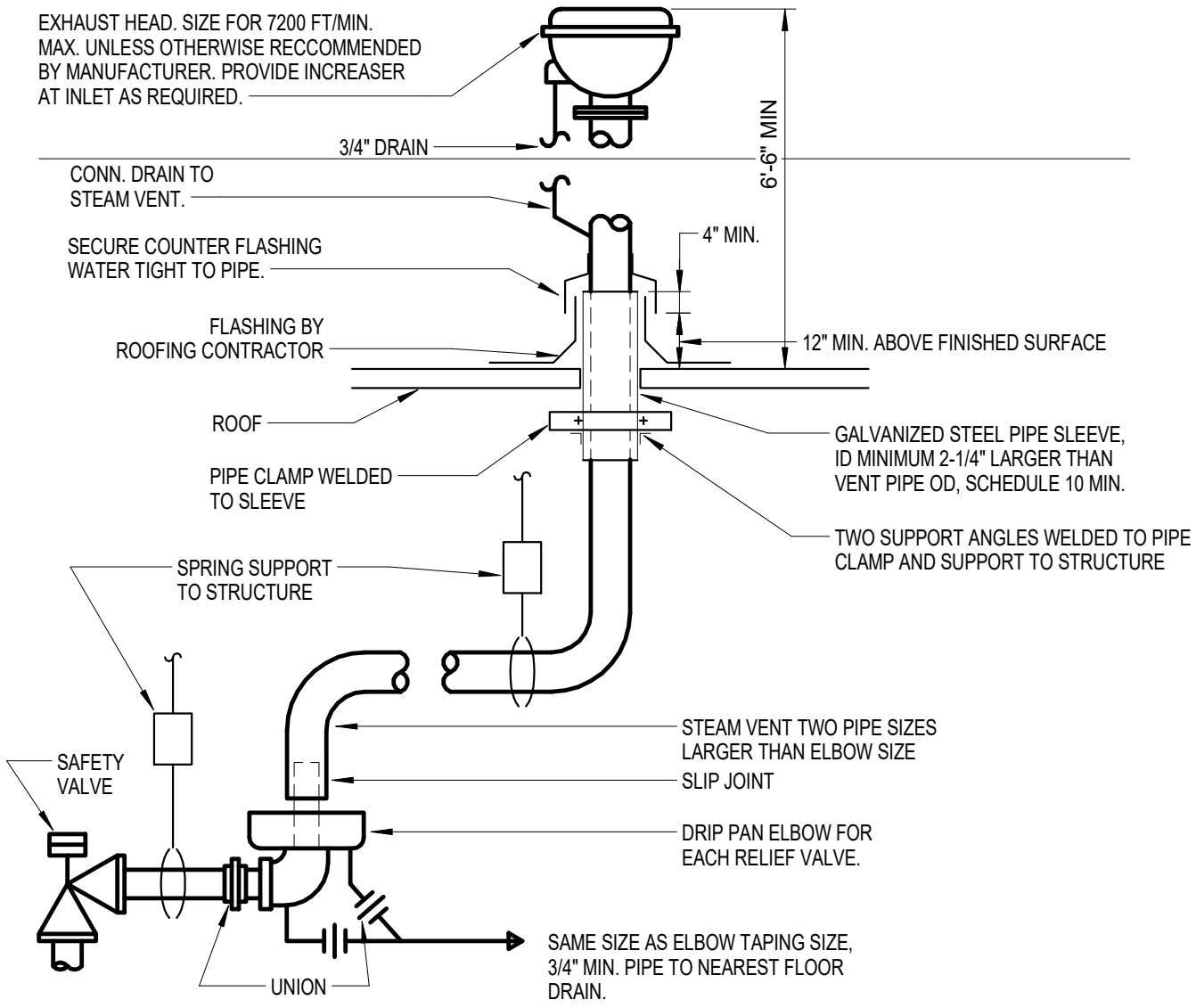
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: STEAM MAIN DIRT LEG DETAIL

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-6



1 DRIP PAN ELBOW AND EXHAUST HEAD

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

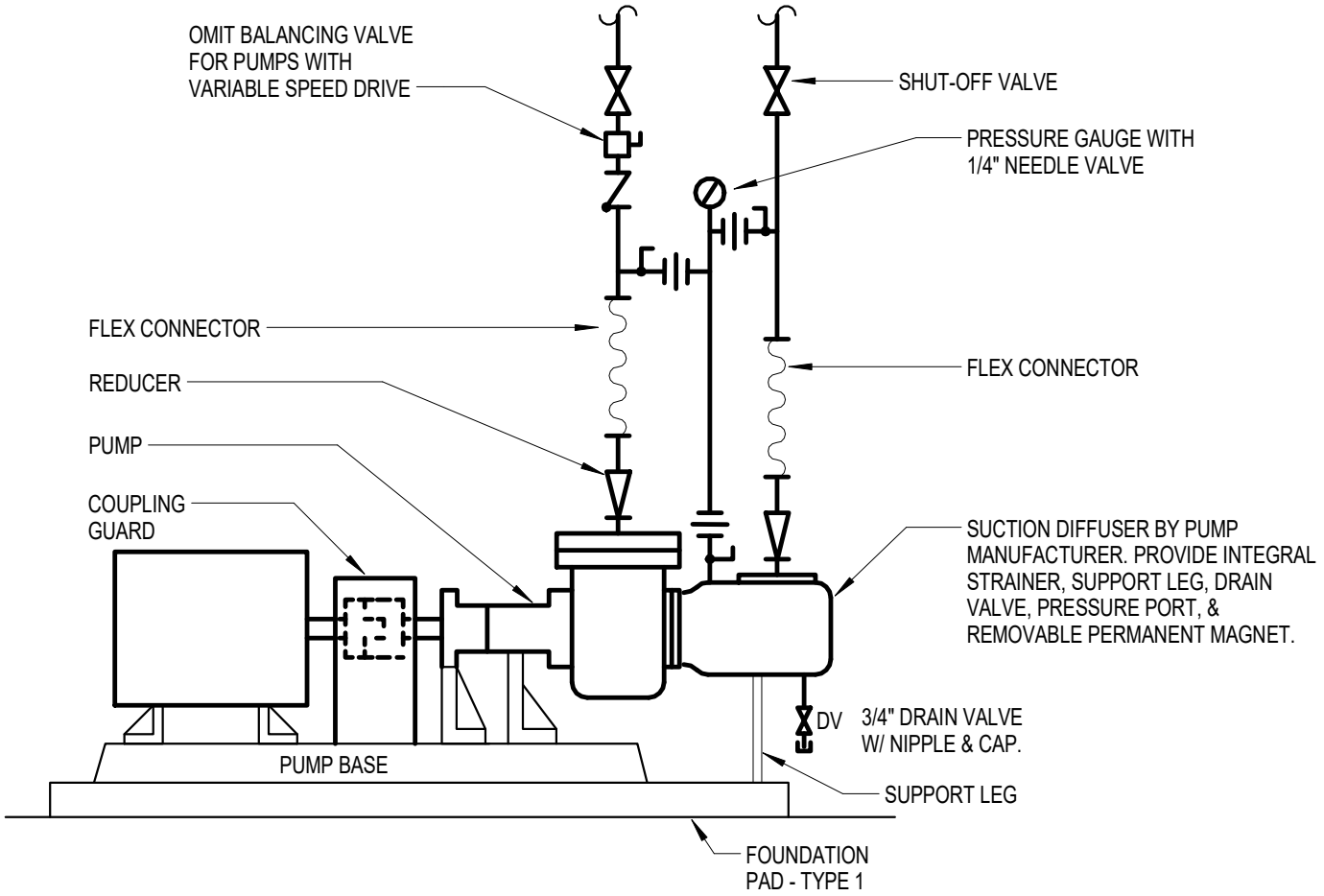
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: DRIP PAN ELBOW AND EXHAUST HEAD

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-7



NOTES:
1. ALL AUXILIARIES LINE SIZE.
2. SUCTION DIFFUSER SHALL BE BY PUMP MANUFACTURER. MAX PRESSURE DROP (7 FT HD)

1 END SUCTION PUMP PIPING (WITHOUT ISOLATION BASE)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

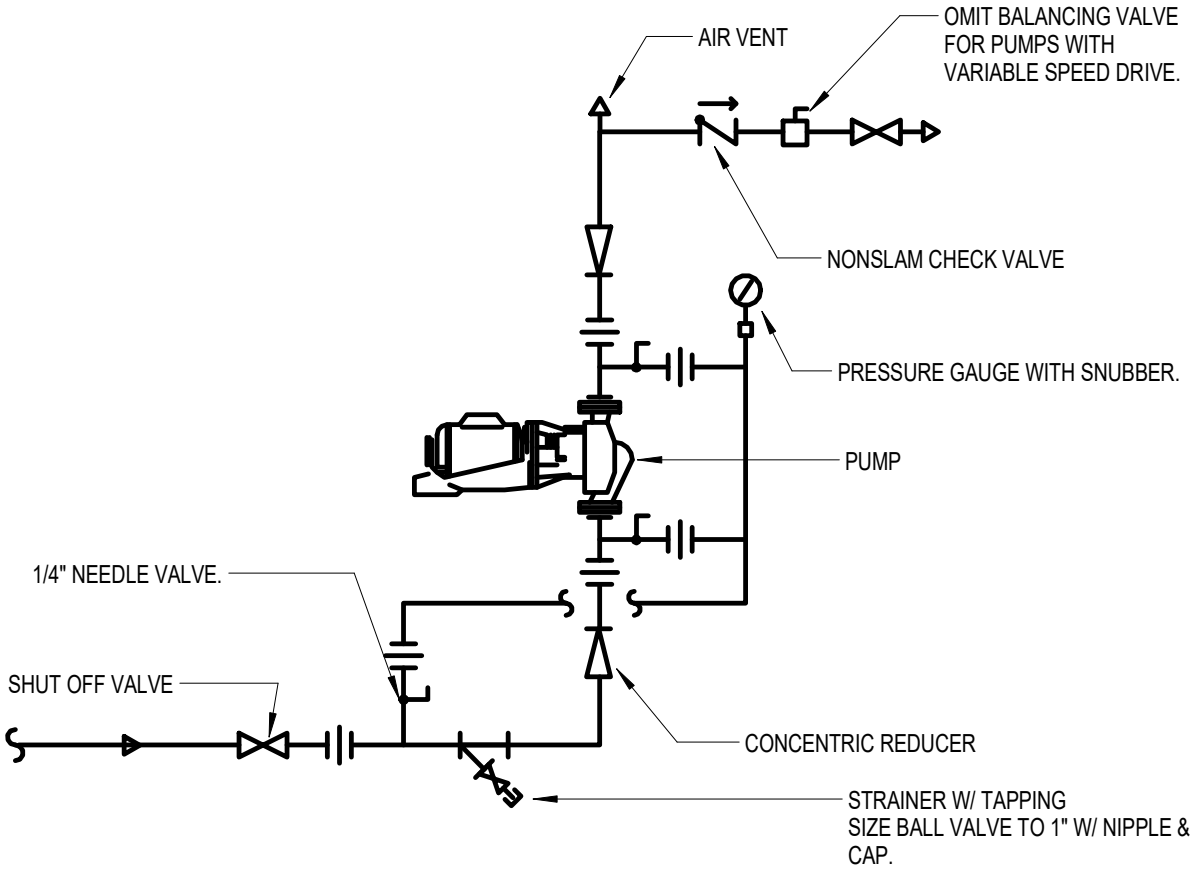
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
END SUCTION PUMP PIPING (WITHOUT ISOLATION BASE)

DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-8



NOTES:
1.ALL AUXILIARIES LINE SIZE
2.USE ECCENTRIC FLAT ON TOP SUCTION REDUCER FOR PUMP INSTALLED IN HORIZONTAL PIPE.

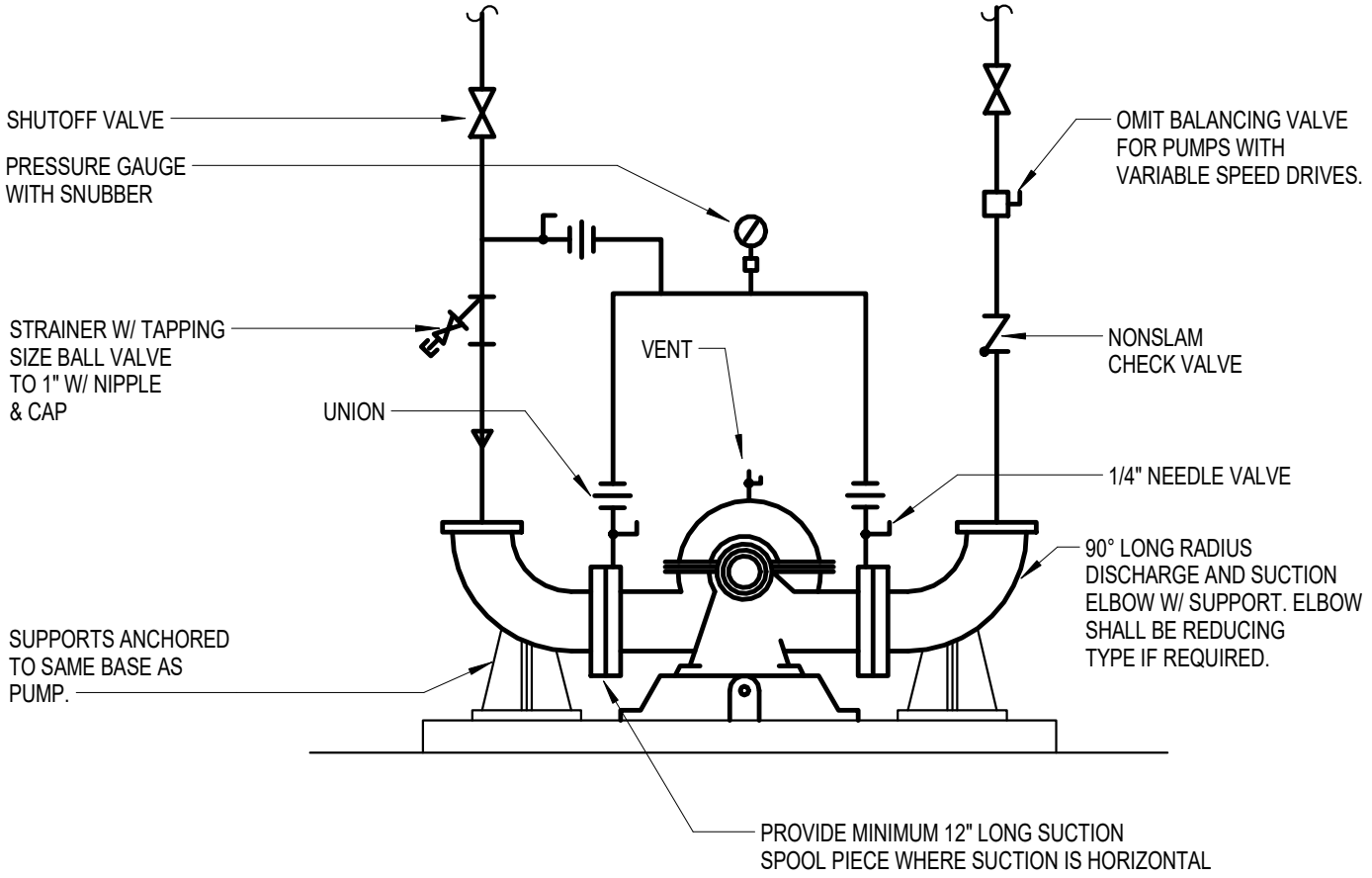
1 IN-LINE PUMP PIPING
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
IN-LINE PUMP PIPING

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-9



NOTE:
1. ALL AUXILIARIES LINE SIZE.
2. PIPE PACKING DRAIN TO NEAREST FLOOR DRAIN.

1 DOUBLE SUCTION PUMP PIPING (WITHOUT ISOLATION BASE)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

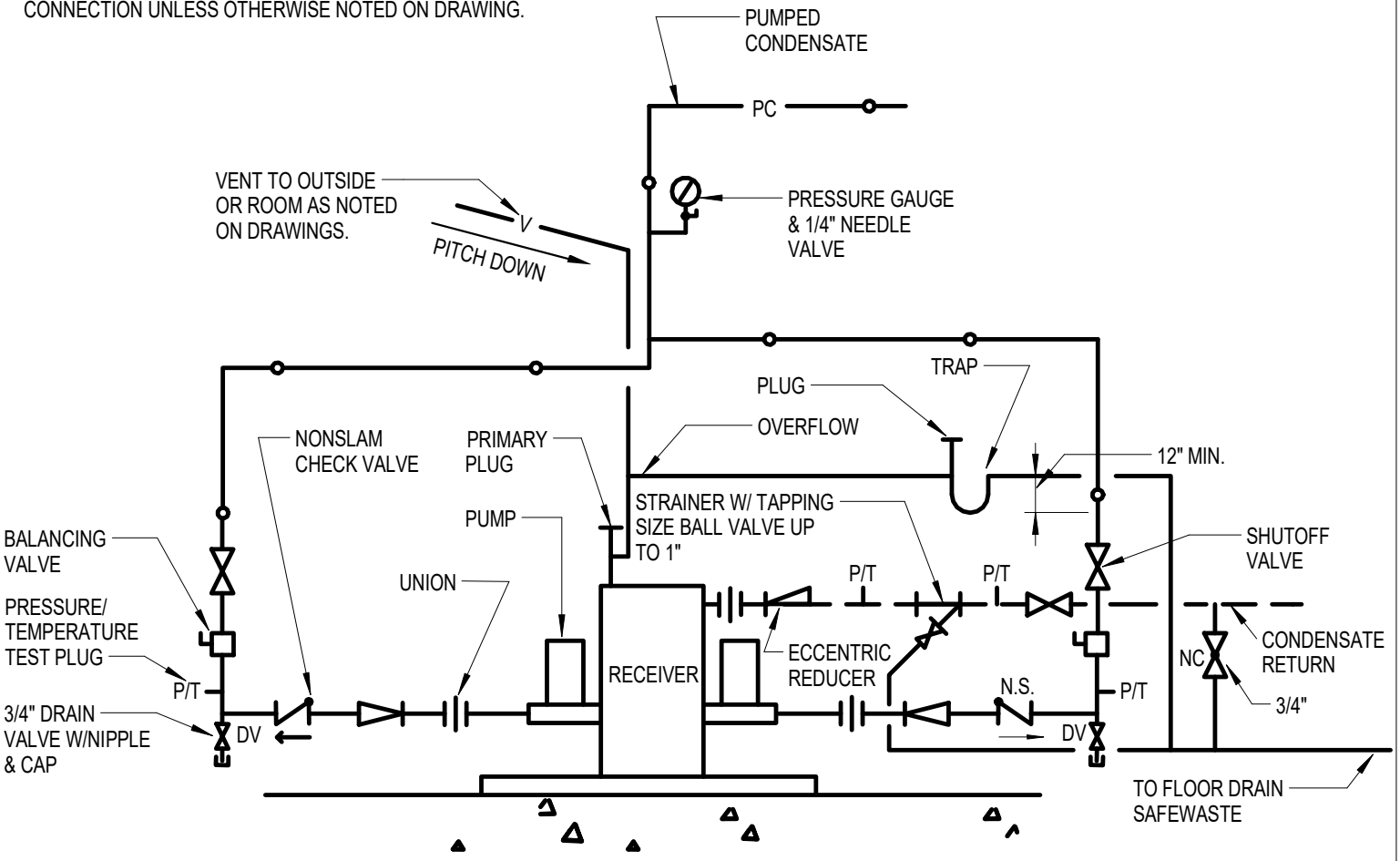
DRAWING TITLE
DOUBLE SUCTION PUMP PIPING
(WITHOUT ISOLATION BASE)

DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-10

NOTES:
1. CONNECTIONS FOR SINGLE PUMP SET SIMILAR.
2. VENT AND OVERFLOW SAME SIZE AS RECEIVER VENT CONNECTION UNLESS OTHERWISE NOTED ON DRAWING.



1 CONDENSATE RETURN PUMP PIPING (ELECTRIC)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

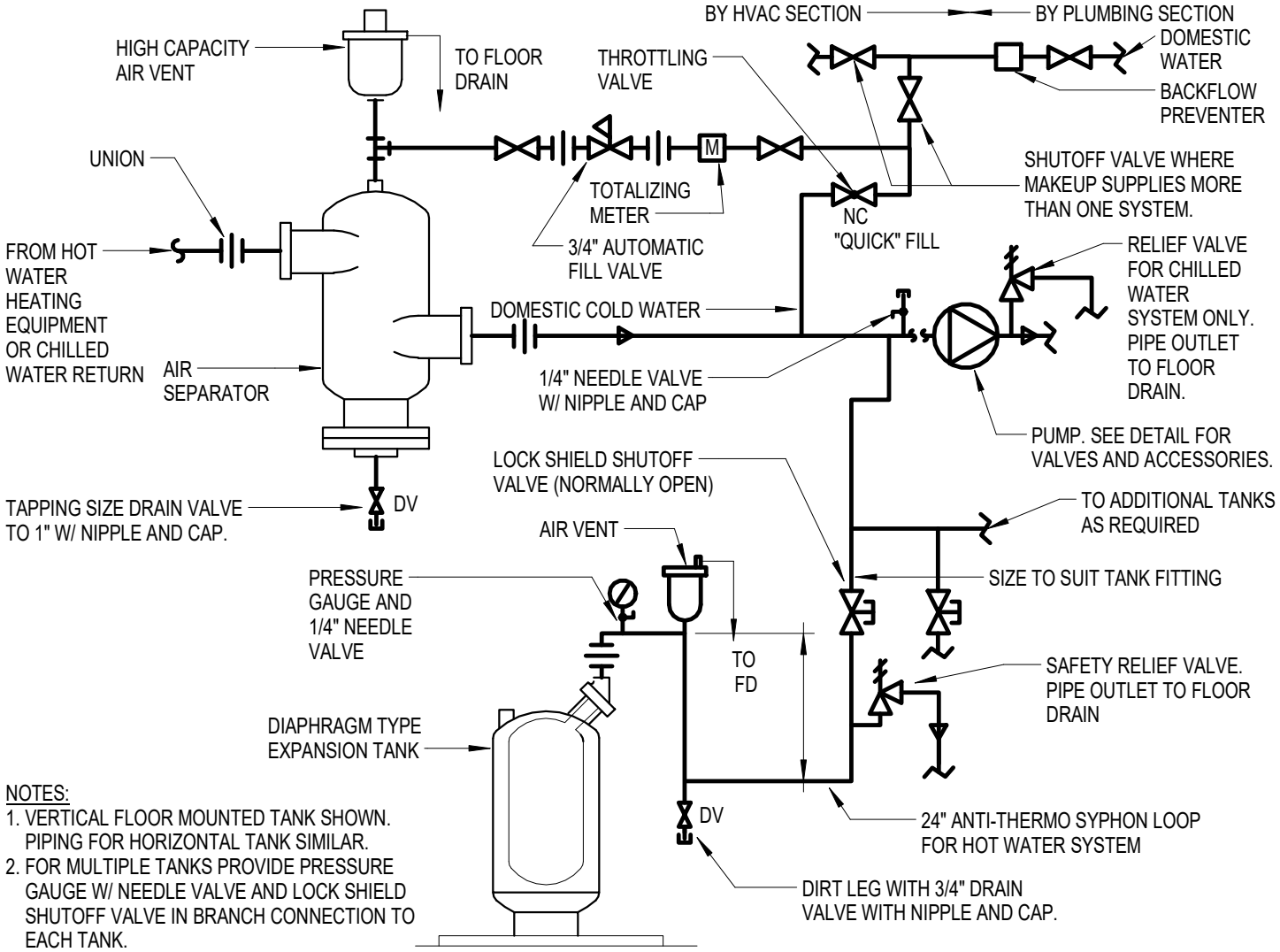
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: CONDENSATE RETURN PUMP PIPING (ELECTRIC)

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-11



NOTES:
1. VERTICAL FLOOR MOUNTED TANK SHOWN. PIPING FOR HORIZONTAL TANK SIMILAR.
2. FOR MULTIPLE TANKS PROVIDE PRESSURE GAUGE W/ NEEDLE VALVE AND LOCK SHIELD SHUTOFF VALVE IN BRANCH CONNECTION TO EACH TANK.

1 EXPANSION, PURGE & VENT SYSTEM

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

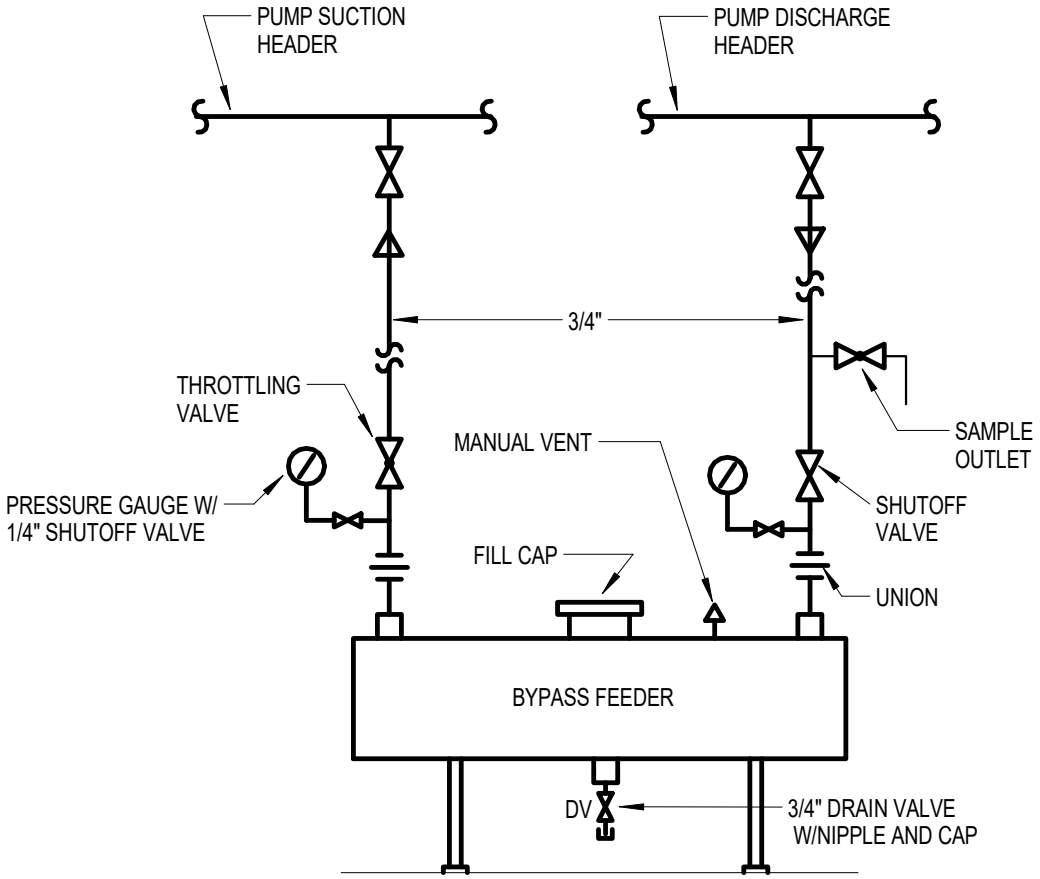
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: EXPANSION, PURGE & VENT SYSTEM

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-12



1 WATER TREATMENT BYPASS FEEDER PIPING

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

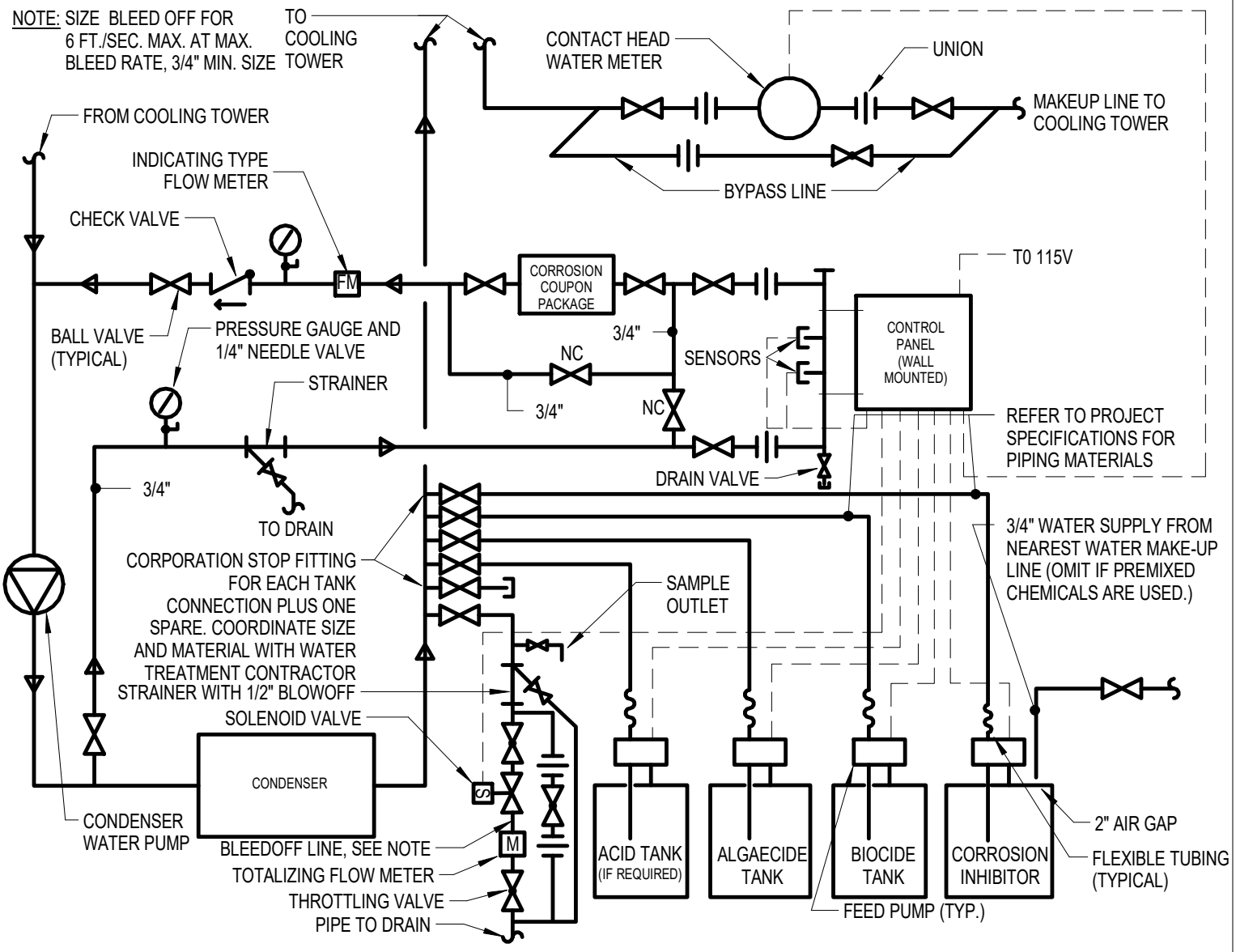
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
WATER TREATMENT BYPASS FEEDER PIPING

DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-13



1 COOLING TOWER CHEMICAL FEED SYSTEM (W/CONTACT HEAD WATER METER)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

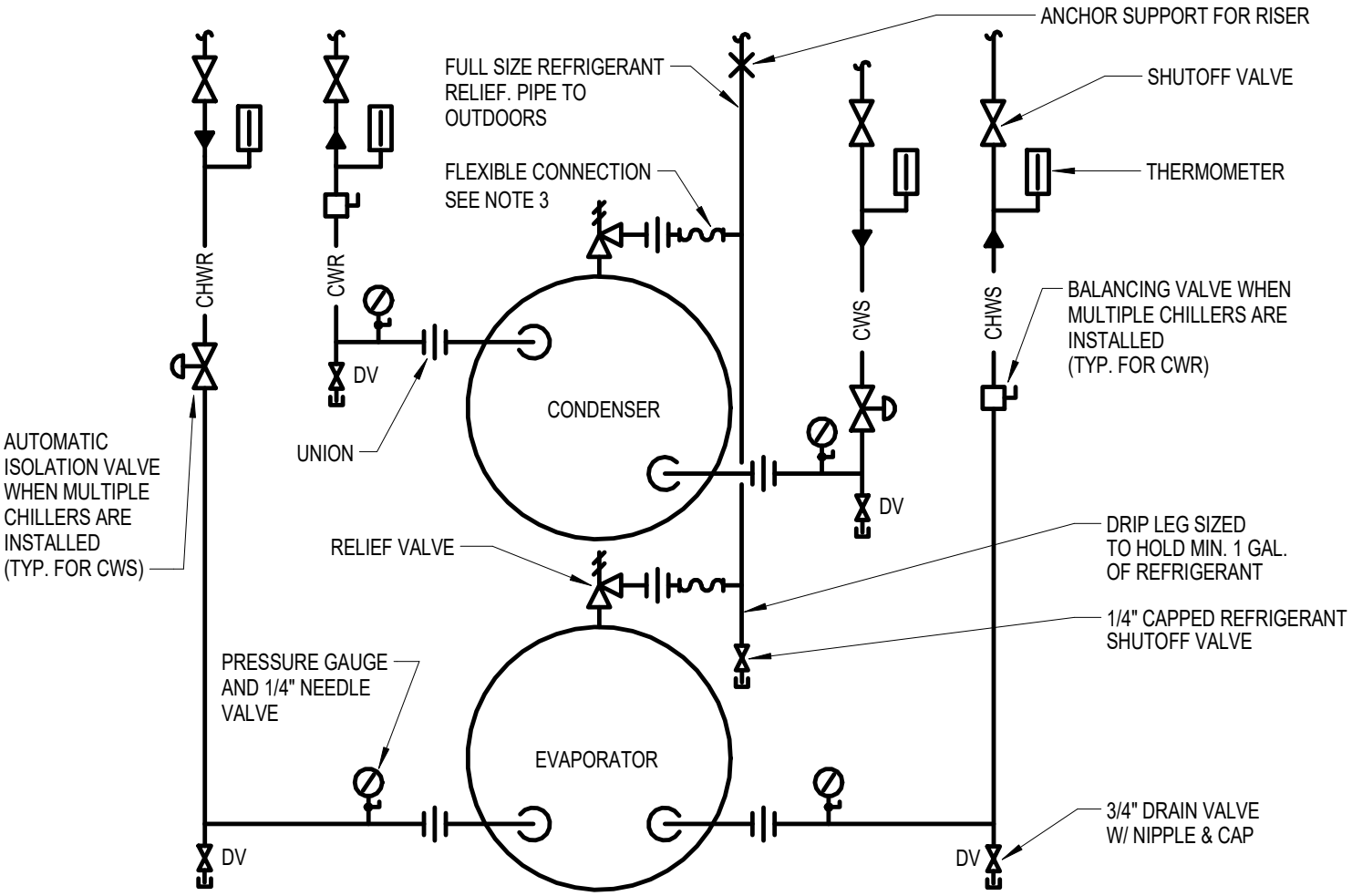
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: COOLING TOWER CHEMICAL FEED SYSTEM (W/ CONTACT HEAD WATER METER)

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-14



NOTES:

1. AUXILARY (OIL COOLER, PURGE, ETC.) PIPING NOT SHOWN. PROVIDE AS REQUIRED BY CHILLER MANUFACTURER.
2. LOCATE UNIONS AND VERTICAL PIPING TO ALLOW HEAD REMOVAL FOR TUBE CLEANING/REPLACEMENT WITHOUT DISTURBING MAIN PIPING TO CHILLERS.
3. INSTALL PARALLEL TO MOTOR SHAFT.

1 WATER CHILLER PIPING (HIGH PRESSURE REFRIGERANT)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

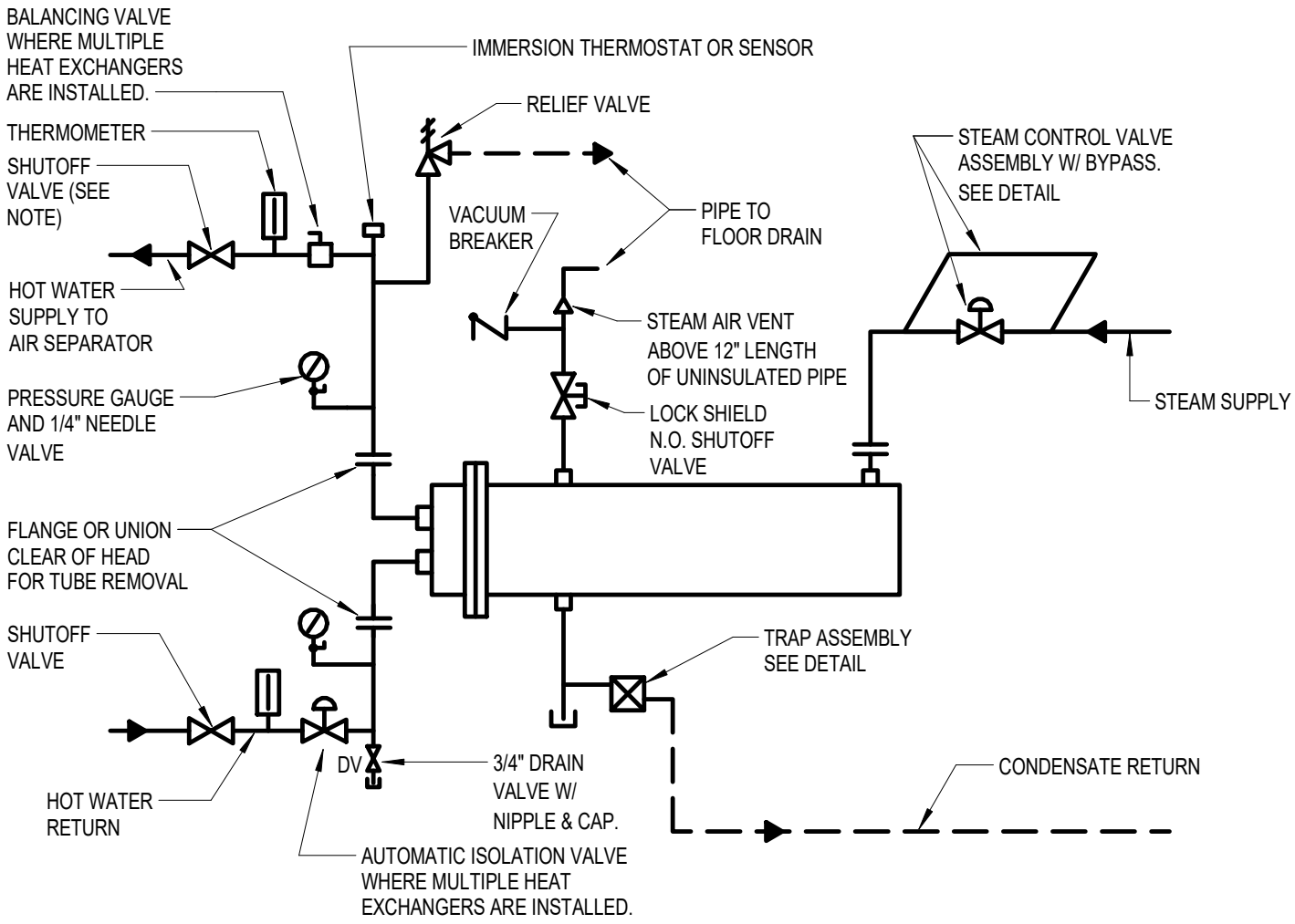
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: WATER CHILLER PIPING (HIGH PRESSURE REFRIGERANT)

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-15



1 STEAM TO WATER HEAT EXCHANGER PIPING

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT: EPS - STANDARD DETAILS
DIVISION 23

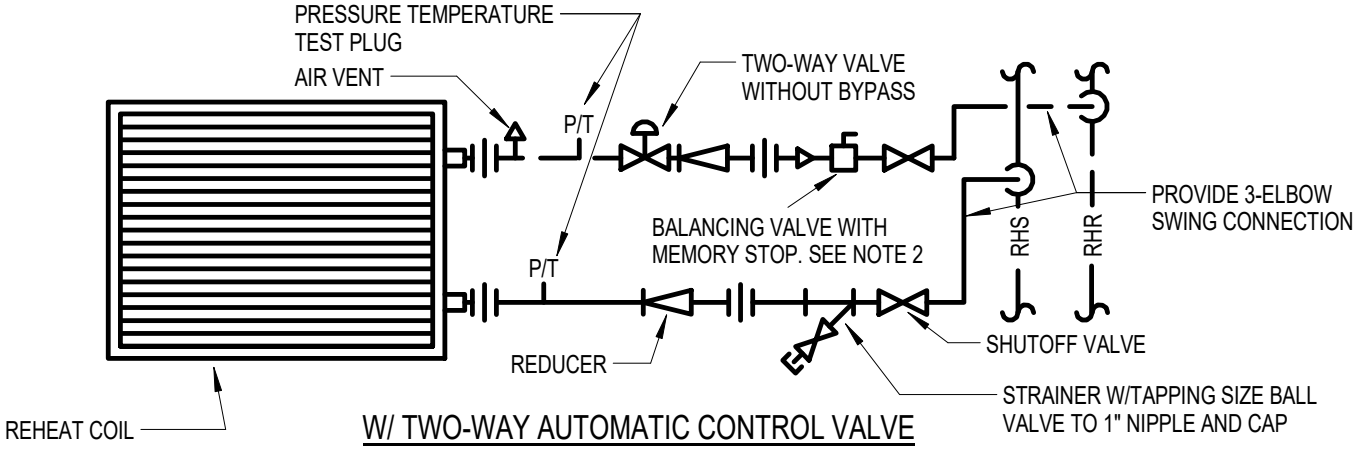
DRAWING TITLE: STEAM TO WATER HEAT EXCHANGER PIPING

DWG. DATE: 09/25/2020

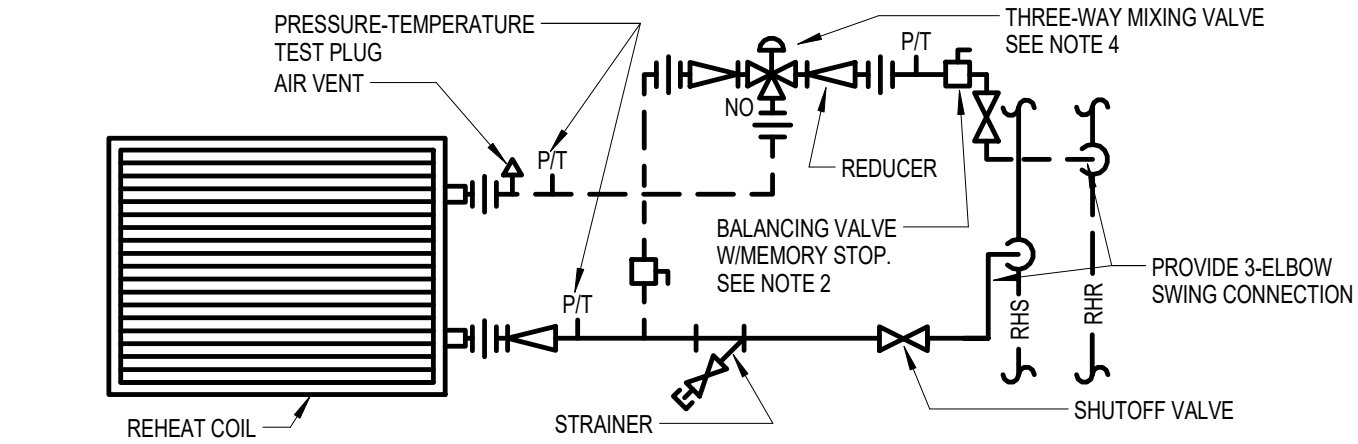
REV. DATE:

DRAWING NO.: M-16

NOTES:
1. PROVIDE MANUAL AIR VENTS AS REQUIRED.
2. PROVIDE 1/2" BALANCING VALVE WHERE FLOW RATE IS 1.3 GPM OR LESS, PROVIDE FULL LINE SIZE BALANCING VALVE FOR LARGER FLOW RATES. OMIT BALANCING VALVE WHERE PRESSURE-INDEPENDENT CONTROL VALVE IS UTILIZED.
3. PROVIDE FULL LINE SIZE SHUT-OFF VALVE AND STRAINER.
4. MODIFY PIPING AS REQUIRED BY VALVE MANUFACTURER FOR VALVE TO BE NORMALLY OPEN TO PASS WATER THROUGH COIL ON LOSS OF POWER.



W/ TWO-WAY AUTOMATIC CONTROL VALVE



W/ THREE-WAY AUTOMATIC CONTROL VALVE

1 REHEAT COIL PIPING (DUCT OR AIR VOLUME CONTROL BOX MOUNTED)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

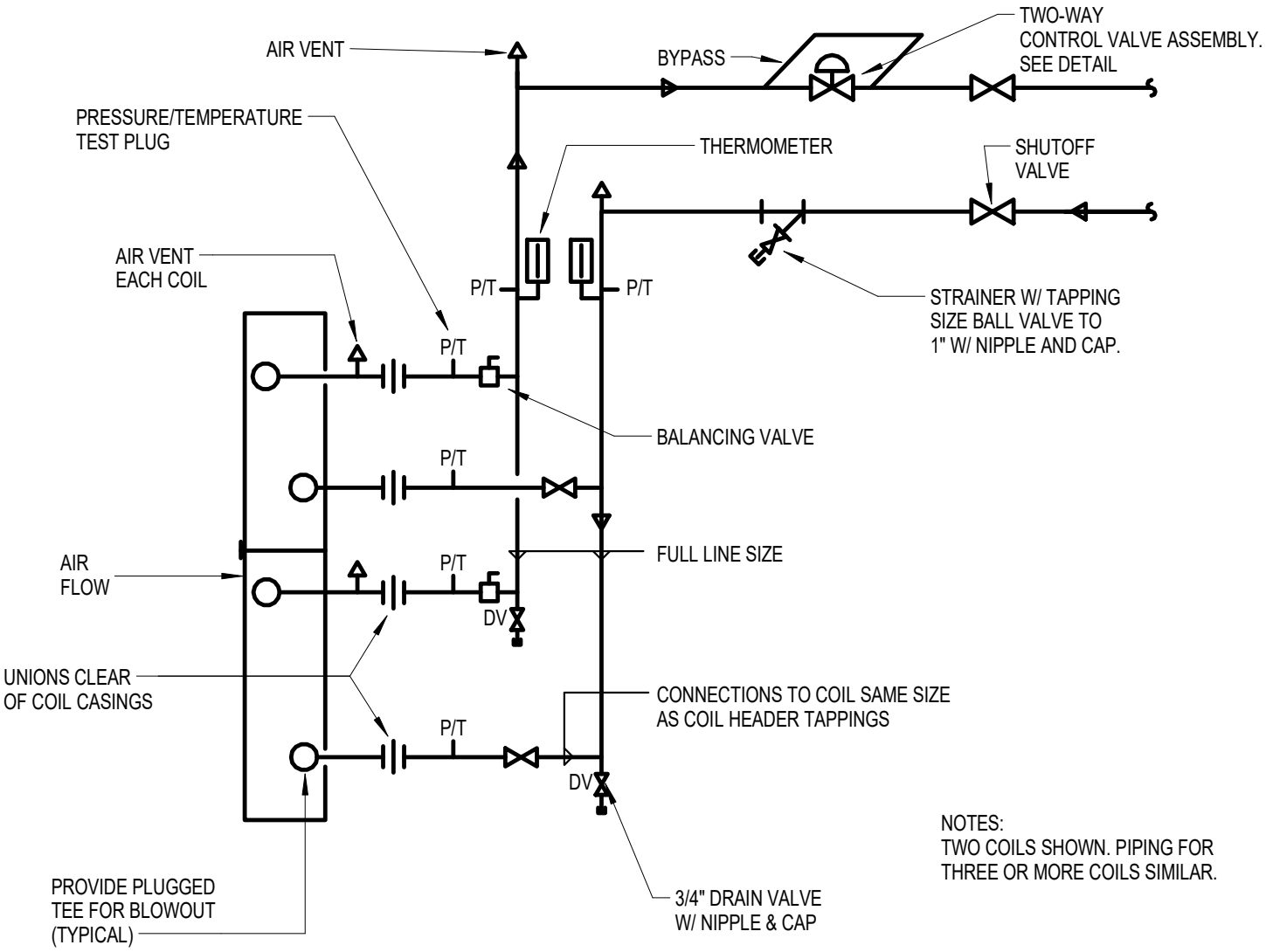
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: REHEAT COIL PIPING (DUCT OR AIR VOLUME CONTROL BOX MOUNTED)

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-17



1 STACKED WATER COOLING OR HEATING COIL

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

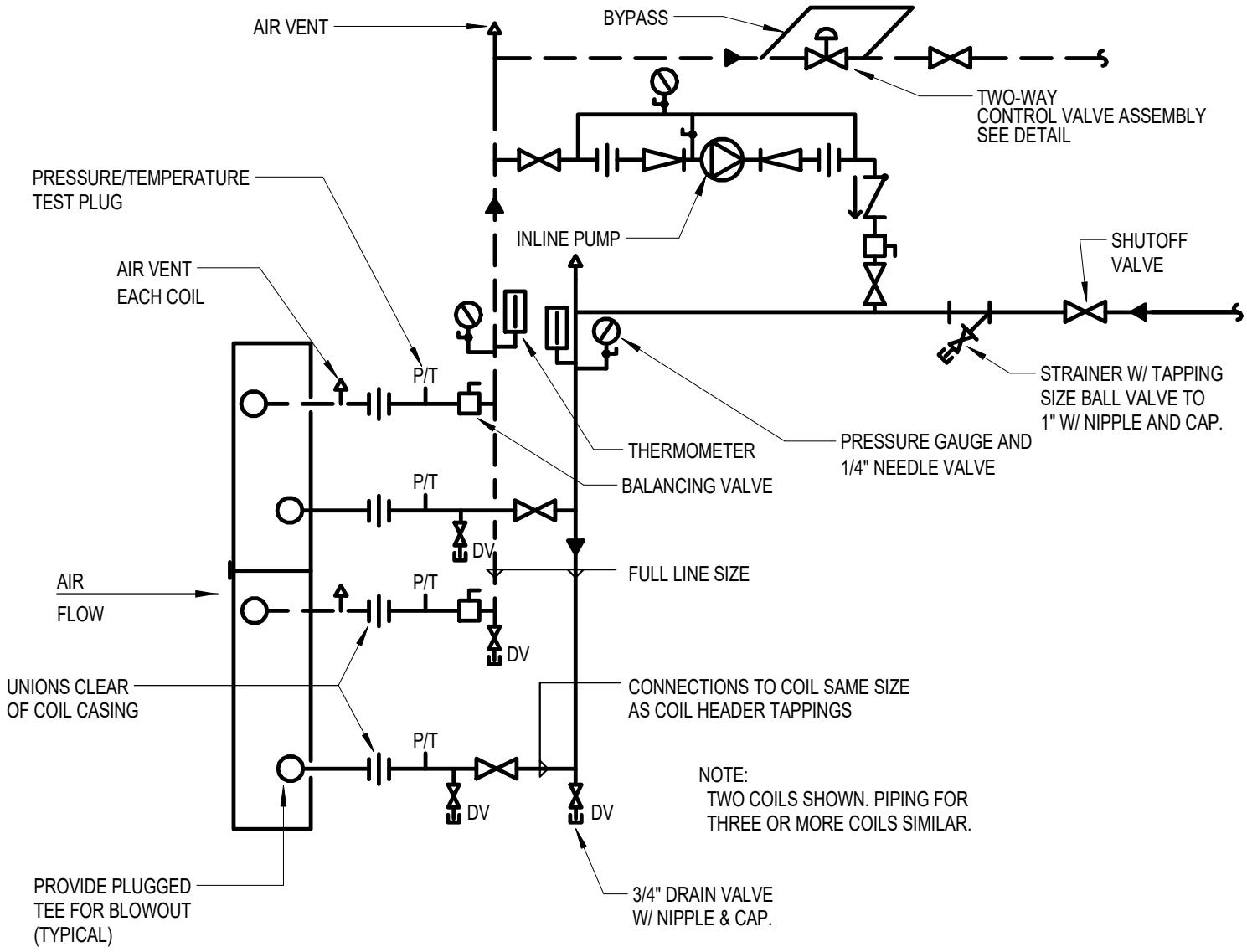
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
STACKED WATER COOLING OR
HEATING COIL

DWG. DATE
09/25/2020

REV. DATE

DRAWING NO.
M-18



1 STACKED CHILLED WATER COOLING COIL AND INLINE PUMP (TWO-WAY CONTROL VALVE)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

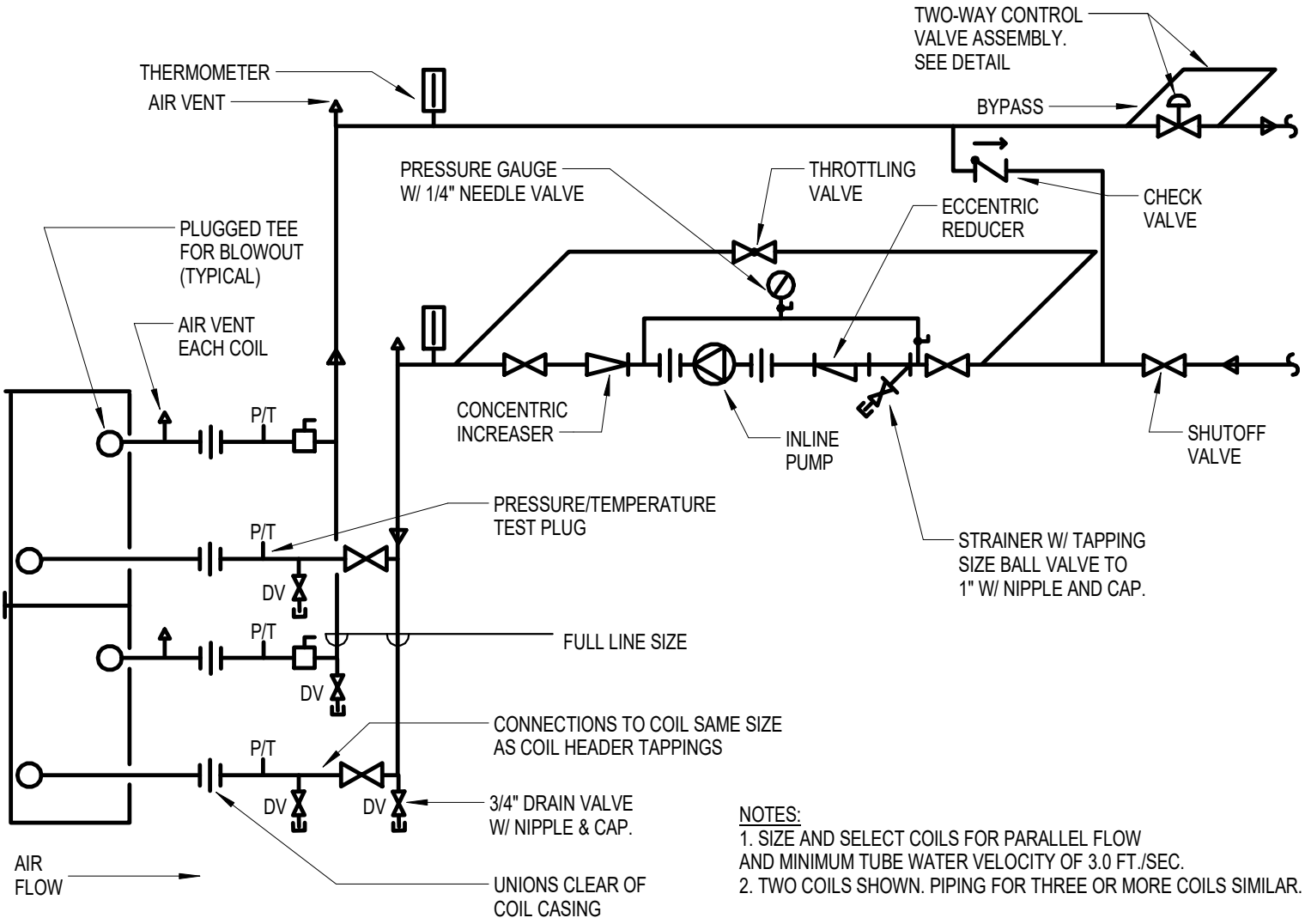
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
STACKED CHILLED WATER COOLING COIL AND INLINE PUMP (TWO-WAY CONTROL VALVE)

DWG. DATE
09/25/2020

REV. DATE

DRAWING NO.
M-19



NOTES:
1. SIZE AND SELECT COILS FOR PARALLEL FLOW AND MINIMUM TUBE WATER VELOCITY OF 3.0 FT./SEC.
2. TWO COILS SHOWN. PIPING FOR THREE OR MORE COILS SIMILAR.

1 STACKED HOT WATER HEATING COIL AND INLINE PUMP (TWO WAY CONTROL VALVE)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT: EPS - STANDARD DETAILS DIVISION 23

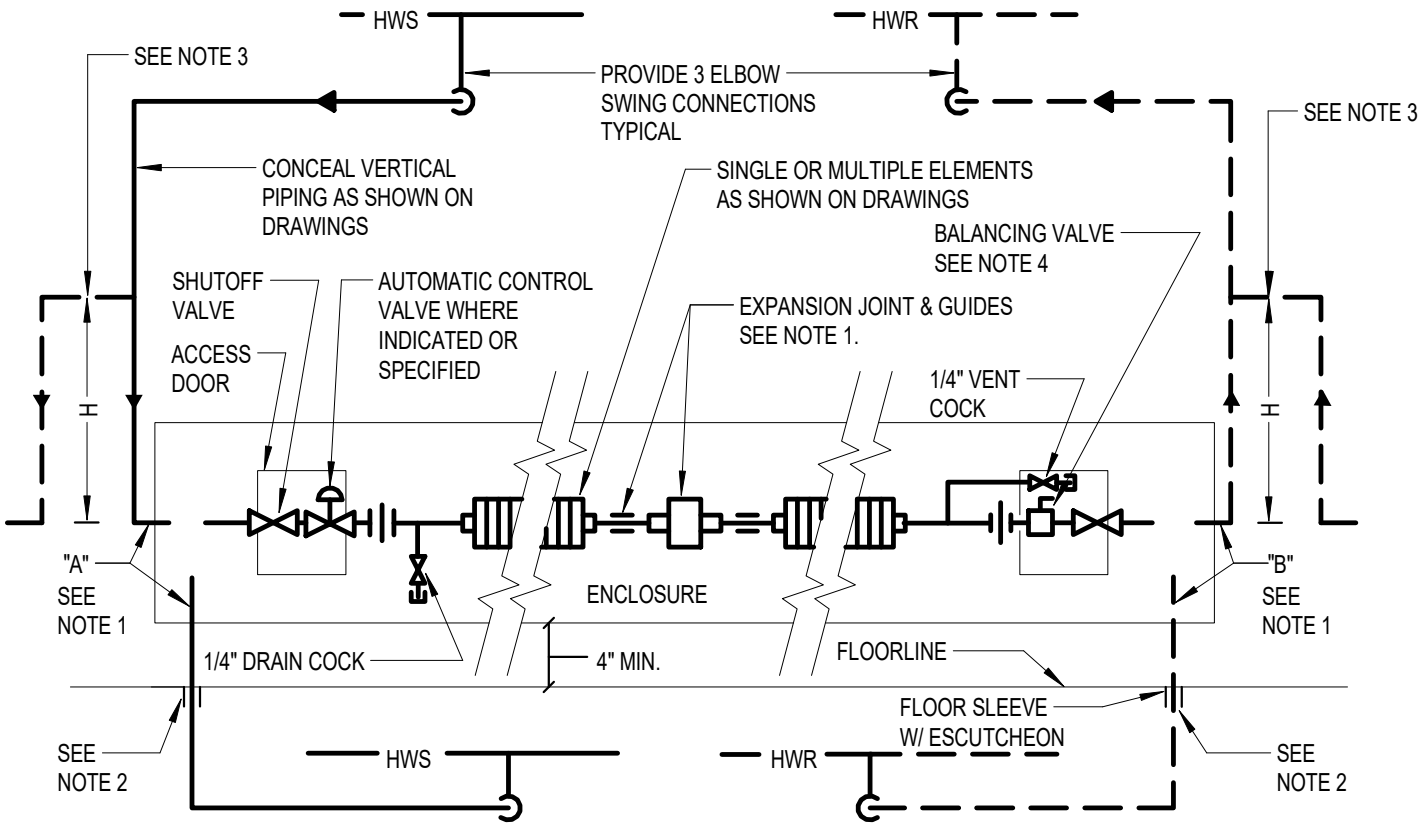
DWG. DATE: 09/25/2020

REV. DATE:

DRAWING TITLE: STACKED HOT WATER HEATING COIL AND INLINE PUMP (TWO WAY CONTROL VALVE)

DRAWING NO.: M-20

NOTES: 1. PROVIDE EXPANSION JOINTS AND GUIDES WHERE CIRCUIT LENGTH "A" TO "B" EXCEEDS 40 FEET.
SPACE JOINTS FOR EQUAL COMPRESSION (1/2 INCH MAX.) ON EACH END OF JOINT AND ANCHOR AT A & B.
2. 1/2 INCH MINIMUM CLEARANCE FROM INSULATION WHEN COLD.
3. TO ADJACENT CIRCUIT. DO NOT USE BULL HEAD "T". H=36" MIN. FOR ANY CIRCUIT THAT DOES NOT HAVE EXPANSION JOINT.
4. PROVIDE 1/2" BALANCING VALVE WHERE FLOW RATE IS 1.3 GPM OR LESS AND FULL LINE SIZE BALANCING VALVE WHERE FLOW RATE IS GREATER. OMIT BALANCING VALVE WHERE PRESSURE-INDEPENDENT CONTROL VALVE IS UTILIZED.
5. PROVIDE FULL LINE SIZE RADIATOR VALVE.
6. BYPASS NOT REQUIRED FOR AUTOMATIC CONTROL VALVE.



1 HOT WATER FINNED TUBE RADIATION PIPING
SCALE: NTS

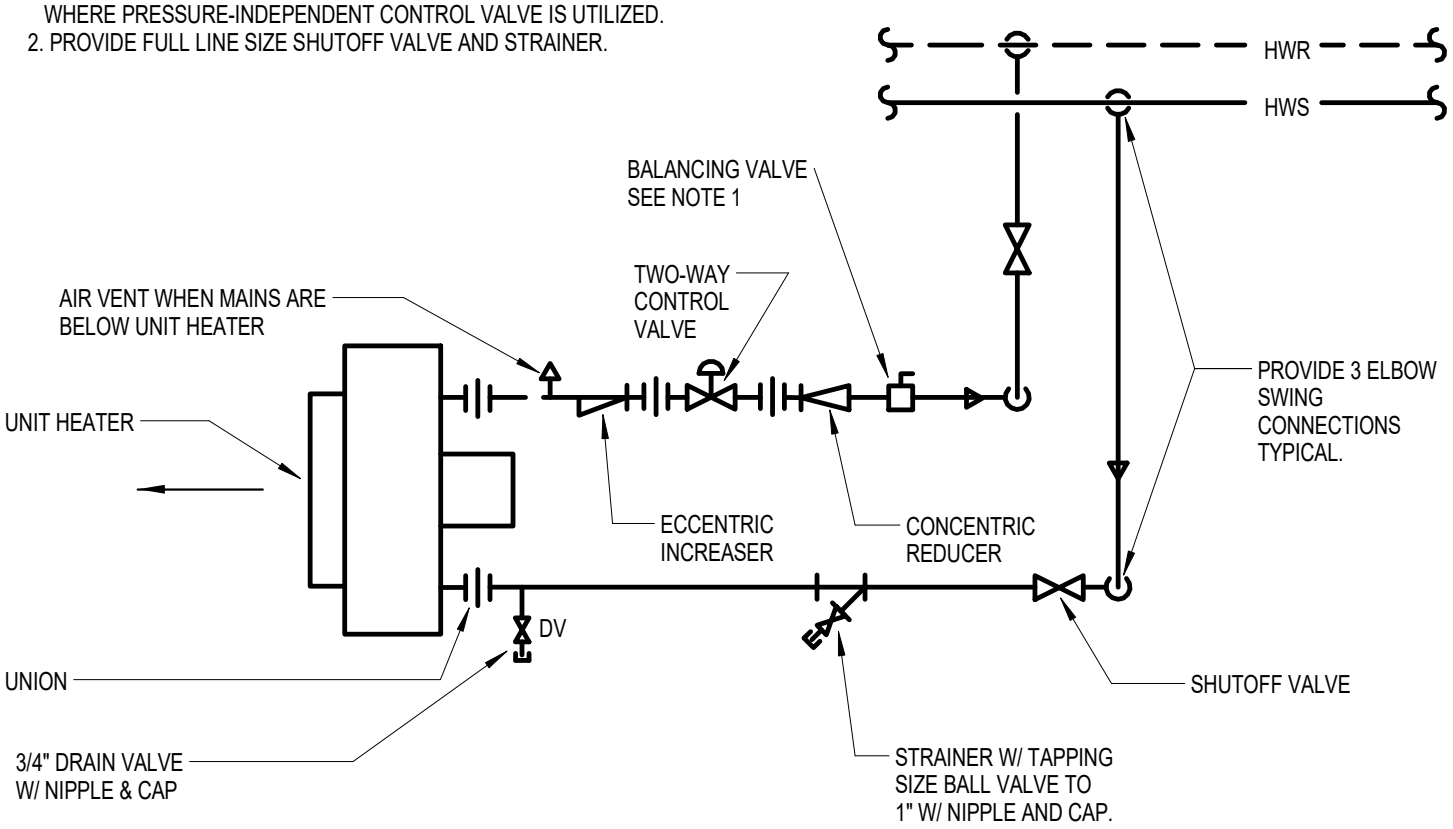
UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
HOT WATER FINNED TUBE RADIATION PIPING

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-21

NOTES:
1. PROVIDE 1/2" BALANCING VALVE WHERE FLOW RATE IS 1.3 GPM OR LESS. PROVIDE FULL LINE SIZE BALANCING VALVE FOR LARGER FLOW RATE. OMIT BALANCING VALVE WHERE PRESSURE-INDEPENDENT CONTROL VALVE IS UTILIZED.
2. PROVIDE FULL LINE SIZE SHUTOFF VALVE AND STRAINER.



1 HOT WATER PROPELLER UNIT HEATER PIPING (W/ CONTROL VALVE W/O BYPASS)
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: HOT WATER PROPELLER UNIT HEATER PIPING (W/ CONTROL VALVE W/O BYPASS)

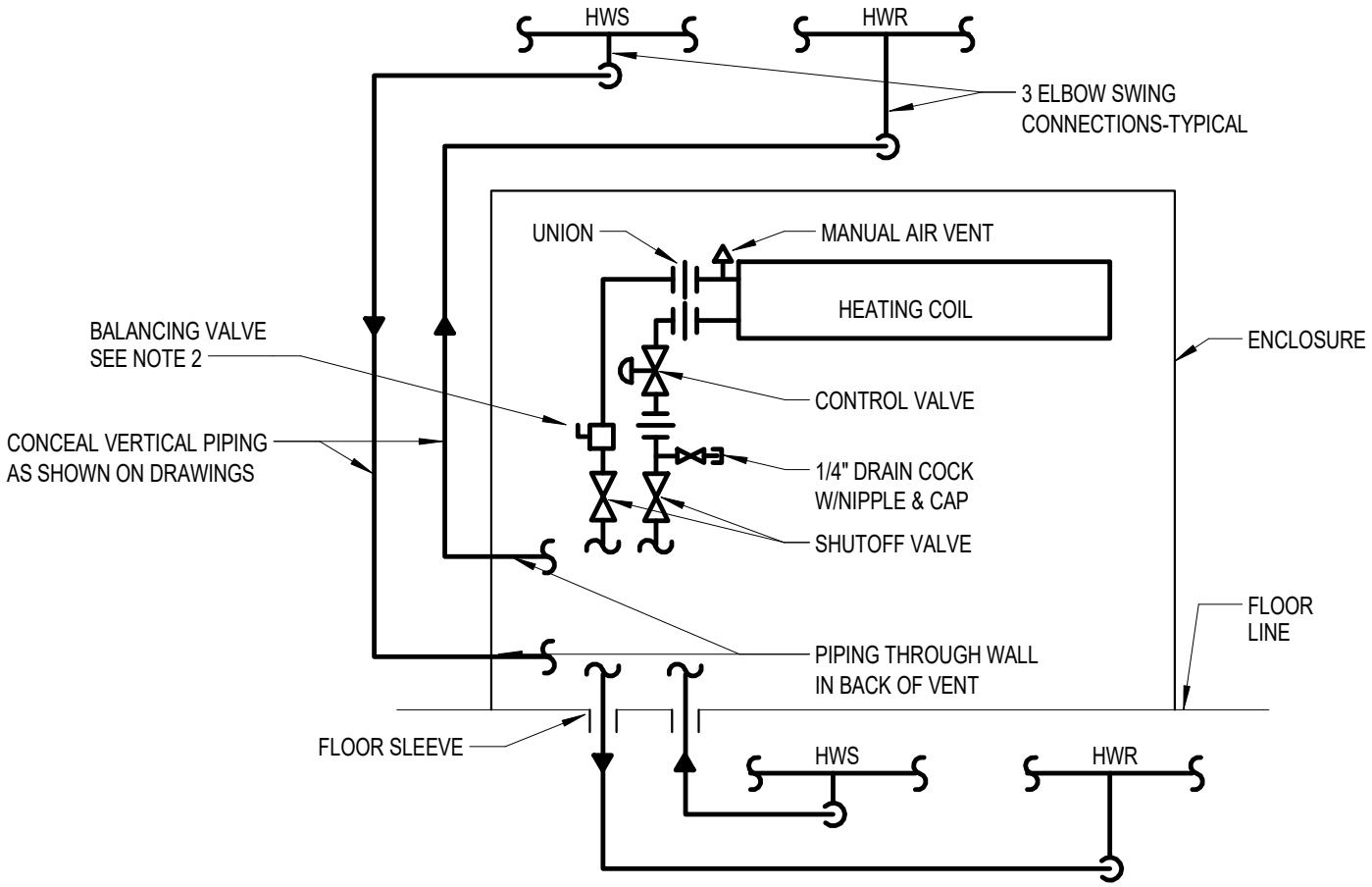
DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-22

NOTES:

1. VERTICAL UNIT SHOWN. HORIZONTAL UNIT SIMILAR, EXCEPT VALVES OUTSIDE OF ENCLOSURE WHERE LOCATED IN CEILING SPACE OR WHERE PIPING IS EXPOSED.
2. ALL BRANCH PIPING 3/4" UNLESS OTHERWISE NOTED ON DRAWINGS. PROVIDE FULL LINE SIZE RADIATOR VALVE. PROVIDE 1/2" BALANCING VALVE WHERE FLOW RATE IS 1.3 GPM OR LESS AND FULL LINE SIZE BALANCING VALVE WHERE FLOW RATE IS GREATER. OMIT BALANCING VALVE WHERE PRESSURE-INDEPENDENT CONTROL VALVE IS UTILIZED.



1 HOT WATER CABINET UNIT HEATER PIPING

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
HOT WATER CABINET UNIT HEATER PIPING

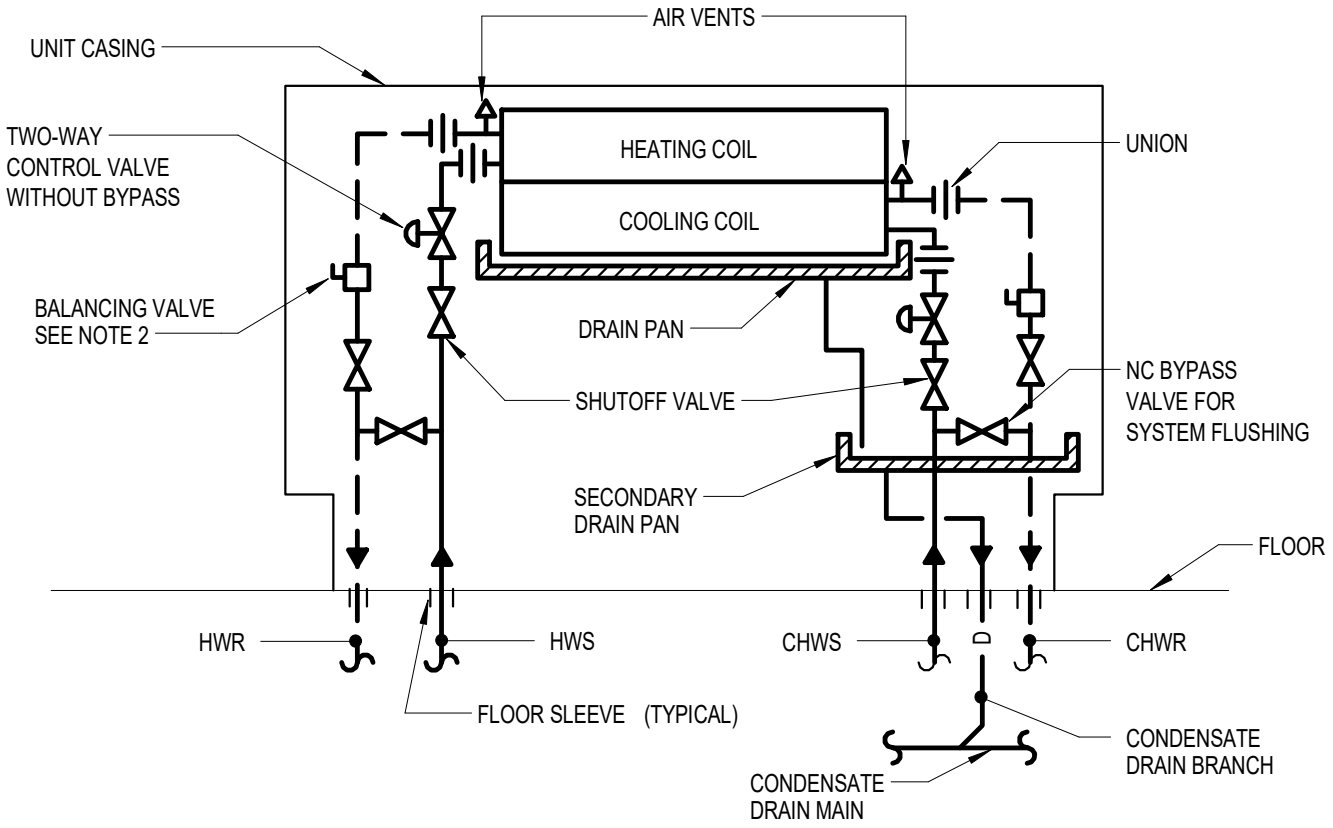
DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-23

NOTES:

1. ALL CONNECTIONS ON SAME END [NOT] ACCEPTABLE.
2. ALL BRANCH PIPING 3/4" UNLESS OTHERWISE NOTED ON DRAWINGS. PROVIDE FULL LINE SIZE RADIATOR VALVE. PROVIDE 1/2" BALANCING VALVE WHERE FLOW RATE IS 1.3 GPM OR LESS AND FULL LINE SIZE BALANCING VALVE WHERE FLOW RATE IS GREATER. OMIT BALANCING VALVE WHERE PRESSURE-INDEPENDENT CONTROL VALVE IS UTILIZED.
3. MAKE WATER CONNECTIONS TO DISTRIBUTION MAINS USING 3-ELBOW SWING JOINT TYPE CONNECTIONS.



1 FOUR PIPE FAN COIL UNIT PIPING WITH TWO-WAY VALVES (WITH SYSTEM FLUSHING VALVES)

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

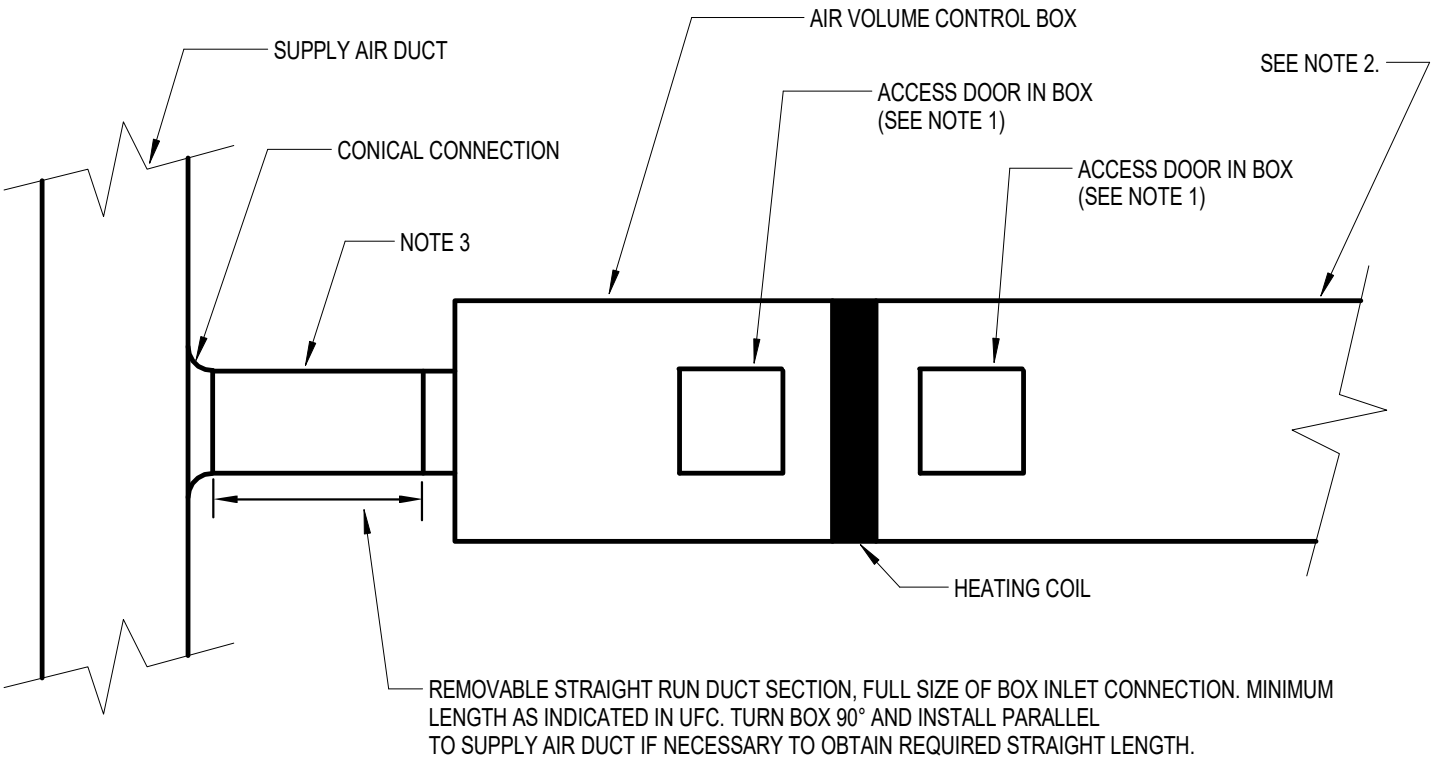
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
FOUR PIPE FAN COIL UNIT PIPING WITH TWO-WAY VALVES (WITH SYSTEM FLUSHING VALVES)

DWG. DATE 09/25/2020

REV. DATE

DRAWING NO. M-24



NOTES:
1. IF BOX DOES NOT HAVE EITHER REMOVABLE BOX CASING PANEL OR ACCESS DOOR UPSTREAM OF HEATING COIL, REMOVE COIL AND REINSTALL IN DOWNSTREAM DUCTWORK WITH REQUIRED ACCESS DOORS. REFER TO DUCT MOUNTED REHEAT COIL INSTALLATION DETAIL.
2. BOX LOCATIONS/ARRANGEMENTS ON PLAN ARE SHOWN DIAGRAMMATICALLY. PROVIDE MINIMUM OF ONE 90° ELBOW IN DISTRIBUTION DUCT BEFORE FIRST BRANCH DIFFUSER CONNECTION.
3. IF ELBOW IS PROVIDED BETWEEN SUPPLY MAIN AND BOX, OR LENGTH OF DUCT EXCEEDS 10 FT., INCREASE INLET DUCT BY 2 INCH IN DIAMETER.

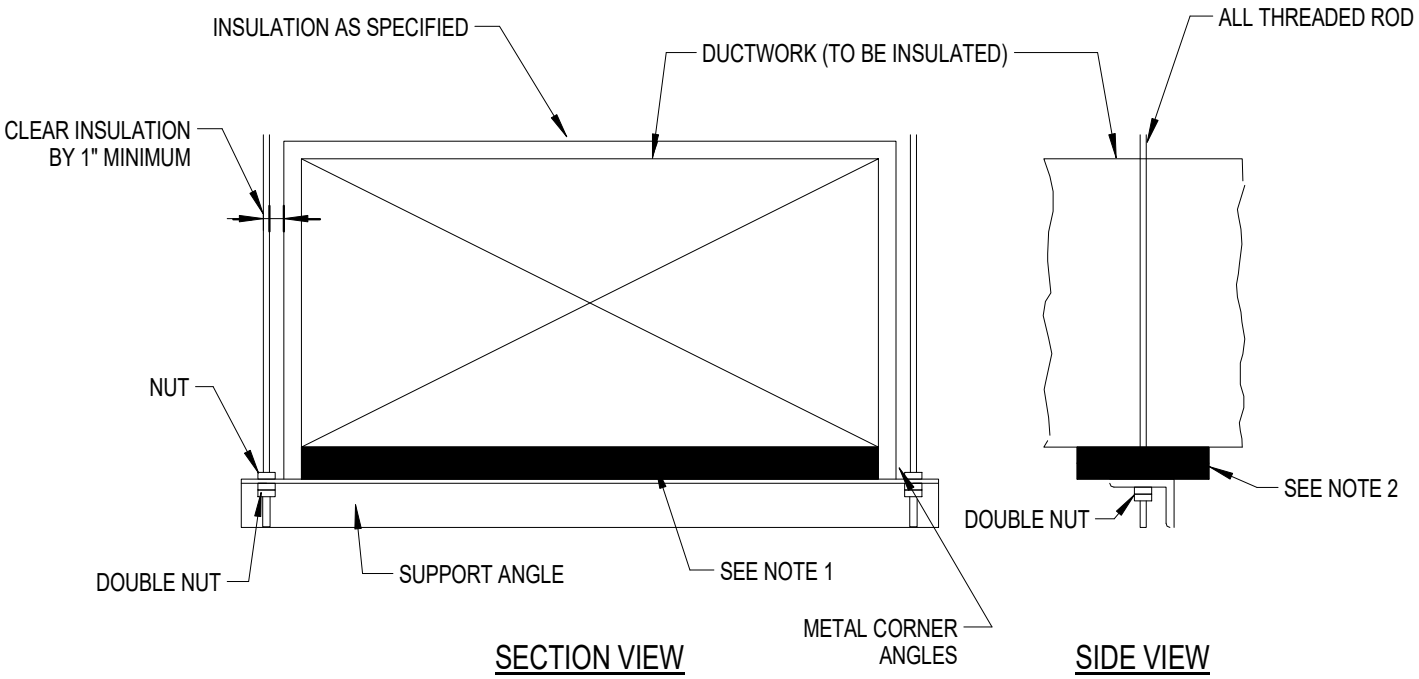
1 SUPPLY AIR VOLUME CONTROL BOX (WITH HEATING COIL)
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
SUPPLY AIR VOLUME CONTROL BOX
(WITH HEATING COIL)

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-25



NOTES:

1. DOUBLE LAYER OF RIGID INSULATION TO BE PLACED BETWEEN CONDITIONED DUCTWORK AND SUPPORT ANGLE.
2. PROVIDE INSULATION 12" LONG MINIMUM, FULL WIDTH OF DUCT BETWEEN SUPPORTS FOR ALL DUCTWORK SPECIFIED AS BEING INSULATED (SUPPLY, EXHAUST, RETURN AND OUTSIDE AIR).
3. USE ALUMINUM JOINT TAPE TO SEAL ALL SEAMS AND REINFORCE BOTTOM CORNERS OF INSULATION
4. INSTALLATION SHALL FORM A CONTINUOUS VAPOR BARRIER
5. HANGERS SHALL BE SIZED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS, CHAPTER 5.

1 INSULATED DUCT HANGER DETAIL

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

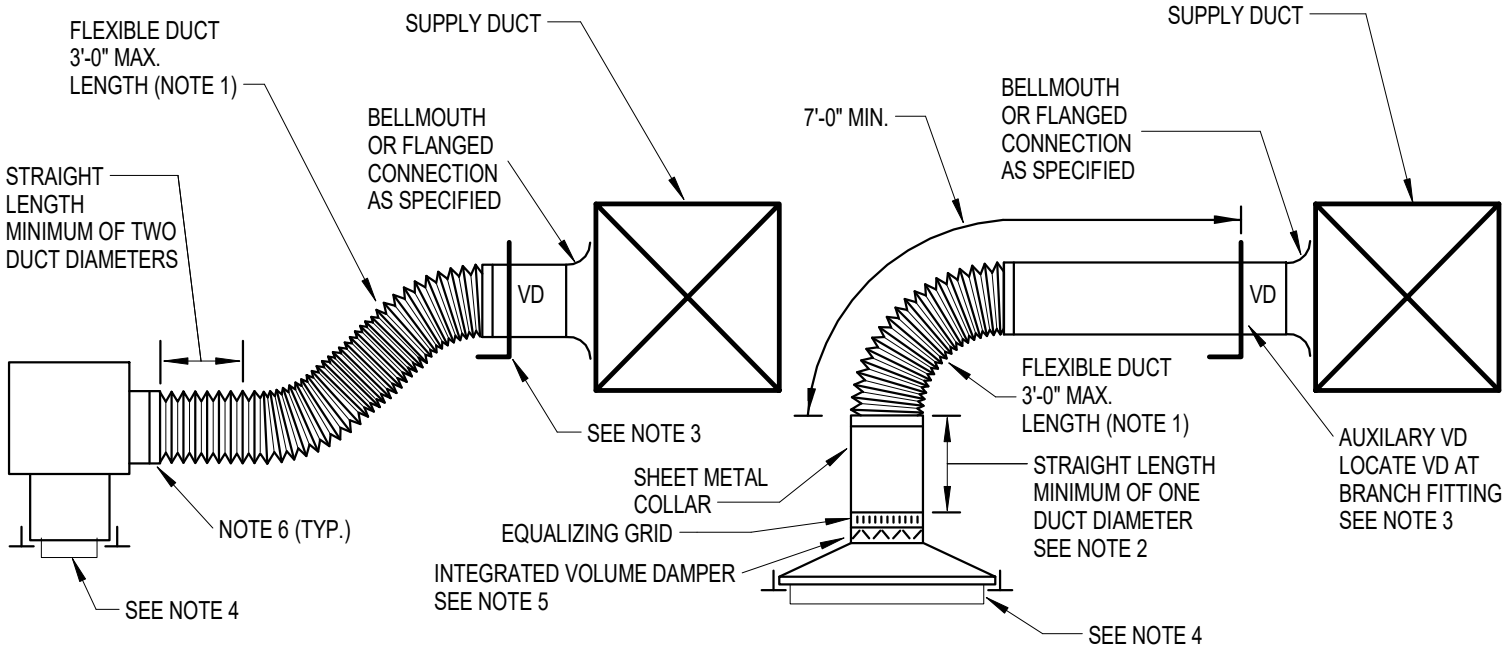
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: INSULATED DUCT HANGER DETAIL

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-26



LINEAR SLOT DIFFUSER

CEILING DIFFUSER

NOTES:
1. FLEXIBLE DUCT SHALL BE SUPPORTED FROM STRUCTURE ABOVE TO PREVENT KINKING AND SAGGING. MAXIMUM ALLOWABLE LENGTH TO BE APPROVED BY DPW.
2. MAY BE REDUCED ONLY WHEN REQUIRED BY SPACE LIMITATION. PROVIDE SHEET METAL TRANSITION AS REQUIRED BETWEEN FLEXIBLE DUCT AND SHEET METAL COLLAR IF DIFFUSER DOES NOT HAVE ROUND CONNECTION.
3. PROVIDE CONCEALED CEILING DAMPER REGULATOR WHERE VD IS LOCATED ABOVE INACCESSIBLE CEILING.
4. PROVIDE BORDER STYLE AND DIFFUSER FACE COMPATABLE WITH CEILING SYSTEM.
5. OMIT INTEGRAL VOLUME DAMPER WHERE SPECIFIED.
6. ATTACH FLEXIBLE DUCT TO DIFFUSER AND BRANCH DUCT WITH SCREW WORM GEAR BAND CLAMP. PLASTIC TIE STRAPS NOT ACCEPTABLE.

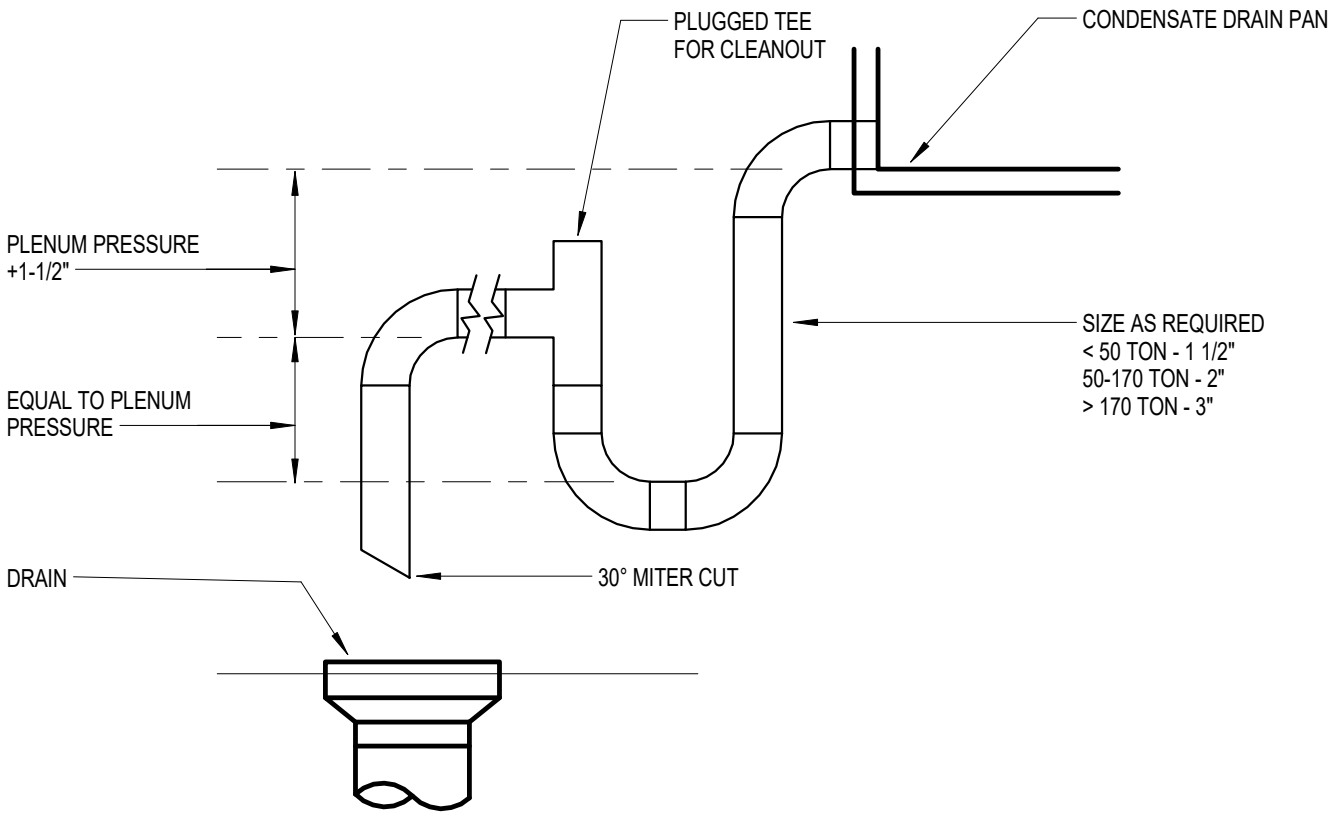
1 DIFFUSER INSTALLATION
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
DIFFUSER INSTALLATION

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-27



NOTE:
1. PROVIDE SUPPORT FRAME OR LEGS FOR FLOOR MOUNTED UNIT TO ALLOW TRAP INSTALLATION, PIPE TO DRAIN.
2. PLENUM PRESSURE AT COOLING COIL DRAIN. AHU MANUFACTURER SHALL CONFIRM MINIMUM PLENUM PRESSURE BASED ON UNIT INTERNAL STATIC PRESSURE PROFILE

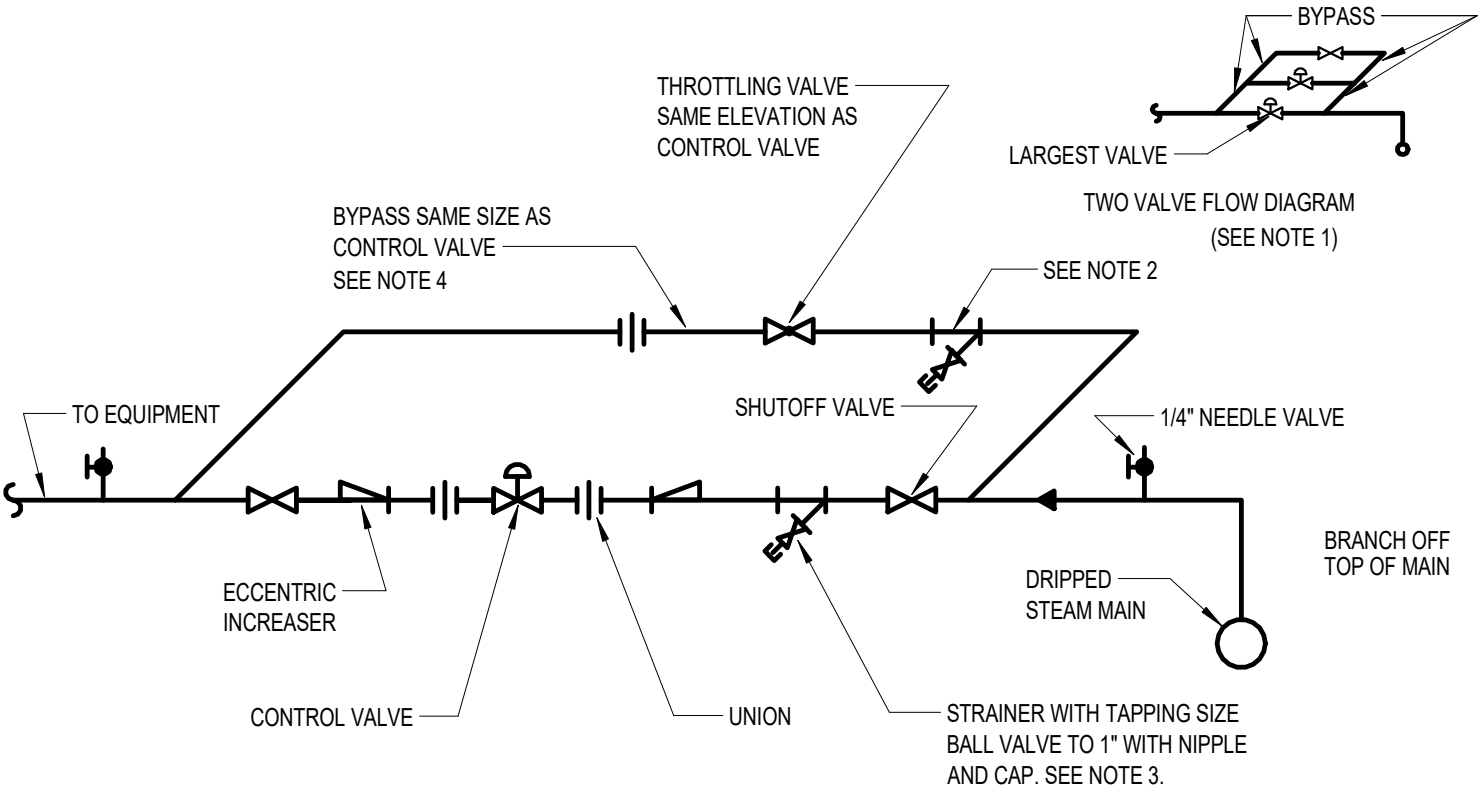
1 DRAW-THRU UNIT DRAIN PAN PIPING
SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

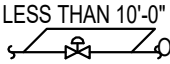
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
DRAW-THRU UNIT DRAIN PAN PIPING

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-28



NOTES:

1. WHERE TWO CONTROL VALVES ARE SHOWN, SPECIFIED OR REQUIRED, INSTALL BOTH AT SAME ELEVATION PIPED AS SHOWN FOR SINGLE VALVE WITH COMMON BYPASS FOR BOTH VALVES (SEE DIAGRAM ABOVE). MAKE BYPASS ONE PIPE SIZE LARGER THAN LARGER CONTROL VALVE.
2. STRAINER IN BYPASS REQUIRED FOR INNER STEAM DISTRIBUTING TUBE COIL ONLY. TURN STRAINER ON ITS SIDE.
3. PROVIDE STRAINER WITH 3/4" NORMALLY OPEN VALVE AND STEAM TRAP PIPED TO CONDENSATE RETURN WHERE HORIZONTAL DISTANCE BETWEEN STRAINER AND STEAM MAIN IS GREATER THAN 10'-0". WHERE DISTANCE IS LESS THAN 10'-0" TURN STRAINER ON ITS SIDE TO AVOID COLLECTING CONDENSATE IN STRAINER.
4. THE SYMBOL  ON DRAWINGS OR DETAILS INDICATES CONTROL VALVE TO BE INSTALLED AS SHOWN ON THIS DETAIL.

1 STEAM CONTROL VALVE ASSEMBLY

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

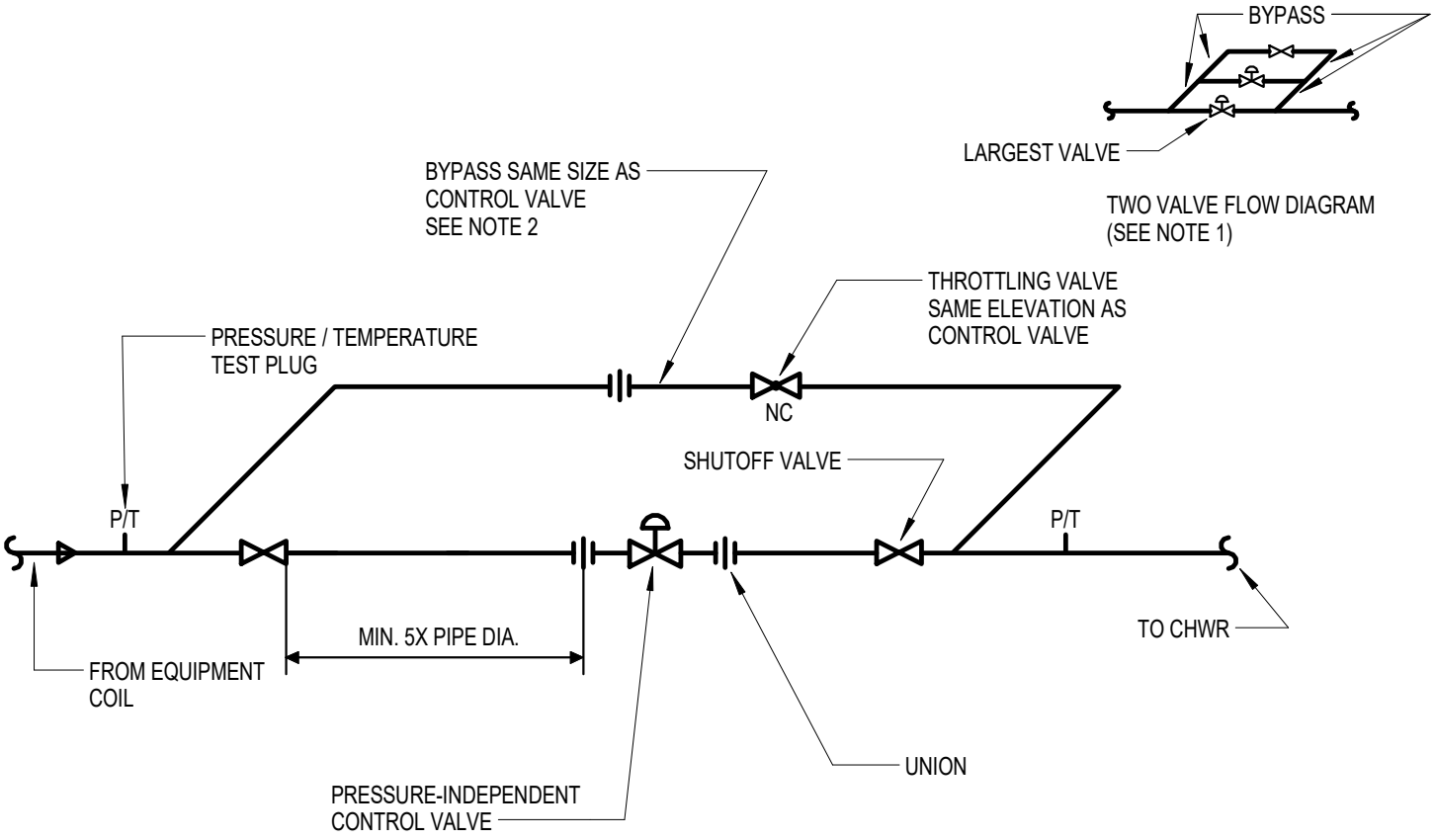
PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: STEAM CONTROL VALVE ASSEMBLY

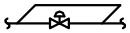
DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-29



NOTE:

1. WHERE TWO CONTROL VALVES ARE SHOWN, SPECIFIED OR REQUIRED, INSTALL BOTH AT SAME ELEVATION PIPED AS SHOWN FOR SINGLE VALVE WITH COMMON BYPASS FOR BOTH VALVES (SEE DIAGRAM ABOVE). MAKE BYPASS ONE PIPE SIZE LARGER THAN LARGER CONTROL VALVE.
2. THE SYMBOL  ON DRAWINGS OR DETAILS INDICATES CONTROL VALVE TO BE INSTALLED AS SHOWN ON THIS DETAIL.

1 TWO-WAY WATER CONTROL VALVE ASSEMBLY

SCALE: NTS

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT: EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE: TWO WAY WATER CONTROL VALVE ASSEMBLY

DWG. DATE: 09/25/2020

REV. DATE:

DRAWING NO.: M-30

RESERVED for future CSI or UFGS Division Development

DIVISION 24

DIVISION 25 – BUILDING AUTOMATION PLANNING STANDARDS

Division 25 – BUILDING AUTOMATION PLANNING STANDARDS

25.1 Introduction

1. These Engineering Planning Standards define requirements that are specific to the United States Army Garrison (USAG) West Point. These standards build upon the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this design standard. Codes, Regulations and other Standards Specific to West Point
2. Relevant sections of the Unified Facilities Criteria (UFC)
3. ASHRAE Handbook – Fundamentals; Fundamentals of Control Chapter
4. ASHRAE Guideline 36, High Performance Sequences of Operation for HVAC Systems
5. Standard Control Diagrams – Section 25.7. Standard control diagrams are provided for reference only. Designer of Record (DOR) is responsible for reviewing control diagrams and revising as necessary to meet the needs of the specific project. DOR shall submit proposed standard control diagram revisions for DPW review and approved.

25.2 HVAC Design Parameters

1. The Building Management System (BMS) shall be designed by a licensed Professional Engineer, employed by the design firm, with experience in automation system and network design. Use of control vendors to complete BMS design is not permitted. BMS designs shall be included at all major design review milestones. The design shall include control diagrams, point lists, sequences of operation, technical specifications and all other requirements defined in the UFC and UFGS.
2. The DOR shall be responsible for reviewing the construction contractor's proposed programming for compliance with the design and all sequences shall be functionally tested as part of the commissioning process.
3. The main Building Management System (BMS) servers are in Building 2101. The monitoring of the BMS is done from Building 667. These locations must be surveyed as a part of the design process to confirm interface requirements.
4. The BMS shall be based on the LonWorks open protocol, which includes software capability with scheduling, local and remote-control adjustment, load shedding, event management, monitoring, trending, logging, maintenance and notification alarms.
5. The BMS shall be a Lon-based Direct Digital Control (DDC) system and shall be compatible with the existing Honeywell Niagara Energy Management and Control System (EMCS). The current version of Niagara used on the campus shall be confirmed during the design phase. A Niagara Framework Supervisory Gateway (Java Application Control Engine JACE) interface shall be indicated for interface to the campus EMCS.
6. All provided equipment shall utilize the most recent version of firmware that is planned for release at the time of project installation. The only exception permitted is where integration to legacy systems cannot be accommodated by newer versions of equipment.
7. The project Specifications shall indicate that the Division 25 construction contractor will also act as the system integrator as part of their services. Use of third-party integrators is not acceptable. The integration shall comply with all requirements as listed in the most recent version of the UFC and UFGS.
8. The BMS is operated by a third-party control vendor contracted to USMA West Point. Assignment of the vendor is dependent on the project type and location. It is the

designer's responsibility to confirm which third party vendor will operate the system and to coordinate all requirements with that vendor. All designs shall clearly delineate the line of demarcation between the Division 25 construction contractor's work and West Point's vendor's work.

9. The DOR shall contact DPW's appointed review personnel and explain the scope of work. The DPW's appointed review personnel shall review the design and comment. The project designer shall revise the controls design as necessary to respond to the comments.
10. The construction contract documents shall include provisions for software and licenses associated with the BMS. The quantity of licenses shall be confirmed with DPW.

25.3 Installation Requirements to be Included in Project Drawings and Specifications

1. The HVAC control system panels shall be installed with a minimum clearance of 36" to provide a proper work area for technicians to service, diagnose, calibrate, remove, repair or replace any of the control system devices. Clearances shall be clearly noted on the design drawings.
2. The control system interface panels shall be located in the space provided as not to interfere with the clearance requirements of other mechanical and/or electrical equipment/systems located in the same space.
3. Display panels shall be located in each mechanical room and the maintenance office. These panels shall provide SNVT inputs for display and outputs for adjusting SNVT values.
4. All enclosures and DDC hardware shall be permanently labeled with phenolic tags. Coordinate naming convention with DPW.
5. Temperature sensors shall be installed on an interior wall, away from direct sunlight, windows, doors, drafts, sources of heat (i.e. vending machines, microwaves, computers, printers, etc.), large furniture, office partitions or any other obstructions that would block or cover the sensor or affect the sensor's ability to accurately control space temperature.
6. All BMS installations shall be included in the overall building commissioning effort. The commissioning agent shall verify functionality as specified in the UFGS. Additionally, the commissioning agent shall verify mapping of all sensors to the appropriate control device and comment on the installation location of all sensors with respect to the sensor's ability to properly operate.

25.4 Sensors, Valves and Instrumentation Requirements and Specifications

1. Wall-mounted DDC temperature sensors shall be located in each zone that requires temperature control. Sensors shall have exposed set point adjustment with BMS limiting and digital display in non-public areas. Sensors located in public spaces shall have a blank face with no set point adjustment controls (remote adjustment only).
2. Any spaces subject to surface condensation, and all TR and TER rooms shall be provided with humidity sensors that allow for dew point temperature reporting.
3. Motion sensors shall not be utilized to set back temperatures or de-energize HVAC systems in sleeping areas.
4. All hydronic flow meters shall be a full bore, magnetic type with integral electronics module. Meters shall be NIST traceable with an accuracy of +/- 0.2% of design flow over 1.6 to 33 feet per second flow range. Where used for energy metering, provide a thermal energy measurement system with paired temperature sensors and flow computer with BMS interface.

5. Humidity sensors shall have a measurement range of 0-100%, non-condensing with an accuracy of +/- 2% over a range of 0-90% relative humidity.
6. Pressure sensors and transmitters shall be selected for the specific application in which they are used. Low range differential pressure transmitters shall only be used for filter monitoring purposes. All other applications shall utilize either midrange or high range differential pressure transmitters, selected so that normal operating pressure falls at the mid-point of the rated sensor scale.
7. Air flow measuring stations shall utilize a thermal dispersion technology utilizing thermistor probes to determine airflow and temperature. The manufacturer's paired transmitter shall be utilized and shall communicate to the BMS with an analog (0-10 VDC or 4-20 mA) signal. The combined sensor and transmitter shall have a measurement accuracy of +/- 3% over an airflow range of 0-5,000 feet per minute and a temperature range of -20°F to +160°F.
8. Motor status sensing shall be accomplished through split-core type current sensors for motors ¾ hp and smaller. Current transmitters capable of recording actual current shall be utilized for motors 1 hp and larger. All current sensors/transmitters shall be capable of sensing belt breakage or coupling shear. When utilized on variable speed motors, the sensor/transmitter shall be specifically designed for variable speed applications.
9. Hydronic control valves shall be pressure-independent type designed to maintain required flow regardless of pressure variation in the system. Valves shall be equipped with heavy-duty actuators, stainless steel trim, and with proper close-off rating for each individual application. Minimum close-off rating generally be considered at dead head rating of the pump. All valves shall be fully modulating unless noted otherwise.

25.5 System Functionality

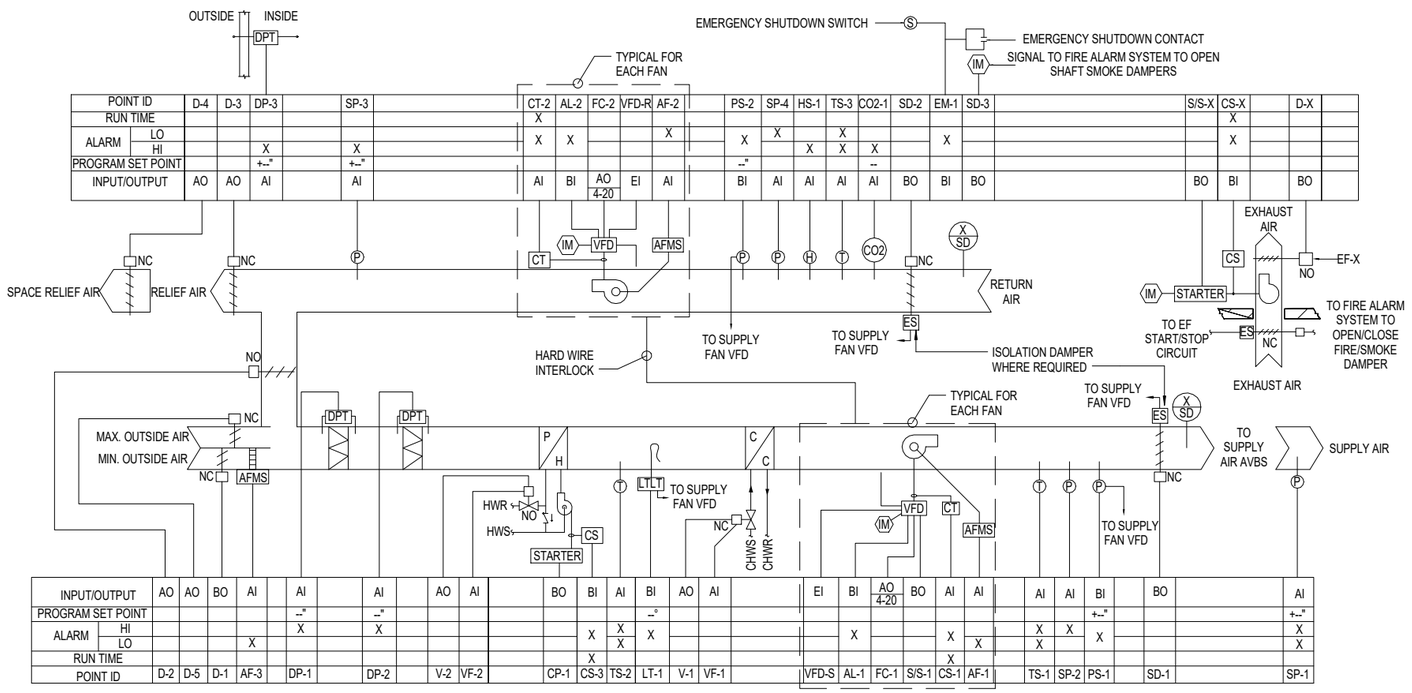
1. All new systems and equipment shall be controlled and monitored by the BMS and be integrated to the EMCS. Any exceptions taken to this approach must be reviewed with DPW at the milestone review.
2. Where electronic interfaces are available on equipment, they shall be included and integrated into the BMS for monitoring purposes only. Requirements for mapping of available software points shall be included in the project Specifications and coordinated with DPW. All variable speed drives, chillers and packaged equipment shall include electronic interfaces. Provide required communication protocol to interface with the electronic interface.
3. Critical control shall be provided through hard-wired points to provide control in the event of an interface card failure. Critical control includes start/stop, general alarm and primary control input (temperature, pressure, flow, etc.).
4. For projects with existing control systems or devices that are intended to remain, the extent of control upgrades shall be reviewed with DPW at the beginning of the project.
5. Graphics shall be provided for each system that is controlled or monitored. All new graphic screens shall match the existing screens in format. All graphics shall be submitted, reviewed and approved by DPW prior to final programming.
6. All control points shall have trending capability in the BMS. Trends shall be set up for all critical parameters and elsewhere as directed by DPW. System shall include network access capabilities for real time monitoring and access. All trends shall be archived on the server for past issue investigation and resolution.
7. Alarms shall be annunciated through the operator workstation and via email and text message. The system shall provide a minimum of three alarm levels: low priority, high priority and critical. The reporting mode, including format and list of recipients, for each alarm level shall be reviewed with DPW prior to final programming.

8. Provisions for central load shedding shall be provided within the BMS design. These commands shall be manually initiated with a resettable time clock to revert to automatic conditions after a programmable time delay. Global commands shall control the following, at a minimum:
    a. Universal space temperature raise/lower
    b. Universal supply air temperature raise/lower
    c. Universal supply water temperature raise/lower
    d. Supply air pressure set point raise/lower
    e. Hydronic system differential pressure set point raise/lower

9. Lighting will be controlled through a separate lighting control system. Lighting control systems shall not be integrated to the BMS.
10. Indicate carbon dioxide sensing in all densely occupied spaces, defined as those spaces having a default occupancy of 50 people per 1,000 square feet or more. Include control sequences to reduce ventilation levels when spaces are unoccupied or when carbon dioxide levels are below an acceptable threshold. Provide software override capability of reset controls at the operator workstation.
11. All operable windows shall be shown with magnetic contact switches to indicate window position. When windows are open, associated zone HVAC shall be disabled unless space temperature rises above 85°F or falls below 55°F at which point the zone HVAC system shall be energized and an alarm shall be annunciated to the BMS.
12. Indicate a flow switch and BMS alarm on each eye wash station and emergency shower. Provide temporary disable function in the BMS to avoid nuisance alarms during testing.
13. Indicate a pulse type, totalizing flow meter on the make-up water connection to each closed loop system to alarm upon excessive make-up water flow. The meter shall be located downstream of the system's initial fill valve to prevent nuisance alarms.
14. Energy metering shall be indicated at the building level to meet the requirements of EPACT. This includes metering of electricity, water and campus utilities (steam, chilled water, hot water). Sub-metering shall be provided to meet the LEED Advanced Energy Metering credit. At a minimum, the following systems shall be sub-metered:
    a. Lighting
    b. Plug Loads
    c. Pumps
    d. Fans
    e. Central Heating/Cooling Equipment
    f. Elevators

25.6 Standard Detail Index

1. M-801 – Typical AHU Control Diagram
2. M-802 – Typical Cabinet Unit Heater Control Diagram
3. M-803 – Typical FCU Control Diagram
4. M-804 – Typical Split System Heat Pump Control Diagram
5. M-805 – Typical Steam to Hot Water Heat Exchanger Control Diagram
6. M-806 – Typical VAV Box Control Diagram



Sequence of Operation

1. General
a. Unit has [supply and return air smoke dampers,] a hot water preheat coil with blend pump, chilled water cooling coil, supply air fan array with variable frequency drives, and a return air fan array with variable frequency drives.
b. Preheat pump shall be energized whenever outside air temperature falls below 35°F (reprogrammable).
c. BAS shall control unit occupancy status based upon an individual 365 day / 24 hr reprogrammable time of day schedule. Provide VAVs with an unoccupied mode override pushbutton as scheduled that shall index the associated air handling unit to occupied mode for 2 hours (reprogrammable).
2. Startup and Fan Shutdown
a. When unit is indexed to start, BAS through DDC controller shall [open supply and return air smoke isolation dampers (SD-1 and SD-2) and] signal the fire alarm interface IM (SD-3) to open all associated combination fire/smoke dampers in duct smoke barrier partitions. When all fire/smoke damper end switches interlocked in fan safety circuit indicate dampers are open, fans shall be energized. Interlocked exhaust fans shall be energized.
b. Whenever fan is de-energized, [supply and return air smoke isolation dampers close and] the fire alarm system shall close all associated combination fire/smoke dampers in duct smoke barrier partitions, outside air dampers close, relief air dampers close, cooling coil valve closes, preheat coil pump and heating valve remain under control. Interlocked exhaust fans are de-energized.
c. Provide slow opening signal to (maximum) outside air damper to prevent nuisance shutdowns.
d. There shall be a time delay to allow for fan spin down before closing unit [smoke isolation] dampers.
3. Warm up/Cool down Cycle: Cycle shall be initiated prior to occupancy in order to warm up/cool down building by occupied time. Supply fan shall operate according to occupied mode pressure control sequences except airflow shall be limited to return fan maximum. Return fan VFD shall be controlled to maintain return airflow equal to supply airflow. Outside air and relief dampers shall remain closed and return air damper shall be open, unless outdoor air conditions allow for economizer operation. Interlocked exhaust fans shall be de-energized. Supply air temperature controls shall operate in accordance with occupied mode control sequences during warm up/cool down. Preheat coil shall remain under normal control. Outside air temperature and building temperatures shall be measured in order to determine warm up/cool down time.
4. Occupied Mode
a. A signal from the BAS through the DDC controller shall index the system to occupied mode.
b. Minimum outside air damper (D-1) shall open.
c. Temperature
1) A supply air sensor (TS-1), through DDC controller shall, on a rise in temperature above set point first modulate the preheat coil valve closed and stop the preheat coil pump, then modulate the maximum outdoor air damper (D-5) open and return air damper closed, and finally modulate the cooling coil valve to maintain supply air temperature set point. System shall go to minimum outside air when outside air temperature is above --°F (reprogrammable).
2) A preheat coil discharge air temperature sensor (TS-2), through DDC controller shall, on a drop in supply air temperature below set point, first close the maxiumum outside air damper and then start the preheat coil pump and modulate open the preheat coil valve.
3) Supply Air Temperature Reset: If the unit cooling coil valve is modulated to any open position and all boxes are at their minimum settings or calling for reheat, reset the supply air temperature set point upward to the warmest supply air temperature set point that satisfies all zone cooling requirements. Continue to reset the supply air temperature upwards, to a maximum of --°F, until the position of the worst case box is 90% open. Upon a rise in return air humidity above set point of --% (reprogrammable), DDC controller shall reset supply air temperature to design set point until return air humidity drops below --% (reprogrammable).
4) Reheat Unavailable: Provide a graphic interface at the Operator Workstation to manually place the system into a "Reheat Unavailable" mode. In this mode, the supply air temperature shall be set based on the average of the AVB box deviation from set point. Upon a rise in return air humidity above set point of --% (reprogrammable), DDC controller shall reset supply air temperature to design set point until return air humidity drops below --% (reprogrammable).
d. Pressure
1) A static pressure sensor in the return fan discharge plenum (SP-3) shall modulate open the relief air damper to maintain its setting. The DDC controller shall modulate the space relief damper (D-4) to maintain pressure differential set point of +-- in. w.g. (reprogrammable) relative to the outside based on input from the wall-mounted space pressure sensor (DP-3).
2) A static pressure sensor located 2/3 down the supply duct (SP-1) shall, through the DDC controller, modulate the supply fan variable frequency drives to maintain duct static pressure of - inch (reprogrammable). A discharge high limit static pressure sensor (SP-2) shall override supply duct static control and prevent over pressuring of the system. Variable frequency drive shall be enabled and status monitored through the BAS.
3) Static Pressure Reset: The BAS shall monitor the damper position of all boxes in the system to determine the amount of supply static pressure reduction necessary to cause the most open box damper in the system to open more than the minimum value (60%) but not more than the maximum value (90% or negligible static pressure drop) and reset the static pressure set point accordingly. The BAS shall continually monitor the damper position of all boxes in the system whenever the unit operates. The BAS shall ensure that the supply static pressure is sufficient to supply the required airflow at the worst case box, but not more than necessary so the boxes do not operate with a pressure drop greater than required to maintain the airflow set point of each individual box. As the unit operates, if the most open box damper opens more than 90%, the BAS shall recalculate the pressure reduction and the amount of reset is reduced. If the most open damper closes to less than 60%, the BAS recalculates the pressure reduction and the amount of reset is increased
4) Supply air and return air flows shall be measured through a totalizing calculation based on each fan's flow measuring station and return fan variable frequency drive shall be controlled to maintain constant cfm differential. Set point shall be adequate to maintain the building under a positive pressure with all exhaust fans operating.
5. Unoccupied Mode
a. Air volume control boxes (AVBs) shall remain under control.
b. Unit shall be indexed to start upon a call for cooling or heating only.
c. Fans shall be de-energized, outside air dampers shall close, [unit smoke isolation dampers shall close,] associated combination fire/smoke dampers in duct smoke barrier partitions shall close through fire alarm interface IM, cooling coil valve shall close, and preheat coil pump and valve shall remain under control of preheat coil low limit discharge controller.
d. System shall operate in according to warm up/cool down mode whenever any space sensor indicates a rise in temperature above the unoccupied cooling set point (--° F reprogrammable) or a drop in any space temperature below the unoccupied heating set point (--° F reprogrammable).
6. Safety Controls
a. Smoke detectors in supply and return air ducts shall through interface modules de-energize fans.
b. Low temperature limit thermostat (LT-1) shall de-energize fans and indicate an alarm at the Operator Workstation.
d. Return fan intake pressure switch (PS-2) and supply fan discharge pressure switch (PS-1) shall be wired into fan safety circuit and de-energize fans upon duct static pressure reaching duct pressure class rating and an alarm shall be indicated at the Operator Workstation.
e. Provide and monitor differential pressure sensor across each filter bank (DP-1 and DP-2) and indicate an alarm at the Operator Workstation for filter change.
f. When current switches indicate a fan failure or heating coil in-line pump failure an alarm shall be indicated at the Operator Workstation.
g. Preheat coil pump shall be energized whenever outside air temperature falls below --°F or upon a call for heating.
h. Provide a wall-mounted shutdown switch (EM-1) where indicated to automatically shutdown the unit and close all associated outside air, relief air, and exhaust air dampers.
i. Provide an airflow measuring station (AF-3) in the minimum outside air ductwork to monitor airflow and send an alarm if airflow varies more than 10% from design value. AF-3 shall be disabled during economizer operation.

DDC SYSTEM POINT LIST

MECHANICAL POINT DESCRIPTION	POINT ID	ANALOG INPUT: GRAPHIC	TEMPERATURE	PRESSURE	HUMIDITY	KW	GPM	CFM	PPM	POSITION	CURRENT	ANALOG OUTPUT: DDC CONTROL	DRIVE CONTROL	BINARY INPUT: STATUS	FILTER ALARM	BINARY OUTPUT: OFF / ON	SYSTEM FEATURES ALARMS: HIGH	LOW	BINARY	PROGRAMS: TIME SCHEDULING	OPT. START / STOP	RESET	DDC	DDC PRIM INSTRUCT	MANUF. WK. ORD	RUN TIME	TREND LOG	GENERAL NOTES
AHU SYSTEM		X																		X							
SUPPLY FAN START/STOP	S/S-1															X				X							
SUPPLY FAN STATUS	CT-1										X						X							X		X	TYP. EACH
SUPPLY FAN DRIVE ALARM	AL-1													X			X							X			TYP. EACH
SUPPLY FAN SPEED SIGNAL	FC-1											X					X							X			TYP. EACH
SUPPLY SMOKE DAMPER	SD-1															X											
RETURN FAN STATUS	CT-2										X						X							X		X	TYP. EACH
RETURN FAN DRIVE ALARM	AL-2													X			X							X			TYP. EACH
RETURN FAN SPEED SIGNAL	FC-2											X					X							X			TYP. EACH
RETURN SMOKE DAMPER	SD-2															X											
SUPPLY FAN AIRFLOW	AF-1						X										X										TYP. EACH
RETURN FAN AIRFLOW	AF-2						X										X										TYP. EACH
MIN. OUTSIDE AIR DAMPER	D-1															X											
RETURN AIR DAMPER	D-2											X															
RELIEF AIR DAMPER	D-3											X															
SPACE RELIEF DAMPER	D-4											X															
MAX. OUTSIDE AIR DAMPER	D-5											X															
RETURN FAN DISCH. PRESS.	SP-3			X													X							X			
RETURN FAN INLET PRESS.	SP-4			X													X							X			
RETURN LOW LIMIT PRESS.	PS-2													X										X			
SUPPLY AIR STATIC PRESS.	SP-1			X													X							X			
SUPPLY FAN STATIC PRESS.	SP-2			X													X							X			
SUPPLY AIR TEMPERATURE	TS-1	X															X							X			
SUPPLY FAN HI LIMIT PRESS.	PS-1													X										X			
COOLING COIL VALVE	V-1											X															
CC VALVE FEEDBACK	VF-1										X																
PREHEAT DISCH. TEMP.	TS-2	X															X							X			
FREEZE PUMP START/STOP	CP-1															X											
FREEZE PUMP STATUS	CS-3													X											X	X	
PREHEAT COIL VALVE	V-2											X															
PH VALVE FEEDBACK	VF-2										X																
LOW LIMIT ALARM	LT-1													X											X		
OPEN SMOKE DAMPERS	SD-3															X											
EMERGENCY SHUTDOWN	EM-1													X											X		
RETURN AIR CO2	CO2-1										X																
RETURN AIR TEMPERATURE	TS-3	X															X							X			
RETURN AIR HUMIDITY	HS-1		X														X							X			
PENTHOUSE DIFF. PRESS.	DP-3			X													X							X			
OUTSIDE AIR FLOW	AF-3						X										X										
PRE-FILTER DIFF. PRESS.	DP-1			X													X							X			
FINAL FILTER DIFF. PRESS.	DP-2			X													X							X			
VFD FEEDBACK	VFD-S																										LON
VFD FEEDBACK	VFD-R																										LON
EXHAUST FAN SYSTEM		X																		X							
EXHAUST FAN STOP/START	S/S-X															X											
EXHAUST FAN STATUS	CT-X										X						X							X		X	
EXHAUST AIR DAMPER	D-X															X											

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

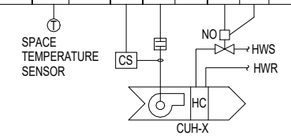
DRAWING TITLE
TYPICAL AHU CONTROL DIAGRAM

DWG. DATE
09/25/2020

REV. DATE

DRAWING NO.
M-801

POINT ID		TS-1		CS-1	S/S-1		V-1	VF-1
RUN TIME				X				
ALARM	LO	X		X				
	HI							
PROGRAM SET POINT		50°F						
INPUT/OUTPUT		AI		BI	BO		AO	AI



Sequence of Operation

1. Provide a DDC controller, a space temperature sensor, and heating coil valve as scheduled.
2. Fan shall be energized and run continuously when outside air temperature falls below 55°F. (reprogrammable). When outside air temperature is above 55°F, fan shall run only when heating is required to maintain space temperature set point. On a fall in temperature below space temperature set point of 50°F (reprogrammable), modulate heating coil valve to maintain set point.
3. Provide a current switch that shall monitor fan status and indicate an alarm for fan failure at the Operator Workstation.

DDC SYSTEM POINT LIST

MECHANICAL POINT DESCRIPTION	POINT ID	ANALOG INPUT: GRAPHIC	TEMPERATURE	PRESSURE	HUMIDITY	KW	GPM	CFM	PPM	POSITION	ANALOG OUTPUT: DDC CONTROL	DRIVE CONTROL	BINARY INPUT: STATUS	FILTER	ALARM	BINARY OUTPUT: OFF / ON	SYSTEM FEATURES ALARMS: HIGH	LOW	BINARY	PROGRAMS: TIME SCHEDULING	OPT. START / STOP	RESET	DDC	ALARM INSTRUCT	MAINT. WK. ORD.	RUN TIME	TREND LOG	GENERAL NOTES
CUH-X SYSTEM		X																									
SPACE TEMPERATURE	TS-1	X															X						X				
CUH-X START/STOP	S/S-1															X											
CUH-X STATUS	CS-1												X				X						X	X			
HEATING VALVE	V-1										X																
HEATING VALVE FEEDBACK	VF-1									X																	

UNITED STATES ARMY GARRISON
WEST POINT

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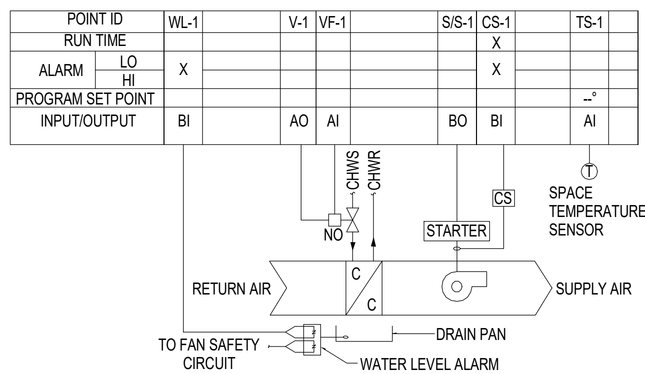
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
TYPICAL CABINET UNIT HEATER
CONTROL DIAGRAM

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-802



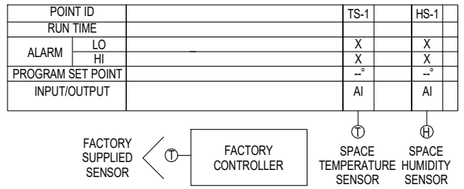
Sequence of Operation

1. Provide a DDC controller, a space temperature sensor, and cooling coil valve as scheduled. Modulate cooling coil valve to maintain setpoint (--°F, reprogrammable).
2. Fan shall be energized upon a call for cooling only.
3. Safety Controls:
a. Provide a current switch that shall monitor fan status and indicate an alarm for fan failure at the Operator Workstation.
b. Provide a water level sensor and locate in the cooling coil drain pan. If the water level rises above setpoint, de-energize the fan and indicate an alarm at the Operator Workstation.
c. Indicate an alarm at the Operator Workstation if space temperature rises above the temperature setpoint limit.

DDC SYSTEM POINT LIST

MECHANICAL POINT DESCRIPTION	POINT ID		ANALOG										BINARY				SYSTEM FEATURES											GENERAL NOTES
			INPUT								OUTPUT		INPUT			OUTPUT	ALARMS			PROGRAMS								
		GRAPHIC	TEMPERATURE	PRESSURE	HUMIDITY	KW	GPM	CFM	PPM	POSITION	DDC CONTROL	DRIVE CONTROL	STATUS	FILTER	ALARM	OFF / ON	HIGH	LOW	BINARY	TIME SCHEDULING	OPT. START / STOP	RESET	DDC	ALARM INSTRUCT	MAINT. WK. ORD.	RUN TIME	TREND/LDG	
FCU-X SYSTEM		X																										
SPACE TEMPERATURE	TS-1		X														X	X						X				
FCU-X START/STOP	S/S-1															X												
FAN STATUS	CS-1												X						X					X		X		
COOLING VALVE	V-1										X																	
WATER LEVEL ALARM	WL-1														X				X					X				
COOLING VALVE FEEDBACK	VF-1									X																		

UNITED STATES ARMY GARRISON WEST POINT	
PROJECT	EPS - STANDARD DETAILS DIVISION 23
DRAWING TITLE	TYPICAL FCU CONTROL DIAGRAM
DWG. DATE	09/25/2020
REV. DATE	
DRAWING NO.	M-803



DDC SYSTEM POINT LIST

MECHANICAL POINT DESCRIPTION	POINT ID	GRAPHIC	ANALOG INPUT: TEMPERATURE	PRESSURE	HUMIDITY	KW	GPM	CFM	PPM	POSITION	ANALOG OUTPUT: DDC CONTROL	DRIVE CONTROL	BINARY INPUT: STATUS	FILTER	ALARM	BINARY OUTPUT: OFF / ON	SYSTEM FEATURES ALARMS: HIGH	LOW	BINARY	PROGRAMS: TIME SCHEDULING	OPT. START / STOP	RESET	LOCK	ALARM INSTRUCT	MAINT. WK. ORD.	RUN TIME	TRENDLDG	GENERAL NOTES
SPLIT SYSTEM HEAT PUMP		X																									
ROOM TEMP.	TS-1		X														X							X		X	
ROOM HUMIDITY	HS-1				X												X							X		X	

Sequence of Operation

1. The ductless split [heat pump] unit (SS) has a factory-mounted controller that will control all aspects of the system operation including energizing/de-energizing the compressor, [operating the heat pump reversing valve,] and energizing auxiliary electric heat to maintain space temperature at set point. Unit will be supplied with a wall-mounted thermostat to be field installed by the control contractor.
2. The BAS shall monitor space temperature alarm the Operator Workstation upon a rise above or drop below set point plus dead band.

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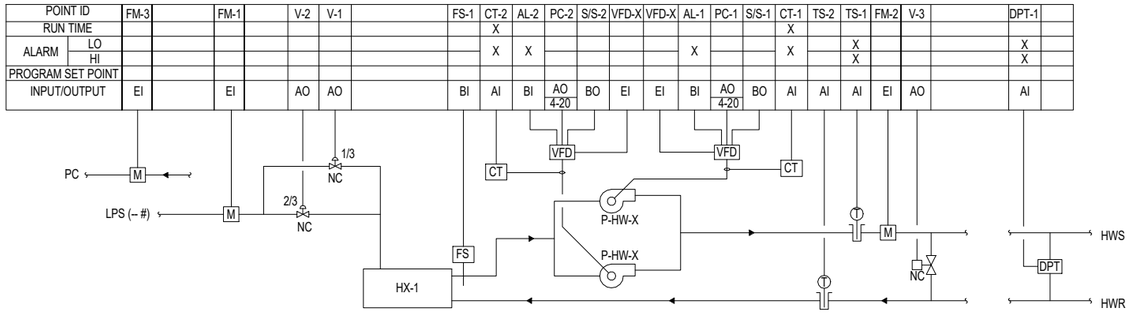
DRAWING TITLE
TYPICAL SPLIT SYSTEM (HEAT PUMP)
CONTROL DIAGRAM

DWG. DATE 09/25/2020
REV. DATE
DRAWING NO. M-804

POINT ID		FM-3		FM-1		V-2	V-1		FS-1	CT-2	AL-2	PC-2	S/S-2	VFD-X	VFD-X	AL-1	PC-1	S/S-1	CT-1	TS-2	TS-1	FM-2	V-3		DPT-1	
RUN TIME										X									X							
ALARM	LO									X	X					X			X		X				X	
	HI																				X				X	
PROGRAM SET POINT																										
INPUT/OUTPUT		EI		EI		AO	AO		BI	AI	BI	AO 4-20	BO	EI	EI	BI	AO 4-20	BO	AI	AI	AI	EI	AO		AI	



Sequence of Operation

1. General
a. Heating water system consists of a steam heat exchanger and variable volume pumping system. System shall operate continuously.
2. Pump Control
a. Pumps are arranged in a lead/spare arrangement.
b. The DDC system shall modulate lead pump's variable frequency drive to maintain secondary heating water system differential pressure at set point.
c. Upon failure of the lead pump, an alarm shall notify the DDC system and the spare pump shall be energized.
d. The lead and spare pump assignments shall be rotated in order to equalize all pumps' run times. Rotate assignments every -- hours (reprogrammable) of lead pump run time.
e. VFD Control
1) As differential pressure deviates from set point, system controller shall send the appropriate analog signal to the VFD to speed up or slow down the pump motor.
2) If set point cannot be satisfied by designated lead pump, or if lead pump should be required to operate beyond its end of curve point, system controller shall initiate a timed sequence of operation to stage on the spare pump.
3) Spare pump shall accelerate resulting in lead pump decelerating until both pumps equalize in speed.
4) Further change in system variable shall cause pumps to change speed together.
5) When the set point can be safely satisfied with fewer pumps, system controller shall, after an appropriate time delay, initiate a timed de-stage sequence and continue variable speed operation. De-stage point will be determined in the field by the balancing contractor as the point where the multiple speed pump curve falls completely below the single pump maximum speed curve.
6) In event of failure to receive the zone system variable signal, VFD shall maintain 100% speed, unless otherwise required for end of curve protection; reset shall be automatic upon correction of the failure.
7) The heating water differential bypass shall be modulated to maintain minimum pump flow as sensed by a differential pressure sensor located in the heating water supply and return piping.
3. Heating Water Loop Temperature Control
a. Modulate (--) normally closed steam valves [in sequence] after flow is established by the flow switch (FS-1) to maintain exchanger heating water discharge temperature at set point as determined by a reprogrammable reset schedule. Initial Reset Schedule shall be based upon supplying --°F at an outdoor temperature of --°F and ---°F at an outdoor temperature of --°F (reset shall be linear between these limits).
c. [Select steam valves for 1/3 and 2/3 of total capacity.] All steam valves shall close when the heating system is not enabled or upon a failure of all heating water pumps (as indicated by current sensor on each pump). DDC system shall enable pumping system whenever heat exchangers are enabled.
8) Provide an electronic interface to flow meter monitoring panel. Coordinate with Division 23 contractor for hot water, steam, and condensate monitoring. Provide all wiring required and DDC Panels required to connect to the network connections of the panel to monitor the following interface points at the BAS Operator Workstation:
a. Total Energy (BTU)
b. Energy Rate (BTU/HR)
c. Flow Rate (GALLONS/MINUTE or LB/HR)
d. Supply Temperature (°F)
e. Return Temperature (°F)
f. Pressure (PSIG)

DDC SYSTEM POINT LIST

MECHANICAL POINT DESCRIPTION	POINT ID	ANALOG INPUT: GRAPHIC	TEMPERATURE	PRESSURE	HUMIDITY	KW	GPM	CFM	CURRENT	POSITION	LB/HR.	ANALOG OUTPUT: DDC CONTROL	DRIVE CONTROL	BINARY INPUT: STATUS	FILTER ALARM	ALARM	BINARY OUTPUT: OFF / ON	SYSTEM FEATURES ALARMS: HIGH	LOW	BINARY	PROGRAMS: TIME SCHEDULING	OPT. START/STOP	RESET	DDC	ALARM INSTRUCT	MAINT. WK. ORD.	RUN TIME	TREND LOG	GENERAL NOTES
HEATING WATER SYSTEM		X																										
STEAM FLOW METER	FM-1	X	X							X																	X	LON
HX 1/3 VALVE	V-1											X																
HX 2/3 VALVE	V-2											X																
HX FLOW SWITCH	FS-1													X														
P-HW-X START/STOP	S/S-1																X											
P-HW-X SPEED SIGNAL	PC-1											X																
P-HW-X DRIVE ALARM	AL-1														X				X						X			
P-HW-X STATUS	CT-1								X										X						X	X		
P-HW-X START/STOP	S/S-2																X											
P-HW-X SPEED SIGNAL	PC-2											X																
P-HW-X DRIVE ALARM	AL-2														X				X						X			
P-HW-X STATUS	CT-2								X										X						X	X		
SUPPLY WATER TEMP.	TS-1	X																X						X				
RETURN WATER TEMP.	TS-2	X																X										
HW FLOW METER	FM-2	X				X			X																	X		LON
DIFF. PRESSURE VALVE	V-3											X																
SYSTEM DIFF. PRESSURE	DPT-1		X															X						X				
PC FLOW METER	FM-3	X				X			X																	X		LON
VFD FEEDBACK	VFD-X																											LON

UNITED STATES ARMY GARRISON
WEST POINT

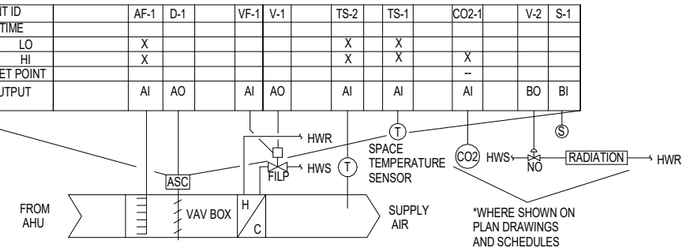
PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
TYPICAL STEAM TO HOT WATER HEAT EXCHANGER CONTROL DIAGRAM

DWG. DATE 09/25/2020
REV. DATE

DRAWING NO. M-805

POINT ID			AF-1	D-1		VF-1	V-1		TS-2		TS-1		CO2-1		V-2	S-1
RUN TIME																
ALARM	LO		X						X		X					
	HI		X						X		X		X			
PROGRAM SET POINT													--			
INPUT/OUTPUT			AI	AO		AI	AO		AI		AI		AI		BO	BI



Sequence of Operation

1. General
a. Coordinate with box manufacturer and provide all necessary materials and field work to connect control components factory supplied in order for them to operate as described.
b. Provide each VAV with a wall-mounted DDC temperature sensor with features as scheduled. Unoccupied mode override pushbutton shall index the associated air handling unit to occupied mode for 2 hours (reprogrammable).
2. Occupied Mode: DDC space sensor shall, on a fall in space temperature below occupied temperature set point, modulate VAV to minimum cooling airflow. On a continued fall beyond dead band, the VAV shall be set to minimum heating airflow and modulate open the fin tube control valve (where noted on drawings with a single sensor) and then the reheat coil valve shall be modulated open. Fin tube shall be disabled when outdoor air temperature is above --°F.
3. Unoccupied Mode: DDC space sensor shall, on a fall in temperature below unoccupied heating temperature set point, set VAV to minimum heating air flow and modulate reheat coil valve open. DDC space sensor shall on a rise in temperature above unoccupied cooling temperature set point, modulate VAV to maximum cooling airflow. DDC sensor shall maintain airflow at minimum cooling airflow when space temperature is between the unoccupied cooling and heating set points.
4. Carbon Dioxide Control
a. Provide space carbon dioxide (CO2) sensors where indicated on drawings.
b. Upon a rise in space CO2 levels above set point, modulate VAV damper to maximum scheduled airflow.

DDC SYSTEM POINT LIST

MECHANICAL POINT DESCRIPTION	POINT ID	ANALOG INPUT: GRAPHIC	TEMPERATURE	PRESSURE	HUMIDITY	KW/KWH	GPM	CFM	PPM	POSITION	LB/HR	ANALOG OUTPUT: DDC CONTROL	DRIVE CONTROL	BINARY INPUT: STATUS	FILTER	ALARM	BINARY OUTPUT: OFF / ON	SYSTEM FEATURES ALARMS: HIGH	LOW	BINARY	PROGRAMS: TIME SCHEDULING	OPT. START / STOP	RESET	DDC	ALARM INSTRUCT	MAINT. WK ORD.	RUN TIME	TREND LOG	GENERAL NOTES
AIR VOLUME BOXES		X																										TYP. EACH
SPACE TEMPERATURE	TS-1		X															X						X				
DISCHARGE TEMPERATURE	TS-2		X															X						X				
HW VALVE	V-1											X																
HW VALVE FEEDBACK	VF-1										X																	
DAMPER POSITION	D-1											X																
AIRFLOW	AF-1							X										X						X				
RADIATION VALVE	V-2																X											
SPACE CARBON DIOXIDE	CO2-1								X									X										
UNOCC. OVERRIDE SWITCH	S-1													X														

UNITED STATES ARMY GARRISON
WEST POINT

PROJECT
EPS - STANDARD DETAILS
DIVISION 23

DRAWING TITLE
TYPICAL VAV BOX CONTROL DIAGRAM

DWG. DATE
09/25/2020

REV. DATE

DRAWING NO.
M-806

DIVISION 26 – ELECTRICAL PLANNING STANDARDS

Division 26 – ELECTRICAL PLANNING STANDARDS

26.1 Introduction

These Engineering Planning Standards define requirements that are specific to the United States Army Garrison (USAG) West Point. These standards build upon the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes, and standards along with the requirements of this design standard. Refer to General Criteria for additional information.

As referenced in this document, the cantonment area is the area within the secured fences of the property. Areas outside of the secure/cantonment area include the golf course, training camps, etc. which electrically are fed by the utility company not West Point's electrical distribution system.

26.2 Scheduling

1. Work items requiring long lead planning, design, coordination and USAG West Point input shall be started as early as possible in the design process. In particular, the following shall be pursued:
    a. Electric service requests shall be made to the Directorate of Public Works (DPW) and other agencies whose approval must be obtained. Final equipment selection and room layouts shall not be completed without submission and approval of all agencies involved.
    b. Field surveys requiring coordination of DPW and other departments.
    c. Determination of existing electrical loads shall be the responsibility of the designer.
    d. Determination of electrical service entrance and rooms to house equipment for temporary or permanent electrical equipment shall be jointly conducted by the designer, DPW and utility representatives.
    e. Field surveys of existing conditions, for measurements and investigations of conduit runs.
    f. Coordination with City Light and Power (CLP) for permanent and temporary electric services.

26.3 General Site Electrical Distribution

1. Upgrades to the electrical site distribution are pending. The Designer of Record shall confirm the specific characteristics of general Site Electrical Distribution at the time of the project.
2. The West Point cantonment area is fed by Orange & Rockland Utilities, Inc (O&R) at three locations: The Delafield Substation, Wilson Gate Substation and the South Post. In addition to the cantonment area, these O&R feeders serve other West Point facilities as well as Highland Falls and Fort Montgomery. The internal West Point electrical distribution system comprises of 15kV (nominal) and 5kV (nominal) distribution.
3. The 15kV (nominal) distribution system is derived from Delafield Substation, where there are two 34.5kV-13.8kV, 12/16/20 MVA transformers. Each transformer is connected to one O&R feed and terminates on a 13.8kV bus with a tie breaker.
4. The 5kV (nominal) distribution systems are derived separately at substations B, C, D, and South Switching Station: Substation B has two 34.5-4.16kV, 2.85/3.2MVA

transformers connected to the 34.5kV feeder from Wilson Gate substation. Additionally, a 13.8-4.16kV, 4.25/4.76MVA transformer at substation B is connected to circuits A-4 and A-8 from Delafield substation. Substation C has one 13.2-4.16kV, 2/2.24MVA transformer connected to circuits A-3 and A-7 from Delafield substation. Substation D has two 13.8-4.16kV, 2/2.24/2.3/2.576MVA transformers connected to circuits A-2 and A-10 from Delafield substation. Each transformer terminates on a 4.16kV bus with a tie breaker. South Switching station has one 13.8-4.16kV, 2.5MVA transformer connected to circuit WP-1 from Wilson Gate. This transformer terminates on a 4.16kV bus with a tie breaker. The alternate source for South Switching station is Feeder F-15 from the 5kV (nominal) distribution system derived from substation B.

5. Low voltage transformers and switchgear are owned by West Point. The utility provider is responsible for maintaining the medium voltage transformers and switchgear.
6. The distribution systems are primarily installed underground, while approximately 5% of the primary supplies within the Cantonment area is suppled Overhead. Most of the distribution systems outside the Cantonment area are run overhead.
7. The Transportation Motor Pool (TMP) is outside the cantonment area and fed from O&R's Dean substation with a 13.2kV underground feed.
8. All other training areas outside the cantonment area are fed by three single-phase, 500kVA, 7.62-2.4kV transformers banked together (4.16kV, 1.5MVA total) connected to O&R's Dean substation:
9. A three-phase, 4.16kV service feeds the areas south of Dean substation, including Camp Buckner, Camp Natural Bridge, Bull Pond, and Areas K and W.
10. A single-phase, 2.4kV service feeds the areas north of Dean substation, including the Ranges (2, 3-5, and 7-10) and Round Pond.

26.4 Electrical Service

1. At the Schematic Design Phase, the design engineer/contractor shall submit an electrical service request/load letter to DPW. The letter shall be signed and sealed by a licensed Professional Engineer. The service request shall inquire about the available service voltage, available utility short circuit, transformer impedance and any other requirements. The request shall also indicate the desired voltage, estimated demand load and point of entry. A detailed site plan shall be included with the service request.
2. Electrical service requests within cantonment area shall also be submitted to the USAG West Point utility company, City Light and Power (CLP). All work shall be in accordance with City Light and Power (CLP) standards and guidelines. It is the designer/engineer/contractor’s responsibility to obtain a copy of the standards, become familiar with them, and incorporate them into design and construction. The Designer shall determine and include in the documents the responsibilities of the Utility Company, DPW and contractor.
3. Electrical service requests outside the cantonment area shall be prepared by the designer/contractor and issued to DPW for submission to the local utility company. Electrical service requests outside cantonment must also be submitted to CLP when connecting to CLP owned assets.
4. Orange and Rockland specific details of installation shall be included in all design documents for projects where Orange & Rockland is the serving utility.
5. The utility provider shall be consulted for metering points and requirements.
6. A description of electrical service responsibilities shall be included in design documents. It shall describe what work is to be performed by the contractor, the utility, DPW, etc..
7. Where a building is required to remain in operation during construction, the design documents shall define electrical system work required for continued operation. The

scope shall be defined in cooperation with USAG West Point representatives. Alterations and connections to existing facilities shall be completed with a minimum of interruption. Where interruption is necessary written clearance from USAG West Point/DPW is required.

8. The requirements for temporary power for construction shall be the responsibility of the installing contractor. The installing contractor shall provide all coordination with the utility and DPW. All temporary services shall be metered in accordance with utility standards.
9. Alterations and connections to existing facilities shall be completed with a minimum of interruption. Where interruption is necessary, prepare a time schedule for same, coordinate with DPW and other sections, and obtain prior written clearance from DPW. Provide and place notices in affected areas, and on luminaires or equipment, which will be temporarily out of use.
10. All new construction facilities, within the cantonment area, shall have (2) redundant incoming service feeders as determined by DPW and CLP. All medium voltage feeders shall be 15kV EPR, copper conductors to be used at a temperature not to exceed 105 degrees for normal operation. For service feeder inventory requirements, only #2, #4/0 and #250kcmil (AWG), shall be specified.
11. All medium voltage service conductors shall be copper. The use of aluminum service conductors will not be accepted.
12. The primary side of electrical service transformers and switchgear shall be dual rated 4.16x13.8kV for projects connecting to a 4.16kV distribution system. The requirement for dual rating shall be subject to review and approval by DPW on a project by project basis.
13. All electrical services shall be run underground, unless specifically approved by DPW.
14. Underground service conductors shall run in concrete encased, schedule 40 PVC conduit. Schedule 80 PVC shall be used at road crossings and other traffic areas. A minimum of one spare conduit shall be run with each circuit.
15. Prior to the installation of any primary or secondary conductors within the West Point Garrison electric ductbank system, the point of service and final location within the ductbank system shall be investigated to ensure the duct is not obstructed. The tests shall include, but not limited to, camera and mandrel investigations. All test reports shall be issued to DPW prior to proceeding. All repairs required to complete the installation shall be included in the design documents.

26.5 Metering

1. All incoming electrical services shall be metered at the main distribution switchboard, on the line side of the service disconnect switch. Meters shall be revenue grade with advanced I/O and power quality. Meter shall be sole sourced to Shark 200 as manufactured by Electo Industries/GaugeTech. No substitutions will be permitted. Shark 200 meter shall be equipped with V2 of higher V-Switch technology. Meter shall be provided with INP100S and PO1S I/O boards. Provide fiber optic communication between the meter and DPW Garrison wide control system. As an alternative and if approved by DPW, wireless communication is acceptable. The Shark meter shall be programmed to reflect the correct electrical service ratings including voltage, CT/PT ratio.
2. For utility meters installed by other trades (water, gas, steam, etc.), provide an empty conduit between each utility meter and the Shark meter.
3. When provided, electrical sub-metering shall monitor each of the following separately.
   a. Total electrical energy
   b. HVAC systems
   c. Interior lighting

d. Exterior lighting
e. Receptacle circuits

4. Further separation of submetering by load type, area, floor, tenant, etc. shall be reviewed with DPW individually for each project.
5. The electrical energy usage for all loads shall be recorded a minimum of every 15 minutes and reported at least hourly, daily, monthly, and annually. The system shall be capable of maintaining all data collected for a minimum of 36 months.

26.6 Emergency Generator

1. Where an emergency generator is provided, the emergency loads shall be divided into the following classification, each of which shall be connected to the emergency generator distribution via its own dedicated transfer switch (ATS).
   a. Emergency Systems (NEC Article 700)
   b. Legally Required Systems/Optional Standby Systems (NEC Article 701/702)
   c. Fire Detection and Alarm Systems (NEC Article 700)
   d. Fire or Sprinkler Booster Pumps (NEC Article 695)

2. Electrical system components shall be connected to the applicable branch in accordance with NEC and UFC requirements. The following additional systems shall be connected to the Optional Standby System:
   a. Electrical Room Lighting
   b. Public address Systems
   c. Telephone Systems
   d. Lan/Data Systems
   e. Security and Video Surveillance Systems
   f. Gas Leak Detection and Alarm Systems
   g. Tele/Data Room Mechanical Systems
3. The fire or sprinkler pump controller shall have an integral dedicated and listed ATS.
4. The automatic transfer switches and main emergency distribution panel shall be located in a room separate from the normal distribution equipment. The emergency equipment room shall be constructed with a 2-hour fire rating.
5. The location of the emergency generator shall be coordinated with the Architect and DPW during the Schematic phase. Emergency generators shall be located outdoors on grade, unless specifically approved by DPW. The generator shall be located within close proximity of the Emergency Electrical Service Room, in a suitable weathertight enclosure with accessibility for fueling and maintenance.
6. Generator enclosures shall have a maximum sound rating at 21 feet, of 75db.
7. Generators shall be diesel driven. Dual fuel diesel/natural gas shall be considered and. Diesel generators shall be provided with a dual wall skid tank, providing a minimum of 24 hours of continuous full load operation.
8. An integral load bank shall be provided on all generators larger than 500kW. Generators less than 500kW shall be provided with circuit breaker and camlocks for connection of a portable load bank.
9. The building automation system shall monitor the emergency generator for “running”, “fault” and “switch in non-auto position”. Automatic transfer switches shall be monitored for position.
10. Automatic transfer switches shall be 4 pole.
11. The basis of design for generators shall be Cummings.
12. The basis of design for automatic transfer switches shall be Onan.

26.7 Low Voltage - Distribution Equipment

1. The basis of design for electrical distribution equipment shall be Square D.
2. The design drawings and specifications shall provide 20% spare load and breaker capacity in all switchboards and panelboards. 20% spare capacity shall be provided for all feeders.
3. Distribution equipment shall be fully rated for short circuit available. Series rated equipment is not acceptable.
4. All feeder and branch circuit conductors, panel busses and transformer windings, shall be copper. The use of aluminum will not be accepted.
5. A Service Tap box, fully rated for electrical service, with camlocks shall be provided for buildings not furnished with an emergency generator. The tap box shall include a Kirk Key interlock with the service main circuit breaker. If the tap box is located within the building, conduits from the tap box shall be provided to a location outside the building for ease in connecting to a temporary roll-up generator.
6. Panelboards shall have lockable door-in-door covers.
7. All equipment shall be identified with phenolic nameplates. Nameplate shall include equipment designation, voltage, phase and source of service.
8. NEC required working spaces shall be identified on drawings for all equipment.
9. Electrical construction inspections shall be provided by a licensed and recognized third party inspection agency when projects are direct contracts with DPW, end user or department.
10. All Electrical room and closet doors shall open out and provided with panic hardware. Without exception.

26.8 Lighting

1. All luminaires shall be LED.
2. When available and in accordance with code, luminaires shall be 277 Volt.
3. All luminaires located with Cadet barracks shall be vandal and impact resistant. Luminaires in Cadet rooms shall include overhead, over sink and under shelf.
4. All luminaires located in Mechanical, Electrical and Storage rooms shall have impact resistant lenses or wire guards.
5. Emergency lighting shall be provided via a battery invertor. Invertors shall, at a minimum be located on every floor. Provide full light output of emergency luminaires for a minimum of 90 minutes. When an emergency generator serves life safety loads, battery invertors shall not be required.
6. Individual battery units shall not be utilized, unless specifically approved by DPW.
7. Exterior lighting shall meet the requirements outlined in the West Point Real Property Vision Plan Installation Planning Standards.

26.9 Lighting Controls

1. Exterior lighting shall be timeclock/photocell controlled via relay panel. Exterior lighting controls shall be capable of being overridden by a local switch or the Campus system via radio signal. Relay panel basis of design shall be Wattstopper LMCP.
2. Lighting control power packs shall not be located in Cadet or Toilet rooms. Power packs shall be located in areas such as corridor ceilings or electrical closets to allow maintenance with disrupting to occupants.
3. Cadet room lighting shall be provided with individual dimming of overhead and over sink

luminaires at the entrance. Each under shelf luminaire shall be provided with an individual wall mounted dimmer control. All luminaires within the room, as well as the HVAC unit, shall be controlled by a ceiling mounted dual technology occupancy sensor.

4. Wireless technologies shall not be used. All lighting controls shall be hard wired. Lighting controls within spaces with TEMPEST requirements or identified to house sensitive /classified systems shall be installed in metallic conduit.

26.10 Lightning Protection System

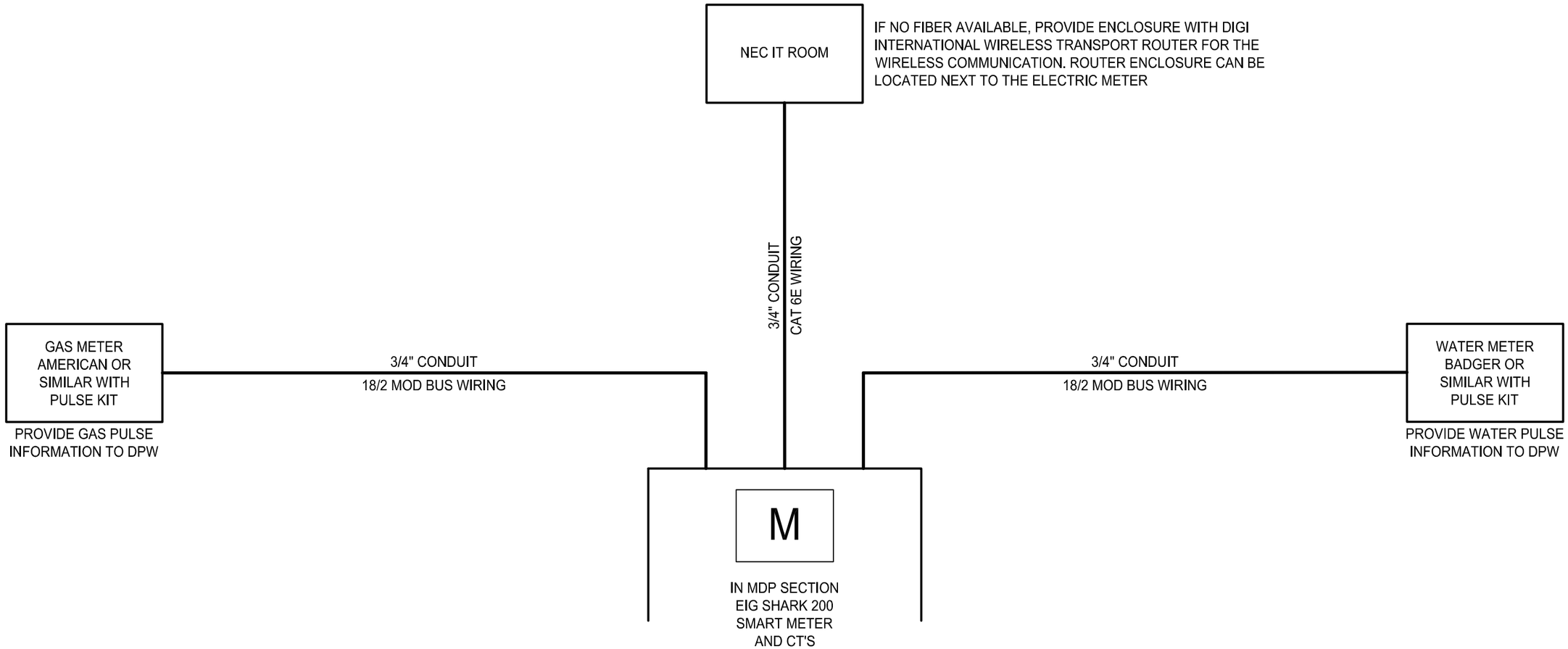
1. A UL master label shall be provided for all new installations. When extending or connecting to an existing lightning protection system, the new and existing systems shall be certified as a complete system and provided with a master label.
2. All systems down conductors shall be concealed within construction, unless specifically approved by DPW.
3. The completed lightning protection system installation shall be independently inspected by a third party agency and signed off by a licensed professional engineer.

26.11 Uninterruptable Power Supply

1. Uninterruptable power supply(UPS) shall be sized to accommodate load and duration of disturbances. Load and duration requirements shall be reviewed with DPW and end user during the Schematic phase of design.
2. The building automation system shall monitor the UPS for “on-line”, “on battery”, “load-on bypass”, “in alarm condition” and “UPS off (maintenance bypass closed)”. The UPS remote annunciator location and connection to the building automation system shall be reviewed with DPW.
3. Proper ventilation of UPS room shall be insured. HVAC systems serving UPS room shall be monitored for operational status by the building automation system.

26.12 Other Systems

1. Corridors and Hallways throughout all Levels at approximately every 100 feet, provide a 50-Ampere receptacle (208/120 V – to be determined by DPW) for maintenance purposes as needed by DPW maintenance.
2. Demolition of existing electrical systems shall include the complete removal of all unused cables, conduits, boxes, etc.



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09/21/2020

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DRAWING NO.
E-1

DIVISION 27 – COMMUNICATIONS

DIVISION 27 - COMMUNICATIONS

27.1 Project Summary

The intent of these Engineering Design Standards is to define requirements that are specific to the United States Military Academy at West Point. These standards build upon the baseline requirements defined in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this design standard.

Refer to Academic Building Planning Standards (ABPS) for systems integration in academic facilities.

27.2 Codes, Regulations and Other Standards Specific to West Point

1. Installation Information Infrastructure Architecture (13A) “Technical Criteria”.
2. TIA/EIA-568-C.1: Commercial Building Telecommunications Cabling.
3. TIA/EIA-568-C.2: Balanced Twisted-Pair Telecommunication Cabling and Components Standards.
4. TIA/EIA-569: Commercial Building Standards for Telecommunication Pathways and Spaces.
5. TIA J-STD-607: Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
6. BISCI Customer-Owned Outside Plant Design Manual.

27.3 Communications Infrastructure Design Parameters

1. This document is constrained to the design and implementation of low-voltage information technology and audiovisual systems technology related to the infrastructure and space necessary to support the interior fit-out of the building and connections to common building elements.
2. The information provided in this report will be utilized to develop and coordinate the Engineering Planning Standards design details for the following:
   a. Local Exchange Carrier entrance conduits and facilities.
   b. Service Provider Entrance Rooms and Points of Entry (POE).
   c. Telecommunications Equipment Room (TER).
   d. Vertical backbone pathways for Academic buildings (Distribution Riser).
   e. Telecommunication Rooms (TRs).
   f. Room-Based Audiovisual Systems.
   g. Building-Wide Audiovisual Systems.

3. Any proposed new technologies will require testing in advance of deployment within the design. This testing enables technology personnel to test in a lab environment, and eventually end users, teams, and the USAG West Point leadership team to pilot in a fully functional mock-up environment prior to deployment. We have found that this testing helps identify what is really needed vs. installing “shiny objects” and empowers the USAG West Point leadership team as technology ambassadors.
4. Design all installations with the capability for additional capacity in rooms, racks and pathways to accommodate 25 to 50 percent growth.

5. Wireless Standards:
    a. The building LAN and wireless network infrastructure will provide coverage throughout the facility for voice and data wireless network services. The wireless network will provide sufficient bandwidth and QoS to support Voice over wireless and delivery of video to endpoints.
    b. Support for wireless voice over IP, video distribution over IP and other high bandwidth traffic will be included in the infrastructure design. In cases where the technology is not mature enough for immediate deployment, placeholders and/or headroom will be factored into the design to accommodate future adoption.

27.4 Technology Pathways and Spaces

1. Service Provider Entrance Facilities:
    a. Consideration to be given to two inbound diverse pathways (conduit banks) for local exchange carrier and campus connectivity into the building. Carrier/service provider connections to the facility to be accommodated by two diverse duct banks, terminating at the POE in both locations, and new 4” Schedule 40 or 80 conduits will be installed from each POE to the TER in the building, utilizing diverse shafts.

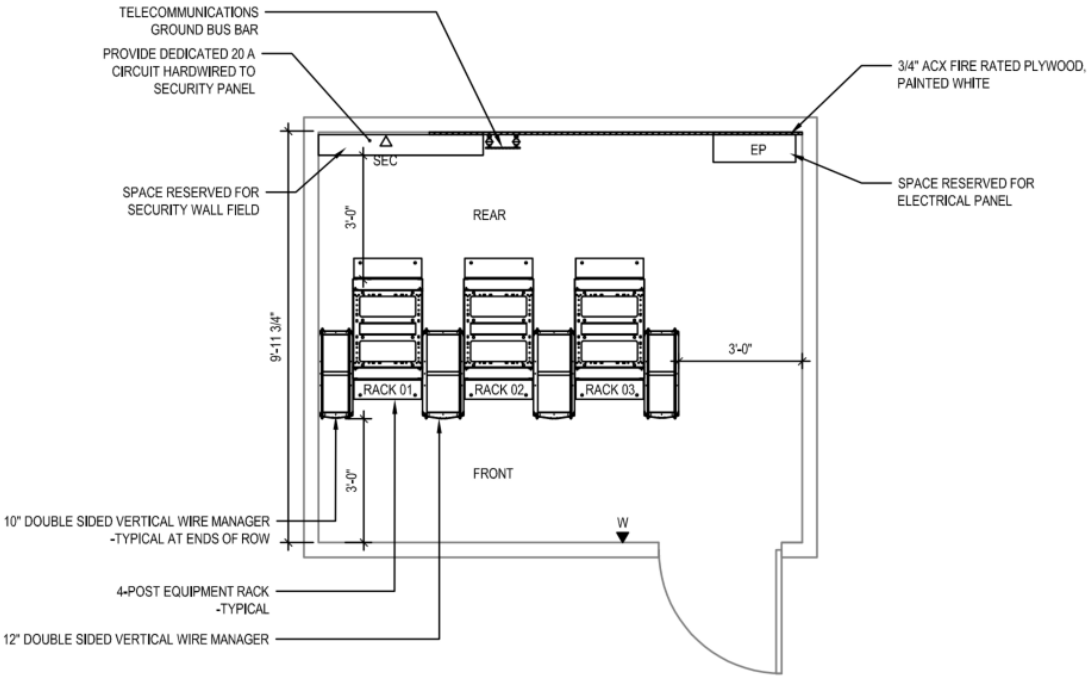
2. Telecommunications Equipment Room (TER):
    a. One TER is planned for the building, location is TBD. The TER will be interconnected to Telecommunications Room(s) via separate 4” conduits.
    b. Provide 2 hour rated enclosure construction with entry access control.
    c. Provide UPS, emergency power and dedicated air conditioning as indicated in related sections of the EPS.
    d. A pre-action sprinkler system is recommended for the TER.

3. Telecommunications Rooms (TRs):
    a. The facility will be served by TRs on each floor, to be confirmed based on square footage of areas served and maximum cable length requirements. All TRs will be served by the TER from two physically diverse vertical pathways to eliminate backbone cabling single points of failure.
    b. The TRs are the distribution points for lateral station cabling for each respective floor. Each TR shall have minimum of three (3) telecommunications cabinets 84-inch High (45RU) X 36-inch Wide X-36-inch Deep with front and back lockable mesh doors, exhaust at top (typical). Designate one cabinet for voice, one for NIPR, and one for WREN/WAP. Provide minimum of 6" wide vertical cable managers on both sides inside the cabinets and 2RU horizontal cable manager with covers. Basis of design is Panduit #WMPH2E or approved equal.
    c. Provide UPS, emergency power and dedicated air conditioning as indicated in related sections of the EPS.
    d. Sprinkler heads in the TR should be provided with wire cages to prevent accidental operation, and side wall type is recommended to eliminate sprinkler piping within the room.
    e. Below are standard TR layouts. USAG West Point technology team to confirm the equipment going in each room to ensure standard layout meet their requirements and allows for future growth of a minimum of 1 rack.

4. Typical TR:

a. Fully route all pathways concealed within wall and ceiling construction possible.

27.5 Cabling Infrastructure



1. A goal of the project is to provide USAG West Point a reliable structured cabling system (SCS) that will effectively and efficiently support current and the emerging technologies to meet USAG West Point present and future needs. As the SCS will sustain several generations of active IT systems equipment, care will be taken to ensure that the infrastructure will be capable of supporting the migration to future technologies.
2. All products, services and materials provided and performed under the scope of this section will conform to industry standards, best practices and applicable codes.
3. The primary purpose for creating the Engineering standards is to optimize the SCS based on the following criteria:
   a. Functionality:
      i) Capability to support Local Area Network (LAN) and Wireless Local Area Network (WLAN).
      ii) Capability to support a Voice over Internet Protocol (VoIP) solution.
      iii) Capability to support other IT, building, security, and Audio-Visual systems sharing a common transport infrastructure.
      iv) Capability to support dedicated alarms, central station connections, fax, ISDN, etc. (typically, copper based end-to-end solutions).
      v) Colocation in the TRs of ancillary building technology systems equipment and cabling.
   b. Performance:

i) Durable and structurally sound pathways and housings.
ii) Horizontal cabling capable of supporting up to 10 Gigabit Ethernet to the Work Area Outlet (WAO).
iii) Backbone cabling capable of supporting 10 Gigabit Ethernet with expandability to 40/100 Gb. (Final cabling bandwidth requirements to be confirmed as part of both Design Development and Construction Documentation).

c. Manageability:
i) IT spaces and pathways shall provide proper accessibility and clearance to ease moves, adds and changes.
ii) Compliance with the TIA/EIA-606-A Administration Standard for Telecommunications Infrastructure to ensure a uniform administration approach that is independent of applications which may change over the lifecycle of the SCS.
iii) Electronic records of the as-built conditions to be updated for moves, adds and changes shall be provided as part of the telecommunications contractor's scope of work.

d. Scalability and Upgradeability:
i) Fully accessible cabling infrastructure to facilitate the removal and replacement of cabling without the need for destructive or interruptive work.
ii) At least one spare horizontal cable is recommended at each work area outlet location beyond anticipated immediate need.

e. Flexibility:
i) The SCS shall be capable to support a variety of building technology and IT systems and accommodate future upgrades and expansion.

f. Cost:
i) Optimize the geographical and physical topology of the TRs, pathways and the floor zones served by each room to ensure an efficient and effective design.
ii) Select the media type capable to support the applications for an extended life cycle may have a larger initial cost but a smaller annualized cost of Ownership.

4. Service Cabling: Shall be provided to connect building TER to nearest site communications service manhole.
a. OSP Fiber Optic Cabling: Provide (2) 144-strand single mode fiber optic cables from manhole(s) to TER.

5. Backbone Cabling: Shall be provided to connect the TER to each TR location.
a. Existing Cabling: Confirm reuse of existing OSP copper and fiber cabling with NEC West Point. OSP copper cables shall be terminated onto gas tube building entrance terminals (BETs) with 5-pin protection modules and stub out to 48 port unloaded patch panels with green RJ-45 insert modules. Terminate one pair per port (pins 4 and 5), except for port #48 terminate 2-pair. Provide Circa part #1880ECA1-100G or approved equal for building entrance terminals with 5-pin gas surge protector modules. The building entrance terminals shall have 110

connector input and output, designed with internal splice chamber, and cover. The 5-pin gas surge protector modules shall have positive temperature coefficient (PTC) self-resetting feature to provide protection from sneak current faults. Recommend Circa Model C4B1E for surge protection modules.

b. Copper Cabling: Solid untinned copper, #24 AWG, UTP, multi-pair voice backbone cables sized to support no more than 1.5 pairs for every outlet connected to the serving TR.
c. Fiber Optic Cabling: 48-strand, high grade, single mode, plenum, fiber optic cable with dielectric strength members for installation within the building. Provide Corning Closet Connector Housing (CCH) with LC pigtailed splice cassettes for patch panels. The fiber optic cable shall be fusion-spliced to factory-produced LC pigtails in the CCH cassettes."

6. Horizontal Cabling: Shall be provided to connect TR locations to each work area outlet.
   a. Cabling shall be Category 6, 4-pair, 23 AWG, UTP for voice and data. Category 6A, 4-pair, 23 AWG, UTP for wireless. Provide 48 port CAT 6 unloaded patch panel with green RJ-45 wired T-568A inert modules for voice. Provide 48 port CAT 6 unloaded patch panel with blue RJ-45 wired T-568A insert modules for WREN data. Provide 48 port CAT 6 unloaded patch panel with yellow RJ-45 wired T-568A insert modules for NIPR data. Provide 48 port CAT 6A unloaded patch panel with orange RJ-45 wired T-568A insert modules for wireless.
   b. Cable Color Coding - The following color coded shall be used for horizontal wiring:
      i) YELLOW (JACKET, JACKS AND PATCH CORDS) FOR NIPRNET DATA.
      ii) BLUE (JACKET, JACKS AND PATCH CORDS) FOR WREN DATA
      iii) GREEN (JACKET, JACKS AND PATCH CORDS) FOR VOICE.
      iv) ORANGE (JACKET, JACKS AND PATCH CORDS) FOR WIRELESS.
      v) WHITE (JACKET, JACKS AND PATCH CORDS) FOR CCTV, EMCS, ACCESS CONTROL."

   c. Provide a minimum of 5 feet of extra cabling above each work area outlet.
   d. Maintain 36-inch minimum clearance between communications cabling and the nearest power cabling running parallel with communications lines.

27.6 Audiovisual System Design Parameters

1. The objective of this section is to define the requirements for pathways and wiring as required to support audiovisual (AV) systems and components, including coordination with the interface to Information Technology (IT) infrastructure.
2. Infrastructure and Coordination:
   a. The quality and extent of the AV systems infrastructure is critical to maximize the flexibility of installed equipment and to allow for the addition of portable or future installed equipment with minimal impact to the surrounding structure and finishes. AV infrastructure must support typical AV signal types and network bandwidths with sufficient available system headroom to allow for future upgrades.
   b. A system of empty conduit will be designed for use with the initial AV system equipment package including back box and conduit for future use to support

flexibility, dry tie-lines between audiovisual equipped spaces, along with cable pathways for portable “snake cabling”.

c. Shared Infrastructure: Individual room AV systems will be cabled to spaces designated as to house shared system resources through distributed AV systems. A cable tray system will be utilized within hallway interstitial space to provide cable management
d. Wall Mounted Infrastructure: At wall locations conduit stub-ups to the accessible ceiling above will be provided. Considerations for adjacency to switched and dimmed power circuits, and cable tray for IT/security will be reviewed.
e. Display Locations: At flat panel display locations, large in-wall boxes containing power, data and audiovisual cabling will be used to allow for a typical display mounting detail and to provide space within the wall cavity for audiovisual and digital signage receiver mounting.

3. Integration with Information Technology (IT) Systems
   a. The audiovisual systems will require network connectivity for a variety of management, control and signal transport uses. In addition to standard Ethernet protocols for both AV signal transport and control communication traffic, the structured cabling plant may be used for point-to-point transport of high definition audio and video via HDBaseT and similar standards-based protocols using transmit/receive hardware.
   b. Much of the AV control LAN network traffic remains internal to the system / rack with local AV network hardware. This allows for a reduction in the total number of networks drops to the rack, reduces network traffic in the local TR for AV equipment and allows systems to be built, tested and commissioned offsite prior to installation.

4. General AV Requirements:
   a. Centralized AV Racks: AV racks for distribution can be consolidated in either the TR, TER, or a separate AV closet.
   b. Room Scheduler Panels: Small, touch equipped displays mounted at the entrance to rooms interface with a central room booking server to provide room scheduling details. Scheduling management system consistency must be maintained across buildings to ensure reliable result and scalability.
   c. Centralized Control Monitoring: Consideration for deploying a centralized control / room monitoring solution. Overhead monitoring cameras to provide Tier 1 support that can troubleshoot room issues remotely with same control capability as if they were present in the space.
   d. Recording/Capture: Classroom AV systems will leverage installed cameras and microphones to support a centralized course capture and/or streaming platform. System support consistency must be maintained across buildings to ensure reliable result and scalability.
   e. Digital Signage: Dynamic signage, including central directory, main entries for wayfinding, general and localized information, and individual room signage identifying room status and scheduling information will be maintain and management through a centralized digital signage. System support consistency must be maintained across buildings to ensure reliable result and scalability.

DIVISION 28 – FIRE ALARM AND MASS NOTIFICATION SYSTEMS

DIVISION 28 – FIRE ALARM & MASS NOTIFICATION SYSTEM PLANNING STANDARDS

28.1 Introduction

The intent of these Engineering Planning Standards is to define requirements that are specific to the United States Military Academy at West Point. These standards build upon the baseline requirements define in the Unified Facilities Criteria (UFC), Unified Facilities Guide Specifications (UFGS) and all referenced codes and standards. Project designers are responsible for familiarizing themselves with all adopted criteria, specifications, codes and standards along with the requirements of this planning standard. Refer to Division 01 for additional information.

28.2 Codes, Regulations and other Standards Specific to West Point.

1. West Point Installation Design Guide (IDG) for references to architectural, landscape and street visual themes specific to West Point.
2. USMA Guide Spec: 28 31 79 Interior Fire Alarm and Mass Notification System

28.3 Definitions

1. Fire alarm and mass notification definitions specific to West Point are as follows:

28.3.1 Class A Addressable System

a. A Class A system as defined in NFPA 72 with each FA device reporting individually to the FACP and the FACP continuously relaying that information to the central receiving station. This system is also referred to as “device point reporting” or “point-to-point”. In device point reporting systems, the status of each device is reported back to the central receiving station through the FACP. This contrasts with a zone reporting system wherein devices are lumped into zones. In a Class A system, devices are connected by circuits configured such that an open circuit on one or both incoming and outgoing conductors at the same location does not prevent reporting of all devices on the circuit. This system type is a required to meet the requirements of the sole sourced fire alarm and mass notification equipment.

28.3.2 Fire Alarm and Mass Notification Control Panel (FACP/FMCP)

a. A master control panel having the features of a fire alarm and mass notification control unit and fire alarm and mass notification control units are interconnected. The panel has central processing, memory, input, and output terminals.

28.3.3 Signal Line Circuit (SLC)

a. A SLC is one of up to 8 circuits reporting to the FACP, configured for Class A operation, with each circuit having the capacity to support up to 99 addressable sensors (smoke or heat) and up to 99 addressable modules (control, monitor, NAC, and interface). Alarm, supervisory or trouble conditions are transmitted by the FACP radio transmitter to the central station reporting the status of each individual device. Equipment and/or device faults, including command faults, missing device, early warning, maintenance alert, communications loss, IDC, NAC, SLC, power, and

battery faults are also transmitted by the FACP to the central receiving station instantaneously.

28.4 Central Receiving Station

1. The central receiving station is an existing Factory Mutual approved Monaco Enterprises Inc. model D-21 Incident Management System transceiver located at Building 616, Provost Marshal Office (PMO), transmitting and receiving encoded radio signals in the UHF MHz band, communicating with the FA/MNS transceiver at each USAG West Point building. Hereafter the central receiving station will be identified merely as “D-21.”

28.5 General Requirements

1. New construction and renovation projects are now featuring the latest version of the Monaco Enterprises, Inc. Fire Alarm Control Panel. The MAAP Plus or MAAP X Analog Addressable Integrated Radio Transceiver and Fire Alarm Control Panel is capable of point reporting up to 1584 addressable device points via proprietary UHF radio signal to the D-21.
2. New Fire Alarm installations include Mass Notification Systems (MNS) in accordance with UFC 4-021-01. The existing RF infrastructure provided by Monaco Enterprises, Inc. supports the UFC requirements for primary MNS communications. The Monaco Enterprises, Inc. Fire Alarm and integrated MNS system has the capability to remotely activate the in-building MNS messaging system and provide live-voice announcements directly from the D-21.
3. Each FA/MNS shall be a complete, supervised, non-coded, analog-addressable system, installed in a Class A configuration. The FA/MNS shall provide point reporting to the FACP. The FACP shall in turn provide point reporting to the D-21. Point reporting, also known as point to point reporting, is the capability to relay the status of each addressable device and certain system components such as SLC’s to the D-21 in real time. The FA/MNS shall be tested and perform as a critical life-safety system. The FA/MNS shall be compatible with and shall communicate seamlessly with the D-21 without impairing operational function or reliability of any existing FA or MNS.
4. A Knox Box shall be provided for every project. Coordinate location and type of Knox Box (surface mounted, recessed) with Architect.

28.6 Fire Alarm Design Requirements

1. Follow the requirements outlined in UFC 3-600-01 except as supplemented below:

28.6.1 Visible Notification Devices

a. Fire alarm visible notification devices must be wall mounted devices and must include a clear lens marked with “FIRE”.

28.6.2 Wiring

a. Provide Class A wiring configuration as required by Monaco Enterprises, Inc.

28.6.3 Fire Alarm Input/ Output Requirements

a. Upon general alarm activation within a facility, all magnetic locks/CAC readers shall fail safe until panel is reset and alarm system is in normal condition.

28.7 Carbon Monoxide Detection Requirements

1. Follow the requirements outlined in UFC 3-600-01 except as supplemented below:

28.7.1 Carbon Monoxide Notification

a. Carbon Monoxide notification does not use the 520 Hz temporal 4 (T-4) signal and unique voice message as required by the UFC as it is not supported by the Monaco Enterprises, Inc. equipment. Carbon Monoxide detection utilizes the standard fire alarm signal (T-3) and standard West Point voice messages. Engineer of record must contact West Point Fire Department to initiate waiver/deviation from this UFC requirement.

28.8 Mass Notification Design Requirements

1. Follow the requirements outlined in UFC 4-021-01 except as supplemented below:

28.8.1 Visible Notification Devices

a. Mass notification visible notification devices must be wall mounted devices and must include an amber lens marked with “ALERT”.
b. LED text signs as part of the notification appliance network at not required.

28.8.2 Wiring

a. Provide Class A wiring configuration as required by Monaco Enterprises, Inc.

28.9 Radio Repeater Design Requirements

1. Provide radio repeater system as follows:
   a. To improve radio coverage in building with low trunked land mobile radio connectivity, facilities must implement the use of an in-building digital voice repeater network that is compatible with the campus system. The system is required to provide radio coverage to 99 percent of the building’s floor areas defined in NFPA 1, NFPA 72 and NFPA 1221. The repeater will need to operate in the UHF 380-430 MHz range with a programmable channel spacing of 12.5 or 25 kHz and be tuned to the current frequencies of 390.325 MHz (receive) and 380.325 (transmit). Access to repeater must be limited for use by the fire department radios via the Astro signal type method and a NAAC code of 293.The digital voice repeater will need to be capable of passing encrypted radio traffic from Motorola XTS-2500, XTS-5000 and APEX series portable radios. Additionally, the repeater is required to pass emergency alarm calls, portable PTT ID pass-through, call alert paging, talk permit / prohibit tone and AES P25 Encryption.
   b. The in-building radio repeater will require a secondary radio to tie transmitted and received audio into the West Point Motorola 7.13 trunking system to meet a mandatory radio transmission recording requirement indemnified in NFPA 1, NFPA 72 and NFPA 1221 standards. The secondary radio must be connected directly to the digital voice repeater network and provide receive and transmit capability into the radio repeater system. Additionally, the secondary radio is required to perform Motorola AES encryption with over the air rekey capability from the Motorola trunked key management terminal for secure radio transmissions capability. Due to the

sensitivity of the trunking system specifications, the installer must work with the West Point Land Mobile radio manager to program specific trunking radio configuration data into the secondary trunked radio.

c. The digital voice repeater network system is required to have a battery backup power supply capable of maintain power into the in-building radio unit four (4) hours in the event of loss of commercial power. Where applicable, the system must be tied into the facility generator to maintain coverage during power outages.

28.10 Equipment Manufacturers

28.10.1 Sole Source Manufacturers

a. Fire Alarm / Mass Notification System
   i) Monaco Enterprises, Inc.

RESERVED for future CSI or UFGS Division Development

DIVISIONS 29-30

DIVISION 31 – SITE PREPARATION

DIVISION 31 - SITE PREPARATION

31.1 Introduction

1. Site preparation shall include, but not be limited to, the demolition of pavement, removal and/or relocation of existing utilities, the clearing and grubbing of trees and shrubs, and earthwork grading of the site to obtain the building pad and site improvement's desired elevations.

2. DOR will work with PM to Incorporate the following requirements into project contract documents.

31.2 Excess Soil/Fill Material Requirements

1. West Point does not have a landfill on-site, suitable for disposal of excess soil/fill material (soil). All excess soil/fill material generated by the project, must be analyzed prior to being shipped off site for reuse or disposal. Soil/fill material shall not be shipped off-site without written approval from the West Point Environmental Management Division.
   a. Conform with contamination review procedures as indicated in Division 02 of this Engineering Planning Standards (EPS) document.

2. Excess soil/fill material may be stockpiled until the end of the project, then reused on-site as much as possible prior to sampling and analysis for residual soil to be disposed. Store in a manner that prevents rain from infiltrating the soil matrix and preventing runoff into the surrounding soil or pavement (for example, store soil on top of polyethene sheeting and cover with second layer, or store in lined, covered dumpsters). If the soil is going to be relocated or disposed outside the construction site, sampling and analysis is required.

3. Excess Soil/Fill Material Reused on the Construction Site:
   a. If soil/fill material is to be reused on the construction site, sampling is not required unless contamination is suspected or otherwise directed. Sampling and analysis will be required if there is visual evidence of a spill, odors, field instrument readings, debris or other indications that the soil is contaminated.

4. Requirements for Excess Soil/Fill Material Exported from West Point:
   a. The Contractor shall not move excess soil/fill material off-site without written permission from the West Point Environmental Management Division. This requirement is in effect even if the Contractor does not believe the soil is contaminated. Excess soil will be evaluated for Beneficial Use Determinations (BUDS) using the Revised Part 6 NYCRR 360 Series. Excess soil for reuse shall be analyzed in accordance with 6 NYCRR 360.13. Sampling frequency shall be in accordance with the Table at 6 NYCRR 360.13 (e). The analysis report shall include a description of the soil stockpile including the location of origin and composition, estimated quantity of soil being characterized, and a sketch showing where the samples were collected.

   b. Excess soil for disposal shall be analyzed in accordance with 6 NYCRR 371. If soil is exported from West Point, the Contractor shall submit the analysis report and documentation that the receiving facility is properly permitted and can accept the soil, to the West Point Environmental Management Division for written approval to ship

the soil to the disposal facility.

c. After the soil/fill material has been shipped off-site, the Contractor shall submit documentation such as shipping manifests, weight tickets, and invoices documenting the quantities and locations the excess soil was shipped.

5. Requirements for Imported Fill:
   a. Any material being imported onto the project site must meet BUDS criteria and meet the limits of NYCRR Part 375-6.7(d) and follow DER-10 Table 5.4(e)10. Soil/fill material brought in from off site for use on the construction site shall be tested in accordance with 6 NYCRR 360.13. Fill material shall not contain concentrations of analytes above the appropriate New York State standards in 6 NYCRR 375-6.8. Imported material must meet the NYSDOT definition of a suitable material (section 203-1.1,H). Do not bring material on-site until test results have been received and approved by the West Point Environmental Management Division.

   b. Fill shall be free of invasive plant seeds or propagules. The contractor must address invasive species which are imported to the US Army Garrison through contaminated fill, plant materials, or contaminated equipment.

6. Concrete Washout Facilities:
   a. Any project with concrete or cement work requires a designated concrete wash out that must conform to NYS DEC requirements.

7. Trench Backfill for Utilities Under Pavements:
   a. Backfill material for all utilities under pavements shall be Controlled low-strength material (CLSM).

8. UXO Safety Requirements:
   a. Conform with the Unexploded Ordnance (UXO) awareness program.
   b. UXO Safety Sheet provided in Appendix

31.3 Radon Mitigation

1. All new construction, major building renovations, and those projects determined applicable shall include radon resistant building techniques and installation of a radon mitigation system.

2. Radon mitigation design and installation shall conform to UFGS Radon Mitigation Specification and the following criteria as applicable:
   a. National Environmental Health Association (NEHA).
   b. National Radon Safety Board (NRSB).

3. IAW AR 420-1 Radon mitigation techniques will be incorporated in construction plans to prevent excessive radon migration into new structures.

DIVISION 32 – EXTERIOR IMPROVEMENTS

DIVISION 32 – EXTERIOR IMPROVEMENTS

32.1 Introduction

1. The following information is provided as guidance for site development projects at the USAG West Point.
2. This guide supplements the site planning objectives, considerations and design criteria set forth in the USMA Installation Design Guide (IDG).
3. The site development standards referenced below shall be followed at a minimum, and project-specific requirements shall govern.

32.2 Vehicular and Pedestrian Circulation Systems

1. Use the USMA IDG and UFC 3-201-01, Civil Engineering.

32.3 Parking Areas

1. Use the USMA IDG and UFC 3-201-01, Civil Engineering.

32.4 Roads, Security Gates and Access drives

1. Use the IDG, UFC 3-600-01, Fire Protection Engineering for Facilities, and UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings.
2. West Point emergency vehicle access roads shall meet these minimum requirements:
   a. Be within 50-feet of an exterior door to the building.
   b. Be a minimum of 20-feet wide.
   c. Be designed to accommodate the loading from, and turning radii of, West Point's firefighting vehicles.

32.5 Pavement Design

1. All roads, drives, and parking areas shall be designed using HS-25 load rating, at a minimum. All asphalt pavement shall be at a minimum 2" top/3" dense binder/6" granular base; however, pavement sections may vary based on subsurface conditions and site-specific requirements. Pavement material shall be coordinated with and approved by DPW and comply with the pavement sections located within the UFC Series 3-200.
2. When new road construction is approved, the width of the roadway shoulder will be dependent upon the proposed routing. For roadway extensions, the shoulder width should match the existing, at a minimum. New roadways designed for two-way traffic flow shall have a minimum width of 24-feet.
3. Where concrete walks abut concrete curbing, an integral pour is required.

32.6 Site Appurtenances

1. Use the IDG and UFC 3-201-01, Civil Engineering, for site appurtenances including, but not limited to, curbs and gutters, bollards, signage and markings, mailboxes, and trash dumpster enclosures.
2. Dumpster concrete pads shall be a minimum of 8" thick and accessible by vehicle, with concrete-filled, steel bollards per UFC 4-010-01, DoD Minimum Antiterrorism

Standards for Buildings. Mechanical and electrical equipment concrete pads shall be sized to extend a minimum of 6-inches past the equipment limits in a rectangular configuration and shall have a minimum 3-foot by 3-foot area in front of all equipment service doors.

3. Use the IDG and UFC 3-530-01, Interior and Exterior Lighting Systems and Controls for exterior lighting criteria.
4. Fencing shall be screened in high-visibility areas and shall comply with the IDG.

DIVISION 33 – SITE UTILITIES

DIVISION 33 – SITE UTILITIES

33.1 Utilities

1. All new utilities shall tie into the existing utility system and should follow all the requirements outlined in the UFC.
2. During development of the project Scope of Work (SOW), evaluate building service connections to utility main laterals to determine if replacement is required.
3. New utility pipes require a minimum separation of 2-feet from existing and proposed utilities. Project-specific utility separation requirements will govern and may be greater than 2-feet.
4. All proposed water and sanitary sewer utility connections and appurtenances must coordinate with the West Point Water Utility Privatization Contracting Officer's Representative (COR).
5. American Water (AW) shall perform the installation of all water and wastewater lines from the system to the point of demarcation. All utility designs shall be sent to AW during the design phase for review and comments.
6. The DOR shall provide a utilities design submission which includes a profile showing elevations, manhole inverts, utility crossings, existing and proposed ground cover for all utilities in the contract. The data results from the utility survey shall be shown on the profiles and notes shall be clearly added for those items which require field verification during construction. Any existing conflicts shall be addressed by the designer in their design submission

33.2 Storm Drainage Systems

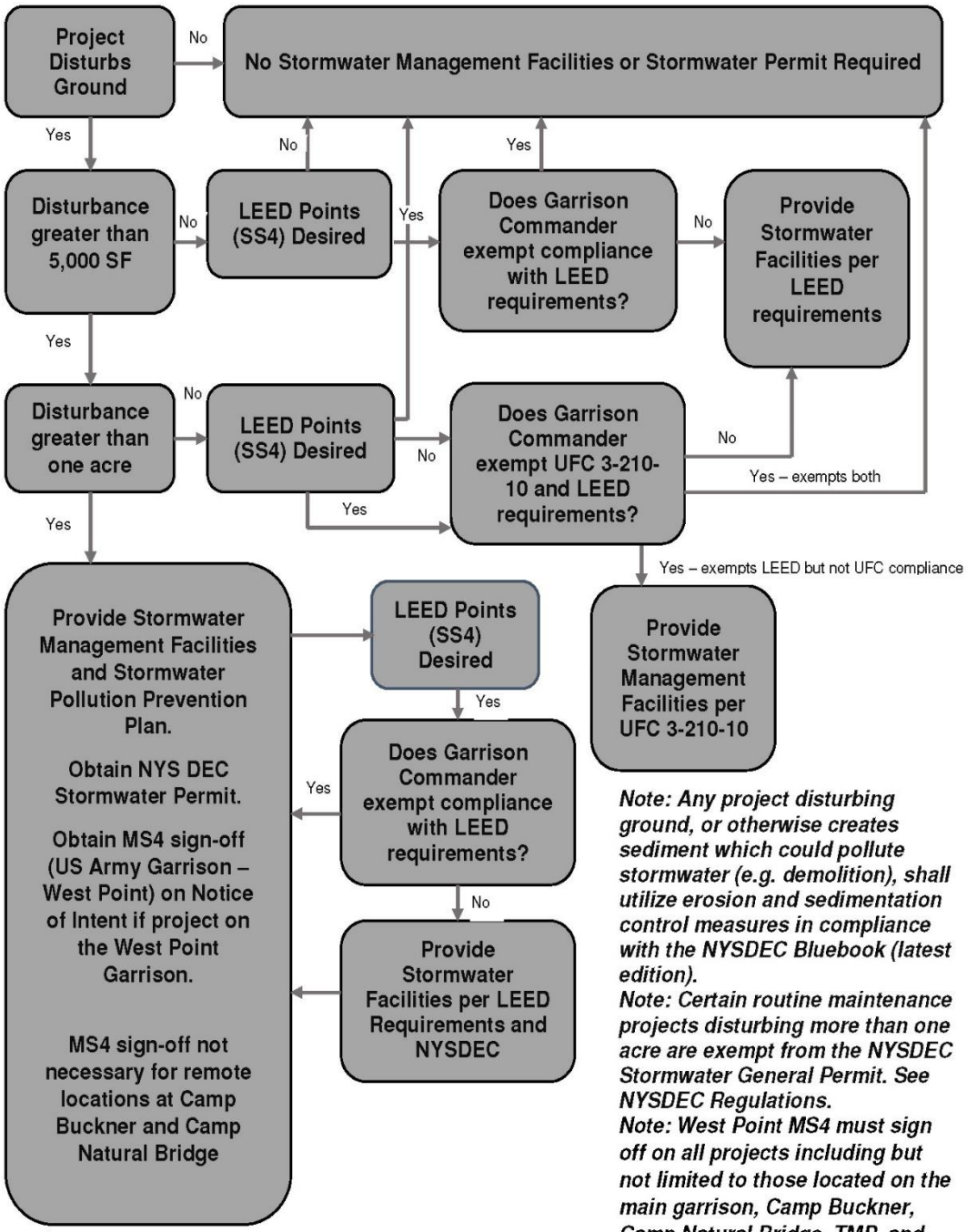
1. Storm runoff shall be analyzed to comply with New York State Department of Environmental Conservation (NYSDEC) Standards and the following flow chart. The design of all storm runoff features shall be stamped by a NYS Professional Engineer.
2. The DPW Environmental Management Division (EMD) Stormwater Manager reviews and approves all plans. This includes:
    a. Soil Erosion and Sediment Control Plan
    b. Storm Water Pollution Prevention Plans (SWPPP)
    c. Notice of Intent (NOI) & Notice of Termination (NOT).

3. Any new or modified SMP’s need to be added to real property. Supply a maintenance plan/schedule to DPW O&M and DPW EMD Stormwater Manager
4. NYSDEC exempts certain projects from a stormwater permit even if they exceed 1 acre of disturbance such as emergency repairs and routine maintenance.
5. Routine Maintenance Activity - means construction activity that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:
    a. Re-grading of gravel roads or parking lots.
    b. Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch.
    c. Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch).

d. Placement of aggregate shoulder backing that stabilizes the transition between the road shoulder and the ditch or embankment.
e. Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material.
f. Long-term use of equipment storage areas at or near highway maintenance facilities.
g. Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment.
h. Existing use of Canal Corp owned upland disposal sites for the canal.
i. Replacement of curbs, gutters, sidewalks and guide rail posts.

6. Projects adjacent to historic structures are not eligible for a General Stormwater Permit unless the USAG West Point Cultural Resources Department (CRM) acting by authority of the NYS Office of Historic Preservation declares that the project will not have an adverse impact on cultural resources. If they find that it would, an Individual Stormwater Permit will be required which involves notification of, and review by, of the NYSDEC Regional Office. It is important for the Army to establish the project permit type during project inception as the General Permit has a typical 10-day maximum NYSDEC review duration whereas the Individual Permit has a 90-day maximum review duration. UFC specifications section 01 57 19 Temporary the Environmental Controls put the burden of obtaining the stormwater permit on the contractor requiring the contractor to understand time frames and efforts especially on design-build projects.

STORMWATER DECISION FLOW CHART



Note: Any project disturbing ground, or otherwise creates sediment which could pollute stormwater (e.g. demolition), shall utilize erosion and sedimentation control measures in compliance with the NYSDEC Bluebook (latest edition).

Note: Certain routine maintenance projects disturbing more than one acre are exempt from the NYSDEC Stormwater General Permit. See NYSDEC Regulations.

Note: West Point MS4 must sign off on all projects including but not limited to those located on the main garrison, Camp Buckner, Camp Natural Bridge, TMP, and Lake Fredrick.

33.3 Storm Sewer System

1. Use UFC 3-201-01, Civil Engineering for the design criteria for all underground gravity storm sewer systems.
2. Any new stormwater inlets must have the proper wording cast into the grate or curb housing; “No Dumping, Drains to waterway” or “No Dumping, Drains to River”.
3. New paving and re-paving projects require all stormwater inlets without the proper wording cast into the grate or curb housing (“No Dumping, Drains to waterway”) shall be replaced with the proper grate or curb housing.

33.4 Sanitary Sewer Systems

1. Use UFC 3-240-01, Wastewater Collection and UFC 3-240-02, Domestic Wastewater Collection, for wastewater distribution system criteria and to establish wastewater flows, respectively. Design shall comply with AW specifications and details.
2. Ten-States Standards (Recommended Standards for Wastewater Facilities, latest edition) and TR-16 Standards shall be followed for wastewater treatment, as required by NYSDEC.
3. Per AR420 under Utilities, installations shall meet the requirements of the Nation, the host State, and the utility owner. Design shall comply with AW specifications and details.
4. AW shall perform the installation of all wastewater lines from the system to the point of demarcation. Utility designs shall be sent to AW during the design phase for review and comments.
5. Project-specific requirements should be considered for all new sanitary sewer systems and the system shall comply with existing Garrison standards including, but not limited to, make and model, operation requirements, and compatibility with SCADA and other controls systems.
6. Testing - Gravity sanitary sewers shall be tested for leakage and deflection in accordance with the pipe manufacturer’s specifications.

33.5 Water Distribution

1. Use UFC 3-230-01, Water Storage, Distribution, and Transmission and UFC 3-230-03, Water Treatment, to establish water distribution system criteria and water demand, respectively. Design shall comply with AW specifications and details.
2. Per AR420 under Utilities, installations shall meet the requirements of the Nation, the host State, and the utility owner, American Water MSG (AW). Design shall comply with AW specifications and details.
3. All Proposed Water and Sanitary Sewer Utility connections and appurtenances shall coordinate with the West Point Water Utility (AW) Privatization Contracting Officer's Representative (COR). Design shall comply with AW specifications and details.
4. AW will purchase and install water utility piping in accordance with the Utility Privatization Contract and applicable standards and specifications, Ten State Standards, and American Water MSG.
5. Water distribution systems shall comply with the requirements of the Ten-State Standards (Recommended Standards for Water Works, latest edition). Design shall comply with AW specifications and details.
6. Water Mains:
    a. Site water system piping shall be ductile iron, cement-lined pipe or PVC Schedule 120, similar to Blue Brute. Use also UFC 3-230-01, Water Storage,

Distribution, and Transmission, Water Utility Owner (American Water MSG), and Ten-State Standards for allowable pipe materials.

b. AW must be contacted for purchase and installation of fire hydrant assemblies.
c. The water pressure at the site varies depending on elevation and shall be field verified by the designer for each project.

7. Water lines shall have a minimum depth of 4-foot of earth cover to maintain the water line below the frost penetration depth at West Point. Provide appropriate installation where this cover cannot be obtained which duplicates this 4-foot earth cover, per Ten-State Standards and as specified by Water Utility Owner (American Water MSG).
8. Where a cross connection is made between non-potable water distribution piping and the existing West Point potable water supply, an approved backflow prevention device must be provided. Any new water distribution piping installed to the existing West Point potable water supply must meet all pressure testing and disinfection requirements (Ten-State Standards) prior to being put into service. West Point buildings (housing is generally exempt from this requirement) shall have an approved backflow prevention device installed prior to connection to the West Point Potable water supply.
9. AW shall perform the installation of all water lines from the system to the point of demarcation. Utility designs shall be sent to AW during the design phase for review and comments.
10. Water system appurtenances shall comply with Garrison standards and AW standards including, but not limited to, make and model, operation requirements, and compatibility with SCADA and other controls systems.
    a. Fire Hydrants:
       Site fire hydrants shall be Mueller Co. type with two 2-½-inch hose nozzles with National Standard Threads (NST) and one 4-inch storz outlet connection.
       Fire hydrants shall be supplied by AW.
    b. Water Meters:
       Water meters will be required for the service line to each building and shall be located within the mechanical room of the building, unless otherwise directed by DPW.

33.6 Natural Gas Distribution

The gas service line shall be design in accordance with the local gas company standards.

1. Gas Lines:
    a. Operating pressure of the gas distribution at the site varies depending on point of connection and shall be field verified by the designer for each project.
    b. Gas lines shall have a minimum depth of 30-inches of earth cover. Gas lines shall have a minimum separation of 10-feet from other site utilities, where possible, and unless otherwise directed by DPW.

2. Gas Meters:
    a. A gas meter and regulator will be required each building in a location directed by DPW and shall be protected from falling ice and snow. A strainer shall be provided upstream of the gas meter.

Reserved for West Point Future Development

DIVISION 34	*TRANSPORTATION*
DIVISION 35	*WATERWAY AND MARINE CONSTRUCTION*
DIVISION 40	*PROCESS INTERCONNECTIONS*
DIVISION 41	*MATERIAL PROCESSING AND HANDLING EQUIPMENT*
DIVISION 42	*PROCESS HEATING, COOLING AND DRY*
DIVISION 43	*PROCESS GAS AND LIQUID*
DIVISION 44	*POLLUTION AND WASTE CONTROL EQUIPMENT*
DIVISION 46	*WATER AND WASTEWATER EQUIPMENT*
DIVISION 48	*ELECTRICAL POWER GENERATION*

RESERVED for future CSI or UFGS Division Development

DIVISIONS 36-39

APPENDIX

A. West Point Acronym List
B. West Point Installation Framework Plan
C. West Point Maintenance Contracts

Appendix A

West Point Acronym List

APPENDIX A

EPS West Point ACRONYM LIST

ABPS	Academic Building Planning Standards
ABUP	Academic Building Upgrade Program
ACES	Army Continuing Education System
ACI	Army Cyber Institute
ACSIM	Assistant Chief of Staff of Installation Management
ACOM	U.S. Army Command
ADA	Americans with Disabilities Act (of 1990)
ADAAG	American with Disabilities Act Accessibility Guidelines
AFRC	Armed Forces Reserve Center
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
AOG	Association of Graduates
AR	Army Regulation
ARI	Army Research Institute
ARL	Army Research Laboratory
ARPA	Archeological Resources Protection Act
ASA	Assistant Secretary of the Army
ASF	Assignable Square Feet
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
AT/FP	Antiterrorism Force Protection
ATO	Antiterrorism Officer
AW	American Water
BAS	Building Automation System
BSC	Brigade Support Center
BTC	Brigade Tactical Command
BTD	Brigade Tactical Department

C2	Command and Control
CAC	Common Access Card
CBUP	Cadet Barracks Upgrade Program
CCS	Construction and Contracting Services
CCTV	Closed Circuit Television
CIO	Chief Information Office
CLDS	Cadet Leader Development System
CLIN	Contract Line Item
CLP	City Light and Power (Local Utility Company)
CMDT	Commandant
CMH	Center for Military History (U.S. Army)
COA	Course of Action
COE	Chief of Engineering Services
COMSEC	Communications Security
COR	Contracting Officer's Representative
CRM	Cultural Resources Manager
CSI	Construction Specifications Institute
CUI	Controlled Unclassified Information
DA	Department of the Army
DAA	Directorate of Academy Advancement
DAD	Director of Admissions
DCA	Directorate of Cadet Activities
D/CMDT	Deputy Commandant
DCS	Deputy Chief of Staff
DEC	Department of Environmental Conservation (NYS)
DES	Directorate of Emergency Services
DFMWR	Directorate of Family Morale, Welfare and Recreation
DHR	Directorate of Human Resources
DMI	Department of Military Instruction
DNI	Director of National Intelligence

DOD	Department of Defense
DOT	Department of Transportation
DPE	Department of Physical Education
DPTMS	Directorate of Plans, Training, Mobilization and Security
DPW	Directorate of Public Works
DSI	Directorate of Strategic Initiatives
EAB	Echelons Above Brigade
EAB-C2F	Echelons Above Brigade Command and Control Facility
EIP	Equipment Installation Plan
EMD	Environmental Management Division
EPAC	Electronic Physical Access Controls
ePRISMS	Enterprise Pro-active Real Property Interactive Space Management System
EPS	Engineering Planning Standards
FDC	Facility Design Criteria
FHED	Fort Huachuca Engineering Directorate
G1	Personnel Directorate
G2	Intelligence Directorate
G3	Operations Directorate
G4	Logistics Directorate
G5	Strategic Plans and Policy Directorate
G5R	Strategic Resourcing
G5E	Strategic Effects
G6	Communications Officer
G8	Finance Directorate
GC	Garrison Commander
GIB	General Instruction Building

HAB	Historic American Buildings Survey
HQ	Headquarters
HQDA	Headquarters Department of the Army
HQIMA	Headquarters, Installation Management Agency
IDG	Installation Design Guide
IDS	Intrusion Detection System
I&E	Installations and Environment
IMCOM	Installation Management Command
IP	Internet Protocol
IS	Information System
ISEC	Information Systems Engineering Command
ISO	International Organization for Standardization
ISP	Inside Plant
ITR	Internal Technical Review
LAN	Local Area Network
LCCA	Life Cycle Cost Analyses
LEED®	Leadership in Energy and Environmental Design
LID	Low Impact Development
LLOP	Low Level of Protection
LOE	Line of Effort
LRC	Logistics Readiness Center
MEDDAC	Medical Department Activity
MCLC	McDonald Cadet Leadership Conference
MHM	Museum, Historic, and Memorialization Committee
MILCON	Military Construction
MOE	Margin of Excellence
MUE	Mission Unique Equipment
MWR	Morale, Welfare and Recreation (G9 Division of the U.S. Army Installation Management Command)

NEC	Network Enterprise Center
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NIST	National Institute of Standards and Technology
NIPR	Non-classified Internet Protocol Router
NOC	Network Operations Center
NOI	Notice of Intent
NOT	Notice of Termination
NR(HP)	National Registry of Historic Places
NYSDEC	New York State Department of Environmental Conservation
OACSIM	Office Assistant Chief of Staff for Installation Management (ASA IE&E)
OC	Operations Center
OEMA	Office of Economic and Manpower Analysis
O&M	Operation and Maintenance Division (DPW)
OPR	Owner's Project Requirements; Owner's Performance Requirements
PA	Programmatic Agreement
PDC	Protective Design Center
PDR	Project Definition Report
PDT	Project Delivery Team
PE	Professional Engineer
PIP	Prioritized Improvements Projects
PMO	Provost Marshal Office
POE	Point of Entry (Term used for Utility Services)
POV	Personally Owned Vehicle
PRISMS	Pro-active Real Property Interactive Space Management System
PRV	Plant Replacement Value
PSO	Physical Security Officer

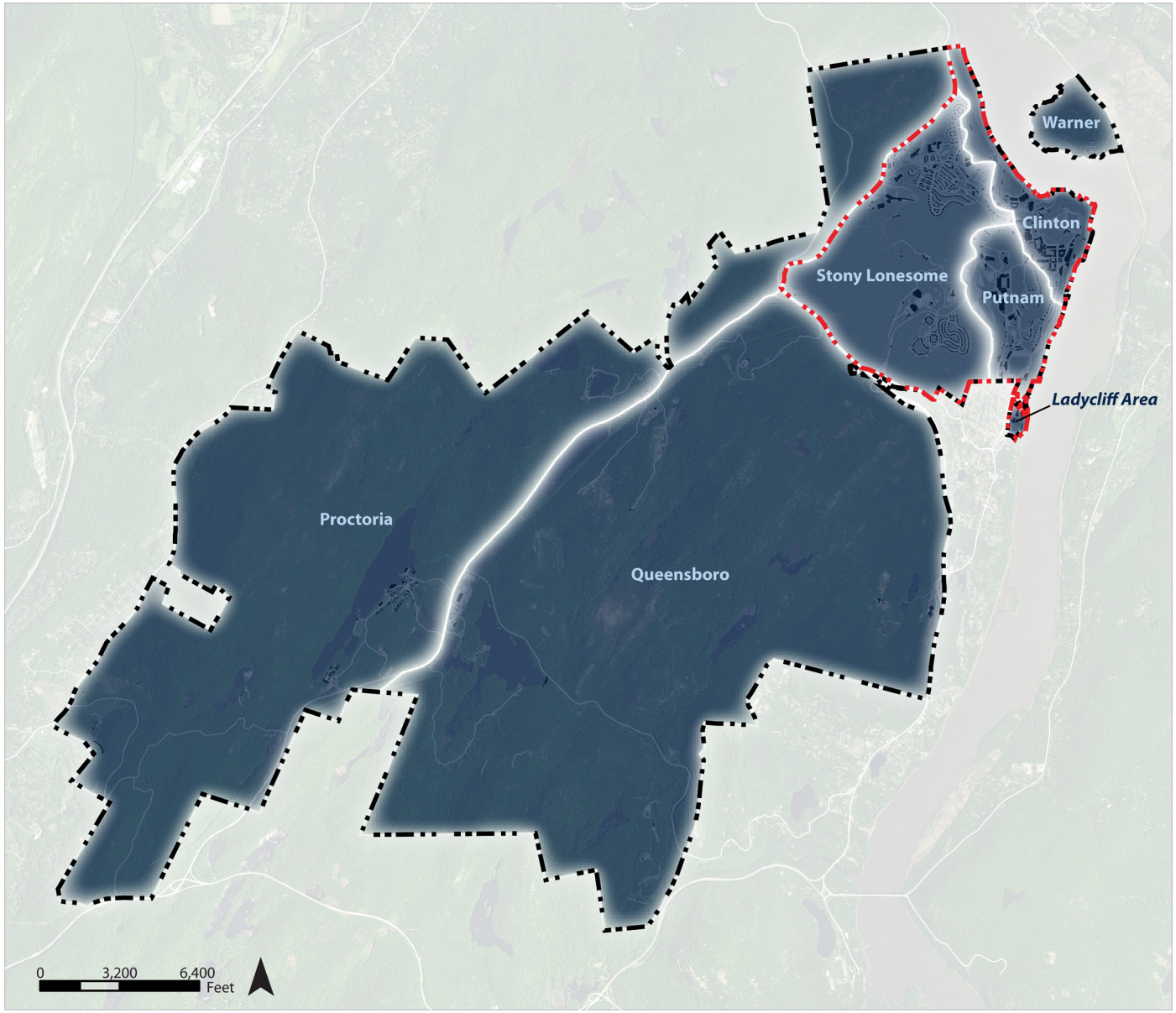
QA	Quality Assurance
QC	Quality Control
REC	Record of Environmental Consideration
ROM	Rough Order of Magnitude
RPMP	Real Property Master Plan
SCP	Standards and Criteria Program
SDD	Sustainable Design and Development
SDP	System Design Plan
SHARP	Sexual Harassment/Assault Response and Prevention
SHPO	State Historic Preservation Office (New York State Office of Parks, Recreation, and Historic Preservation)
SIPR	Secret Internet Protocol Router
SIR	Standard Interconnect Requirements (Orange and Rockland Utilities)
SJA	Staff Judge Advocate
SOW	Scope of Work
SPCC	Spill Prevention Control and Countermeasure Plan
SPDES	State Pollutant Discharge Elimination System (NYSDEC).
SRM	Sustainment, Restoration and Modernization
TB	Technical Bulletin
TBD	To Be Determined
TDA	Table of Distribution and Allowance
TER	Telecommunications Equipment Room
TIA	Telecommunications Industry Association
TM	Technical Manual
TR	Telecommunications Room; Technical Report
TRADOC	Training and Doctrine Command (US Army)
TSB	Telecommunications Systems Bulletin
TOE	Table of Organization and Equipment

UFC	Unified Facilities Criteria
UFGS	Unified Facilities Guide Specifications
USACE	U.S. Army Corps of Engineers
USAISEC	U.S. Army Information Systems Engineering Command
USAG	United States Army Garrison
USCC	United States Corps of Cadets
USGBC	U.S. Green Building Council
USGS	U.S. Geological Survey
USMA	U.S. Military Academy
VAR	Value Added Resellers
VE	Value Engineering
VIOS	Visual Information Ordering Site (DA East Region)
VoIP, VOIP	Voice Over Internet Protocol
VSS	Virtual Security System
VTC	Video Teleconferencing
WBDG	Whole Building Design Guide A collaborative online source prepared by the National Institute of Building Sciences (NIBS) for federal agencies. It provides Department of Defense (DOD) Federal Facility Criteria which includes: Unified Facility Guide Specifications (UFGS) and Unified Facilities Criteria (UFC). It also provides recommendations for design and project management, and multiple design resources,
WLAN	Wireless Local Internet
WPLC	West Point Leadership Center
WREN	West Point Research Education Network

Appendix B

West Point Installation Framework Plan

Framework Plan Districts



West Point Framework Plan

- Growth Boundary
- Installation Boundary
- Existing Buildings
- District Area

During a collaborative exercise, stakeholders examined the best organization of West Point to create districts for effective long-range planning. Once identified, the stakeholders then prioritized the districts based on the need for a comprehensive planning effort. The districts identified in the framework plan are the basis for future ADPs. The prioritization order for future ADPs by district are identified below.

District Prioritization

1. Clinton District
2. Putnam/Ladycliff Area District
3. Proctoria District
4. Queensboro District
5. Stony Lonesome District
6. Warner District

Appendix C

UXO Safety Poster

Follow the 3Rs

West Point Information

Emergency Contacts

if you encounter a munition:

Call **911**

or

if at West Point report it to:

Military Police

845-938-3333

if found on ranges or training areas report it to:

Range Control

845-938-3930

ORecognize
ORetreat
OReport

Visit the US Army's UXO Safety Education website:
www.denix.osd.mil/uxo

West Point

ORecognize

Recognize when you may have encountered a munition.

Recognizing when you may have encountered a munition is the most important step in reducing the risk of injury or death. Munitions may be encountered on land or in the water. They may be easy or hard to identify.

To avoid the risk of injury or death:

- Never move, touch or disturb a munition or suspect munition
- Be aware that munitions do not become safer with age, in fact they may become more dangerous
- Don't be tempted to take or keep a munition as a souvenir

Munitions come in many sizes, shapes and colors. Some may look like bullets or bombs while others look like pipes, small cans or even a car muffler. Whether whole or in parts, new or old, shiny or rusty, munitions can still explode. The easiest way to avoid injury or death is to stay out of areas marked with no entry signs and heed posted warnings..

ORetreat

Do not touch, move or disturb it, but carefully leave the area.

Avoid death or injury by recognizing that you may have encountered a munition and promptly retreating from the area.

If you encounter what you believe is a munition, do not touch, move or disturb it. Instead, immediately and carefully leave the area by retracing your steps — going out the way you entered. Once safely away from the munition, mark the path (e.g., with a piece of clothing) so response personnel can find the munition.

OReport

Notify the miltary police at 845-938-3333 on ranges/training areas call Range Control at 845-938-3930

Protect yourself, your family, your friends and your community by immediately reporting munitions or suspected munitions to the police.

Provide as much information as possible about what you saw and where you saw it. This will help the police and military or civilian explosive ordnance disposal personnel find, evaluate and address the situation.

If you believe you may have encountered a munition, call the police or range control and report:

- The area where you encountered it.
- Its general description. Remember, do not approach, touch, move or disturb it.
- When possible, provide:
  - Its estimated size
  - Its shape
  - Any visible markings, including coloring

BACKGROUND

West Point's history dates back to the Revolutionary War when General George Washington considered it to be the most strategic position in America. Since that time, the United States Army has held West Point, making it the oldest continuously occupied military installation in the United States. Due to its strategic role in the Revolutionary War, and as the home of the United States Military Academy since 1802, unexploded ordnance (UXO) may be present on virtually every part of West Point and on some nearby recreational areas.

West Point includes nearly 14,000 acres of training areas and range complexes. Live-fire impact/dud areas are marked and off-limits to all personnel. There are numerous recreational areas for hunting, fishing, horseback riding, and camping on or near West Point where the potential to encounter UXO from past military activity exists.

Weathering may make munitions, which may be on the surface, buried, or whole or in parts, difficult to recognize. Even old munitions can still kill. As such, cadets and others should never touch, move or disturb anything encountered that may be a munition or part of one. All munitions should be considered dangerous, regardless of how long they have been in the environment or how frequently they have been handled.

Help protect yourself, your family and your community by learning and following the 3Rs of Explosives Safety.

END OF EPS II DOCUMENT