

2ND RADIO BATTALION COMPLEX PHASE II  
MCB CAMP LEJEUNE, NC

19P1458  
ePROJECTS W.O. NO.: 1397586

## **PART 6 – ATTACHMENTS**

This page intentionally left blank.



## Table of Contents

### Chapter A - Miscellaneous Documents

- Camp Lejeune Base Exterior Architectural Plan (BEAP)
- Determining Compliance with the Guiding Principles for Sustainable Federal Buildings
- NAVFAC Sustainability and Energy Building Requirements
- Executive Order 13834 - Efficient Federal Operations
- Guiding Principles for Sustainable Federal Buildings and Associated Instructions
- Determining Compliance with the Guiding Principles for Sustainable Federal Buildings
- ESOP 10.1 - Vapor Intrusion Evaluation Program for Marine Corps Base Camp Lejeune and Marine Corps Air Station New River
- Environmental Standard Operating Procedure (ESOP) 5090.21
- Per and Polyfluoroalkyl Substances Guidance for Construction
- NCDEQ Express Application Fee Chart 2022

### Chapter B – Drawings

- Overall Site Plan
- Topographic Survey
- Partial Survey

### Chapter C - Affinity Diagrams

- Parachute Maintenance and Paraloft
- Supply Warehouse
- Combined Electrical / Communications / Vehicle Maintenance, and Boat Operations Facility
- Hazardous Material Storage Facility
- Wash Rack and Pad
- Overall Site Plan
- Southwest Site – Parachute Maintenance with Paraloft and Supply Warehouse Site Plan
- Southeast Site – Vehicle Maintenance/Boat Operations Facility, and Hazardous Material Storage Facility Site Plan

### Chapter D - Low Impact Development

- Department of Navy Policy November 2007 Memorandum
- Low Impact Development Data – January 2017, Version 3.0
- Report Documentation Page – Standard Form 298 (Rev. 8-98)
- Low Impact Development Waiver Form
- LID Waiver Form Instructions

### Chapter E - Mechanical and Fire Protection

- Fire Hydrant Flow Test
- IWD-MILCON FACP MNS 28 JAN 2015 Typical (US Version - Alkurdi)
- MNS Riser
- Baseline Energy Cost Data
- 22 14 00.00 22 - Rainwater Harvesting

- 22 33 30.05 22 - Solar Water Heating Equipment (Integrated Solar Hot Water)
- 22 33 31.05 22 - Integrated PV-Thermal System (Integrated Solar Hot Water & PV)
- 22 81 28.10 22 - Variable Refrigerant Flow (VRF) Multi-Split Air Conditioning and Heat Pump Equipment
- Camp Lejeune Mechanical Design Guidance Rev. August 2022
- 28 31 76 - Interior Fire Alarm and Mass Notification System, Addressable

#### Chapter F – Electrical

- Estimated Electrical Load – Paraloft and Supply Warehouse
- Estimated Electrical Load - Combined Electrical / Communications / Vehicle Maintenance, and Boat Operations Facility and Hazardous Material Storage Facility
- Estimated Electrical Load – Wash Rack and Pad
- Lightning Risk Assessment – Parachute Maintenance with Paraloft
- Lightning Risk Assessment – Supply Warehouse
- Lightning Risk Assessment – Hazardous Materials Storage Facility
- MCB Camp Lejeune Electrical Policies and Criteria
- Camp Lejeune Exterior Light Fixtures and Photocell Specification v1\_1 20210903
- 26 31 00.00 22 – Solar Energy Electrical Power Generation Systems

#### Chapter G – FF&E

- Estimated Furnishings, Fixture and Equipment FF&E) Cost Summary
- Estimated Audio / Visual Cost Summary

#### Chapter H – Elevator Guide (Not Used - Refer to UFC 3-490-06 ELEVATORS)

#### Chapter I – Forms

- ATFP UFC 4-010-01 Checklist, Updated 19 August 2020
- NAVFAC MIDLANT Permits Record of Decision (PROD)

#### Chapter J – Reference Drawings and Documents

- SW8 110906 Permit Renewal 08.27.20 – Project Limits
- State Stormwater Management Permit No. SW8 110906 2D - Anglico and 2N BN OPS Complexes - Overall Low Density Project With Areas Of Higher Density - Onslow County

#### Chapter K – Subsurface Soil Information

- Geotechnical Site Characterization Report 2nd Radio Battalion Complex Phase (P1458)
- Report of Geotechnical Exploration 2nd Radio Battalion Complex (P1280) Report of Geotechnical Exploration 2nd Radio Battalion Complex (P1280)

## Part 6 - Attachments

### Chapter A - Miscellaneous Documents

- Camp Lejeune Base Exterior Architectural Plan (BEAP)
- Determining Compliance with the Guiding Principles for Sustainable Federal Buildings
- NAVFAC Sustainability and Energy Building Requirements
- Executive Order 13834 - Efficient Federal Operations
- Guiding Principles for Sustainable Federal Buildings and Associated Instructions
- Determining Compliance with the Guiding Principles for Sustainable Federal Buildings
- ESOP 10.1 - Vapor Intrusion Evaluation Program for Marine Corps Base Camp Lejeune and Marine Corps Air Station New River
- Environmental Standard Operating Procedure (ESOP) 5090.21
- Per and Polyfluoroalkyl Substances Guidance for Construction
- NCDEQ Express Application Fee Chart 2022

This page intentionally left blank.



# Marine Corps Base Camp Lejeune

## BFAP

Base Exterior Architectural Plan  
2010





Prepared by:



HBA Architecture & Interior Design, Inc.  
One Columbus Center, Suite 1000  
Virginia Beach, Virginia 23462  
757-490-9048  
[www.HBAonline.com](http://www.HBAonline.com)



Vanasse Hangen Brustlin, Inc.  
5544 Greenwich Road, Suite 302  
Virginia Beach, Virginia 23462  
757-490-0132  
[www.VHB.com](http://www.VHB.com)





## CONTENTS

EXECUTIVE SUMMARY .....	I
ES-1 USING THE BEAP .....	I
ES-2 INTRODUCTION .....	2
ES-2.1 STUDY PURPOSE AND FOCUS.....	2
ES-2.2 BASE MISSION .....	2
ES-2.3 STUDY AREA .....	2
ES-2.4 BEAP OBJECTIVES.....	3
ES-3 EXISTING CONDITIONS SUMMARY .....	3
ES-3.1 VISUAL ENVIRONMENT DEFINED.....	3
ES-3.2 DISTRICTS.....	3
ES-3.3 ARCHITECTURAL STYLE.....	4
ES-3.4 DISTRICT ENTRYWAYS .....	4
ES-3.5 LANDMARKS AND REFERENCE POINTS .....	4
ES-3.6 SIGNIFICANT VIEWS .....	4
ES-3.7 ACTIVITY NODES .....	4
ES-3.8 CIRCULATION ROUTES.....	4
ES-3.9 INSTALLATION OR DISTRICT EDGES.....	4
ES-4 DESIGN GUIDELINES OVERVIEW .....	5
ES-4.1 THEME ANALYSIS.....	5
ES-4.2 THEME DEFINITIONS .....	5
I.0 INTRODUCTION .....	7
I.1 REGION .....	7
I.2 BASE MISSION.....	7
I.3 STUDY AREA.....	8
I.4 STUDY PURPOSE AND FOCUS .....	9

1.5 METHODOLOGY .....	9
1.6 GUIDELINE ELEMENTS.....	9
1.7 OVERALL PROJECT OBJECTIVES .....	9
2.0 EXISTING CONDITIONS SUMMARY .....	11
2.1 HISTORICAL BACKGROUND .....	11
2.2 PREVIOUS DESIGN GUIDELINES.....	11
2.3 VISUAL ENVIRONMENT DEFINED.....	11
2.3.1 SPECIAL DISTRICTS.....	11
2.3.2 ARCHITECTURAL STYLES .....	13
2.3.3 ENTRIES.....	13
2.3.4 LANDMARKS AND REFERENCE POINTS.....	13
2.3.5 SIGNIFICANT VIEWS .....	13
2.3.6 ACTIVITY NODES.....	14
2.3.7 CIRCULATION ROUTES .....	15
2.3.8 INSTALLATION OR DISTRICT EDGES .....	16
2.4 VISUAL STRUCTURE OVERVIEW .....	16
2.4.1 NATURAL ENVIRONMENT AND OPEN SPACE OVERVIEW .....	16
2.4.2 DEVELOPED ENVIRONMENT OVERVIEW .....	17
2.5 SPECIAL DISTRICT OVERVIEW .....	17
HADNOT POINT .....	17
FRENCH CREEK.....	18
COURTHOUSE BAY .....	19
PARADISE POINT .....	20
CAMP GEIGER .....	20
MCAS NEW RIVER .....	21
STONE BAY .....	22

CAMP JOHNSON .....	23
2.6 HISTORIC DISTRICT OVERVIEW.....	24
2.6.1 HISTORIC BUILDINGS AND LANDMARKS.....	24
2.6.2 HISTORIC DISTRICT .....	24
2.6.3 ADJUSTMENTS TO HISTORIC DISTRICT .....	25
2.6.4 ARCHITECTURAL STYLES .....	25
2.7 ASSETS AND LIABILITIES OVERVIEW .....	26
2.7.1 ASSETS .....	26
2.7.2 LIABILITIES.....	27
3.0 INSTALLATION WIDE DESIGN GUIDELINES.....	29
3.1 FRAMEWORK FOR THE OVERALL DESIGN THEME.....	29
3.1.1 DESIGN THEME FRAMEWORK .....	29
3.1.2 INTRODUCTION TO THE MECHANICS OF THE GUIDELINES.....	29
3.1.3 NATURAL AND CULTURAL RESOURCES .....	30
3.1.4 ANTI-TERRORISM AND FORCE PROTECTION .....	30
3.1.5 SUSTAINABLE PLANNING AND DESIGN .....	32
3.2 SITE DESIGN .....	37
3.2.1 GATES .....	37
3.2.2 PERIMETER EDGES.....	39
3.2.3 ROADWAYS AND ACCESS – VEHICULAR CIRCULATION .....	39
3.2.4 BUILDING SITING – BUILDING LAYOUT ORIENTATION .....	43
3.2.5 PARKING .....	44
3.2.6 BICYCLE CIRCULATION.....	46
3.2.7 PEDESTRIAN CIRCULATION .....	47
3.2.8 PLAZAS AND COURTYARDS – EXTERIOR USE AREAS.....	51
3.2.9 COMMON AREAS, ACTIVITY NODES, OPEN SPACES AND PARKS – EXTERIOR USE AREA.....	52

3.2.10 MAINTENANCE AND IMPROVEMENTS (COLS) .....	54
3.2.11 STORMWATER MANAGEMENT AND LOW IMPACT DEVELOPMENT .....	55
3.3 ARCHITECTURAL DESIGN .....	57
3.3.1 ARCHITECTURAL STYLE AND ROOF FORMS .....	57
3.3.2 COLOR CHARTS .....	58
3.3.3 ARCHITECTURAL COMPONENTS .....	58
3.3.4 BUILDING ENTRANCES .....	62
3.3.5 BUILDING ADDITIONS AND RENOVATIONS .....	62
3.3.6 GUIDELINES FOR HISTORIC BUILDINGS, HISTORIC BUILDINGS PRIORITY TREATMENT .....	62
3.4 LANDSCAPE ARCHITECTURE .....	63
3.4.1 FOCAL POINT DEVICES .....	63
3.4.2 MEMORIALS, MONUMENTS, STATUES, AND STATIC DISPLAYS .....	63
3.4.3 FLAGPOLES .....	64
3.4.5 PLANT MATERIAL .....	65
3.4.6 SIGNAGE .....	67
3.4.7 PAVING SURFACES – PAVING .....	69
3.4.8 SITE FURNISHINGS .....	70
3.4.9 WALLS AND FENCES .....	72
3.4.10 UTILITIES – SITE UTILITY / TRASH ENCLOSURE .....	73
3.4.11 LIGHTING .....	74
4.0 DESIGN GUIDELINES FOR SPECIAL DISTRICTS .....	77
4.1 COMMON DISTRICT .....	77
4.1.1 TRAINING FACILITIES .....	81
4.1.2 BACHELOR ENLISTED QUARTERS .....	82
4.2 HADNOT POINT .....	85
4.2.1 HADNOT POINT .....	85

4.2.2 INDUSTRIAL AREA.....	89
4.2.3 MARINE CORPS EXCHANGE COMPLEX .....	91
4.3 HOSPITAL POINT .....	93
4.4 FRENCH CREEK .....	97
4.5 COGDELS CREEK .....	103
4.6 WALLACE CREEK.....	109
4.7 COURTHOUSE BAY .....	113
4.8 PARADISE POINT .....	117
4.8.1 BREWSTER ROAD .....	121
4.8.2 WOUNDED WARRIOR COMPLEX.....	123
4.9 ONSLOW BEACH .....	127
4.10 CAMP GEIGER .....	131
4.11 NEW RIVER.....	135
4.12 STONE BAY .....	141
4.12.1 STONE BAY COMMON SUPPORT AREA.....	141
4.12.2 RIFLE RANGE HISTORIC AREA.....	144
4.12.3 MARSOC .....	148
4.13 CAMP JOHNSON .....	151
4.14 ENTRY GATES.....	155
4.15 GREATER SANDY RUN.....	159
4.16 CAMP DEVIL DOG .....	163
5.0 SPECIAL BEAP AREAS .....	167
5.1.1 DODEA SCHOOLS .....	167
5.1.2 PRIVATE VENDORS.....	167
5.1.3 HOUSING .....	168
6.0 ARCHITECTURAL REVIEW BOARD .....	169

6.1 COMPOSITION .....	169
6.2 MEETINGS .....	169
6.3 DUTIES AND RESPONSIBILITIES .....	169
6.3.1 MATTERS WITHIN PURVIEW OF THE BOARD .....	169
6.4 CERTIFICATE OF COMPLIANCE PROCEDURES .....	170
6.4.1 NEW CONSTRUCTION SUBMITTAL REQUIREMENTS .....	170
6.4.2 MAJOR ALTERATIONS OR ADDITIONS TO EXISTING BUILDINGS .....	170
6.4.3 DATES AND PROCESS .....	170
6.4.4 REASONS FOR DENIAL .....	171
6.4.5 PROCESS FLOW CHART .....	172
6.5 CERTIFICATE OF COMPLIANCE.....	173
REVIEW BOARD USE ONLY .....	173
APPENDICES .....	175
APPENDIX A – SUMMARY OF FIELD WORK.....	175
SCOPE OF DATA COLLECTION.....	175
APPENDIX B – COMMON OPERATING LEVELS (COLS).....	177
APPENDIX C – REGIONAL MATERIALS RADIUS .....	179
APPENDIX D – PLANT PALETTE.....	181
DUNE RESTORATION PLANTS – GRASSES .....	187
DUNE RESTORATION PLANTS – TREES AND SHRUBS.....	187
APPENDIX E - COLOR BOARDS.....	189
APPENDIX F – BEAP PAMPHLET .....	191
OBJECTIVE.....	191
SITE AND LANDSCAPING.....	191
ARCHITECTURE.....	191
MODIFICATIONS.....	192

RESTRICTIONS .....	192
REFERENCES AND RESOURCES.....	192
ACRONYMS AND ABBREVIATIONS.....	193
BIBLIOGRAPHY .....	195





# BEAP

## BASE EXTERIOR ARCHITECTURAL PLAN

### EXECUTIVE SUMMARY

#### ES-1 USING THE BEAP

This Base Exterior Architectural Plan (BEAP) is the official direction for designing, developing, and reviewing all Installation construction and renovation projects at Marine Corps Base (MCB) Camp Lejeune and Marine Corps Air Station (MCAS) New River.

Chapters 1, 2 and Appendix A: Summary of Field Work provides a comprehensive background in understanding the historical and existing Installation context. The design guidelines in Chapters 3 and 4 provide direction on how to make MCB Camp Lejeune and MCAS New River more attractive and functionally organized Installations, but also encourage creativity in architecture, planning, landscape architecture and site design.

The design guidelines summarize the overall recommended design styles and elements for the Installation, which has been subdivided into Special Districts. The basic process for using this document for a design project is as follows:

1. Consult the Special District Map, Section 2.3.1, to determine approximate project location.
2. Consult the design guidelines in Chapter 3 for more detailed design development information. The design guidelines include instructions on the following topics:
  - Site planning: gates, roadways and access, building siting, parking, pedestrian circulation, plazas and courtyards, common areas/activity nodes/open spaces and parks, service areas, and maintenance and improvements (Common Operational Level or COLs)
  - Landscape architecture: focal point devices, memorials and static displays, flagpoles, plant material, signage, paving services, bollards, fencing, and utilities.
3. Consult Chapter 4 for the design guidelines of the specific Special District or Sub-district in which the project is located. These guidelines will cover the following topics:
  - Massing
  - Windows and Entrances
  - Body and Roof Materials
  - Colors
  - Details
  - Precedent Buildings
4. Submit an Application for Certificate of Compliance during the Design Development Submittal or 35% Design Submittal. The Architectural Review Board will make an initial assessment of the project to ensure design direction is in compliance with the BEAP.
5. Submit an Application for Certificate of Compliance for the Pre-Final or 100% Design Submittal. The Architectural Review Board will make a final decision on approving the Certificate of Compliance.

## ES-2 INTRODUCTION

This Base Exterior Architectural Plan (BEAP) is the official direction for designing, developing and reviewing all installation construction and renovation projects at MCB Camp Lejeune and MCAS New River.

### ES-2.1 STUDY PURPOSE AND FOCUS

This BEAP replaces the previous March 1997 version and has a two-fold purpose. It provides aesthetic and functional direction for new development and renovation efforts, and it helps to protect and preserve the Installation's natural and historic resources. Though preservation of resources must be a high priority, the guidelines must be flexible enough to allow for renovation, expansion, or demolition of inadequate facilities that may need

to be removed to make room for other mission essential facilities.

### ES-2.2 BASE MISSION

MCB Camp Lejeune is home to the II Marine Expeditionary Force (II MEF), the Marine Forces Special Operations Command, 2nd Marine Division, 2nd Marine Logistics Group, the Naval Hospital, and several other major subordinate commands. The mission of MCB Camp Lejeune is to maintain combat-ready units for expeditionary deployment.

### ES-2.3 STUDY AREA

The study area includes developed land within the bounds of MCB Camp Lejeune and MCAS New River, as well as two remote locations: Oak Grove Outlying Landing Field and Morehead Port. See map below.



BEAP Study Area

## ES-2.4 BEAP OBJECTIVES

---

1. Identify and strengthen the formal site planning elements at MCB Camp Lejeune and MCAS New River.
2. Improve wayfinding for Installation occupants, their customers and visitors by developing a hierarchy of roadways and pedestrian paths, and establishing visual wayfinding elements including signage systems.
3. Identify visual assets and liabilities on MCB Camp Lejeune and MCAS New River. Provide direction to maintain assets and change liabilities.
4. Recognize and analyze the unique visual districts within Installations' boundaries to classify the built environment style and a harmonizing theme to strengthen each district.
5. Initiate a process to control the architectural style and direction for all planned and imminent construction.
6. Establish clear visual environment design guidance both in a general sense and specific to individual districts.
7. Establish a process by which the guidance in the plan is routinely and effectively administered and implemented within each new modification or project.
8. Develop guidelines that apply to all built environment elements including buildings, walls, fencing, landscaping, utilities and pavements related to personnel and vehicular movement.
9. Recommend materials and construction elements that can realistically be maintained by local resources.

## ES-3 EXISTING CONDITIONS SUMMARY

---

### ES-3.1 VISUAL ENVIRONMENT DEFINED

---

This section defines the major perceptual environment components and the terminology used in analyzing those components at MCB Camp Lejeune and MCAS New River. They include Special Districts, architectural styles, entries, landmarks and reference points, significant views, activity nodes, circulation routes, and Installation edges.

### ES-3.2 DISTRICTS

---

Humans typically utilize a mental visual-spatial map that helps them navigate and interact with their environment. We rely heavily on the visual environment and tend to organize areas into perceptual units. To visually comprehend the complexities associated with a Marine Base, it is appropriate to subdivide the Installation into units or Special Districts. Special Districts are pre-existing neighborhoods of development which are part of the formal and informal spatial maps at Camp Lejeune.

There are 13 Special Districts, some of which also have sub-districts with unique characteristics.

- Hadnot Point
- Hospital Point
- French Creek
- Cogdels Creek
- Wallace Creek
- Courthouse Bay
- Paradise Point
- Onslow Beach
- Camp Geiger
- Marine Corps Air Station New River
- Stone Bay
- Camp Johnson
- Entry Gates

### ES-3.3 ARCHITECTURAL STYLE

---

There are three common architectural styles on Camp Lejeune by which some, not all, buildings may be classified.

*Georgian.* A formal arrangement of classical details, including pediments, pilasters, or columns.

*Colonial Revival.* Fashioned after the Georgian style, commonly with broken pediments and somewhat less detailed classical ornament

*Shingle Style.* Uniform covering of unpainted shingles, porch coverings and small groups of windows.

### ES-3.4 DISTRICT ENTRYWAYS

---

Entries are those areas an individual passes through to go from one district to another. For the purposes of this study, entries are gates that lead from off base to on base or from one major district to another.

### ES-3.5 LANDMARKS AND REFERENCE POINTS

---

Landmarks are points on the Installation that can be used for cognitive reference. Generally, a landmark is a physical object such as a tower, building, monument, or natural feature so distinctive from its surroundings that it becomes easily recognizable and memorable. Major landmarks on MCB Camp Lejeune and MCAS New River include:

- Parade deck at Hadnot Point
- Roundabouts at MCB Camp Lejeune
- Marine Corps Exchange complex
- Officers' Club at Paradise Point
- Flight line at MCAS New River

### ES-3.6 SIGNIFICANT VIEWS

---

MCB Camp Lejeune and MCAS New River benefit from views along the banks of the New River where development gives the greatest access to the water. These occur along large expanses of the river's edge, such as at Paradise Point, as well as in sheltered inlets in Courthouse Bay. A multitude of uses exist along these views, such as bachelor housing, recreation, and parking.

### ES-3.7 ACTIVITY NODES

---

Activity nodes are definable areas that support high concentrations of activity. They generally coincide with major facility landmarks or buildings that house important functions such as headquarters. They can also occur in areas where a high level of vehicular or pedestrian traffic converges and interacts within spaces between facilities. Nodes can occur outside facilities in plazas, entrances or other outdoor spaces. Recreation and commercial functions can also generate high levels of activity and are commonly indicated as nodes. Nodes are often where the convergence of two major circulation routes occur.

### ES-3.8 CIRCULATION ROUTES

---

Circulation routes determine the basis for much of what a person sees, which includes all roads, walkways and unimproved paths. The primary circulation routes, the roadways, become a framework for the organization of the Installation. Circulation routes provide physical access to all areas of the Installation and are used for wayfinding purposes.

### ES-3.9 INSTALLATION OR DISTRICT EDGES

---

Edges consist of definable elements that separate unlike districts. These edges can be open spaces, streets, walls, fences, rows of trees, sides of buildings, water bodies or landforms. In this analysis, edges are

primarily limited to the Installation edge and areas between major districts. An edge attains significant visual strength if it has long lateral visibility and is impenetrable to cross movement, such as the Installation boundary fencing. Conversely, penetrable edges usually serve to join two districts together.

## ES-4 DESIGN GUIDELINES OVERVIEW

### ES-4.1 THEME ANALYSIS

An overall Installation architectural theme sets the framework for guidelines and standards. This theme integrates the goals for the built environment with the broader non-facility goals and objectives of the mission at MCB Camp Lejeune and MCAS New River. Existing settings, buildings and structures were analyzed to determine the factors to provide the framework for the overall theme. (See Appendix A: Summary of Field Work.) This analysis concluded:

- An overall predominant architectural style presently exists at MCB Camp Lejeune, but some districts do not represent this style as much as others.
- Predominant materials, color, and forms do exist at MCB Camp Lejeune, but are not always consistently applied.
- Architectural character and positive visual impressions can be found in many areas of Camp Lejeune and are examples of proper treatment of historical districts and integration of contemporary architecture.

In addition to architecture, other visual support or infrastructure elements have been evaluated. This analysis concluded:

- The major roadways
- The larger scale landscape elements (trees and other mature vegetation including natural areas)
- Streetscape and site elements

- Signage and graphics
- Currently existing lighting

### ES-4.2 THEME DEFINITIONS

Defining a design theme for the Installation is one of the functions of this Base Exterior Architectural Plan. Assigning prominence to specific areas enhances orientation and wayfinding by highlighting their distinctiveness and sense of place within an overall coherent physical arrangement that visually and cognitively unifies the Installation. Extensive field work has revealed that the elements that appear most frequently throughout MCB Camp Lejeune are:

1. Red to red-brown brick, modular size
2. Concrete or stone foundation base and window sills
3. White door and window trim, eaves, gutters and downpouts
4. Gray asphalt or standing seam metal roofing
5. Gable-on-hip roof

Using the common items listed above as a nucleus, and taking into account the existing elements from the previous section, the overall architecture theme is **traditional early American design** and can be implemented through guidelines and standards that recognize the dominant character. Because of the visual and/or spatial separation that exists between several of the districts, separate standards are appropriate under a Special District design approach. Though the standard may vary among districts, common harmonizing elements are intended to unify the entire Installation. At the same time, wayfinding, district delineation, and spatial clarity depend on uniqueness. The guidelines must accommodate and encourage variety and uniqueness while incorporating harmonizing elements.

It is appropriate that some areas be treated as districts, independently or collectively, by function, use, density, topography, orientation, and/or architectural character. The dominant positive characteristics of the district are intended to be repeated to further reinforce and strengthen the definition of the district. Districts with historical or near-historical significance are intended to be reinforced through preservation or retrofit methods that support the area character. This methodology is used throughout the design guidelines.

## 1.0 INTRODUCTION

Those serving aboard and visiting the Installation invest emotional qualities in the environmental design. This means each person's surroundings comprise of connotations, memories, experiences, feeling, hopes and dramas. This forms a collective image, or urban legibility, and is not only the basis of spatial orientation but the key to providing a stimulating and healthy environment.

Improvements to the overall visual organization and aesthetics of MCB Camp Lejeune and MCAS New River will not occur by simply writing a generalized set of guidelines. Likewise, changes to the visual environment will not be positive unless they are following a prescribed format and intended direction. Guidelines are the starting point, but the implementation of a review process that directs development must be part of the process to positively affect the base. This BEAP is intended to cover the first few steps in the process that will eventually help to improve the overall visual environment and to contribute to protecting the positive elements that are already present.

This BEAP is a working document that will function as a guide to physical development and urban legibility, while at the same time, is flexible enough to account for changing conditions, priorities and programs. The decision making process for physical development must address site planning and design issues, as well as the financial and functional requirements of physical design and development. Aesthetic improvements cannot be achieved on a site-by-site or problem-by-problem basis, but must be based on a master plan which is properly conceived to allow each problem to be resolved as part of a total concept.

This document is MCB Camp Lejeune and MCAS New River's official direction on facility and site development. It will be used in developing,

designing, and reviewing all construction and renovation projects on the Installation. The guidelines are meant to be specific enough to provide direction on how to make both Installations more attractive and functionally organized, but they are also meant to encourage creativity in site design, planning, architecture, and landscape architecture. The guidelines do not cover all physical elements commonly addressed by facility development. They only cover those elements needed to produce a historically correct design theme, where appropriate, and coherent physical development of the Base.

## 1.1 REGION

Marine Corps Base Camp Lejeune is located in Onslow County within the coastal plains of North Carolina and sits adjacent to the City of Jacksonville. The New River runs north and south through the Base, separating MCB Camp Lejeune from MCAS New River and the Greater Sandy Run training area.

MCB Camp Lejeune serves approximately 150,000 active duty, dependent, retiree and civilian employees, which is a significant part of the Jacksonville and Onslow County populations. Over 25 percent of the county is part of the Armed Forces.

MCB Camp Lejeune and MCAS New River are surrounded by predominantly rural agricultural lands, which diversify into higher density areas near the urban centers of Jacksonville, Swansboro and Topsail Beach.

## 1.2 BASE MISSION

MCB Camp Lejeune is home to the II Marine Expeditionary Force (II MEF). The major commands include:

- II Marine Expeditionary Force (II MEF)
- Marine Corps Special Operations Forces Command



- 2nd Marine Division
- 2nd Marine Logistics Group
- Naval Hospital Camp Lejeune
- 22nd, 24th, and 26th Marine Expeditionary Units
- Marine Corps Engineer School
- Joint Maritime Training Center
- School of Infantry – East
- Marine Corps Combat Service Support School
- Field Medical Training Battalion – East
- Wounded Warrior Battalion – East

The mission of MCB Camp Lejeune is to maintain combat-ready units for expeditionary deployment. Marine Corps Base owns all the real estate, hosts entry-level and career-level formal schools and provides support and training for tenant commands – II Marine Expeditionary Force conducts operational planning for Fleet Marine Force commands; 2nd Marine Division is the ground combat element of II MEF; 2nd Marine Logistics Group is the combat service support element of II MEF; and 2nd Marine Air Wing, headquartered at Cherry Point, North Carolina, is the air combat element of II MEF. Additionally, the naval hospital provides primary medical care to service members and their families stationed at Camp Lejeune and Marine Corps Air Station New River. Marine Corps Special Operations Forces Command is the Marine Corps force provider for the US Special Operations Command (USSOCOM).

Among many other support units, MCAS New River is home to two groups of the 2nd Marine Air Wing: Marine Aircraft Group 26 which consists of tiltrotor squadrons, and Marine Aircraft Group 29 which comprises both heavy and light/attack helicopters.

### 1.3 STUDY AREA

The study area includes developed land within the bounds of MCB Camp Lejeune and MCAS New River, as well as two remote locations.

**MCB Camp Lejeune:** The largest contiguous portion of MCB Camp Lejeune consists of approximately 56,000 acres and occupies the land immediately to the east of the New River. Commonly referred to as “main side”, this part of the study area contains the majority of the Special Districts, administration, personnel support, and family and bachelor housing facilities.

**Stone Bay:** Stone Bay District is 2,700 acres of range training areas, administration and support facilities, as well as encompassing the Marine Corps Forces Special Operations Command complex.

**MCAS New River and Camp Geiger:**

Collectively this area consists of 4,507 acres, including land dedicated to the Marine Corps School of Infantry East and the subordinate units of the 2nd Marine Air Wing, flight line, aprons, and supporting areas.

**Camp Johnson:** An ancillary camp located between MCAS New River and MCB Camp Lejeune. Camp Johnson is approximately 1,552 acres consisting of primarily military education facilities.

**Oak Grove:** An outlying landing field (OLF) to the north of MCB Camp Lejeune located outside of Pollocksville, North Carolina.

**Morehead Port:** Located in Morehead City, North Carolina, this area consists of a small cluster of buildings for use by the Marine Corps during port operations.

**Camp Devil Dog:** Approximately 134 acres of austere training facilities primarily used by the School of Infantry. Camp Devil Dog is located to the south of MCAS New River along Highway 17.

**Greater Sandy Run:** A vast maneuver area of 41,227 acres, Sandy Run is on the western edge of the military reservation and represents the largest expanse of training area for the Marine Corps on the east coast.



## I.4 STUDY PURPOSE AND FOCUS

This BEAP replaces the previous BEAP version (dated March 1997) and has a two-fold purpose. It provides aesthetic and functional direction for new development and renovation efforts, and it helps to protect and preserve the Installation's natural and historic resources. Though preservation of resources must be a high priority, the guidelines must be flexible enough to allow for renovation, expansion or demolition of inadequate facilities that may need to be removed to make room for other mission essential facilities.

## I.5 METHODOLOGY

Major phases for the BEAP include:

- Identify the overall project goals
- Complete field work to determine assets, liabilities, dominant elements, perceptual districts and spatial structure
- Develop objectives for site planning, architecture, landscape architecture, signage and lighting
- Map perceptual districts and spatial structure
- Map assets and liabilities
- Map historic structures and districts
- Map road hierarchy and structure
- Develop specific guidelines
- Develop examples of what to do and not to do
- Describe acceptable building materials
- Develop a review process
- Obtain consensus and approval on the guidelines
- Produce a final document and brochure

## I.6 GUIDELINE ELEMENTS

Design guidelines are developed for the following:

- Site planning: gates, roadways and access, building siting, parking, pedestrian circulation, plazas and courtyards, common areas/activity nodes/open spaces and parks, service areas, and maintenance and improvements
- Architecture: building design, building entrances, building renovations and additions, historic architecture, and the Building Color Design Guide
- Landscape architecture: focal point devices, memorials and static displays, flagpoles, plant material, signage, paving services, bollards, fencing, and utilities.

## I.7 OVERALL PROJECT OBJECTIVES

1. Identify and strengthen the formal site planning elements at MCB Camp Lejeune and MCAS New River.
2. Identify and protect the Historic District's significant resources. This BEAP will focus on the exterior visual environment where buildings form the edges of spaces as well as the site "grounds" within the Historic District.
3. Improve wayfinding for Installation occupants, their customers and visitors by developing a hierarchy of roadways and pedestrian paths, and establishing visual wayfinding elements including signage systems.
4. Identify visual assets and liabilities on MCB Camp Lejeune and MCAS New River. Provide direction to maintain assets and change liabilities.
5. Recognize and analyze the unique visual and historic districts within MCB Camp Lejeune and MCAS New River boundaries to classify the built environment style and a harmonizing theme to strengthen each district.

6. Initiate a process to control the architectural style and direction for all planned and imminent construction.
7. Establish clear visual environment design guidance both in a general sense and specific to individual districts.
8. Establish a process by which the guidance in the plan is routinely and effectively administered and implemented within each new modification or project.
9. Develop guidelines that apply to all built environment elements including buildings, walls, fencing, landscaping, utilities and pavements related to personnel and vehicular movement.
10. Recommend materials and construction elements that can realistically be maintained by local resources.

## 2.0 EXISTING CONDITIONS SUMMARY

### 2.1 HISTORICAL BACKGROUND

MCB Camp Lejeune is located in eastern North Carolina adjacent to the City of Jacksonville. The base consists of 14 miles of beach front along the Atlantic Ocean. The New River runs north/south through the base and Highway 24 separates MCB Camp Lejeune from Jacksonville. The Base serves approximately 150,000 active and retired military, their dependents, and civilian employees.

Originally Marine Barracks New River, established 1 May 1941, the Base's first warehouse was a converted tobacco barn and the Base Headquarters a summer cottage. In December 1942, the Base was renamed MCB Camp Lejeune in honor of Lieutenant General John A. Lejeune — 13<sup>th</sup> Commandant of the Marine Corps. Today, MCB Camp Lejeune and the adjacent New River Air Station are the largest concentration of Marines and Sailors in the world.

### 2.2 PREVIOUS DESIGN GUIDELINES

Camp Lejeune instituted its first BEAP in 1997. Because no formal documentation existed prior to that time, architecture and landscape evolved as a mixture of different forms, colors, materials, and styles. The first BEAP was designed to establish basic standards of appearance where none previously existed.

While the previous BEAP was successful at establishing color and material standards, it left other areas of building and landscape to the designer. When facility acquisition shifted to the Design-Build process, these areas became significant gaps in controlling aesthetics. Where the Design-Bid-Build process gave the Installations a large role in the design of a facility, Design-Build did not, and

occasionally resulted in less desirable architecture and landscapes.

The primary difference in this BEAP is to address new methods of facility acquisition, incorporate newly developed areas of the Base, and provide more specific guidelines to control the physical appearances of the Installation.

### 2.3 VISUAL ENVIRONMENT DEFINED

This section defines the major perceptual environment components and the terminology used in analyzing those components at MCB Camp Lejeune and MCAS New River. They include Special Districts, architectural styles, entries, landmarks and reference points, significant views, activity nodes, circulation routes, and Installation edges.

#### 2.3.1 SPECIAL DISTRICTS

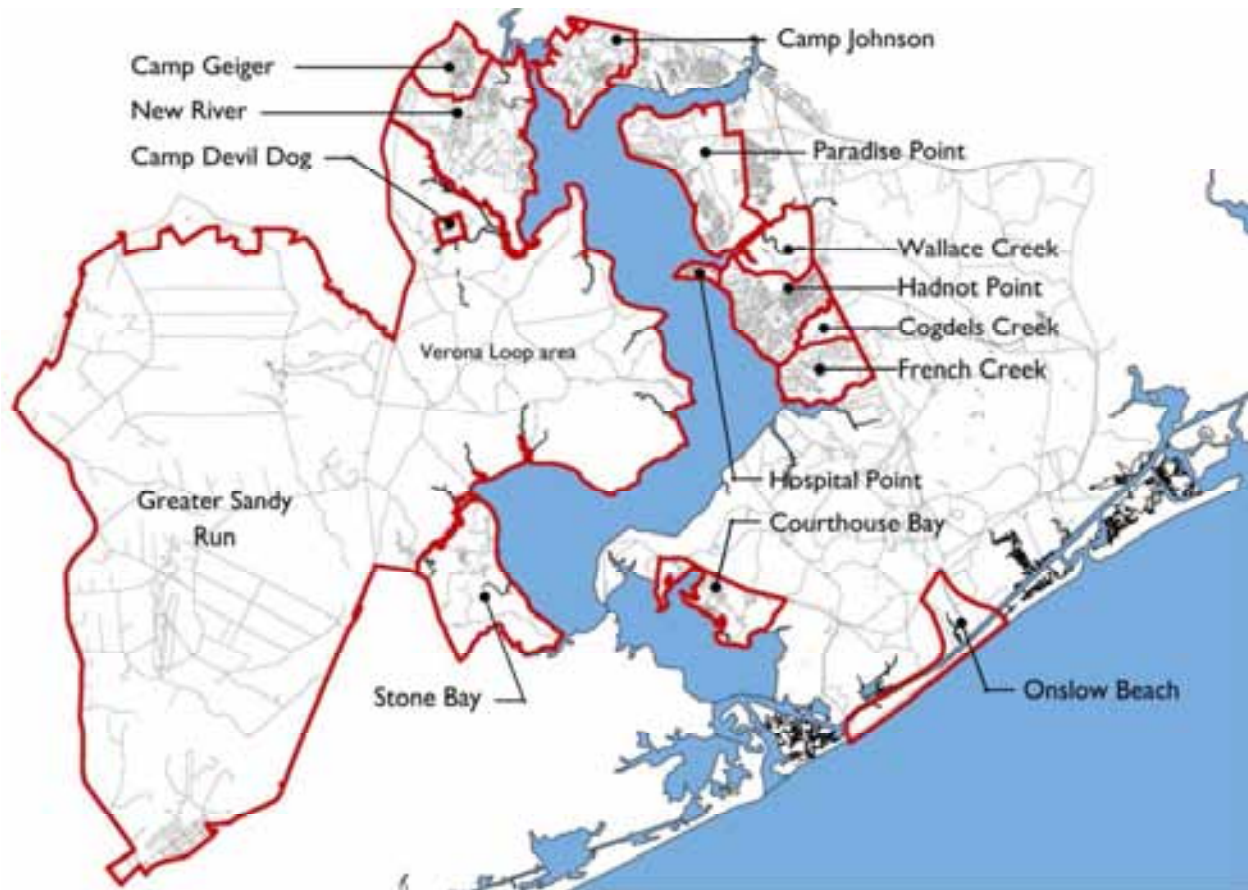
The NAVFAC Installation Appearance Guide (IAG) uses functional district to analyze areas of an installation. Functional districts are areas unified by common functions, such as administrative/ training, airfield, industrial, personnel support and waterfront. Instead of functional districts, MCB Camp Lejeune uses a system of distinct neighborhood areas, known as Special Districts. Special Districts are based on unique geographical areas, which, over time, have developed as separate districts as well as unique variations on the predominant architectural theme. Therefore, the BEAP uses Special Districts defined by elements such as architectural style, color schemes, and landscaping. The Special Districts this BEAP addresses are:

- Hadnot Point
- Hospital Point
- French Creek
- Cogdels Creek
- Wallace Creek
- Courthouse Bay

- Paradise Point
- Onslow Beach
- Camp Geiger
- Marine Corps Air Station New River
- Stone Bay
- Camp Johnson
- Entry Gates
- Greater Sandy Run
- Camp Devil Dog

These Special Districts contain sub-districts:

- Hadnot Point
  - Industrial Sub-district
  - Marine Corps Exchange
- Paradise Point
  - Brewster Street
  - Wounded Warrior Complex
- Stone Bay
  - Historic Rifle Range
  - MARSOC



Special Districts on MCB Camp Lejeune and MCAS New River

### 2.3.2 ARCHITECTURAL STYLES

---

Architectural style is a way of classifying architecture largely by physical characteristics. Styles formed during certain architectural periods and were influenced by prominent designers, cultural context, climatic or economic conditions or a combination. These designs became so formalized that they constituted “style.”

Classifying architecture by style gives emphasis to characteristic features of design, irrespective of the historic period from which the style emerged. The identifying features of a style include a wide variety of elements that may or may not be found on a particular building. Some structures are often identified with only one or two primary stylistic elements or forms. But the majority of buildings are often simplified versions that attempt to mimic the basic ideas of these “high style” prototypes. And some are simply utilitarian structures designed purely to meet functional requirements.

### 2.3.3 ENTRIES

---

Entries include both physical gateways into the installation as well as physical or implied gateways into Special Districts. Installation gateways functionally serve as check points for access, control, and security, as well as primary locations for informational and directional help to guide visitors to their destination. They also establish the initial impression of the Installation. Special Districts may have physical gateways or secondary security control points. Entries may be implied by signage, landscaping, change in color scheme or an architectural feature. Refer to Section 3.4.6 for signage.



This sign on McHugh marks the gateway to French Creek

### 2.3.4 LANDMARKS AND REFERENCE POINTS

---

Landmarks are visual features that are distinctive and memorable. They serve as orientation of guiding devices because they help create a mental map of the Installation. MCB Camp Lejeune and MCAS New River have several primary landmarks:

- Parade deck at Hadnot Point
- Roundabouts at MCB Camp Lejeune
- Marine Corps Exchange complex
- Officers' Club at Paradise Point
- Flight line at MCAS New River

### 2.3.5 SIGNIFICANT VIEWS

---

Significant views provide a positive visual context. These include near distant views such as the Goettge Memorial Field House and the historic administration buildings along Holcomb Boulevard from across the main parade deck. Distant views include those along the New River from various vantage points on the Installation.



The main parade deck offers several near distant views



Example of a distant view along the bank of the New River

land use, landmarks or spaces that are defined by their active functions. Nodes on the Installation include:

- Marine Corps Community Services
- Parade decks
- Base theaters
- Clubs and function halls



Activity nodes on MCB Camp Lejeune and MCAS New River

### 2.3.6 ACTIVITY NODES

Activity nodes are generators and collectors of activity. Some nodes are highly defined with a specific physical enclosure, such as a courtyard or plaza, which heightens the user's sense of functional purpose and detail. Others are defined by important



### 2.3.7 CIRCULATION ROUTES



Primary vehicular circulation on MCB Camp Lejeune and MCAS New River

- Primary Road
- Secondary Road
- Entry Gate

Circulation routes include vehicular circulation and pedestrian circulation. Our image of the environment is influenced most directly by the views from the roads. Movement along roads causes a succession of perceptions and experiences that are related in time and space. Good roads are not only safe and convenient, but orderly, articulate and visually distinguishable from others.

Vehicular routes may be classified by their level of traffic. Primary routes provide access to and from the gates as well as direct connection between major nodes. Secondary routes distribute traffic from the primary routes to activity nodes in each functional or physical district. Tertiary routes connect clusters of buildings and other traffic generators to the secondary routes.

Sidewalks and trails provide a similar experience for the pedestrian but with a greater emphasis on detail and textures. Sidewalks are often related to streets or buildings while trails tend to be more informal and for recreational in use.

### 2.3.8 INSTALLATION OR DISTRICT EDGES

---

The general public's primary impressions of the station are gained from the appearance of the edges. Improperly maintained, inadequate or inconsistent

screening of negative visual areas will not present the installation in a proper manner. Likewise, district edges, when not properly planned, may have a negative impact on adjacent uses. When conflicting land uses adjoin (such as housing adjacent to industrial), care must be taken to screen negative visuals, sound, dust and light impacts from one use to the other.

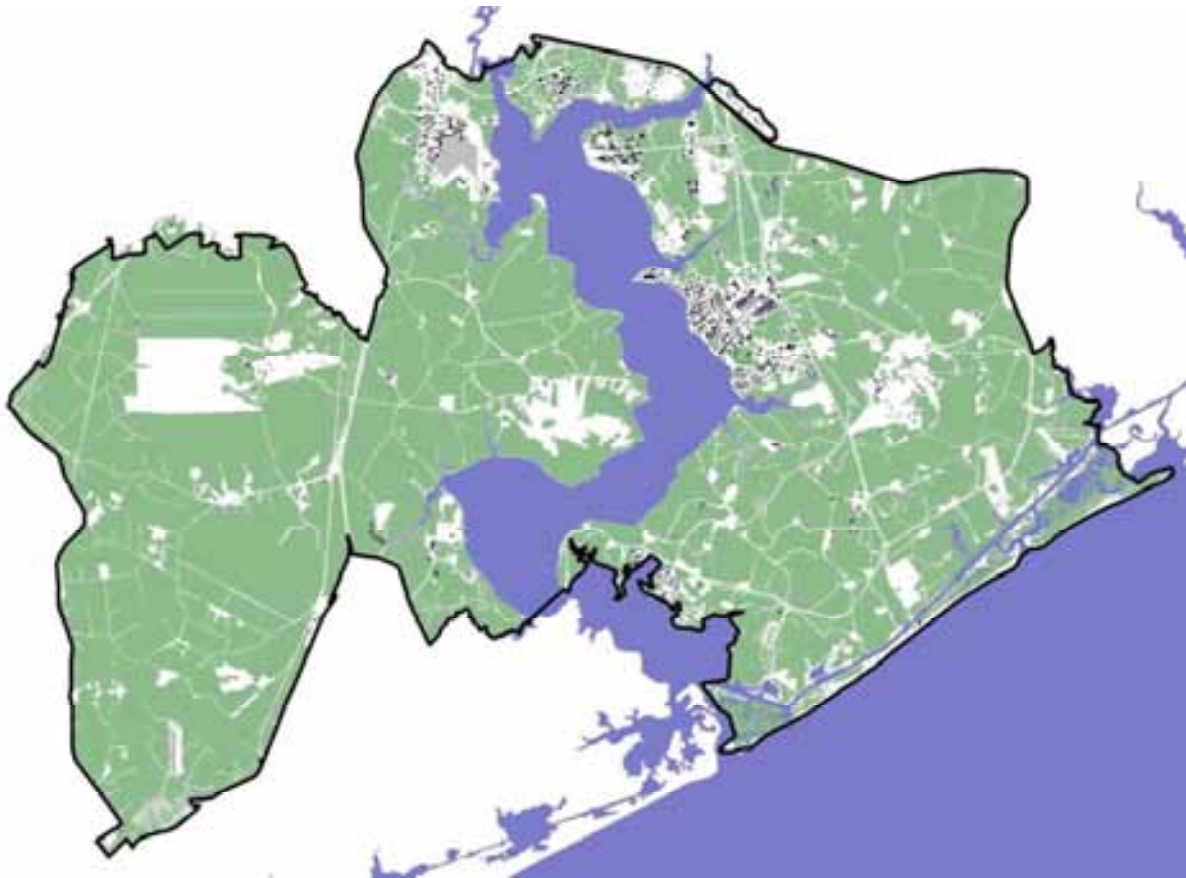
## 2.4 VISUAL STRUCTURE OVERVIEW

### 2.4.1 NATURAL ENVIRONMENT AND OPEN SPACE OVERVIEW

---

MCB Camp Lejeune and MCAS New River have a vast amount of natural environment in which Marine units conduct maneuver training. The Greater Sandy Run Area and Training Area West (Verona Loop) make up over half of the entire land mass of the combined Installations. These areas are relatively flat coastal plains crossed by shallow valleys and meandering stream channels. Vegetation consists of a mix of pines and hardwoods and large areas of scrubland and wetland vegetation. MCB Camp Lejeune contains areas of protected flora and fauna, including the endangered Red Cockaded Woodpecker. These areas should be identified prior to development planning by coordinating with the Installation and Environment staff.





Green indicates vegetation while black and gray areas are developed. The Greater Sandy Run training area comprises most of the natural environment on Base.

#### 2.4.2 DEVELOPED ENVIRONMENT OVERVIEW

MCB Camp Lejeune is bound by Highway 24 to the North, Highway 172 to the East, and the Atlantic Ocean to the South. Highway 17 bisects the western portion of the Base. Developed areas of the Base are located centrally along the New River while training functions are located in surrounding wooded areas. For the most part, mature stands of pines denote the outer boundaries of the base, extending a positive image.

#### 2.5 SPECIAL DISTRICT OVERVIEW

MCB Camp Lejeune is divided into a network of Special Districts which are based on unique geographical locations. These Special Districts delineate the character of Camp Lejeune through distinct architectural style, color schemes, and landscaping.

##### HADNOT POINT

Hadnot Point is located in the geographic center of MCB Camp Lejeune and is the architectural and landscape soul of the Installation.

Primary roads include Holcomb Boulevard and McHugh Boulevard, which traverse Hadnot Point along two perpendicular axes and are heavily used. Julian C. Smith Road (locally known as River Road) parallels McHugh Boulevard but its slower speeds and use as a running route make this a secondary road. Birch Road and Louis Road are also secondary roads, both serving four corners and outer reaches of Hadnot Point.



 Activity Node  
Hadnot Point

Hadnot Point contains an extensive Historic District which follows parts of Holcomb and McHugh Boulevards. The consistent Georgian architecture as well as the continued use for command services sets the character and importance of this area.

### EXISTING ARCHITECTURE

A common palette of colors and materials as well as classical elements of the Georgian style are ubiquitous. Combined these features evoke a sense of hierarchy and formality, as well as traditional values.

- Red to red-brown brick

- White base foundations, sill, and lintels
- White door and window trim
- Gray asphalt or standing seam metal roof

Building facades are largely symmetrical and entryways embellished. Other common details include:

- Cupolas
- Quions
- Raised concrete foundations
- Molded cornices
- Hipped or gable-on-hip roofs

### FRENCH CREEK

French Creek is located to the south of Hadnot Point and encompasses the land between French Creek and Sneads Ferry Road.

McHugh Boulevard is the primary route into this district, followed by secondary roads Julian C. Smith Road and Gonzales Boulevard. Sneads Ferry Road borders the east side of the district and is the primary means of getting to Cogdels Creek.

French Creek is the least cohesive district in terms of overall theme and architectural styles. Its sporadic development through the 1980s and 1990s resulted in a variety of materials, colors, and forms:

- Red to brown brick
- Stucco and metal panel
- Low slope, hipped, gable, or gable-on-hip roofs



\* Activity Node  
French Creek

## COURTHOUSE BAY

Courthouse Bay developed both as a training area as well as means of access to the New River and the Atlantic Ocean littoral. It is far removed from main side Camp Lejeune, located 2.5 miles south, toward the mouth of the New River as it meets intracoastal waters. This district is divided into two parts connected by a narrow strip of land.

NC Highway 172 bounds the north edge of Courthouse Bay, which has two primary entrances: Horn Road on the eastern side and Courthouse Road on the western side.



\* Activity Node  
Courthouse Bay

This district is an artful mix of Georgian-like original structures and contemporary architecture. Materials and colors include:

- Brick, red and red-brown
- White, light gray foundations, sill, and lintels
- White door and window trim, eaves, gutters and downspouts
- Medium gray and dark gray asphalt or standing seam metal roofing

Common ornamental details:

- Cupolas
- Quions
- Raised concrete foundations
- Water table lines
- Molded cornices
- Monitor and clerestory windows
- Entryway canopies
- Distinctive water tables
- Brick masonry details

## PARADISE POINT

Paradise Point, named after a peninsula of land that is formed by a bend in the New River, is comprised of single family housing, community, and other personnel support facilities.

Its primary circulation route is Seth Williams Road, an extension of McHugh Boulevard, which shadows the river's edge and connects to Brewster Road by means of a roundabout. Stone Street completes the triangle that forms the district.



\* Activity Node  
Paradise Point

Although there are no historic districts in Paradise Point, there are ample examples of period architecture that make the character of this area clear and distinct. Georgian style buildings, interspersed between single family dwellings, echo the design elements of Hadnot Point. The Officers' Club, surrounding BOQs, and Marston Pavillion suggest the time honored traditional values of the Marine Corps with the symmetry and rhythm of

fenestration, basic solidity of brick masonry and class of white trim and moulding.



Marston Pavilion

## CAMP GEIGER

Located adjacent to MCAS New River, Camp Geiger is one of the oldest parts of Camp Lejeune. Originally developed as an actual camp site, it was the temporary home of the first Marine units to be stationed in the area.



\* Activity Node  
Camp Geiger

Camp Geiger is on the north edge of the air station boundary, cradled by the Jacksonville NC 17 Bypass to the north. Entrance is by way of the Air Station via Curtis Road. 'A' Street runs north south along the edge of a gridded street network.



After Camp Lejeune headquarters moved to Hadnot Point, Camp Geiger was left relatively unchanged from the 1950s until the 1970s. Today there is a variety of materials and detail, including:

- Red brick and concrete
- Hip, gable, and low slope roofs
- Gray or green asphalt shingles or light gray standing seam metal roofing
- White banding across the facades



**Academic facility with distinctive white banding**

## MCAS NEW RIVER

Marine Corps Air Station New River is relatively independent from MCB Camp Lejeune, although the two share many missions, training areas, and some services. For the purpose of this study, MCAS New River is included as a Special District.



**\* Activity Node**  
**MCAS New River**

New River is located west of the river and has two entry gates, Curtis Road and Douglass Road, which serve as primary routes into the installation. Several secondary routes cross between, and provide circulation around the air field district.

The character of New River is contemporary and often utilitarian. Materials and colors consist of:

- Brick, concrete block, stucco and metal panel, typically beiges and white
- Low slope, gable or gable-on-hip roofs
- Green standing seam metal roofing
- Pilaster detail typical on two story structures



Pilaster detail on a high bay simulation facility

## STONE BAY

Stone Bay consists of marksmanship training facilities, a reserve training compound, and the US Marine Corps Forces Special Operations Command (MARSOC) complex.

This area is located across the New River from Hadnot Point and accessed via Highway 17. The main entrance, Range Road, skirts the MARSOC complex and terminates at the ranges.



Stone Bay

This district is divided into two distinct themes: a historic area after the Georgian style and the MARSOC complex, which has its own contemporary architectural language, loosely based on classical detail. The historic Rifle Range area consists of the following:

- Brick, red and red-brown
- White, light gray foundations, sill, and lintels
- White door and window trim, eaves, gutters and downspouts
- Gable-on-hip roofs
- Medium gray and dark gray asphalt or standing seam metal roofs
- Cupolas
- Raised concrete foundations
- Water table lines
- Molded cornices



Typical architecture in the historic district of Rifle Range

MARSOC consists of the following:

- Single course block foundations
- Recessed friezed detail at cornices
- Standing seam metal hip roofs
- Brick soldier coursing, reveals, and set backs
- Hip roofs



Typical MARSOC facility with brick detail and translucent wall panels

## CAMP JOHNSON

Camp Johnson is located between MCB Camp Lejeune and MCAS New River, and is bordered by the Jacksonville NC 17 Bypass to the north and waters of the New River on three sides.

Montford Road is the entrance to this district and continues south to a peninsula of land known as Montford Point.



Camp Johnson and Montford Point

Camp Johnson experienced a significant time of little to no development after an initial surge in the 1940s. This gap is visible in the character of the historic buildings and the contemporary structures that began arriving in the 1980s. Elements of the historical district include:

- Beige or white facades, usually stucco
- Brick framed windows and doors
- Gray asphalt shingles
- Gable roofs and shed roofs above entries



**Much of Camp Johnson is single story buildings, shaded by tall pines and otherwise unimproved**

Contemporary architecture is varied, but the predominant materials and colors include:

- Brick, various colors of reds and browns
- Two or three brick colors, split horizontally or vertically across the facade
- Standing seam metal roof of various colors



**This academic facility uses three brick colors**

## 2.6 HISTORIC DISTRICT OVERVIEW

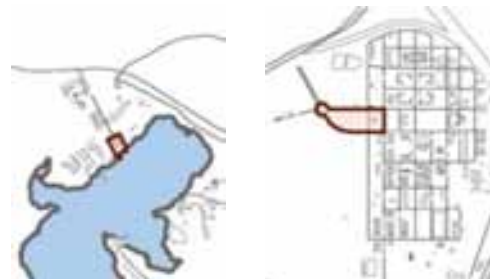
### 2.6.1 HISTORIC BUILDINGS AND LANDMARKS

Camp Lejeune Environmental Management Department has identified individual buildings and historic districts that are eligible for listing in the National Register of Historic Places, as of the year 2008. These are described in detail in a document available from Environmental Management:

*Historical Architectural Evaluations, Marine Corps Base Camp Lejeune, Onslow County, North Carolina (Bowers, Dixon, and Jacobs 2008)*

### 2.6.2 HISTORIC DISTRICT

Historic districts are regarded as a cultural resource to be protected and preserved. The buildings and monuments not only reflect a high degree of design, workmanship, and materials, but possess a central importance in defining and maintaining the historic and architectural character of the Base. Designated historic districts on Camp Lejeune include the following:



**Assault Amphibian Base (Courthouse Bay) and Camp Geiger Chapel and Entrance Circle**





**Command Services/Regimental Area No. 3 (Hadnot Point), Parachute Training, and Naval Hospital/Surgeon's Row**



**Montford Point Camp No. 1, 2 and 2A and Stone Bay Rifle Range**

### 2.6.3 ADJUSTMENTS TO HISTORIC DISTRICT

Although the National Register considers all resources eligible for listing as equal, Camp Lejeune has categorized historic districts and buildings in order to prioritize preservation and guide repairs and other treatment.

The Environmental Management Department manages changes to historic districts and buildings. Guidelines are available in the following document:

*Guidelines for Historic Buildings Management, Marine Corps Base, Camp Lejeune, Onslow County, North Carolina (The Louis Berger Group, 2008)*

### 2.6.4 ARCHITECTURAL STYLES

There are three common architectural styles on Camp Lejeune by which some, not all, buildings may be classified. These are the following:

#### GEORGIAN

The Georgian Style was formed from 1700 to 1800 and is characterized by a formal arrangement of classical details based on a symmetrical façade. Often the entry is emphasized by a pediment or monumental pilasters or columns. Common elements include water table line, pedimented dormers, and quions.



**Building 15, Hadnot Point**

#### COLONIAL REVIVAL

Formed from 1870 to 1920, the Colonial Revival Style is a combination of Colonial and contemporary elements. Similar in formality to the Georgian style, Colonial Revival facades may exaggerate their individual ornamental elements. A common

historical detail among these buildings is the broken pediment above the entryway.



**Walsh Hall, Rifle Range**

## SHINGLE STYLE

The Shingle Style dates between 1880 and 1900 and is characterized by a uniform covering of unpainted wood shingles, including roof and façade. Roof lines typically continue to create porch coverings. Windows are usually small and grouped in twos and threes.



**General Officers' beach house, Onslow Beach, is in the Shingle Style**

## 2.7 ASSETS AND LIABILITIES OVERVIEW

### 2.7.1 ASSETS

The visual setting and natural environment of the Carolina coastal plains is one the greatest assets of MCB Camp Lejeune and MCAS New River. The Installation invests in the recreation facilities at Onslow Beach and continues to take great care in preserving the shore.



**Onslow Beach**

Greater view access to the edges of the New River on MCB Camp Lejeune would further take advantage of this asset.

The historic districts, closely associated with the growth of the Marine Corps, are another asset which the Base should continue to take advantage of. These districts offer not only good examples of early American architectural styles, but a window into past significant events.



**Base Theater at Hadnot Point**

Water recreation opportunities at both MCB Camp Lejeune and MCAS New River are assets that the Installations have recognized and are using. Marinas provide access to the river waters and shoreline via piers, boat slips, and basic marina buildings. Investment in upgrading these facilities would further enhance the Installations' enjoyment of the New River.



**Marina at MCAS New River**

## 2.7.2 LIABILITIES

The primary liabilities of MCB Camp Lejeune are a result of the core industrial functions of the Installation. Although efficiently located along the railroad and central to the cantonment, the

Industrial Sub-district shares many of the same view scapes as the ceremonial center of MCB Camp Lejeune. This is not likely to change, but can be controlled through the preservation and renovation of the remaining perimeter surrounding the parade deck.



**View of steam plant from across the parade deck**

Vehicle barriers at MCAS New River are ubiquitous. Although placed for necessary protection or access control of key facilities, these barriers take away from the character of the district and become a memorable negative image of New River. Access control may be provided by other types of devices which have less visual impact, such as high curbs. If anti-ram passive barriers are required, decorative bollards may be installed around existing facilities without great impact on the Installation's architectural character.



**Vehicle barriers are prevalent on MCAS New River**

Similarly, above ground steam lines obscure building facades and become both a physical and visual barrier to the appearance of MCAS New River and parts of Courthouse Bay. When opportunities arise, steam lines may be routed below grade to free the visual and physical space which they currently occupy.



**Elevated steam lines obscure building facades**

## 3.0 INSTALLATION WIDE DESIGN GUIDELINES

### 3.1 FRAMEWORK FOR THE OVERALL DESIGN THEME

An overall installation architectural theme sets the framework for guidelines and standards. This theme integrates the goals for the built environment with the broader non-facility goals and objectives of the missions at MCB Camp Lejeune and MCAS New River. Existing settings, buildings and structures were analyzed to determine the factors to provide the framework for the overall theme. (See Appendix A: Summary of Field Work.) This analysis concluded:

- An overall predominant architectural style presently exists at MCB Camp Lejeune, but is weakened by designs which dilute the formal rules of the style.
- Predominant materials, color, and forms do exist at MCB Camp Lejeune and MCAS New River in most districts, but some areas lack cohesion.
- Architectural character and positive visual impressions can be found in many areas of Camp Lejeune and are early American design styles.

In addition to architecture, other visual aspects of infrastructure elements have been evaluated. This analysis includes:

- The major roadways
- The larger scale landscape elements (trees and other mature vegetation including natural areas)
- Streetscape and site elements
- Signage and graphics
- Existing lighting
- Camp Lejeune environmental setting

### 3.1.1 DESIGN THEME FRAMEWORK

The architectural foundation of MCB Camp Lejeune and MCAS New River is based on a surge of construction during the 1940s when designers used Georgian and Colonial Revival styles for command, administrative, and support facilities across much of what is now mainside. Many of these structures are now in historic districts, as they are considered windows into the significant past of the military and the country. They also represent values found in the Marine Corps: solid fundamentals, tradition, order, and an affinity for the country's roots. Therefore, the design theme for MCB Camp Lejeune and MCAS New River is based on early American design.

### 3.1.2 INTRODUCTION TO THE MECHANICS OF THE GUIDELINES

The purpose of these design guidelines is to establish standards for improving MCB Camp Lejeune and MCAS New River's physical environment. The guidelines provide a framework for the enhancement of the visual setting of the installations through the siting, design, style and color of building and landscape elements for all improvements to the physical environment.

These guidelines are based on the BEAP goals and objectives, Section I.7: Overall Project Objectives, and general operations and maintenance considerations. The design guidelines also refer to separate criteria specific to the MCB Camp Lejeune Historic District, and the remainder of the installation, when necessary.

Design guidelines have been developed for the following:

- Site planning: gates, roadways and access, building siting, parking, pedestrian circulation, plazas and courtyards, common areas/activity nodes/open spaces and parks,



service areas, and maintenance and improvements (Common Operational Level or COLs -- See Appendix B)

- Architecture: building design, building entrances, building renovations and additions, historic architecture, and the Building Color Design Guide
- Landscape architecture: focal point devices, memorials and static displays, flagpoles, plant material, signage, paving services, bollards, fencing, utilities

### 3.1.3 NATURAL AND CULTURAL RESOURCES

Natural and cultural resources must be maintained, protected, and possibly enhanced. Every designer must be aware of the impact each new project will have on these resources and must design their project to complement or coordinate with the existing environment of the Installation. These resources give the Installations character and aesthetic appeal:

- Historic districts
- Waters edge along New River and tributaries
- Onslow Beach
- Monuments and statues
- Military equipment static displays
- Preservation areas

### 3.1.4 ANTI-TERRORISM AND FORCE PROTECTION

Incorporate antiterrorism and force protection (AT/FP) design with other design elements so that protection is attractive and unapparent. Elements that occur in site design which can unobtrusively protect the building and its inhabitants include:

- Drainage ditches and bio swales
- Ponds

- Open lawn and ground covers
- Lighting and mass notification systems
- Vehicle circulation

Other AT/FP devices can be incorporated into the site design without creating a fortress appearance:

- Berms and ditches
- Setbacks
- Fences and walls; seat walls
- Bollards and planters

Within the framework of the AT/FP planning standards, design all modifications and enhancements to existing facilities to be cohesive and compatible with the Installation's character.

#### BERMS AND DITCHES

Berms and ditches offer an effective means of protection against vehicle-borne threats and have less visual impact than fences and other barriers. Soil berms on the protected side of ditches improve its effectiveness. *Refer to UFC 4-022-02 Selection and Application of Vehicle Barriers for more information on ditches and berms.*





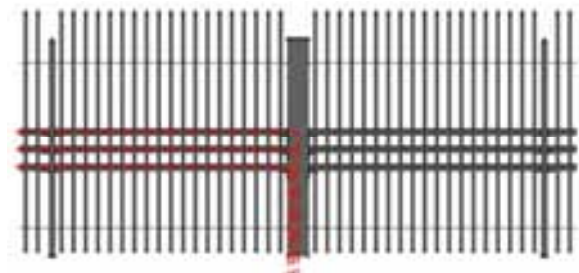
**Berms, when combined with ditches, can be integrated into site design and provide an effective vehicle barrier without detracting from the building design**

## FENCES AND WALLS

Fences and walls provide both physical protection and a visual barrier to the building beyond. When an anti-ramming fence is required, use decorative black finished metal pickets to reduce the visual impact. Steel cable reinforcing should be integrated with the fence design such that it's less visible.



**Crash-rated vehicle barrier across service driveway. If this type of barrier is required, it should be tied into a system of barriers which prevent by-pass.**

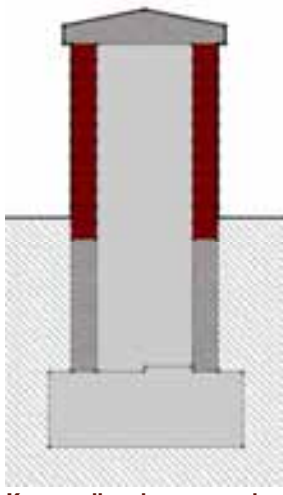


**The cable reinforcing in this fence design is hidden in the three rails and anchored to the ground through the post**



**This fence design uses exposed cable reinforcing**

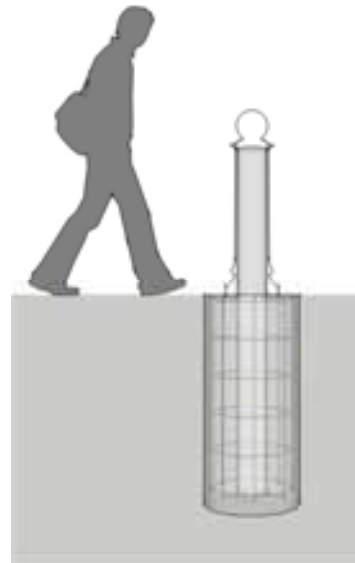
Anti-ramming knee walls are an alternative to re-inforced fencing. Knee walls must have minimum dimensions and steel reinforcement to provide adequate protection, but may be veneered with the same materials as the building facade in order to blend into the design. Refer to UFC 4-022-02 Selection and Application of Vehicle Barriers for more information on anti-ram walls.



**Knee walls, when properly constructed, serve as a vehicle barrier, but also provide the designer an opportunity to add visual interest to the site**

## BOLLARDS AND PLANTERS

Bollards and planters provide protection from vehicles while still allowing pedestrian traffic to move through. They must be constructed to specific construction standards as well as match the character of the Special District. Planters may be veneered in the same way as knee walls. Bollards designed for anti-ramming are substantial structures, constructed from structural steel pipe, and filled with concrete.



**Anti-ram bollard indicating the structure required below grade; bollards will have a decorative exterior**



**The character of these decorative bollards is appropriate for most districts**

## 3.1.5 SUSTAINABLE PLANNING AND DESIGN

Sustainable planning and design is the practice of implementing strategies for buildings and landscapes that protect the environment, reduce life cycle costs,



and improve the quality of living conditions. All of these strategies are compatible with improving the appearance of the Installations. Protection of the environment includes the use of recycled and environmentally friendly materials, managing stormwater through the strategy of low impact development, and limiting the impact of atmospheric emissions.

The reduction and conservation of energy is particularly important to the Marine Corps. Lower the costs of operation by reducing the use of energy through high performance building systems, employing renewable energy sources, optimizing solar orientation, and reducing the amount of materials and man hours required for maintenance. Optimize living conditions by providing good ventilation, natural task lighting, and avoiding items that emit chemicals.

## LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

The U.S. Green Building Council (USGBC) developed the LEED® (Leadership in Energy and Environmental Design) rating system to objectively judge a building's sustainability. Categories by which buildings are rated include:

- Site sustainability
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality
- Sustainable design innovation

Refer to the LEED® guidelines and other resources located on the Whole Building Design Guide (WBDG) website ([www.wbdg.org/design/sustainable.php](http://www.wbdg.org/design/sustainable.php)).

In addition to the sustainable site category, many LEED® credits affect the outward appearance of

the building and impact the character of the Installation. Sustainable elements of a building should contribute positively to the aesthetic appeal. The next sections clarify these specific details.

## LOW IMPACT DESIGN

The goals of LID are to create a developed site that closely maintains the natural hydrologic functions and conserves the maximum amount of the existing natural resources. The key elements of LID are custom site design, conservation, localized stormwater management, pollution prevention and hydrologic recharge of the local aquifer and/or adjacent wetlands. LID implies reduced reliance upon stormwater features such as catch basins, underground piping and concrete curbs, in favor of more natural features such as swales and infiltration basins. All of these elements work hand in hand to create an LID site design. See Section 3.2.12 Stormwater management and Low impact development.



**Biomass filtration basin at MCAS New River**

## DAYLIGHTING

---

Daylighting design uses the sun to supplement or replace artificial lighting in interior spaces, even deep within the building. Daylight harvesting reduces energy costs and improves the quality of the work environment. Often this is done with a combination of strategies including large window openings, shading devices, unique building geometries, or glazing located high in a wall or roof. The key to using these strategies at MCB Camp Lejeune and MCAS New River is to incorporate them in the building without compromising the overall design concept and detracting from the district character.

The following are good examples of daylight design:



**Roof monitor with translucent wall panels allows daylight into the atrium of the MARSOC Headquarters.**



**Roof monitor allows daylight to entry deep interior spaces in the Courthouse Bay fitness center.**



**Wall panels are integrated into this façade without detracting from its overall appearance.**



**This maintenance facility in French Creek uses a clerestory window strategy to daylight vehicle bay space.**

Window size and location should be the first strategy employed for day light harvesting. Position window openings above 2'-6" from the finished floor to maximize available light. Window glazing above 7'-6" is the most effective in allowing light deep into interior spaces. Thus, a window opening from 2'-6" to the height of the ceiling will collect the most light for a space. This results in tall window openings on the facade.



**This window height spans from 2'-8" to 10'-0" to maximize sun light collection**

Exterior shading devices may be necessary to reduce the glare from direct sun light on working surfaces while still allowing light to enter the space. These devices greatly affect the building appearance and therefore must be fitting for the Special District, especially if that district uses historical context as a basis for style. While many shading device manufacturers offer modern-looking products, a more traditional look is achievable by designing from off-the-shelf kit of parts using outriggers, fins, and fascia pieces (below).



**These sun shading devices emulate window shutters, a common element of early American architecture, and are congruent with many Special Districts**

## PHOTOVOLTAICS AND SOLAR HEATING

Photovoltaics and solar heating use large expanses of panels to collect the Sun's energy to convert to electrical power or hot water. The decision to use a stand-alone structure or integrate panels with the building (for example, building integrated photovoltaics or BIPV) depends on many factors, but both have an impact on outward appearances. Low slope roofs provide an ideal location for these devices, are usually not visible from the ground, and have been installed on several buildings in the Industrial Sub-district of Hadnot Point. When incorporated onto high sloping roofs or as a stand-alone structure, renewable energy collection devices have a greater impact on the visual character of the district. Arrange panels in such a way that they are logically organized in harmony with the building and district's aesthetics.



**The BIPVs on these roofs are organized harmoniously with the building design**

Photovoltaics arranged as parking shelter perform multiple functions besides energy collection. These structures have a large visual impact on a site, and shall be designed to enhance the style of the building and district.



**This stand-alone photovoltaic structure is consistent with the early American design theme of Hadnot Point**



**Photovoltaic array arranged to provide parking shade**

## RAIN WATER COLLECTION DEVICES

Cisterns are large water storage tanks used for rain water collection to be used for a building or site's non-potable water needs, such as flushing fixtures or

irrigation. Rain water cisterns may be placed underground, but if not, they are likely to detract from the character of the building and district. Therefore, all above-ground cisterns must be properly screened so they blend in with surrounding architecture. Screen wall must use like-materials as adjacent structures and must comply with anti-terrorism/force protection standards.



**This above ground cistern is obscured from view with a traditional brick screen wall pattern that would be appropriate for most districts**

## 3.2 SITE DESIGN

### 3.2.1 GATES

#### Objectives:

Establish a hierarchy of welcoming entry Gates consistent with Base security requirements that enhance the identity and image of the MCB, provide visual distinction from the roadway streetscape.

Enhance security functions and clarity of vehicular movement, through well organized site layout and treatment of security shelters, circulation, controlled sight lines, signage and effective site lighting.

#### Design Guidelines:

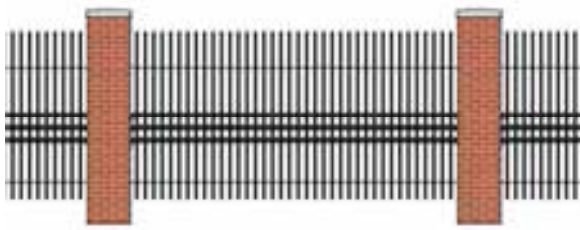
Comply with *UFC 4-022-01 Security Engineering: Entry Control Facilities/Access Control Points* and *UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings*.



MCB Camp Lejeune entrances shall express a clear hierarchy in their scale and appearance based on prominence and vehicle volume.

- Primary entry is given greater prominence through more substantial scale of roadway, special pavement, perimeter wall and fence detailing, massing of plant materials, lighting, and identity signage.
- Secondary entries maintain the elements and character of the primary entry, but at a reduced scale and extent of detailed treatment.
- Tertiary Entries to residential family housing areas should also be visually distinct from the adjacent roadside, with reduced number and scale of entry elements.
- Closed entrances should be clearly designated as such from Highway 24 and conflicting signage removed.

Entry fencing should be ornamental steel pickets (black) set on low brick faced wall (primary entry) and on concrete curb or mow strip at secondary and tertiary entries for ease of maintenance and consistency of design between entries.



Monument signage should be prominent at entry, without conflicting regulatory or directional signage detracting from integrity or full visibility of the identity sign either along the approaching roadside or within the entry setting. Directional and regulatory signage should be minimized to provide clarity of direction without extraneous clutter and conflicting visual cues.



**Signage at MCB Camp Lejeune Main Gate**

Special paving treatments should be considered at entry gates both upon exiting from the local roadway and at sentry plaza to increase visual demarcation of entry and establish the importance of entry. By varying the extent of special paving the hierarchy of entries and circulation ways are reinforced. All entry gate roadways shall have well defined curbed edges.

Planting should enhance the dignity of the entry and should be composed of mass planting in scale with the overall space. Existing wooded edges work well to frame the entry space and should be augmented with seasonally interesting understory tree plantings to distinguish entries from typical perimeter edges. Clarity of space is paramount; planting should not be fussy or distracting from operation of entries. Planting should not obscure traffic or pedestrian sightlines at intersections or where surveillance is required.

Roadway, monument signage and architectural lighting at sentry house should reinforce circulation patterns, define edges of entry space, highlight attention to sentry house, and provide adequate lighting for security functions.

Provide security guard shelters, cover and lighting for inspection area per ATFP standards. Security

cameras shall be mounted on light poles or building structure to reduce numbers of poles.

### 3.2.2 PERIMETER EDGES

#### Objectives:

Establish a visually unified and distinctive perimeter of naturalized landscape edge along the public right of way that conveys a positive image of the Base to the surrounding community and instills pride in the Base community.

Preserve the wooded setting boundary buffer between public lands and military base facilities.

#### Design Guidelines:

Preserve, maintain, and enhance the mature tree stands at the camp perimeter. Remove diseased and dying materials. Clear deadwood and fallen branches from the outer most 25 feet of wooded edge.

Enhance and diversify existing stands by establishing perimeter planting program including planting of shade tree saplings and understory trees.

Prohibit development within the wooded perimeter buffer.



#### Establish consistent perimeter roadway treatment including street tree planting, roadway lighting, pedestrian walks, and security fencing

Provide a hierarchy of perimeter fencing (see 3.4.9 Walls and Fences) Maintain open ground plane to fencing and vertical clear zone to 20 feet for horizontal distance of 20 feet on the exterior side of fencing, 10 feet on interior side of fencing. Shrub masses shall be set back 60 from perimeter fence either side to maintain visibility by security patrols.

### 3.2.3 ROADWAYS AND ACCESS – VEHICULAR CIRCULATION

#### Objectives:

Establish a coherent framework of streets and walks that collectively contribute to a positive, unified Base community setting with a coordinated system of pavements, edging, lighting, signage, furnishings and planting.

Provide clear and safe, convenient circulation for motorists, bicyclists, and pedestrians.

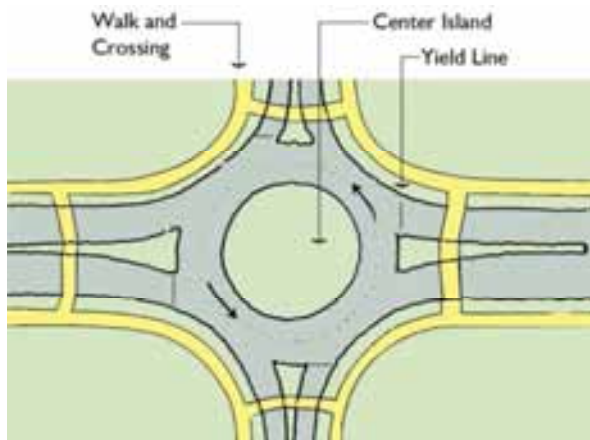
Renew emphasis on visually reducing the scale of the roadways and encouraging pedestrian and bicycle circulation. Roadway cross section design shall give equal consideration to motorists, bicyclists and pedestrians in providing safe travel ways for all functions.

#### Design Guidelines

Conform to *UFC 3-210-02 Design POV Site Circulation and Parking*.

Promote expanded use of roundabouts on Base. Roundabouts express a distinct Base identity and improve traffic flow and intersection safety. Additionally, use of roundabouts reduces long-term operational costs associated with maintaining signalization and related structures and signage. Where employed, roundabouts should be carefully

constructed with appropriate lane markings and traffic signs to clarify the intended movement patterns.



**Promote expanded use of roundabouts**

Priority consideration should be given to replacing signalized intersections at ceremonial locations and roadway focal points and to poorly performing interactions. Smaller scaled roundabouts should be considered for secondary and tertiary road intersections as a means of improving the overall aesthetic of the area and emphasis on non-motorized environment.

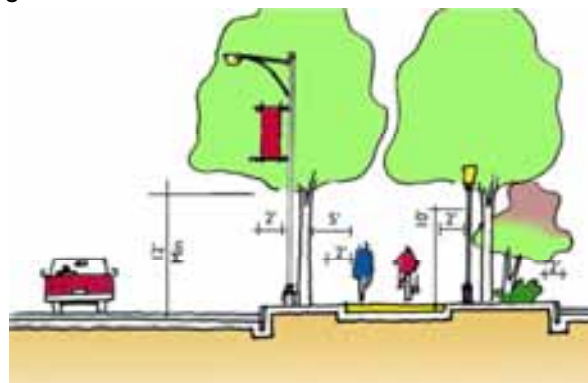


**Intersection setbacks**

Maintain sight lines and pedestrian crosswalks at intersections. Locate driveways and curb cuts a minimum of 50 feet from the intersection. Provide

setbacks between roadway edges and building or parking areas at 30 foot (minimum) on primary roadways and 25 foot (minimum) on secondary roadways.

On street parking will not be permitted on primary or secondary roadways. On street parking will not be permitted on tertiary roadways without review and approval of the BEAP Review Board. In the event the Review Board approves on-street parking for a specific tertiary roadway setting, the following guidelines shall be met: on-street parking will be limited to parallel parking, one side of the road only, applying set back of 30 feet from the corner or 15 feet from the edge of any crosswalk, whichever is greater.



**Recommended clearances at streetscape**

Signs, hydrants, poles, headwalls, fences, and similar obstructions should be set back from the edge of road and walk/bicycle ways a minimum of two feet.

As street and pathway trees mature, branches extending over roadway shall be limbed up 12 feet (minimum) and at walks/bicycle ways 10 feet (minimum) from paved travel surface.

### 3.2.3.1 PRIMARY ROADWAY

Primary roadways include: Highway 24 (four lane divided highway), Highway 172, and Highway 17, Holcomb Boulevard, Main Service Road (McHugh



and Seth Williams Boulevard), Brewster Avenue and Sneads Ferry Road.

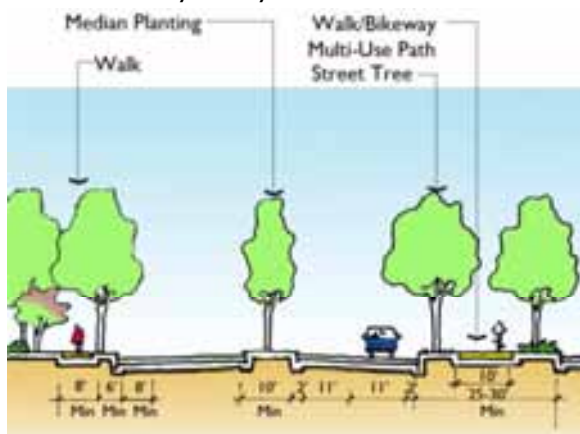


#### Primary Roadways

New primary roadways greater than two travel lanes each direction are discouraged.

On street parking is prohibited.

Bicycle travel within the curb line is discouraged and shall be accommodated through off-road multi-use or dedicated bicycle ways.



#### Primary Roadway Section

Primary roadways shall include pedestrian travel way (six foot width minimum) on either side of road. Multiuse pathways (minimum 10 feet width) should be considered in lieu of separate pedestrian and off road bicycle travel ways.

Street edges shall include a deciduous tree planting strip (six foot width minimum, eight feet or more preferred) at the curb edge. Deciduous shade trees reduce the perceived scale of roadway, slow traffic and create a more welcoming environment for pedestrians through separation from traffic and introduction of shade. Primary road street trees shall be formally aligned with the street and spaced at 40 to 50 feet on center typically, but may be closer in heavily trafficked pedestrian areas as part of a larger landscape plan. Mixed, informal grouping of trees and shrubs shall be provided at the rear side of the walk (eight foot minimum width) either to screen adjacent parking or as part of a larger “greenbelt” planting. Roadway medians ten foot width or greater shall be planted with ornamental and/or columnar tree plantings.

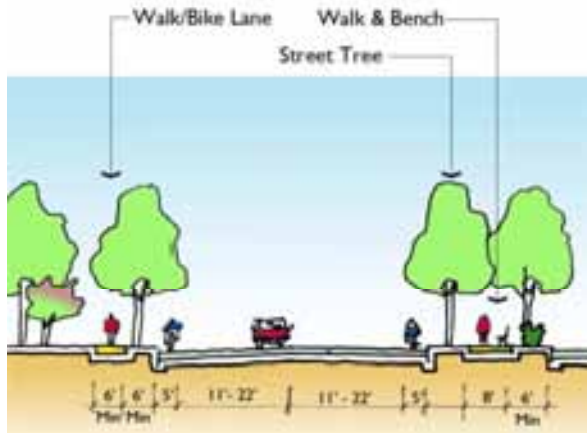
Street lighting should contribute to streetscape character, hierarchy and consistency in pole/fixture and quality of lighting. Consider using a combined approach of taller street and lower pedestrian level lighting or dual fixture lighting on shared poles in higher density pedestrian/commercial zones.

Primary roadways shall have reinforced/turfed shoulders and, only where absolutely required for stormwater management, vertical curbed edges/concrete curb and gutter edge.

Roadway signage and billboards shall be limited to reduce visual clutter and establish clarity for safe movement and improved way finding.

### 3.2.3.2 SECONDARY ROADWAY

Provide one (11 foot width) or two (22 foot width) travel lanes in each direction. If there is no bicycle lane within the curb line, consideration should be given to providing an additional one foot shoulder at each curb edge.



**Secondary Roadway Section**

On street parking is prohibited.

Third, center turning lanes should be considered for secondary roadways that include several vehicle entrances for safe maneuver of left turns. Turning radii should consider movement of large tactical vehicles, especially at operational areas.

Bicycle travel may be accommodated within the curb line through dedicated bicycle lane (five foot width) adjacent to the curb edge or through separate off-road multi-use (10 foot width) or dedicated bicycle ways.

Provide tree planting strip at the street edge, walks, and mixed planting landscape edge at rear of walk and lighting as in primary roadway section.

### 3.2.3.3 TERTIARY ROADWAY

Provide one travel lane each direction.

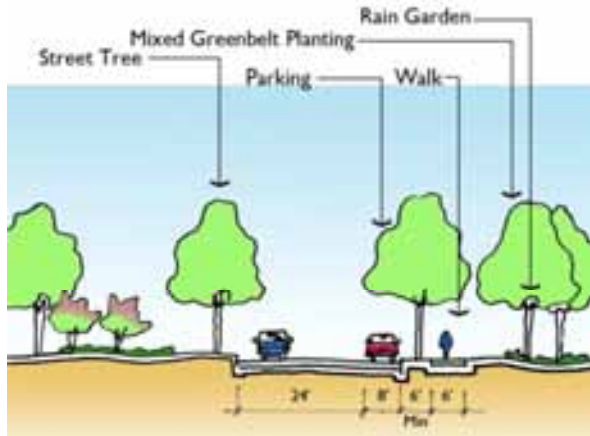
Alternatively, pedestrian and bicycle travel may be accommodated through a combined multi-use pathway. Roadways shall be edged with tree planting strip (six foot width minimum) and planted with shade trees spaced 40 feet on center (maximum). Adjacent landscape—either to rear of walk or contiguous to street tree planting—shall be composed of mixed stands of shade and understory trees as part of “greenbelt” planting.

Lighting shall be provided for combined roadway and pedestrian functions in character and scale with reduced roadway width.

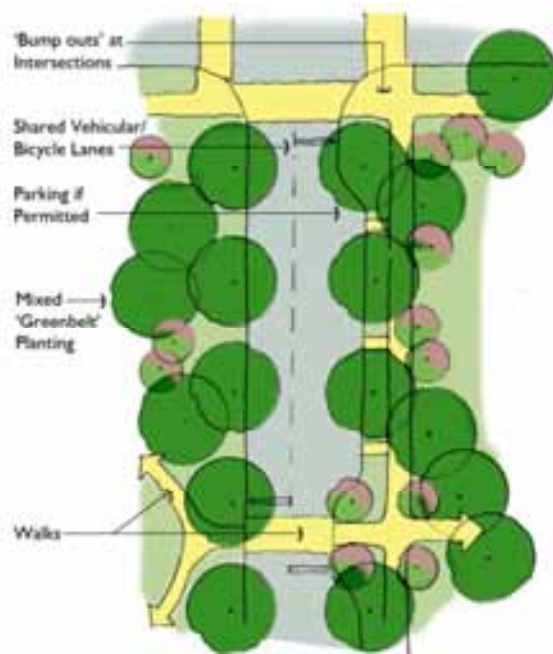
On street parking will not be permitted on tertiary roadways without review and approval of the Architectural Review Board. In the event the Review Board approves on-street parking for a specific tertiary roadway setting, the following guidelines shall be met: on-street parking will be limited to parallel parking, one side of the road only, applying set back of 30 feet from the corner or 15 feet from the edge of any crosswalk, whichever is greater. Parking “bump outs” are encouraged to minimize road width at intersections, reduce extent of impervious pavement and improve pedestrian and vehicle safety.

Bicycle travel shall be accommodated within the roadway in “shared” vehicular/bicycle travel lane or through off-road pathways.

Pedestrian walkways (six foot width) shall be provided on at least one side of roadway.



**Tertiary Roadway Section**



**Tertiary Roadway Plan Diagram**

### 3.2.3.4 SERVICE ROADWAY

Provide service roadways and driveways from secondary or tertiary roadways to adjacent parking areas or building service zones as required and allowed by ATRP requirements.

Maximum pavement width shall be 18 feet on typical access routes with intermittent use. Access road layout and related loading dock and service functions shall be designed for efficient movement and to minimize extent of impervious paved surfaces.

Align service drives to minimize service/ pedestrian crossings and visibility of service functions from public areas. Provide screening from public areas through planting or architectural quality screen walls.

### 3.2.4 BUILDING SITING – BUILDING LAYOUT ORIENTATION

#### Objectives:

Site buildings in positive physical and functional relationship to each other and surrounding site developments, circulation systems and open space to strengthen community identity and activity.

Establish clarity in site design, with logical order and sequence of spaces from site arrival to building entry.

Respond to the natural environment by limiting the extent of development-related disturbance, and preserving and enhancing the natural setting.

Reduce development related storm water runoff and enhance the stability of natural environment. Increase shade and reduce the need for infrastructure through wise siting and design of buildings and treatment of surroundings including implementation of extensive tree planting program.

#### Design Guidelines

Increase emphasis on creation of buildings segregated from parking and site-focused design in response to ATRP requirements, with parking and roadways to the periphery and contiguous pedestrian/ bicycle open spaces and building environments at the core of community settings.

Conform to *UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings*.

Group built facilities in positive relationship to each other and adjacent exterior space within contiguous standoff zones to maximize site land use options and preserve the greatest amount of continuous impervious land.



**Siting Diagram**

Orient building entries onto shared space and connect entries to each other by convenient pedestrian ways. Siting buildings to open onto pedestrian dominated open spaces is encouraged.

Present inviting and favorable articulated building facades toward adjacent streets and parking, even if not providing an entry at that face due to ATRP requirements. Avoid “fortress-like” appearances or otherwise minimally animated exterior facades.

Establish visible “entry forecourts” to provide welcoming exterior arrival spaces that lead one from off site to building entries.

Provide pedestrian and bicycle connections between buildings, to adjacent parking areas and to local roadway, pedestrian, and bicycle systems. Minimize conflicts between vehicular and non-vehicular circulation by providing separation and clarity in routes.

Provide convenient service, delivery and emergency access that is visually screened from public areas.

Site buildings in proximal relationship to other facilities to maximize efficiency of shared resources including walks, lighting, utilities and infrastructure, common facilities, roadways, parking, and long term care and maintenance of grounds.

Site buildings for maximum solar orientation benefit, daylighting opportunity, and reduced heating and cooling demand.

When determining location of development, protect existing natural resources. Avoid development within 50 feet of a water body, five feet of floodplain, and 100 feet from wetland edge.

When planning facilities, give consideration to future expansion of buildings, parking and stormwater management features.

### 3.2.5 PARKING

#### 3.2.5.1 SURFACE PARKING

##### **Objectives:**

Provide attractive, well organized, safe parking areas.

Reduce the overall need for surface parking area through efficient design and decreased use of vehicles on Base.

Reduce the environmental impact of parking and related amenities such as lighting.

### Design Guidelines

All parking areas shall conform to UFC 3-210-02 Design: POV Site Circulation and Parking guidelines. Standard off-street parking layouts, curbing and striping shall be applied Base-wide. Restripe non-conforming areas, and areas with inefficient layouts or unclear circulation to gain stall count and/or reduce lot size. Remove unneeded pavement and create planting beds where removal of “painted islands” allow.

Prohibit on-street parking on all primary and secondary roadways. On-street parking on tertiary roadways will not be permitted without review and approval of the BEAP Review Board. In the event the Review Board approves on-street parking for a specific tertiary roadway setting, the following guidelines shall be met: on-street parking shall be limited to parallel parking, one side of the road only, applying set back of 30 feet from corner or 15 feet from edge of crosswalks, whichever is greater. Maintain fire lanes and safe pedestrian crossings.

Maximize parking efficiency and clarity of movement. Utilize standard 90 degree parking layout with two way access aisles.

Where possible, consolidate parking for multiple facilities so that buildings may be sited in clusters without separation by individual parking areas that may result in increased standoff zones.

Reduce visual impact of parking from roadways and adjacent use areas by establishing planting strips (eight foot width minimum) of informal planting of varied heights – shrub, ornamental trees and shade trees. Situate planting islands within the parking area to maximize screening potential and overall shade coverage.

Plant trees to shade parking areas. Provide 15 percent minimum shade coverage measured 10 years after installation of trees. Within the parking limits, provide pervious planting bed equal to or greater than five percent of the total square footage of paving area.

Provide defined curbed edge to all parking perimeters and planting islands. Curbed edge may include regular breaks or notched inlets as part of stormwater management design. If curb is not provided due to stormwater management design requirements, provide pre-cast parking bumpers at all parking stalls and provide edge of pavement line markings to discourage travel at the edge of pavement.

Provide two foot clearance at back of curb (bumper edge) for safety and ease of maintenance. Bollards, signage and other vertical objects shall be placed outside this two foot zone. Plant materials within this area should be 6 inch height maximum.

Opportunities to reduce stormwater management infrastructure demands through Low Impact Design features, including bio swales, infiltration basins and pervious pavement, shall be considered. Pervious pavement shall not be used in tactical vehicle paving areas or along delivery or trash pick-up routes within POV parking lots.

In order to limit the spread of light to adjacent facilities and restrict upward light spill, all parking area lighting fixtures shall be full-cutoff type. The use of LED lighting fixtures is encouraged.

Provide universal accessible parking spaces and associated pedestrian walks to facilities as required by State and Federal ADA regulation.

Provide designated motorcycle parking spaces 4 ½ feet wide by 12 feet long where need is demonstrated.



### 3.2.5.2 PARKING GARAGES

#### Objectives:

Provide attractive, efficient structured parking where demand justifies.

Reduce the visual impact of structures on adjacent buildings and outdoor use areas through effective siting, design and landscape treatment of adjacent standoff zone.

Reduce the overall demand for surface parking and related impacts including greater land disturbance, increased impervious surface, and heat island effect.

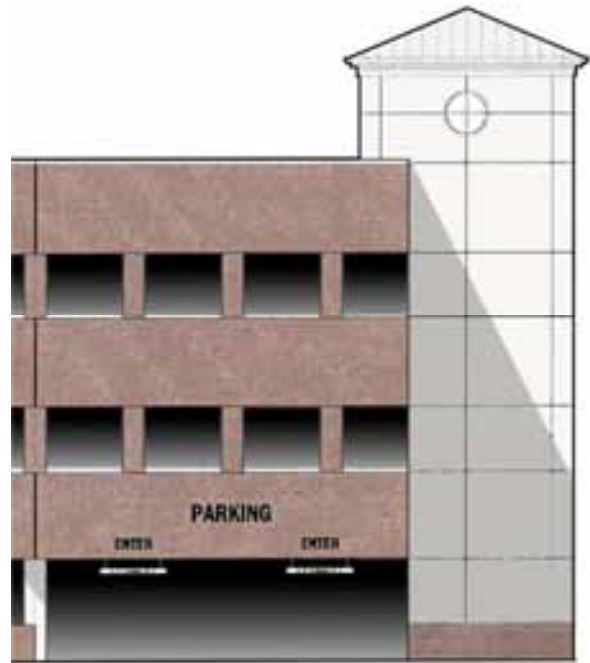
#### Design Guidelines

Establish “greenbelt” treatment in standoff zone between parking structure and unobstructed space of adjacent facilities. Greenbelt planting shall include mixed tree planting of understory and deciduous shade and/ or evergreen trees.

Consider approaches to grading that reduce the visual impact of structured parking through combining berming and naturalized planting.

Include pedestrian walkways linking structured parking to adjacent facilities, roadway and existing walk system in the implementation of new parking structures. Include bicycle parking and shower facilities within structured parking facilities and connections to the bicycle route system.

Parking garages shall be designed with the same style and characteristics as the Special District or sub-district in which they are built. This is particularly important because parking garages will be large, dominant structures on any site and its character will over-power other small adjacent structures.



Above illustration shows a three story parking deck appropriate for Hadnot Point, Wallace Creek, or other Special District where the Georgian or Colonial Revival style is called for. The pre-cast stair or elevator tower is used to break up the expanse of the structure.

The exterior of parking garages shall be level and not express inclined ramps on the façade, in order to blend the structure's appearance with surrounding buildings.

### 3.2.6 BICYCLE CIRCULATION

#### Objectives:

Bicycle transportation provides an alternative to vehicular use on Base and results in reduced demand for roadway, parking and utility infrastructure.

Provision of safe, enjoyable bicycle travel ways encourages bicycle use for transportation and recreation.

### Design Guidelines

Multi-use trails (10 foot width) for use by pedestrians and bicyclists shall be included within all primary streetscape sections. Primary roadway related multi –use trails may run parallel to roadways or more informally with curving alignments. Alignment design should respect nature of safe travel for both pedestrians and bicyclists.

Multi-use trails reintroduce bicycles to traffic at roadway intersections. Intersection and crosswalks design shall consider safety of all users.

Continued implementation of Base-wide multi-use trail and “Greenway” system serving bicyclists, joggers, and pedestrians and linking roadway system, areas of development, and natural areas is encouraged. The Greenway Master Plan allows planned incremental development. All Base projects shall include both pedestrian and bicycle connections to adjacent roadways and facilities.

Within secondary roadway sections, bicycle travel shall be accommodated within the roadway in dedicated bicycle travel lane (five foot width) or through adjacent off-road multi-use trail if one exists as part of overall trail system. On tertiary roads, bicycles “share” the vehicular travel lane.

All bicycle ways, whether dedicated bicycle trail, multi-use trail or bicycle roadway lane, shall have minimum two foot clear zone to either side of the travel way without vertical obstruction or abrupt grade drop.

As trees adjacent to bikeways mature, branches extending over travel way shall be limbed up 10 feet (minimum) from travel surface.

Multi-use trails and dedicated bike lanes intended for use after dark shall be lighted as appropriate for general street conditions with special emphasis on lighting at intersections and road crossings.

Bicycle parking shall be provided within 200 feet of the facility with all new non-residential projects at the rate of one space per five percent (minimum) of all building users based at peak regular occupancy. Provide covered bicycle parking at new residential facilities at one space per 15 percent of occupants. Garage parking facilities shall include provision for bicycle storage and showering.



Continue to expand system of multi-use trails

### 3.2.7 PEDESTRIAN CIRCULATION

#### Objectives:

Walking provides an alternative to vehicular use on base and results in reduced demand for roadway, parking and utility infrastructure, conserved resources and reduced vehicle pollution.

Provision of safe, convenient, accessible and well linked, enjoyable pedestrian ways encourages walking as an alternative to driving, improves physical fitness, and supports healthy well functioning Base community development and ATFP driven design.

#### Design Guidelines

Walkways shall be designed and implemented to establish a continuous network that is convenient, with direct routes between destinations. Establish pedestrian walkway connections to adjacent facilities,

parking and roadway walk and multi-use systems at new and, over time, at existing developments.

Provide amenities including benches, receptacles, planting and lighting.

Walkways width shall be determined by function and scale of importance within setting.

- Troop Movement Walkways: four abreast shall be 10 foot width minimum.
- Major walkways: commonly traveled by two people abreast with frequent use and/or located in proximity to prominent building or open space setting shall be eight foot width minimum.
- Standard walkways: typical walkway use, single person, or two people abreast with lower frequency use shall be six foot width.
- Minor walk: infrequent, limited or local use, low volume shall be 4 foot width.

All roadways shall be designed with pedestrian walkways included in the cross section. See roadway sections for relationship of walks to roadways.

Crosswalks shall be provided at intersections and shall be 10 foot width minimum. Crosswalks shall be clearly marked by a consistent pattern of paint stripes or by crosswalk paving consistent with walkway paving material and contrasting to roadway paving.



**Walkways shall be provided with tree cover.**

Walkways shall be planted with formal lines of shade trees to provide 50% shade coverage within 10 years of installation.

As trees mature, branches shall be limbed up to ensure eight foot minimum clearance between walkway surface and branching. For multi-use trails accommodating bicycles and pedestrians, clearance shall be 10 foot minimum. Trees shall be selected for appropriateness to setting and planted a minimum distance of five feet off walkways and trails, eight to 12 feet preferred as space allows, minimizing long term impact on paving. In tighter planting conditions, consideration should be given to installing root barrier at the walkway edge.

Multi-use trails and dedicated pedestrian walks intended for use after dark shall be lighted with special emphasis on lighting at intersections and vehicular crossings, destinations (building entries) and outdoor gathering spots. Bollard-style lighting is preferred at pedestrian ways as opposed to overhead lighting. Provide handrails and wall-recessed lights at outdoor pedestrian steps, ramps and stairs.

All pedestrian travel ways shall be universally accessible and in compliance with state and federal regulations, including *Uniform Federal Accessibility*



*Standards (UFAS) and Americans with Disability Act Accessibility Guide (ADAAG). Building access and general walkways should be designed to avoid use of stairways or grades requiring handrails when possible. When required, ramp access shall be integrated into the overall site/architectural design and shall not be a lesser means of access.*



Existing multi-use trail network

### 3.2.8 PLAZAS AND COURTYARDS – EXTERIOR USE AREAS

#### Objectives:

Provide functional informal and formal outdoor spaces to enhance the quality of life, promote enjoyment of the outdoors, provide settings for passive, active, and ceremonial uses, and extend usefulness/flexibility of Base facilities and resources.

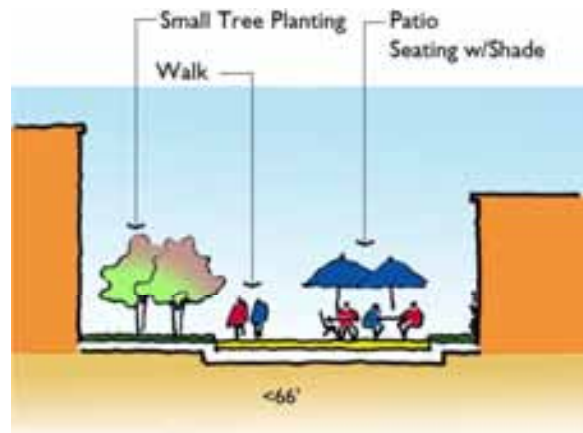
Establish a hierarchy of developed outdoor spaces related to buildings, circulation routes and Base open space to reinforce way finding, enhance entries and building functions, and spatially and visually unify the Base setting.

#### Design Guidelines

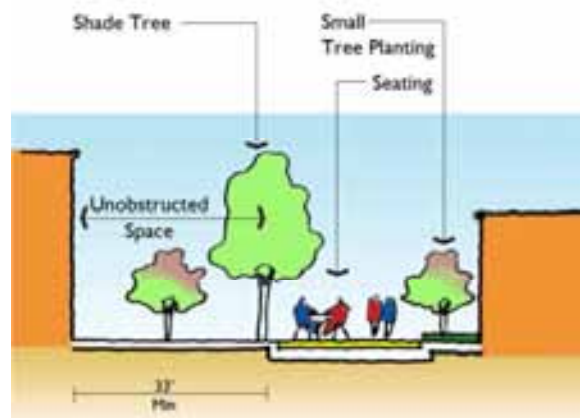
Provide plazas to create outdoor meeting and ceremonial spaces. Size and placement shall reflect functional needs and ceremonial importance to the setting. Consideration shall be given to flexible use of the space in choosing furnishings and establishing relationships –physical and visual- between the plaza and adjacent open space and buildings. Opportunities for extended views to and from plazas shall be considered.

Provide entry forecourts visible from the street and adjacent parking when actual building entries are not visible from these vantage points. Entry forecourts shall be located in proximity to buildings and connected to both parking and actual building entry/ies by pedestrian walkways. Entry forecourts visually reinforce circulation connections between vehicular and non-vehicular zones and visually link buildings to the surroundings.

Forecourts may serve as outdoor plazas, courtyards or smaller “landings” and be furnished with benches, shade structures, lighting, planting and distinctive architectural treatment and may include facilities for bicycle parking.



**Provide courtyards as inviting outdoor spaces for informal gathering and relaxation.**



**Broader spaces allow introduction of larger deciduous trees.**

Provide courtyards as inviting outdoor spaces for informal gathering and relaxation and presenting pleasing views from building interiors. Courtyards should be furnished with seating and tables, and within residential settings may include bicycle parking. Courtyards shall be connected to adjacent building entries and area pedestrian walkway systems by pedestrian walks.

Scale outdoor use areas and select materials in response to adjacent buildings, open space and intended use. Outdoor use areas should unify the setting and visually connect to adjacent spaces.

For outdoor areas used after dark, provide lighting to enhance the use of the space, and create a sense of inviting security. All lighting shall be fully shielded, with full cut off fixtures controlling distribution of light used for sites adjacent to building windows.

Plazas, forecourt entries and courtyards shall be provided with minimum 50% shade cover. Shade cover may be provided by tree canopy, arbor planting, or permanent or temporary architectural device.

All plazas, entry forecourts and courtyards shall be universally accessible and in compliance with state and federal regulations, including *Uniform Federal Accessibility Standards (UFAS)* and *Americans with Disability Act Accessibility Guide (ADAAG)* and conform to *UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings*

### 3.2.9 COMMON AREAS, ACTIVITY NODES, OPEN SPACES AND PARKS – EXTERIOR USE AREA

#### Objectives:

Provide varied and attractive open spaces for passive and active recreational use with established visual and physical connections between open spaces, building entries and exterior spaces, and circulation systems.

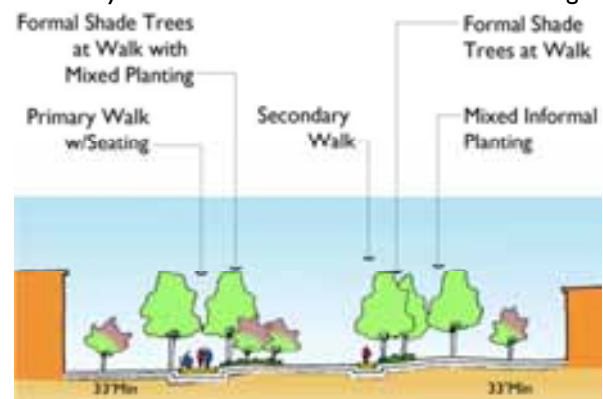
Preserve and enhance natural areas and resources.

The open space system is the overarching unifying element of the Base setting. Implement a Base-wide framework of “greenbelts” – broad bands of naturalized planting within stand-off zones (excluding unobstructed areas) - between roadways/parking (motorized) and building development (non-motorized) to establish a cohesive setting for Base facilities and activity.

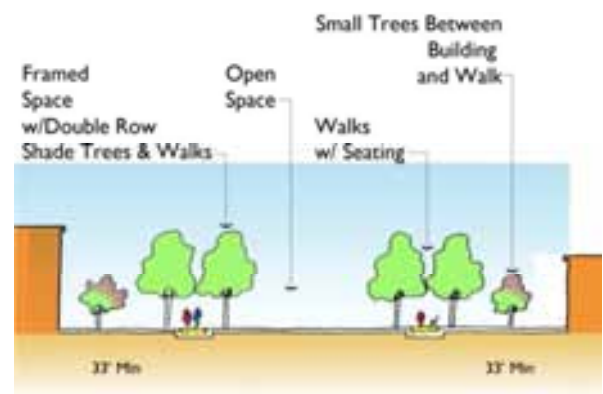
#### Design Guidelines

Open space design shall reflect functional requirements of intended use, contextual setting of both adjacent open space and buildings and opportunities for connections to a broader open space system.

Parade grounds shall include traditional manicured lawn scaled for intended use (one acre per 125 persons) with area for reviewing stand (with capacity equal to five percent of total officer strength) and framed by walks and formal rows of trees at the edge.



Informal Landscape



Formal Landscape

Design recreational open space, including fitness trails, sports fields, and picnic areas according to predominant intended use. Opportunities for multi-use and integrated design should be considered to maximize efficient use of available resources and

create opportunities for increased sympathetic relationship between facilities.

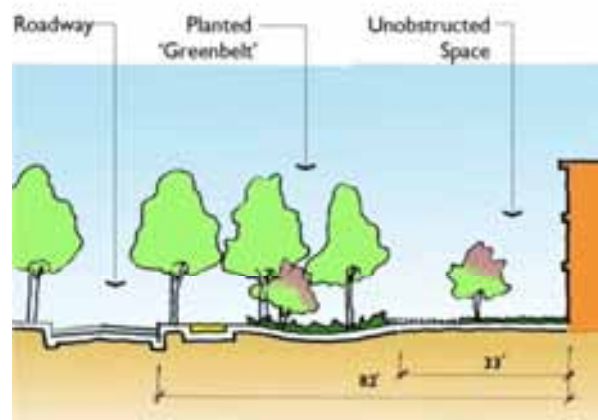
Integrate children's play areas and playgrounds into the open space setting and site in relationship to other supporting facilities such as residences, recreation fields, and schools. Design of these spaces should refer to UFC 3-210-04/1 *Children's Outdoor Play Area* and UFC 4-740-14 *Design, Child Development Centers*.

Preserve natural open space to greatest extent possible during site development. Clustering development to maximize contiguous natural and developed open space shall be considered in all development projects.

Maximize opportunities to link existing and proposed open space elements and areas to establish contiguous and linking vegetative cover and open space.

Provide visual and physical connections to adjacent development and open spaces through managed sight lines, continuity of landscape (including planting) and circulation routes. Preserve view corridors into and from outdoor/open spaces.

Integrate and enhance existing natural settings into open space framework. Emphasis on preservation of natural resources (wetlands, shoreline, and wooded areas) and reduction in areas given over to highly maintained open space should be considered in all site design development.



**Implement a Base-wide framework of "greenbelts"**

### 3.2.10 service areas

#### Objectives:

Provide for functional and efficient building and site service that is sited and designed to minimize negative impacts on adjacent uses including building, vehicular, bicycle and pedestrian circulation, and open space use.

#### Design Guidelines

Locate service facilities and loading docks to minimize visual and physical impact of access drives and actual service areas on adjacent uses such as public circulation ways, pedestrian crossings, building entries/facades and views from the building interior and outdoor use areas.

Combine service areas for multiple buildings to minimize access drives and duplication of facilities when possible.

Establish "service" access side of development areas to reduce conflicts between service and non service circulation.

Service area enclosure design should match the style and materials of adjacent architecture. Enhance

integration of screening into surroundings with planting design.

For limited and controlled access service and emergency activity, such as utility maintenance or emergency access, within the stand-off zone, consider providing access through implementation of controlled access vehicular bearing pedestrian walks in order to clarify “pedestrian” environment, reduce duplicate paving and impervious surface, and maximize resources.

Provide appropriately designed paving cross section for intended vehicle use at service access and service sites. Dumpster enclosures and loading areas shall have reinforced concrete pads.

Design and location of service areas and related screening shall comply with AFTP requirements.

### 3.2.10 MAINTENANCE AND IMPROVEMENTS (COLS)

#### Objectives:

Establish best maintenance practices through programming, design and implementation practices that create well functioning, aesthetically pleasing facilities designed with consideration of long term durability, resource/energy efficiency, and reduced maintenance demand.

Establish planning and design practices that consider individual facility, infrastructure and site design projects in the planning context of the larger Base environment.

Establish a hierarchy of treatment zones and related allocation of resources, including funding for planned maintenance (based on life-cycle costs) at the time of planning and design for the project.

Refer to Appendix B - Common Operating Levels for descriptions of levels and map.

#### Design Guidelines

Reduce areas of mown turf throughout the Base. Increase proportion of site area established as naturalized planting and groundcover. Preserve and enhance areas of existing natural vegetation. Use native plant materials. Use of more formal mulched planting beds should be limited to locations that enhance main building entrances and ceremonial focal points.



Replace maintenance intensive and fussy plantings with plantings of long lived, drought-tolerant native plant materials. Focus planting on simplified designs dominated by trees and low ground cover materials.

Use durable, local materials (500 mile radius) in paving, site construction, and furnishings. See *Appendix C - Regional Materials Radius*.


Establish life-cycle maintenance budget at time of project implementation for planned maintenance funding.

#### RESTRICTIONS

While the Base strongly encourages Organizations to take advantage of the Self-Help program, the uniformity of Base appearance and regular maintenance must be considered. *For more information, see Appendix F Summary Pamphlet.* The Base restricts the following site and building modifications:

Description	Image	Alternative
Rope and wood post fencing		None
Unauthorized parking signs		Base Order permits marking paved surfaces



Landscape timbers		Landscape paver blocks
Exposed cable television cabling		None
Roof-mounted commercial and tactical antennas		Mount to side of structure, requires approval from Tower Working Group
Painted exterior stairways		None
Car ports or other covered storage		Work request for gazebo or picnic shelter

### 3.2.11 STORMWATER MANAGEMENT AND LOW IMPACT DEVELOPMENT

#### Objectives:

Establish stormwater management and Low Impact Development (LID) practices through programming, design and implementation that create well functioning, aesthetically pleasing facilities designed with consideration of long term functionality, and reduced maintenance demand.

Establish planning and design practices that consider individual facility, infrastructure and other site design projects in the planning context of the larger Base environment.

#### Design Guidelines

Comply with:

- *UFC 3-210-10 Low Impact Development (Draft).*
- *North Carolina Department of Environment and Natural Resources (NCDENR) Coastal Stormwater Rules and Division of Water Quality design guidance for Best Management Practices (BMPs).*
- *LEED Site Credits SS6.1 and SS6.2.*
- *Energy Independence Security Act (EISA) Section 438.*

Projects aboard MCB Camp Lejeune that create more than 10,000 square feet of built upon area will be required to be permitted through the North Carolina Department of Environment and Natural Resources (NCDENR). The NCDENR guidelines listed above provide the minimum technical requirements to obtain the State stormwater permit. Where feasible and compliant with future land use and/or master plan documents for the project area, consideration should be given for defining a project boundary and providing site design elements that comply with the NCDENR Low Density permitting requirements. In addition to the State stormwater permitting requirements projects that increase impervious area by 5,000 square feet will be required to comply with the Energy Independence and Security Act (EISA) Section 438, the Penn Memo and the Low Impact Development (LID) UFC.

The goals of LID are to create a developed site that closely maintains the natural hydrologic functions and conserves the maximum amount of the existing natural resources. The key elements of LID are custom site design, conservation, localized stormwater management, pollution prevention and hydrologic recharge of the local aquifer and/or adjacent wetlands. All of these elements work hand in hand to create an LID site design.

A custom site design will be required for each project so as to provide for all of the key elements of LID. A custom designed site shall provide for conservation



by avoiding impacts to environmentally sensitive areas such as wetlands, ephemeral and perennial streams, and any required buffer areas. Where possible locate buildings, structures, parking/staging pavement, roadways, and the associated grading and earthwork operations outside of the above listed sensitive areas.

The custom site shall also provide for localized (i.e. decentralized point source) stormwater management controls or IMPs (integrated management practices) so as to facilitate the groundwater recharge as close to the original source through infiltration. Design shall provide for sheet flow of stormwater and avoid closed drainage systems or concentration of stormwater flow to the extent possible.

The infiltration will facilitate pollution prevention by filtering the ground water naturally while returning it to the local aquifer. LID and North Carolina requirements for infiltration to meet water quality requirements will vary and may require that the project exceed the less stringent requirement. In any case the State standard must be met in order to obtain the required permits.

Runoff beyond the requirement for infiltration should be directed (by surface flow if possible) to adjacent wetlands or streams as recharge these elements in a pattern as close to the original drainage pattern as possible. At a minimum, stormwater drainage shall be directed to wetlands or streams that match the original hydrology so as not to have a detrimental effect on the quality of the natural feature.

In addition to the above methods to meet the required stormwater quality and quantity requirements, the option of water reuse may be employed. Practices for stormwater reuse may include irrigation or a gray water system for non-potable use.

The designer shall take care in selecting stormwater management and LID practices to ensure that they are in compliance with the NCDENR requirements

for the classification of the downstream receiving waters. Certain classifications greatly restrict the allowable stormwater management options.

Maintenance of the selected BMP, IMP or rainwater collection and reuse system is critical. Designer shall coordinate with MCBCL personnel as to acceptable practices to ensure the proper maintenance can be provided. Any measure that is employed shall be required to provide an O&M Manual detailing the proper maintenance requirements and schedule.

The LID principle to minimize the development footprint shall not be used to significantly reduce or eliminate active open space from a project. These areas may include parade decks, formation areas, active recreation areas or other site open space amenities. These project elements are vital to the function of the facilities and Marines that they serve and should be maintained in the site design of the project. Economies may be found in multiple building projects where these active open space amenities may be combined and possibly reduced in scale while maintaining the intended function.

Surface discharge of rainwater collected from roofs at grade, although a LID technique, must be carefully designed to avoid overwash of the surface at the base of downspouts. Rainwater discharge should be diverted to lower-rate conditions that avoid eroding topsoils and mulch, such as discharging onto gravel areas. Surface discharge on north sides of buildings should be conveyed to a minimum distance of six feet away from buildings, to avoid creating damp soils next to building facades that receive little or no sun to dry out.

In addition to proper stormwater management techniques, proper erosion and sediment control shall be considered for all land-disturbing activities. Use of centipede sod is required for all permanent restoration of disturbed areas that are not otherwise built upon, paved or planted. Sod or other intense turf-planting techniques such as erosion control

blankets and sub-surface geogrid reinforcement for turf may also be appropriate for embankments and other sloped areas. Historically, conventional seeding techniques have met with low success on construction sites and are easily disapproved by NCDENR as ineffective.

### 3.3 ARCHITECTURAL DESIGN

The extent and type of architectural treatment on the Installations will vary. However, there shall be a common thread or theme in place to tie the Special Districts together and the Installation as a whole. The creation of place, or the urban imageability, is the experiences of inhabitants as they go from place to place and unconsciously recognize prevailing architectural images throughout the Base. The approach of all individual projects, whether new or renovation, should promote the overall improvement in appearance of the Installations.

The buildings at MCB Camp Lejeune and MCAS New River demonstrate a cohesive theme within most of the special districts. Some areas have less historical context, were developed during various eras of architectural fashion, or have no defined style because they are newly developed. The BEAP is a tool to bring together a visual continuity and to define the architectural standards for future design, construction and maintenance projects.

#### 3.3.1 ARCHITECTURAL STYLE AND ROOF FORMS

The architecture designs at MCB Camp Lejeune and MCAS New River can be grouped into four major categories:



*Early American styles:* this consists of Georgian, Colonial Revival or Federalist styles



*Contemporary style:* interpretations and adaptations of vernacular and classical design elements

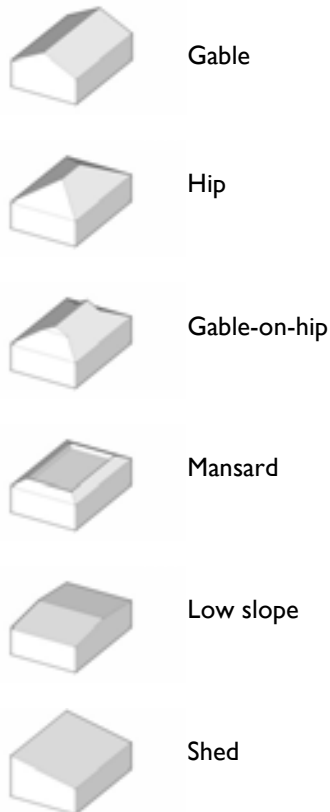


*Shingle style:* large expanses of unpainted shingles, porches, and window clustering



*Utilitarian:* devoid of any discernable style of architecture, strictly functional in form

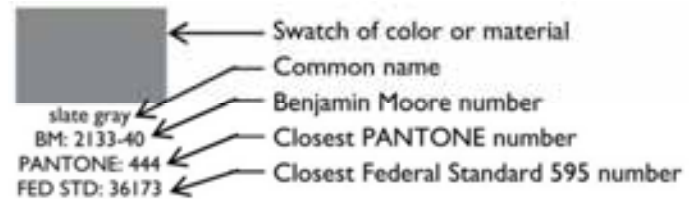
The following diagrams describe the roof forms used throughout this document:



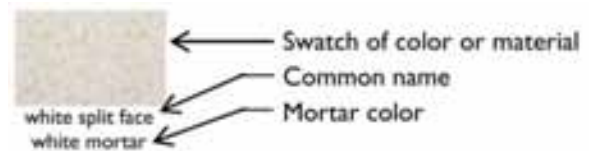
### 3.3.2 COLOR CHARTS

Color charts define the permissible materials and colors for each district. The following diagram clarifies how the color chart is read:

#### Color



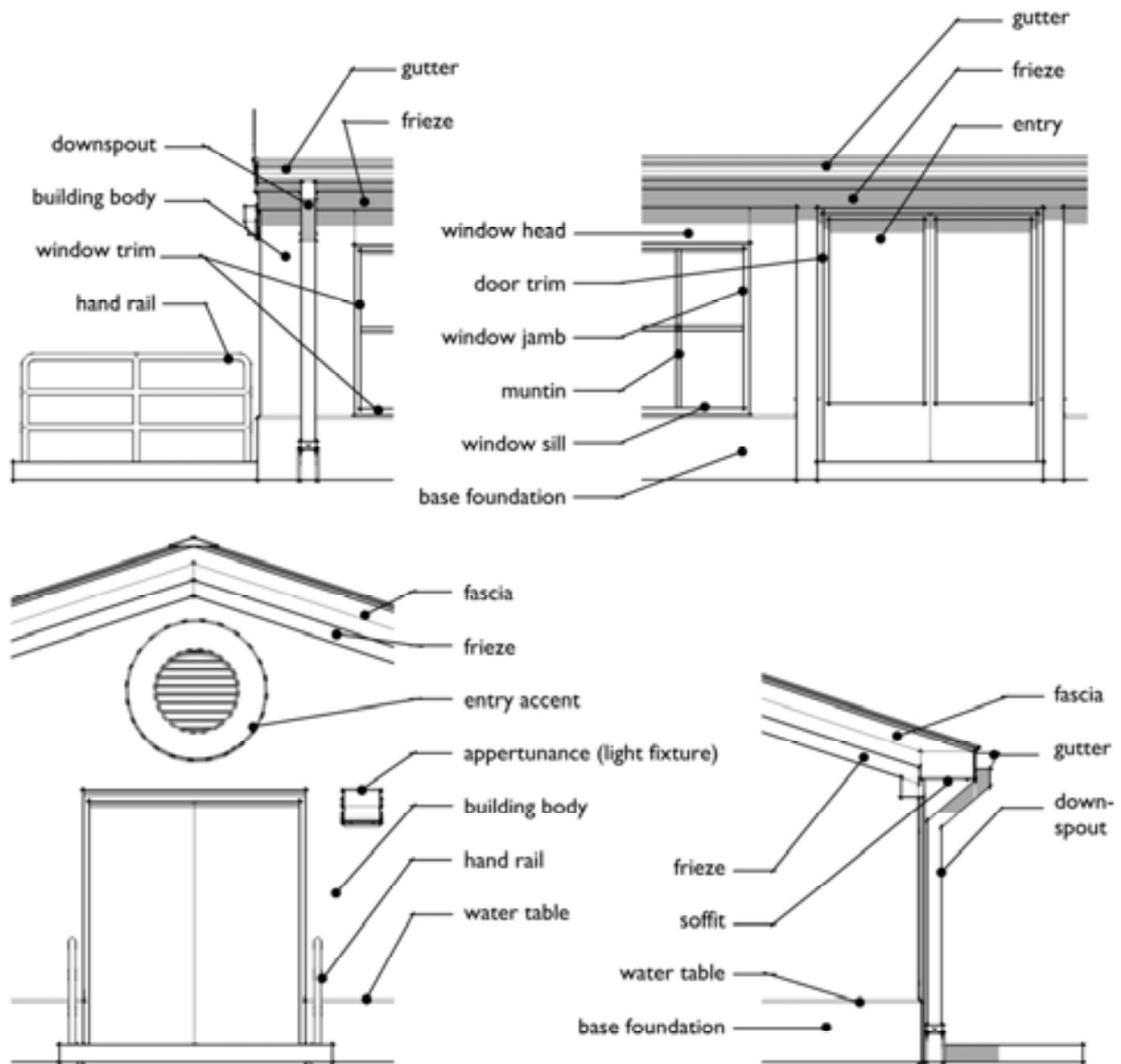
#### Material



Color charts must be used in conjunction with the color boards; see Appendix E – Color Boards.

### 3.3.3 ARCHITECTURAL COMPONENTS

The guidelines in this document use as number of architectural terms to identify specific element of a building facade. The following diagrams clarify these terms:



Description	Hadnot Point Hospital Point Wallace Creek Cogdels Creek	French Creek	Courthouse Bay	Paradise Point	Onslow Beach	Camp Geiger
Architectural Style						
Georgian	yes	no	no	yes	no	no
Colonial Revival	yes	no	yes	yes	no	no
Shingle	no	no	no	no	yes	no
Contemporary	no	yes	yes	no	no	yes
Utilitarian	no	no	no	no	no	no
Roof Form						
Low slope	no	no	no	no	no	no
Gable	no	yes	yes	yes	yes	yes
Gable-on-hip	yes	no	yes	yes	no	no
Shed	no	no	no	no	yes	yes
Mansard	no	no	no	no	no	yes
Hip	yes	yes	yes	yes	yes	yes

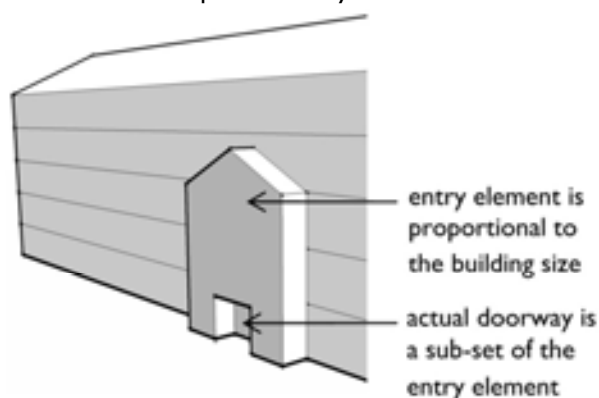
Description	New River	Stone Bay	Camp Johnson	Entry Gates	Industrial	Airfield
<b>Architectural Style</b>						
Georgian	no	yes	no	yes	no	no
Colonial Revival	no	yes	yes	yes	no	no
Shingle	no	no	no	no	no	no
Contemporary	yes	yes	yes	no	yes	yes
Utilitarian	no	no	no	no	yes	yes
<b>Roof Form</b>						
Low slope	no	no	no	no	yes	yes
Gable	yes	yes	yes	no	yes	yes
Gable-on-hip	no	yes	no	yes	no	no
Shed	yes	no	yes	no	yes	yes
Mansard	no	yes	no	no	no	no
Hip	yes	yes	yes	yes	no	no



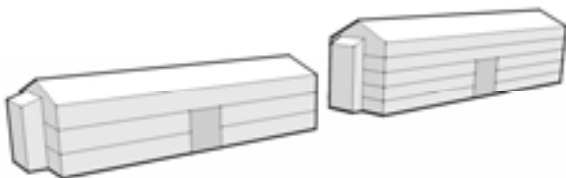
### 3.3.4 BUILDING ENTRANCES

---

Building entrances serve an important role in a building's appearance and function and should play a prominent role in the building's facade. Entrances on new buildings should be clearly defined through formal, spatial, and/or material hierarchy and constitute a clear point of entry.



Primary entrances shall be proportional to the building mass. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



**Entry elements shall be sized proportionately to building height**

On historic buildings, entrances should be preserved, rehabilitated, and restored back to their original configurations wherever possible, or reconstructed to replicate the original appearance. Seek guidance from Camp Lejeune Environmental Management Department prior to any work on individual buildings and historic districts. Specific guidelines may be found in a document available from Environmental Management:

*Historical Architectural Evaluations, Marine Corps Base Camp Lejeune, Onslow County, North Carolina (Bowers, Dixon, and Jacobe 2008)*

### 3.3.5 BUILDING ADDITIONS AND RENOVATIONS

---

All building additions or renovations should be compatible in aesthetics, scale, form, material, orientation, and style with the existing building. Incompatible additions and renovations should be removed and replaced with more compatible designs that are more sensitive to the building style, use, and location. In cases where removal and replacement is not obtainable, incompatible additions and renovations should be modified to make them more compatible with the building style.

### 3.3.6 GUIDELINES FOR HISTORIC BUILDINGS, HISTORIC BUILDINGS PRIORITY TREATMENT

---

The historic buildings on the Installation play a prominent role in the overall quality and character of the Base. They are protected by virtue of established historic districts in order to preserve MCB Camp Lejeune's rich history and culture. Additions and renovations to historic buildings should conform to the guideline document noted above, as well as the State Historic Preservation Office. Incompatible modifications should be removed or enhanced to become compatible with the building. Routine maintenance should constantly be provided to protect structures from deterioration, and any new buildings in the historic districts should conform to the prevalent style. Structures in historic districts proposed for demolition, no matter how insignificant, must be approved by Base prior to demolition. See *Section 2.6 Historic District Overview*.

### 3.4 LANDSCAPE ARCHITECTURE

#### 3.4.1 FOCAL POINT DEVICES

##### Objectives:

Preserve and enhance existing landmarks and focal points and, as opportunities occur, establish additional elements to reinforce Base identity and assist in spatial orientation and way finding.

##### Design Guidelines

Existing landmarks and focal points shall be preserved and enhanced through control and preservation of sight lines, enhanced planting framing the view and consideration of dynamic process of the viewing sequence.



**Focal point and landmarks reinforce Base identity and assist in spatial orientation and way finding**

The views to landmarks and focal points and their immediate settings should be designed and maintained to eliminate or screen elements that are distract from, obstruct or reduce the prominence or importance of the view to the landmark or focal point.

Consider introduction of new focal points within the context of the prominence of the facility, the intended viewer (motorist, pedestrian) and viewing sequence, and the need for symbolic orientation.

#### 3.4.2 MEMORIALS, MONUMENTS, STATUES, AND STATIC DISPLAYS

##### Objectives:

Present, preserve and maintain existing and newly implemented memorials, monuments, statues, and displayed elements honoring people and events in a means that dignifies the remembrance and inspires respect.

Memorials, monuments, statues, and displays communicate the history, identity and culture of the Marines and Base.

As a means of conveying meaning from one generation to the next, memorials, monuments, statues, and displays should be integrated into meaningful locations and be accessible.



**Monument of John A. Lejeune at the Hadnot Point roundabout**

##### Design Guidelines

Select settings for memorials, monuments and displays so as to be respectful of the element, provide appropriate scale to the element's size and importance, and potential for integrating the setting into the larger surroundings.

Consider the experience of approaching and viewing the monument or memorial close up to maximum

benefit. Orient the memorial in a direction to be seen by the majority of viewers. Raise memorial above the adjacent ground plane on plinth or base for better display.

For sites with multiple related memorials, arrange memorials as part of an overall composition rather than as single isolated unrelated elements within the space.

Locate memorials to enhance the selected site, courtyard or plaza.

Select monument and memorial materials for long term quality of appearance and durability.



**Displays communicate the history, identity and culture of the Marines and Base**

Settings for displays such as ships, planes or equipment shall provide prominence for the elements and opportunity to fully appreciate the elements from varied aspects of viewing.

Mounting and installation methods should be designed specifically for the particular element to best display the object by tilting, suspending or anchoring in the most striking or noticeable means, assure secure support, and allow easy access for maintenance of the object.

Exhibit area should be laid out and maintained with crisp detail appropriate to displays with a simple

defined “base” flush or raised and cleanly edged with accompanying ground mounted identification plaque in explanation.

Displayed objects should be exhibited in a way to avoid confusion with operational equipment.

Consider presentation of memorials, monuments, and displays in both day time and night time settings. If area is viewed at night, include appropriate lighting either as part of the overall area site lighting or as special lighting to ensure that the face of the memorial/monument or object of display is not cast in shadow.

### 3.4.3 FLAGPOLES

#### Objectives:

Present flags in a meaningful, highly visible, and consistent way to express national and service pride, and as focal element, assist in orientation and way finding.

#### Design Guidelines

Flagpole design shall be consistent throughout the Base.

Flagpole design shall be consistent throughout the Base. National Flags are authorized on the basis of one per Organizational Flag. See Marine Corps Order PI0520.3B for a list of authorized organizations.

Limit flagpoles to major command and landmark locations. Flagpoles may be grouped to signify the importance of a location or the primary nature of the main gateway.

As with other focal elements and landmarks, avoid visual conflicts with elements such as signage, poles, and utility structures that detract from or obstruct the view of the flag(s).

Site flagpoles to allow respectful observation in the immediate area with adequate space at the base for raising and lowering, unfolding and folding the flag.

Flagpoles should be attractive, durable, and easily maintained. Aluminum poles are recommended. Halyards shall be accessible and operable. The flagpole shall be mounted in reinforced concrete footing designed to withstand wind load based on height of pole, maximum sized flag to be displayed, and local conditions.

Provide site lighting for those flags that remain raised after sundown.



**Flagpole outside the Base Headquarters Building**

### 3.4.5 PLANT MATERIAL

#### **Objectives:**

Planting, in particular tree planting, provides one of the most effective means of establishing continuity and unification of the Base setting by framing spaces, linking areas, reinforcing way finding, and, over time, establishing a long lived and memorable setting for Base activities.

Establish an ordering of outdoor spaces that are clearly defined and perceived as a whole.

Increase planted area and tree coverage to provide greater physical comfort for users and thereby

encourage greater outdoor activity, reduce solar heat gain and glare, and storm water management demand.

#### **Design Guidelines**

Preserve and protect existing healthy, long-living trees. Natural areas, including shoreline, wetlands, and wooded areas, should be preserved and protected. If development requires site disturbance, care shall be taken in layout to preserve the greatest contiguous and/or continuous linear natural and naturalized areas. Avoid development planning resulting in small “islands” or isolated pockets of vegetated land.

Plantings should be appropriate to the scale and setting of their surroundings. Plantings should be composed as large masses and regularly spaced rows rather than as fussy collections. The overall character to be achieved by plantings is one of tranquil order and restraint.

Planting design shall reinforce the physical structure of the Base and help to delineate streets, walks and open spaces.

For walkway, plazas, terraces or other hard surface outdoor gathering areas not otherwise shaded, plant trees so that so that a minimum 50 percent shade cover is provided 10 years after installation.

For parking areas provide 15 percent minimum shade coverage measured 10 years after installation of trees. Within the parking limits, provide pervious planting bed equal to or greater than five percent of the total square footage of paving area.

Where space permits and ATRP requirements allow, use plant materials in informal multi-height plantings to screen undesired views including parking and storage areas, service courts and trash enclosures (not architecturally treated) and substations. Planting screens shall have a natural composition and tie into the overall landscape setting.



**Integrate natural settings and planting. Reduce areas of mown turf.**

Reduce areas of mown turf throughout the Base. Increase proportion of site area established as naturalized planting and groundcover alternatives to mown lawn. Preserve and enhance areas of existing natural vegetation. Use native plant materials. Use of more formal, permanent mulched planting beds requiring higher maintenance should be limited to locations that enhance main building entrances and ceremonial focal points. As a note, this is distinct from mulch required in establishing long term naturalized and groundcover areas (as alternative to lawn).



**Protect and enhance the stability of the natural environment.**

Avoid soil and beach erosion by establishing plant cover on steep slopes and exposed areas.

#### Plant Selection:

Plants shall be selected based on appropriateness to micro-climatic and soil conditions of the site, including stress of human impact; and ease of maintenance once established.

When turf is specified or required, Centipede sod shall be used.

Mature size and form of plant material shall be considered in developing planting design. Design should allow plants to be maintained in their natural form with minimal pruning at mature size and as appropriate for the setting. Microclimate, soil and adjacent activity and utilities should be considered in selecting materials. For example, selection of shade trees for walkways should favor deeper tap root species to reduce impact to adjacent structures.

*See Appendix D Plant Palette.*

#### Irrigation:

Irrigation of lawns is not intended as a general practice on Base. Exceptions to this rule may be made for designated playing fields in recreational areas.

During establishment, trees shall be provided with temporary watering, for example through use of “gators” or by water truck.

Consider captured rainwater, recycled wastewater, cisterns, and detention ponds for use in supplementary watering.

### 3.4.6 SIGNAGE

#### Objectives:

Provide an effective, attractive, unified “family” of signage types to communicate information with clarity, in a manner that:

- Enhances the identity of the Base,
- Assists in providing directional way finding to one’s destination,
- Identifies buildings, landmarks, streets and parking areas, and
- Conveys regulatory information.

Establish a Base wide approach to locating signage so that information is communicated concisely and extraneous sign usage is minimized.

#### Design Guidelines:

##### General Guidelines

*All signage shall comply with the Sign Policy for Marine Corps Base Camp Lejeune, Base Order 11014.3, dated 28 August 2003.*

##### Letters

Letter font shall be Helvetica Medium in upper and lower case. The first letter of every word and acronyms shall be uppercase. Letter color shall be white. The exception to this standard shall be made for entrance signage. Letter font for mounted letters on entrance signage shall be Times Medium, upper case, of stainless steel.

Spacing for words and letters shall be “normal”. Spacing between lines of text shall be consistent among signs at one-half the height of the letters.

Words (lines of text) shall be positioned left justified.

Arrows on signs shall be white and conform to a square proportions illustrated below. Group

destinations to share common directional arrow. Use graphic symbols rather than words when possible to convey messages quickly and concisely.

Design the letter and arrow size in accordance with the design speed of the viewer.

- Less than 25 miles per hour (mph) – 4 inch lowercase letter and arrow shaft height.
- 26 – 35 mph – 6 inch lowercase letter and arrow shaft height.
- 36 to 45 mph – 8 inch lowercase letter and arrow shaft height.
- 46 to 60 mph – 10 inch lowercase letter and arrow shaft height.

Adjust the designated letter size in accordance with the following guidance:

- 150 foot reading distance – minimum 4 inch lowercase letter height.
- 200 foot reading distance – minimum 6 inch lowercase letter height.
- 300 foot reading distance – minimum 8 inch lowercase letter height.
- 400 foot reading distance – minimum 10 inch lowercase height.
- Increase the lowercase letter height 1 inch for every additional 50 feet or part thereof.

##### Placement:

Place signs to allow full unobstructed viewing. Avoid placing behind obstructions such as utility poles, lighting, vegetation, furnishings, or other signage.

Place signs a minimum of two feet and maximum of six feet from the roadway and minimum of two feet from walkways or multi use paths. Adjust distance according to site conditions and viewing speed – the slower the speed the closer the sign to the edge of travel way.



Position the bottom of the sign letters at minimum of 30 inches above the ground for vehicle design speeds of 30 mph or slower, and 36 inches above the ground for design speeds above 30 mph. Signage directed toward pedestrians or bicyclists shall be a minimum 24 inches above the ground and maximum height of 4 feet-6 inches to top of sign.

#### FUNCTION SPECIFIC SIGN GUIDELINES:

##### *Entrance Signs*

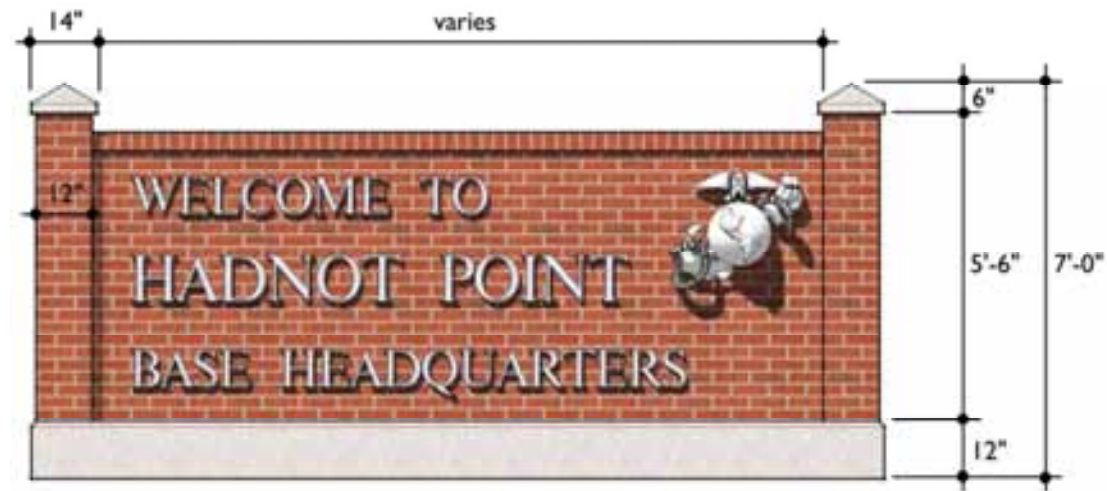
Entrance signs include: exterior entrance signs located at the main entrance and secondary entrances to the Base; and interior entrance signs, located at entrances to special districts of the Base.

Exterior entrance signs shall use brick and concrete. Messages and graphics shall be mounted graphics of

stainless steel (light color on dark brick for legibility). The overall form of the sign shall be horizontal.



**Typical entrance sign announcing French Creek**



Locate entry signage to the right of the entry drive.

Planting should augment the horizontal nature of the signage and should integrate the sign as part of a larger site design and as such shall be composed of naturalized massings (trees and shrubs) extending out from the sides of the sign and forming a visual backdrop. Planting shall not obstruct the view to signage.

Consideration should be given to appropriate night lighting for entrance signs and entry area – preserving legibility of the message and associated graphics.

##### *Directional Signs*

Directional signage is located at pedestrian and vehicular decision points to assist in way finding.

Locate directional signs (vehicular or pedestrian way finding) at decision points. Signs should not proliferate along a route.

Directional signs shall be placed perpendicular to the travel way.

Group destinations to a single arrow.

Highlight visitor information (for example, parking symbol)

#### *Identification Signs*

Identification signs identify building use, landmarks, parking area designations, etc.

Buildings shall be identified by bold numbers for visitors and public safety crews (light letters on dark background). Building numbers shall be mounted at prominent corners, seven feet above ground surface (or as appropriate in relationship to building features), facing street or emergency vehicle access/pedestrian approach. Provide additional signs as required for larger buildings and those located on corners.

Parking area designation/identification signs shall be located in logical sequence with way finding system on drive approach to the parking area. Follow general guidelines for lettering related to viewing from a vehicle. Message shall include: name/number of lot, allowed users, permit/decal requirements, hours of enforcement and allowed parking duration. Special consideration shall be given to signage placement and layout of message (use of graphic symbol) for visitor and handicap parking way finding and designation of parking spaces.

#### *Street*

Used to identify streets by name and provide locational reference.

Street signs for general use shall be green with white lettering and Marine Corps seal in representative colors to the left of the street name. Signs shall be mounted on square tubular galvanized steel posts painted black, with bottom of sign set seven feet above finished grade.

Street signs within camp districts shall be similar to existing concrete pillar signs traditionally found at Camp Geiger and Camp Johnson. Letters shall be black stenciled Helvetica medium continuous.

#### *Regulatory*

Regulatory signage includes traffic signs; and custom postings, warnings or military regulations. Regulatory signage should conform to U.S. Department of Transportation Manual of Uniform Traffic Control Devices for Streets and Highways.

Regulatory signage shall be mounted on square tubular galvanized steel posts painted black. Backs of regulatory signs shall be painted black.

#### *Changeable (Digital or Board)*

Changeable message signage (digital or board) is typical used outside community support facilities indicating activities or special events. Background shall be black/dark with white/light colored letters. Use of this sign type should be limited to specific programmatic locations.

*Digital signs are prohibited from having blinking or moving graphics and are only approved for use at formal school entrances and command buildings.*

### 3.4.7 PAVING SURFACES – PAVING

#### **Objectives:**

Consistent paving differentiated by function provides clarity to circulation and contributes to safety.

Materials shall be attractive and durable. Use of permeable paving to reduce run off and light colored paving with high albedo to reduce heat island affect are encouraged.

### Design Guidelines:

All walks shall be paved with scored concrete, tooled edges, light broom finish perpendicular to direction of travel. Cross slopes shall not exceed two percent.

When connecting to an existing walk, saw cut the existing walk at the control joint, meet and blend grade of new walk to existing. Implement consistent scoring pattern with each segment of new walk.

Provide detectable warning strip at base of ramps, and at flush meeting of vehicular and walk surfaces as required by *Americans with Disability Act Accessibility Guide (ADAAG)*. Detectable warning strip shall be precast concrete or manufactured detectable warning concrete paver.

Materials:

Roadways and parking areas (typical):

- Bituminous concrete

Special vehicular areas including ceremonial drives, drop-offs, car courts, and parking areas:

- Concrete pavers (light grey mix)
- Permeable pavers (light grey mix)

Emergency drives through open space/landscape:

- Concrete scored as walkway (w/ reinforced lawn to provide additional required width)
- Concrete pavers light grey mix (w/ reinforced lawn to provide additional required width)
- Reinforced lawn

Bicycle lanes (within roadway)

- Bituminous concrete with blue painted markings

Walkways, Courtyard, Plazas:

- Scored concrete (typical)
- Scored colored concrete (light warm grey)
- Concrete pavers (light grey mix)
- *Do not* paint concrete or paver walk, stairs or other pedestrian areas.

Multi-use pedestrian/bicycle way:

- Scored concrete (typical within developed areas when used in combination as a sidewalk)

Recreational multi-use trail:

- Bituminous concrete (Use of permeable paving is encouraged.)

Crosswalks

- Consider use of scored concrete as continuation of walkway for greater visual definition of pedestrian travel/crossing for aesthetic and traffic calming in higher visibility or trafficked areas.
- At minimum crosswalk shall be 10 foot width with 12 inch width painted bars.

## 3.4.8 SITE FURNISHINGS

### Objectives:

Consistent use of a selected family of site furnishings throughout the Base reinforces Base identity and provides greater flexibility and efficiency in reuse, addition, and maintenance.

Furnishings shall be attractive, durable and present an image of permanence and quality.

Use of common finishes and colors, especially consistent use of black for all metal and plastic coated metal will lend to a more refined look that will tie dissimilar elements together during a phasing implementation, ease in matching furnishing purchased over time, and present a fitting color for varied architectural styles, and understated integration into the landscape.

## Design Guidelines

### ATFP Devices

#### Bollards

- Black powder coated galvanized steel finish in removable and permanent styles. May be combined with low level bollard lighting. Two forms; ornamental bollard for formal and high profile settings and simpler concrete filled steel post painted black.
- Low fencing as pedestrian or edge definition. Bollards may be combined with steel cable or chain for restricted edging, though other longer lasting, less obtrusive alternatives may be considered such as curbing or grade change.
- Avoid use of wood posts/bollards and rope as these are not durable, nor do they maintain their appearance over time.

#### Benches and Tables

- Black powder coated galvanized steel mesh tables and chairs (movable) for residential courtyards and outdoor dining patios, may be combined with table umbrellas for shade to encourage use during warmer months.
- Black plastic coated steel mesh picnic tables for use in recreational and casual outdoor settings.
- Black plastic coated metal mesh bench for use throughout Base.

In addition to benches, tables and chairs, consideration should be given to incorporating informal seating opportunities in site design through use of seat walls, broad “landscape” steps, and gentle slopes facing onto active use areas such as play fields or waterfront.

#### Bicycle Racks:

- Galvanized powder coated black “bike hoop” design.
- Alternative: “Lightning Bolt” rack which is straightforward to install at new and pre-existing paved sites, has a low profile, may be double loaded, and is efficient in layout.

#### Trash Receptacles:

- Black powder coated galvanized steel mesh with removable cover. Provide receptacles as required for trash collection/recycling programs.

#### Drinking Fountains

- Black powder coated galvanized steel with stainless steel bowl. Simple post and bowl design with paving at base to prevent ground rutting from runoff.

#### Planters:

- Concrete or cast stone with natural finish pots and cast planter boxes.
- Pots: Use in formal line or clustered in group with varied sizes. Within furnishing family identify three sizes. Planting within pots should be equal or greater than height dimension of pot. For possible use as ATFP barrier.
- Boxes: Use as architectural edge to space, for example, at formal plazas or in courtyards. If an extension of building design, finish may be chosen to match architectural

finish and style. For possible use as AFTP barrier.

- When locating planters, consider ability to maintain planting, including availability of water and intensity of sun and pavement heat. Consider drip irrigation for permanent planters.

#### Shelters

- Bus: Simple covered shelter, black finished metal with seating. If side walls are provided use clear “see through” walls to minimize visual impact and allow open view within and from outside. Consider solar roof options for providing shelter lighting.
- Recreational: Pavilion like steel structure. Consider local conditions, wind load and footing requirements. Provide concrete walkway paving for area under shelter.

### 3.4.9 WALLS AND FENCES

#### Objectives:

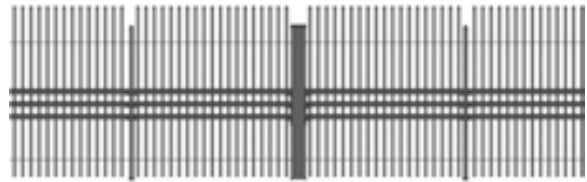
Provide fencing to secure perimeter, enclose recreation areas, mark boundaries, and restrict movement between areas (vehicles and /or pedestrians). Additionally, fencing may be used in screening alone or in combination with planting.

In general, fencing should be understated, functional and durable, and should not detract from the setting.

Walls should be an extension of architectural treatment and materials of the region.

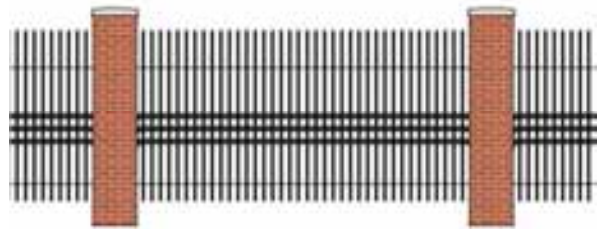
#### Design Guidelines

Ornamental steel picket fencing: Fencing in visually prominent areas such as gateways, administrative areas or near housing should be simple, ornamental, black steel square picket fencing. *Chainlink fencing is prohibited as ornamental fencing.*



**Ornamental steel picket fencing**

In more commanding settings such as primary entry gateways, set fence on a brick faced base. In common settings where the fence is aligned through lawn or groundcover, a concrete “mow strip” base (flush or curbed) may be used for ease of maintenance at the base.



**Fencing appropriate for commanding settings**

Perimeter chain link fencing: Black chain link for use in low activity, less visible perimeter and service areas may be used in combination with planting to provide screening buffer and integration into the landscape setting.

Stormwater management pond fencing: Four foot high black chain link fencing shall be provided for stormwater management ponds with water depths greater than 18 inches. Fencing may be supplemented with adjacent planting to naturalize and integrate pond within the surroundings.

Architectural walls: Walls of materials related to adjacent architecture become an extension of the architecture into the site and may be used to enclose and/or screen undesirable views or restrict access.

### 3.4.10 UTILITIES – SITE UTILITY / TRASH ENCLOSURE

#### Objectives:

Locate utilities and provide related site improvements to minimize visual impact, provide efficient, well functioning utility services, and allow for ease of maintenance and repair.

#### Design Guidelines

Utility corridors and individual lines shall be located to minimize facility disruption or long term damage during repair or maintenance.

- Recommended utility corridor alignment: Locate utilities under pavement or within areas intended to remain open lawn in order to allow effective restoration of surface conditions immediately following excavation due to repair or maintenance.
- Group utilities as possible to minimize extent of land affected. Site above grade utilities, transformers and other structures to avoid or minimize visual impact.
- Avoid aligning utilities within intended mixed planting areas, tree planting zones, and preserved natural areas in order to limit long term destruction caused by utility repair or maintenance.

Dumpsters should be conveniently located to the facility they serve, and away from main roads, entrances, and sidewalks. When possible, landscape treatments should be used to help screen dumpsters.



Utility Enclosure

#### Specifications:

Dumpster areas should be located on concrete pads with adequate radius, approach length, and overhead clearance from trees, utilities, and structures. Screening should be provided on three sides by a 7 foot tall masonry wall to block views of the containers. The dumpster enclosure's materials and style shall complement the facility it serves.

- Where possible, orient the openings of enclosures away from building entrances and main streets.
- Locate dumpsters to minimize visual impact and comply with force protection standards.
- Provide protective bollards to protect screen wall.
- Where appropriate, design enclosures as part of service areas for new facilities.
- Provide concrete pads and access aprons in front of enclosure entrances.
- Include landscaping and provisions for pedestrian access.

Dumpster Pad sizes for Camp Lejeune are as follows:

- Single dumpster: Sixteen feet wide and nine feet deep.
- Double Dumpster Pad: Twenty-seven feet wide and nine feet deep.



- Triple Dumpster Pad: Thirty-eight wide and nine feet deep.
- Four Dumpster Pad: Forty-nine feet wide and nine feet deep.
- Five Dumpster Pad: Sixty feet wide and nine feet deep.

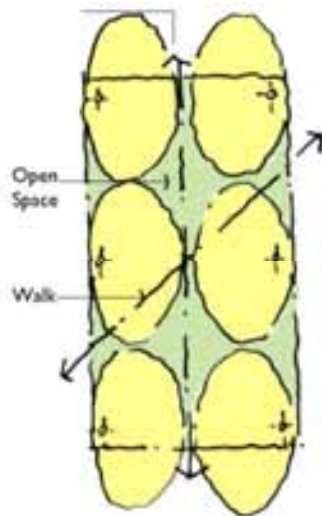
### 3.4.11 LIGHTING

#### Objectives:

Site lighting should enhance the nighttime environment, assist in way finding and orientation, contribute to safe movement, and establish a sense of security.

#### Design Guidelines

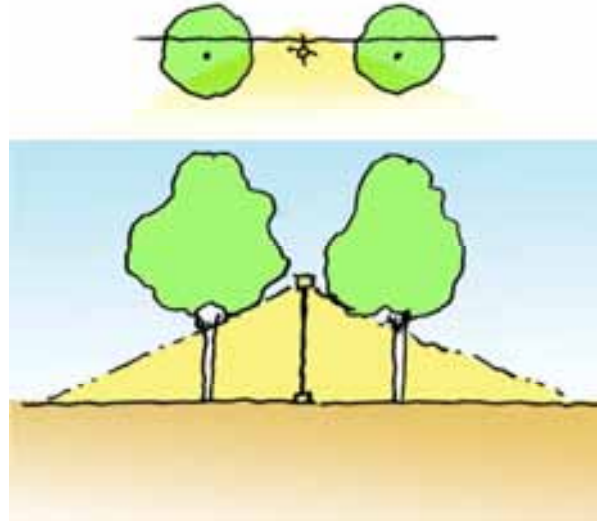
Provide an increased clarity and sense of security using light to define the edge of open space and parking areas. Avoid lighting open spaces and parking areas from the center. Edges left in shadow decrease the sense of security in the night time setting.



**Light spaces from the edges rather than the center.**

Arrange lights opposite each other, or on narrower roadways light from one side only, to reinforce the direction of circulation and increase clarity of roadways at night. Avoid staggered patterns of light.

This pattern works against the creation of a regular rhythm and ordering of the corridor.



**Coordinate lighting and planting design.**

Lighting design should avoid conflict with the foliage and shadows of maturing trees and should provide good uniformity and vertical illumination.



**Provide a hierarchy of lighting effects.**

Aid drivers and pedestrian circulation by providing a hierarchy of lighting affects that correspond to the different zones and uses of the site. Provide highest light levels at the destination (building entry), crossings and decision points (intersections).

Minimize glare and obtrusive light by limiting outdoor lighting that is misdirected, excessive, or unnecessary. Establish use of cut-off and fully shielded fixtures to control distribution of light.

Incorporate lighting curfews (i.e. turn off select lights automatically after a certain hour, such as when businesses close or traffic is minimal).

#### Lighting Pole Heights

- Roadway and Parking Area : 20 to 25 foot height (at secondary and tertiary roads that are one lane each direction may be 14 to 16 foot height)
- Walkways, Plazas and Courtyards: 12 to 15 foot height



## 4.0 DESIGN GUIDELINES FOR SPECIAL DISTRICTS

### 4.1 COMMON DISTRICT

The Common District guidelines are intended as the default guidelines for all areas within the Installation

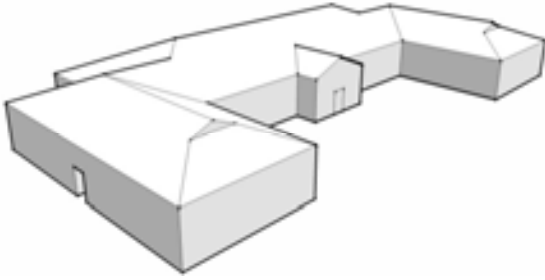
which do not fall in a Special District or otherwise do not require unique consideration. These areas are illustrated below. **BEQs have unique requirements which are outlined in Section 4.1.2.**



Areas shown that do not fall within a Special District and therefore default to the Common District. Remote sites also fall under the Common District guidelines, such as Oak Grove OLF.

## MASSING

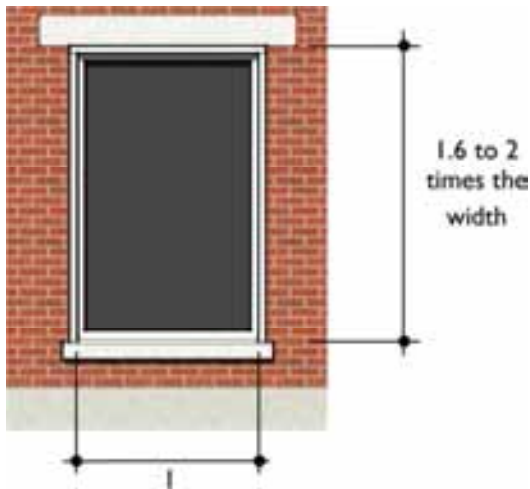
Building mass shall be based on the historical context of Camp Lejeune, primarily the Georgian and Colonial Revival styles. Symmetry in building mass, windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

## WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character seen in Georgian and Colonial Revival buildings throughout Camp Lejeune. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below.



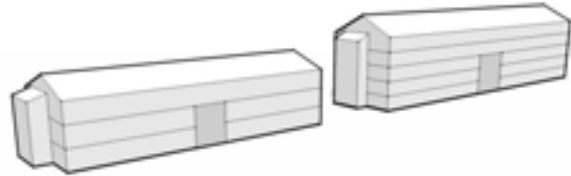
Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished

with different types of lintels which blend with the historic character, such as precast concrete or stone or jack arch. Sills may be precast concrete (preferred) or special brick shapes.



(Left) Example of window head using soldier coursing;  
(Right) Example of precast concrete sill

Entry elements for the primary entrance shall be proportional to the building mass. In two story buildings, entry elements shall be greater than half the height of the building. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



Entry elements (shaded) for three and five story buildings

Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.





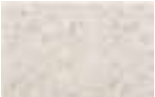



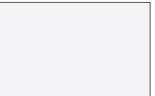
BODY AND ROOF MATERIALS


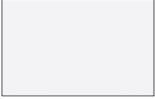

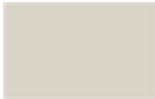
All facades shall be face brick, modular size. Base foundations shall be architectural concrete block.

Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.



COLORS COMMON

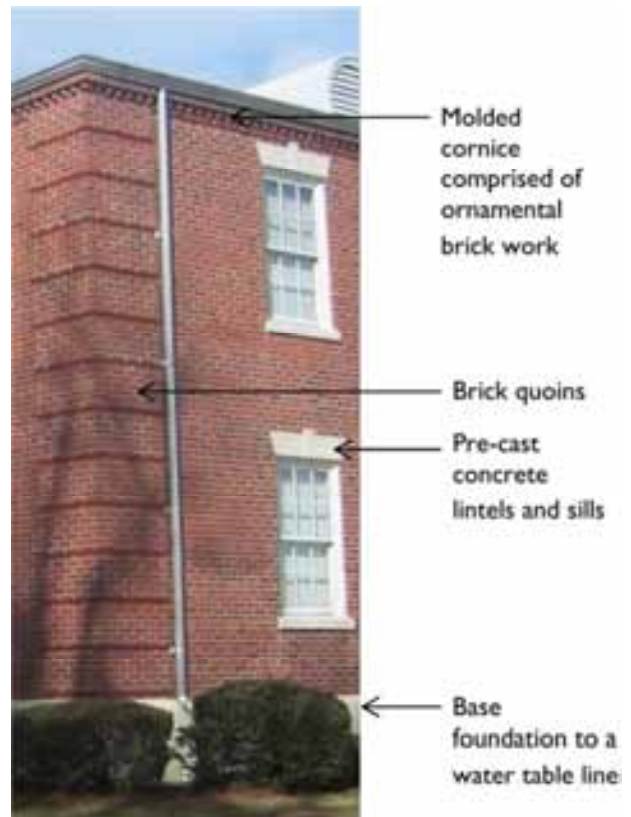
Description	Color
Facade	
Building body Screen walls	 red flashed smooth standard gray mortar  red flashed wire cut standard gray mortar
Base foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875  bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875

Handrails	
Entry accents Doors Window/door trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	
Roof Cladding Metal roof	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875

## DETAILS

Common District details shall be designed according to the early American architecture that is the prevalent style on Camp Lejeune, which includes elements of Georgian and Colonial Revival. Detail commonly associated with these styles includes:

- Brick quoins
- Base foundations to water table line
- Molded cornices



**Building 15 demonstrates details common to the Georgian and Colonial Revival styles: white base foundation, brick quoins, and embellished cornice**



**Molded cornice detail found in Georgian styles on Base**

Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:







The gable end on a gable-on-hip roof shall be equal in height to 1/3 of the overall roof height.






#### 4.1.1 TRAINING FACILITIES



Training facilities include enclosed buildings, observation towers, shelters, or any permanent vertical structure which serves a training function. Generally, training facilities shall follow closely to the Greater Sandy Run District guidelines (Section 4.14). Colors and materials shall be the following:

#### COLORS TRAINING FACILITIES

Description	Color
Facade	
Building body Screen walls	 gray split face standard gray mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875

#### Painted Surfaces and Factory Finishes

Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Handrails	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Entry accents Doors Door trim	 evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Window trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875

Roof Cladding	
Metal roof	 evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Composition shingle	 slate gray

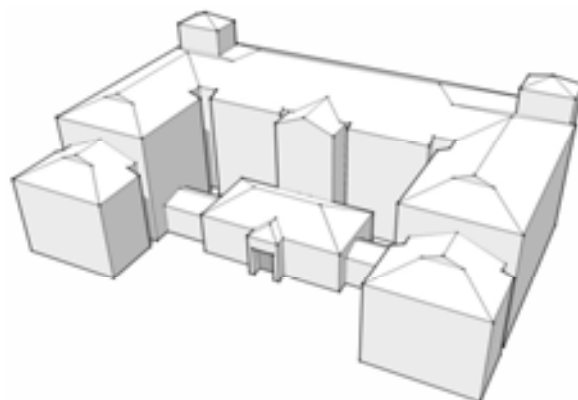
#### 4.1.2 BACHELOR ENLISTED QUARTERS

Bachelor Enlisted Quarters (BEQ) require special consideration with regard to architectural design. This is primarily due to their abundance throughout base and the large visual impact BEQs have on a site and district. Often these buildings are four or even five stories and clustered together, making them a predominant feature regardless of location.

Careful massing of BEQs is critical. Forms shall be designed to evoke the early American styles of the installation, as well as be visually rich. The complexity of massing in the diagram below brings the scale of the BEQ to a human level, as well as break up its large silhouette against the site.



This BEQ design for the west coast exemplifies the blending of the Installation's character and a complex mass of forms.



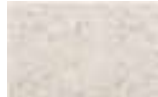




A similar massing which would be appropriate for Camp Lejeune.

Regarding windows, entrances, and details, BEQs shall adhere to the guidelines of the district in which they are located.

BEQ materials and colors shall be the following:

#### COLORS BEQS

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed wire cut standard grey mortar
Building body Screen walls within French Creek	 blended sand faced standard grey mortar
Base foundation	 white split face white mortar
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	Match roof color
Handrails	 clear anodized aluminum





## 4.2 HADNOT POINT



Hadnot Point's Georgian and Colonial Revival style buildings are the dominant architectural precedent for much of Camp Lejeune, particularly for administrative facilities. Therefore, it is important that this area be preserved and future development respect the historic context.

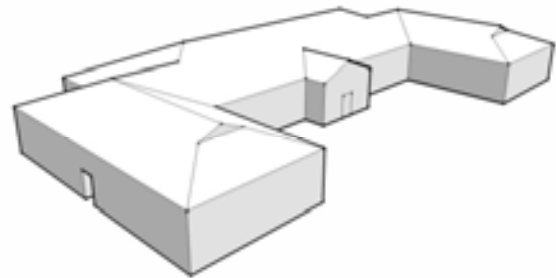
Aside from Hadnot Point proper, this district is comprised of two sub-districts and an historic district: the Industrial Area, the Marine Corps Exchange Complex, and the Command Services/Regimental Area No. 3 historic district. Refer to Section 2.6 for more information on this historic district.

### 4.2.1 HADNOT POINT

#### MASSING

Building mass in this district shall be based on historical context, primarily the Georgian and Colonial Revival styles. Symmetry in building mass,

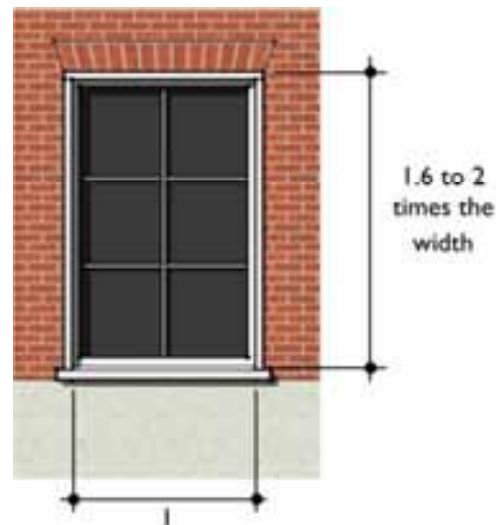
windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

#### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character of Hadnot Point. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 6, 8, or 12 equal parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental

arch. Sills may be precast concrete (preferred) or special brick shapes.



(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



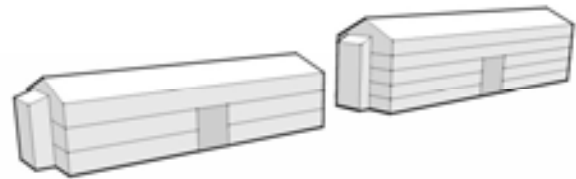
The primary entry element to Building 66 is covered, centrally located on a parking area, and faces on Holcomb Boulevard.



The side entry element to Building 2 is pocketed and clearly announced with a concrete cornice and surround.

Entry elements for the primary entrance shall be proportional to the building mass. In two story

buildings, entry elements shall be greater than half the height of the building. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



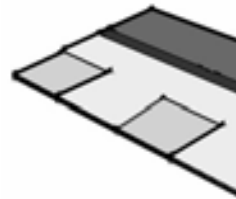
Entry elements shall be sized proportionately to building height

## BODY AND ROOF MATERIALS

All facades in Hadnot Point shall be face brick, modular size. Base foundations shall be architectural concrete block.





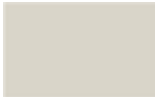
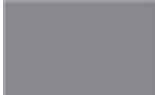

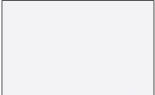

Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

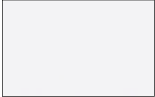




Composition shingles shall be laminated asphalt architectural shingles with a dimensional appearance.



## COLORS HADNOT POINT

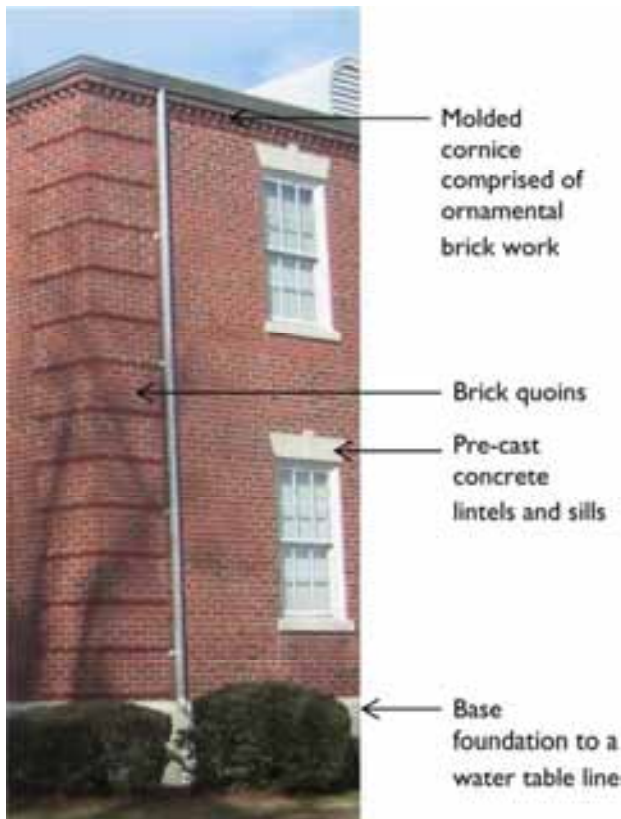
Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed smooth standard gray mortar
Base foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 taupe HC-85 PANTONE: FED STD:
	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Handrails	 clear anodized aluminum

Entry accents Doors Window/door trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
<b>Roof Cladding</b>	
Metal roof	 taupe BM: HC-85
Composition shingles	 weathered wood

## DETAILS

Hadnot Point is known by its Georgian and Colonial Revival details. Exterior detail shall re-inforce this trend. Detail commonly associated with these styles includes:

- Brick quions
- Base foundations to water table line
- Molded cornices



**Building 15 demonstrates details common to Hadnot Point: white base foundation, brick quoins, and embellished cornice**



**Molded cornice detail found in Georgian styles on Base**

Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:



The gable end on a gable-on-hip roof shall be equal in height to  $\frac{1}{3}$  of the overall roof height.

#### PRECEDENTS

Six building have been identified by Camp Lejeune as benchmarks for the character-defining elements associated with Hadnot Point, namely:

- Building 1, Base Headquarters
- Building 15, Medical Clinic
- Building 16, Chapel
- Building 17, Chapel
- Building 19, Theater
- Building 236, Training Pool

These structures are mostly two-story brick, with concrete or stone base foundations, sills, and lintels. The following buildings are equally valuable as precedents:



**Building 66**



**Building 2**

#### 4.2.2 INDUSTRIAL AREA



The industrial area is a sub-district within Hadnot Point and spans from the Steam Plant adjacent to the

main parade field, north along the rail road line. See shaded area in blue (above).

#### MASSING

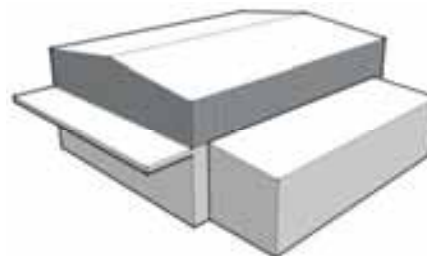


The industrial area requires special consideration. Building massing shall be inherently functional, but also preserve the scale of the district. Low shed roofs or overhangs are required to reduce the visual impact of large building volumes. Allowable roof forms are:

- low slope
- gable
- shed
- hip


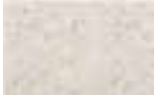


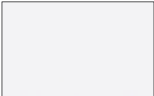


#### BODY AND ROOF MATERIALS

Brick, concrete masonry, pre-cast concrete, and metal panel are acceptable materials in the Industrial sub-district. However the following restrictions apply:



Metal panel shall be limited to 60 percent of the facade area.

COLORS INDUSTRIAL AREA

Description	Color
Facade	
Building body Screen walls	 red flashed smooth standard gray mortar
Base Foundation for brick facade	 white split face white mortar
Concrete Masonry	 cream matte face mortar to match
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
Gutters/downspouts Fascia/soffit/frieze	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875

	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Handrails	 clear anodized aluminum
Entry accents Doors Window/door trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	 clear anodized aluminum
Roof Cladding	
Metal roof	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
Composition shingles	 weathered wood

### 4.2.3 MARINE CORPS EXCHANGE COMPLEX



The Marine Corps Exchange Complex is a sub-district within Hadnot Point. It consists of MCCS services and private vendors surrounding the Marine Corps Exchange on Birch Road.

#### MASSING

Due to the commercial nature of the Marine Corps Exchange Complex, designers must use massing which is both suitable to the character of Hadnot Point, but blend with the Exchange Mall.





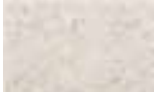

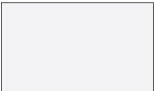
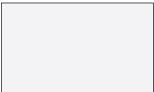
Roof forms are hip and square hip at slopes between 6:12 and 8:12.

#### WINDOWS AND ENTRANCES

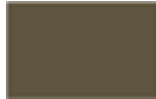
Windows and entrances shall adhere to the Hadnot Point details outlined above. In addition, entrances may use full height storefront systems, but only

within the entry element and no where else along the facade.

#### COLORS MARINE CORPS EXCHANGE

Description	Color
Facade	
Building body Screen walls	 <p>red flashed smooth standard gray mortar</p>
	 <p>red flashed wire cut standard gray mortar</p>
Accent	 <p>white split face white mortar</p>
Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Gutters/downspouts Fascia/soffit/frieze	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>

## Handrails



medium bronze  
BM: 2137-20  
PANTONE: 405  
FED STD: 33070



clear anodized aluminum

Entry accents  
Doors  
Window/door trim



medium bronze  
BM: 2137-20  
PANTONE: 405  
FED STD: 33070



bone white  
BM: 2140-70  
PANTONE: 9041  
FED STD: 37875



clear anodized aluminum

## Roof Cladding

## Metal roof



aged copper

## Composition shingles



weathered wood

## PRECEDENTS



The Main Side C-Store



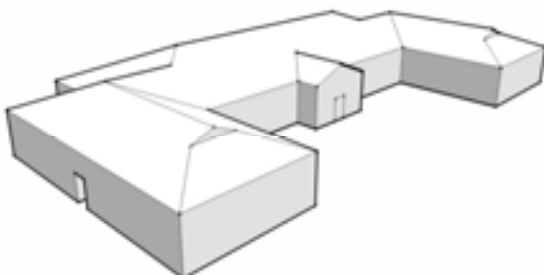
### 4.3 HOSPITAL POINT



Hospital Point, similar to Hadnot Point, is predominantly historic Georgian style buildings. Building H-1, originally the Naval Hospital constructed in 1942, dominates this district in both architectural imageability and sheer size of building. Structures are mostly two-story brick, with concrete or stone foundations, sills, and lintels.

#### MASSING

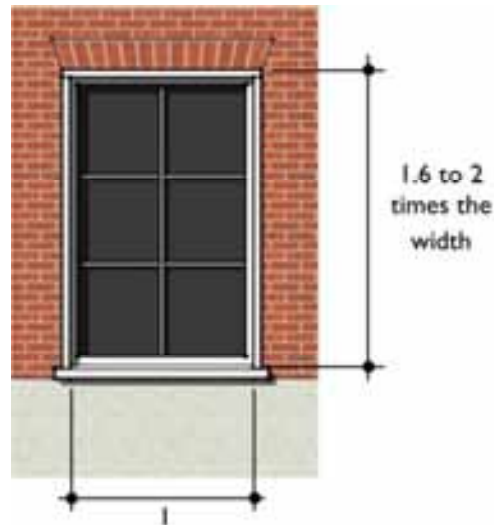
Building massing in Hospital Point shall be based on historical context, primarily the Georgian and Colonial Revival styles. Symmetry in building mass, windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character of Hospital Point. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 4, 6, or 8 parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental arch. Sills may be precast concrete (preferred) or special brick shapes.



(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

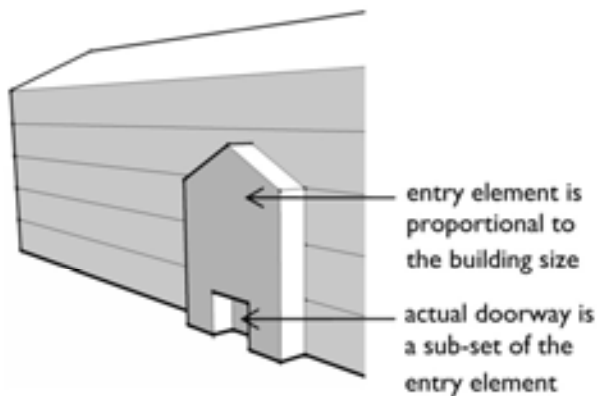
Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



The primary entry to this armory is pocketed and embellished with a pre-cast concrete surround and entablature

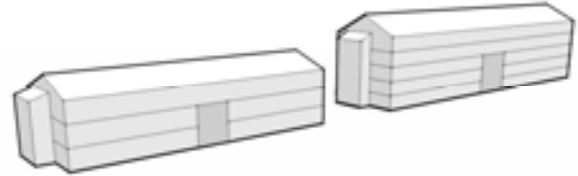


This secondary entry to a wing on Building H-1 is emphasized by surrounding glass and covered by a canopy



Entry elements for the primary entrance shall be proportional to the building mass. In two story buildings, entry elements shall be greater than half the

height of the building. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



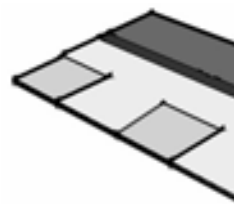
Entry elements shall be sized proportionately to building height

## BODY AND ROOF MATERIALS

All facades in Hospital Point shall be face brick, modular size. Base foundations shall be architectural concrete block.



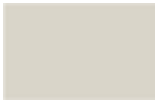



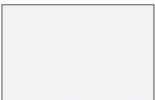




Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.



Composition shingles shall be laminated asphalt architectural shingles with a dimensional appearance.

## COLORS HOSPITAL POINT

Description	Color
<b>Facade</b>	
Building body Screen walls	 <p>red flashed smooth standard gray mortar</p>
Base Foundation	 <p>white split face white mortar</p>
Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Gutters/downspouts Fascia/soffit/frieze	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Handrails	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Entry accents Doors Window/door trim	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>

Roof Cladding	
Metal roof	 <p>taupe BM: HC-85</p>
Composition shingles	 <p>weathered wood</p>

## DETAILS

Hospital Point is known by its Georgian style. Exterior detail shall re-inforce this trend. Detail commonly associated with these styles includes:

- Base foundations
- Molded cornices
- Semi or full round windows



Round window in the pediment of Building H-I



Semi-round window in the gable of a wing in Building H-I



**Base foundations such as on this building in Hospital Point are a key detail to the character of the district.**

Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:



The gable end on a gable-on-hip roof shall be equal in height to  $1/3$  of the overall roof height.

## PRECEDENTS

Seven building have been identified by Camp Lejeune as building which contribute to the character of Hospital Point:

- Building H-1, HQ II MEF
- Building H-25, Officer's Quarters
- Building H-26, Officer's Quarters
- Building H-27, Officer's Quarters
- Building H-35, Utility Building
- Building H-41, Garage

- Building H-42, Garage

Of these, Building H-1 is the most important in defining the district and represents the best architectural characteristics.



**Building H-1**

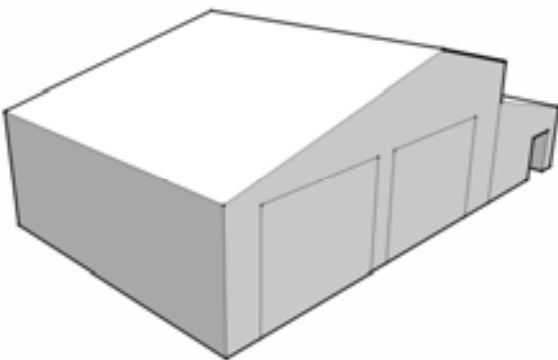
#### 4.4 FRENCH CREEK



The majority of French Creek was developed in the late 1970s through to the late 1990s, and as a result, is typified by contemporary styles.

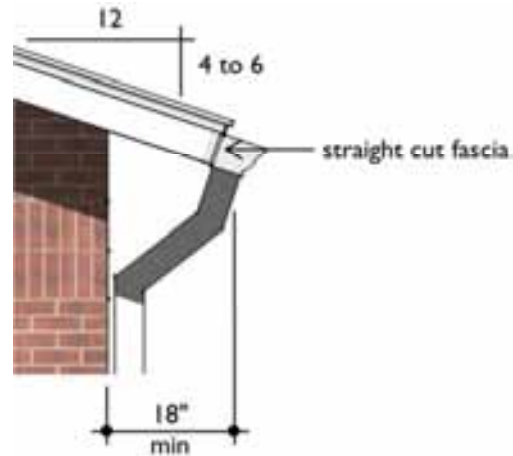
##### MASSING

Contemporary massing, rather than traditional historic massing, is required for the French Creek district. Buildings shall be designed to respond to the site, such that the building form fits contextually with surrounding forms whether they are other buildings, structures, or natural elements.



Allowable roof forms are the gable, the hip, and shed. Roofs shall be sloped from 4:12 to 6:12 pitch.

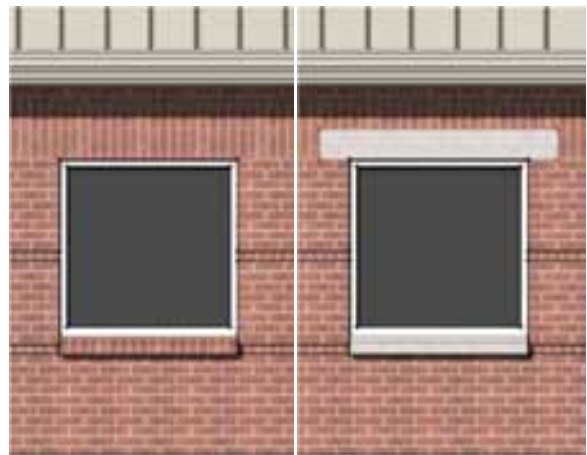
Eave overhangs shall extend at least 18" beyond face of wall, not including gutter, with fascia and soffits finished straight, not plumb.



**Appropriate roof form for French Creek**

##### WINDOWS AND ENTRANCES

Windows shall have detail around heads and sills to avoid a "punched" opening effect. This may include precast concrete shapes, special brick shapes or brick detailing used as lintels and sills of the window opening. Window muntins are not preferred in French Creek except where necessary to support glazing or window operation.



**(Left) Window framed by a brick sill and soldier coursing above; (Right) window with pre-cast concrete lintel and sill**



There are many acceptable entry elements for French Creek. The basic requirement is that primary building entrances be recognizable as obvious points of entry to the facility. At a minimum, this shall include overhead cover to shelter occupants from the weather and a storefront door and side light.



**This represents the minimum requirement for an entry element in French Creek. In this case, overhead cover is provided by a pocketed entry.**



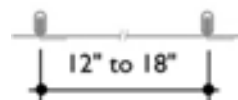
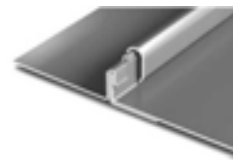
**The entry element to Building FC-356 is fully glazed and protected from the weather. This entry also is facing the parking and public way.**



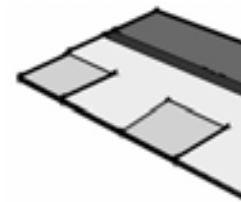
**This entry is a double door with glazing and is protected by entry enclosure**

## BODY AND ROOF MATERIALS

All facades in French Creek shall be face brick, preferably modular size. Base foundations shall be architectural concrete block.






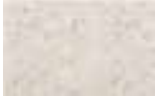


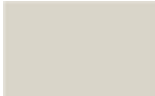
Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

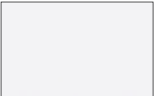
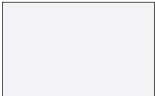


Composition shingles shall be laminated asphalt architectural shingles with a dimensional appearance.



## COLORS FRENCH CREEK

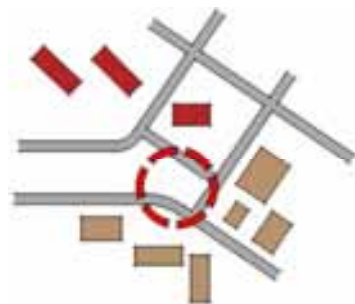
Description	Color
<b>Facade</b>	
Building body Screen walls	 <p>blended sand faced standard gray mortar</p>  <p>red flashed smooth standard gray mortar</p>  <p>red flashed wire cut standard gray mortar</p>
Base Foundation	 <p>white split face white mortar</p>
Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Gutters/downspouts Fascia/soffit/frieze	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>

Handrails	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>  <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
	 <p>clear anodized aluminum</p>
Entry accents Doors Window/door trim	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>  <p>clear anodized aluminum</p>
<b>Roof Cladding</b>	
Metal roof	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
Composition shingles	 <p>weathered wood</p>

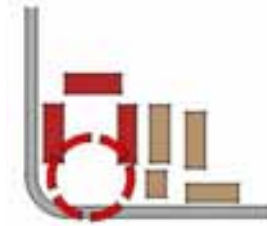
## DETERMINING BRICK COLOR

It may be difficult to determine the most appropriate brick color in the French Creek district due to the variety of existing shades. The default brick color shall always be the blended sand faced. However, the designer must conduct a site analysis to verify this as the most appropriate choice. Use the following steps:

1. Identify the project site and the surrounding significant structures. A rule of thumb: structures within 450 feet of the project site or any structure which has a large visual impact on the project site is significant.
2. Determine the brick colors of the surrounding structures. For the purpose of the study, brick shall be classified as either a brown or a red hue.
3. If the majority of the brick in surrounding significant buildings is a red hue, select the red brick from color chart. Otherwise use the default color.
4. If the project is an addition or replacement within a well-defined group or complex, such as a quad of BEQs, use the brick color associated with the existing structure or structures within the group.



Example: The majority of surrounding significant buildings for the above project site is brown brick. Therefore the appropriate brick color should be brown to match the predominant context.



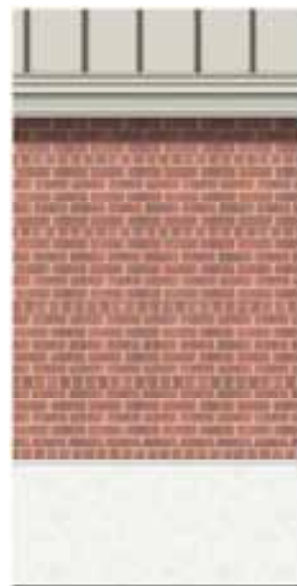
Example: The above project is completing a group of four BEQs, all of which are red. Therefore, the brick color should be red to complete the group.

## DETAILS

Details in French Creek primarily revolve around creative use of clay masonry units. Brick details and special brick shapes shall be used to give facades visual interest, to include:

- Common bond
- Soldier coursing
- Rowlock coursing
- Brick reveal
- Cove or bullnose water table

### *Common Bond*

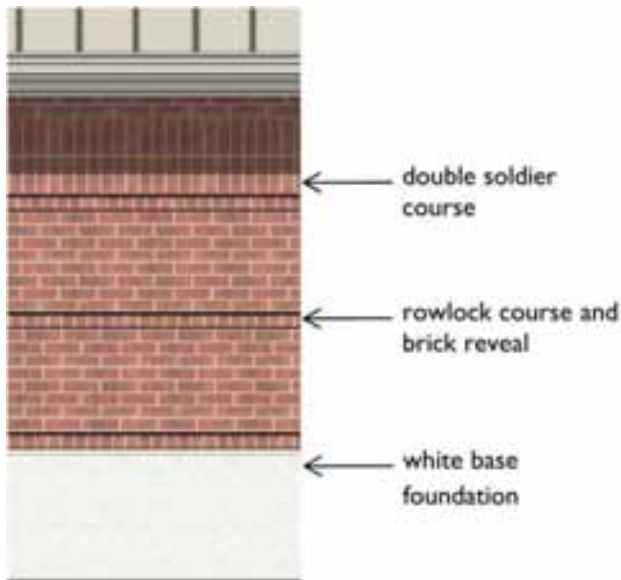


Common bond uses rowlocks every sixth or seventh course

*Soldier and Rowlock coursing, Brick reveal*



*Combination of details*



White base foundations are permitted. They shall of pre-cast concrete, smooth face concrete masonry units, or cast-in-place concrete with a high quality rubbed finish.

## PRECEDENTS



**Building FC-230, maintenance facility**



**FC-292, administration facility**



**FC-294, fire station**



FC-298, gas station

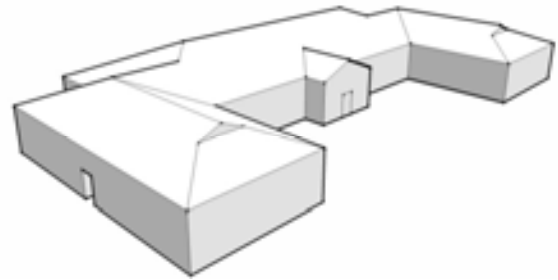
## 4.5 COGDELS CREEK



The Cogdels Creek District is located between Hadnot Point and French Creek. This area is recently developed and the architectural style is derived from the Georgian buildings in adjacent Hadnot Point. This area will be transformed by proposed bachelor housing construction and extension of Gonzales Boulevard through to Sneads Ferry Road. Birch Road is to be extended southward to the new Gonzales Boulevard connector.

### MASSING

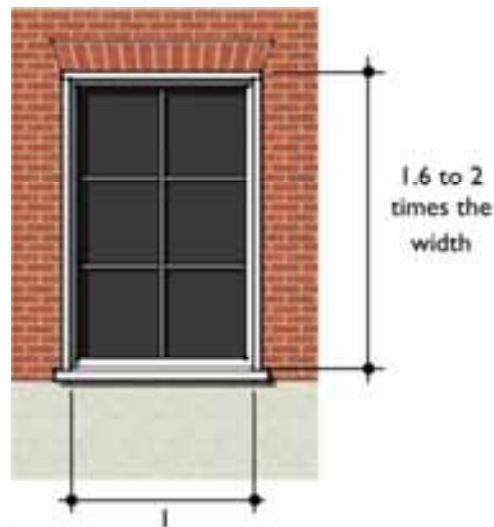
Building mass in this district shall be based on the historical context of Hadnot Point, primarily the Georgian and Colonial Revival styles. Symmetry in building mass, windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character seen in Georgian and Colonial Revival buildings throughout Camp Lejeune. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 6, 8, or 12 equal parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental arch. Sills may be precast concrete (preferred) or special brick shapes.

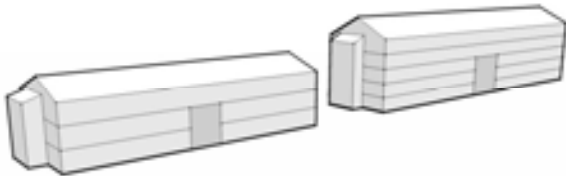


(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

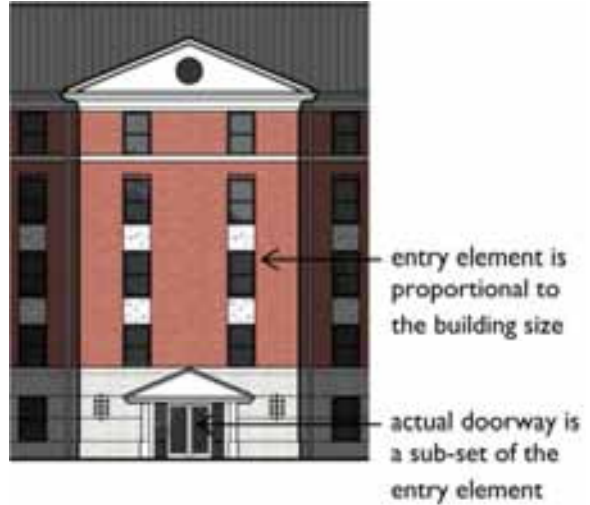


This is an alternate method of detailing around windows at Cogdels Creek

Entry elements for the primary entrance shall be proportional to the building mass. In two story buildings, entry elements shall be greater than half the height of the building. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



Entry elements shaded for three and five story buildings



Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



This facility located in French Creek demonstrates an entrance suitable for Cogdels Creek


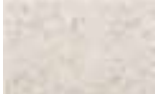
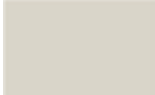

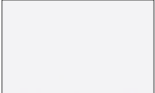
#### BODY AND ROOF MATERIALS


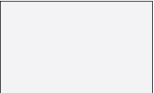

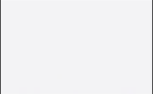

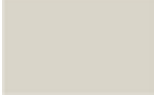
All facades in Cogdels Creek shall be face brick, modular size. Base foundations shall be architectural concrete block.



Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

### COLORS COGDELS CREEK

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed wire cut standard gray mortar
Base Foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
<b>Painted Surfaces</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875

 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875	
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	Handrails
 clear anodized aluminum	Entry accents Doors Window/door trim
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	
 clear anodized aluminum	
	<b>Roof Cladding</b>
 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875	Metal roof

### DETAILS

Cogdels Creek is characterized by Georgian and Colonial Revival styles. Exterior detail shall re-inforce this aesthetic, which includes, among others, the following:

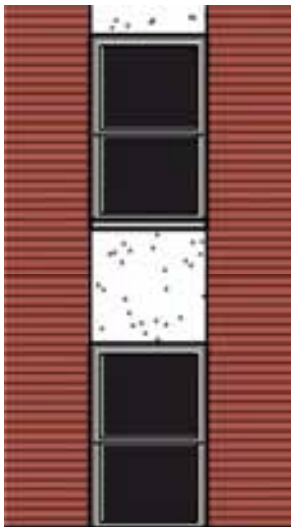
- Base foundation
- Molded cornices



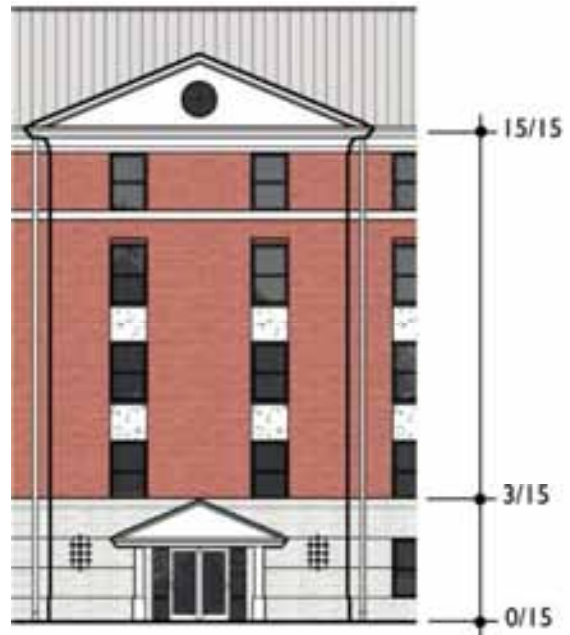
- Precast spandrel panels



Base foundation stops at a water table line. This may or may not align with the window sill, depending on window height and position.



A pre-cast concrete spandrel panel in a contrasting color as a possible detail. This element can be seen on Building I in Hadnot Point.



Multi-level masses shall maintain the proportions of the classically-inspired styles. The above BEQ façade demonstrates adherence to historical proportions of the podium or base, which is established by white masonry, to the remainder of the façade. Single story masses shall be equally proportional:



The gable end on a gable-on-hip roof shall be equal in height to 1/3 of the overall roof height.

## PRECEDENTS

The Military Police Complex, including Buildings FC-1, FC-2, and FC-3 are precedents for future development in Cogdels Creek.



**Military Police Maintenance Facility, Building FC-2**



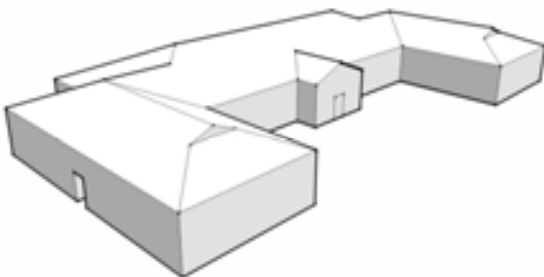
## 4.6 WALLACE CREEK



Wallace Creek experienced rapid development within a few years. Prior to this, the area consisted of a few small historical buildings and a contemporary complex of small brick single-story facilities. The architectural style of the newer development is derived from the Georgian buildings in adjacent Hadnot Point.

### MASSING

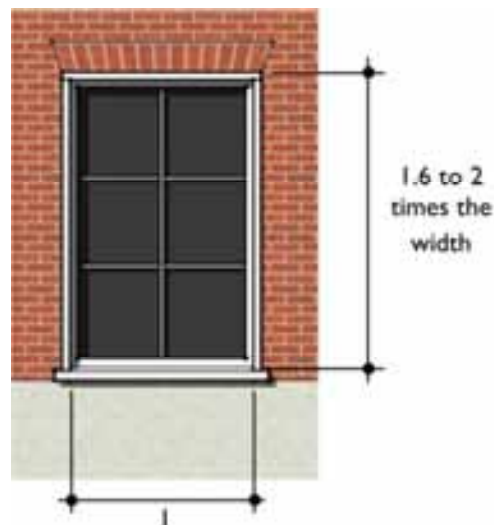
Building mass in this district shall be based on the historical context of Hadnot Point, primarily the Georgian and Colonial Revival styles. Symmetry in building mass, windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character seen in Georgian and Colonial Revival buildings throughout Camp Lejeune. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 6, 8, or 12 equal parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental arch. Sills may be precast concrete (preferred) or special brick shapes.

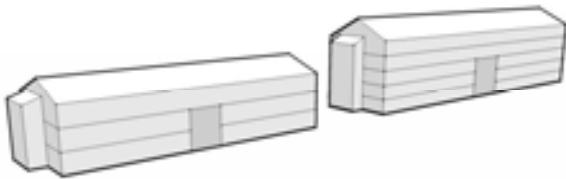


(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

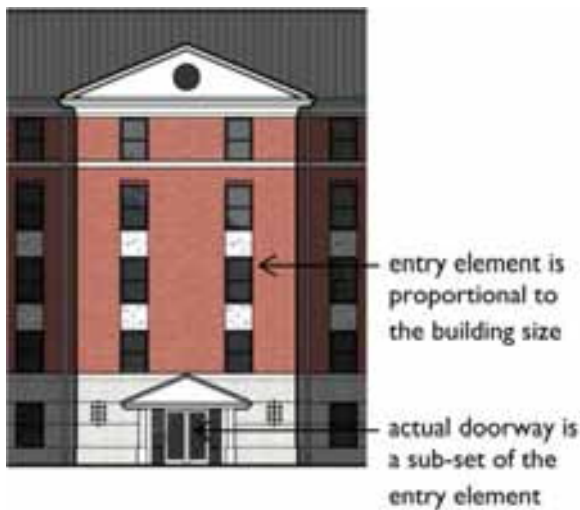


This is an alternate method of detailing around windows at Wallace Creek

Entry elements for the primary entrance shall be proportional to the building mass. In two story buildings, entry elements shall be greater than half the height of the building. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



Entry elements shaded for three and five story buildings



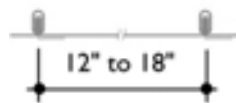
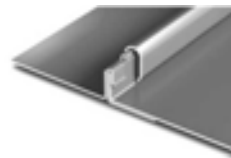
Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



Entrance suitable for Wallace Creek




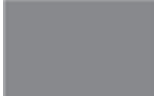
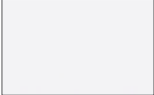


## BODY AND ROOF MATERIALS

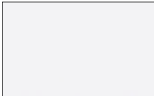
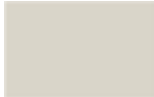
All facades in Wallace Creek shall be face brick, preferably modular size. Base foundations shall be architectural concrete block.



Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

## COLORS WALLACE CREEK

Description	Color
Facade	
Building body Screen walls	 <p>red flashed wire cut standard gray mortar</p>
Base Foundation	 <p>white split face white mortar</p>
Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Gutters/downspouts Fascia/soffit/frieze	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Handrails	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>  <p>clear anodized aluminum</p>

Entry accents Doors Window/door trim	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Roof Cladding	
Metal roof	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>

## DETAILS

Wallace Creek is characterized by Georgian and Colonial Revival details. Exterior detail shall re-inforce this trend and elements to do shall include:

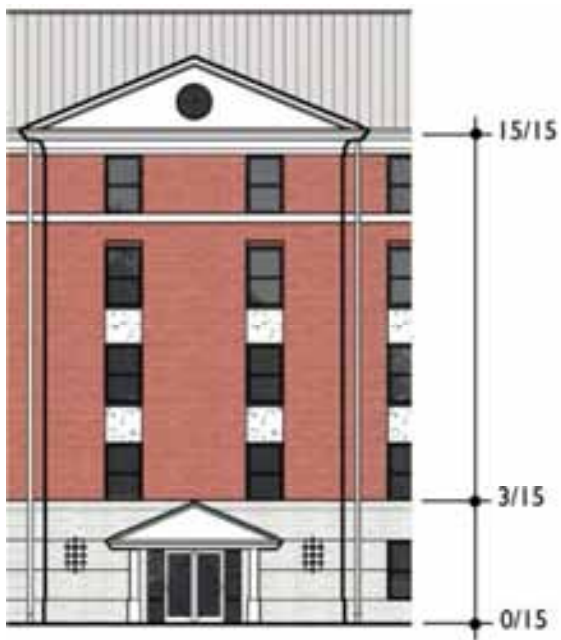
- Base foundation to a water table line
- Molded cornices
- Precast spandrel panel



**Base foundation stops at a water table line. This may or may not align with the window sill, depending on window requirements.**



A pre-cast concrete spandrel panel in a contrasting color as a possible detail. This element can be seen on Building I in Hadnot Point.



Multi-level masses shall maintain the proportions of the classically-inspired styles. The above BEQ façade demonstrates adherence to historical proportions of the podium or base, which is established by white masonry, to the remainder of the façade. Single story masses shall be equally proportional:



The gable end on a gable-on-hip roof shall be equal in height to 1/3 of the overall roof height.

#### PRECEDENTS



Telephone exchange building in Wallace Creek



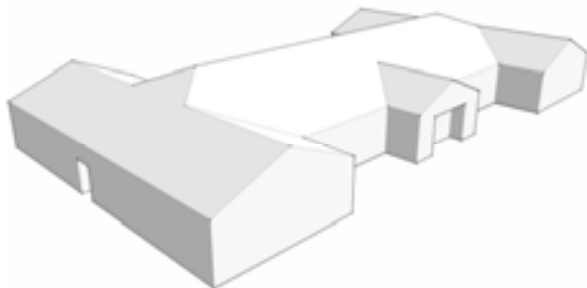
## 4.7 COURTHOUSE BAY



Courthouse Bay is characterized by single-story brick structures designed after the Georgian or Federalist styles. On newer buildings, these styles have been abstracted or exaggerated. The resultant character is a cohesive mix of old and new construction.

### MASSING

Buildings in Courthouse Bay shall be respectful of the district's historic character. However a strict adherence to a set of stylistic rules is not necessarily required. Massing shall be largely symmetrical with contemporary interpretations of the Georgian and Colonial Revival styles.



Allowable roof forms include the gable, gable-on-hip, and hip at slopes between 4:12 and 6:12.

## WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character of Courthouse Bay. Windows shall have evenly spaced muntins dividing the glazing into 4, 6, or 8 parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or pre-cast concrete. Sills may be precast concrete (preferred) or special brick shapes.



Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



The MCCS Military Clothing Facility has a covered entrance announced with a gable end



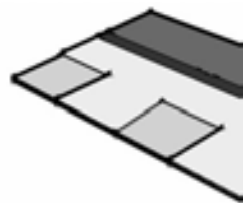
The covered entryway of the Joint Maritime Academic Facility

BODY AND ROOF MATERIALS

All facades in Hadnot Point shall be face brick, preferably modular size. Base foundations shall be architectural concrete block.








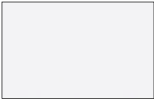





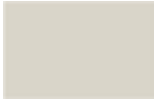
Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.





Composition shingles shall be laminated asphalt architectural shingles with a dimensional appearance.

COLORS COURTHOUSE BAY

Description	Color
Facade	
Building body Screen walls	 red flashed smooth standard gray mortar
	 red flashed wire cut standard gray mortar
Base Foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173

Gutters/downspouts Fascia/soffit/frieze	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Handrails	 <p>clear anodized aluminum</p>
Entry accents Doors Window/door trim	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
	 <p>clear anodized aluminum</p>
Roof Cladding	
Metal roof	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>

Composition shingles	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
	 <p>slate gray</p>

## DETAILS

Courthouse Bay shares many details with Hadnot Point and Hospital Point, such as base foundations and molded cornices. But the district also owes much of its character to roof details such as:

- Dormers (gable fronted and eyebrow)
- Gable-on-hip
- Monitor
- Gable and monitor
- Clarestory windows



These roof details above enrich the visual impression of Courthouse Bay and shall be incorporated into design. From top left to bottom right: monitor, eyebrow, dormer with gable end, gable and monitor.

## PRECEDENTS



**The fitness center, Building BB2**



**Engineer School Headquarters**

## 4.8 PARADISE POINT



Paradise Point is the natural continuation of Hadnot and Hospital Point in regard to architectural style. However, its residential district and concentration of educational facilities gives Paradise Point a unique quality.

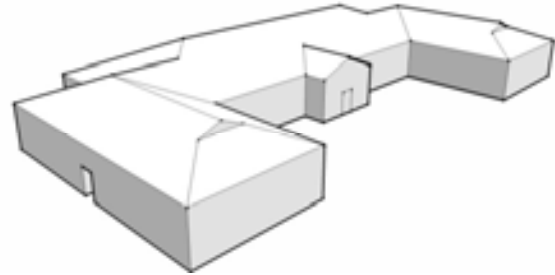
The significant character of Paradise Point is defined along Seth Williams Road, specifically from Marston Pavilion, the Officers Club, and the bachelor and visiting officers' quarters. These buildings embody the Georgian styles seen elsewhere on Base.

Along Brewster Road, the district takes on a more residential appearance, particularly from the vernacular housing areas, the golf course club house, and the schools.

### MASSING

Building mass in this district shall be based on historical context, primarily the Georgian and Colonial Revival styles. Symmetry in building mass,

windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character of Paradise Point. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 6, 8, or 12 equal parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental arch. Sills may be precast concrete (preferred) or special brick shapes.



(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



This entrance to the BOQ, Building 2603, is richly embellished with side lights, cornice detail, and a broken pediment



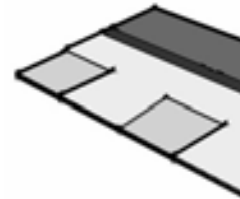
The entrance to Building 2601 is facing Seth Williams Road and is protected with a Colonial Revival style canopy

## BODY AND ROOF MATERIALS

All facades in Paradise Point shall be face brick, modular size. Base foundations may be architectural concrete block, pre-cast concrete, or cast-in-place concrete with a high quality rubbed finish.






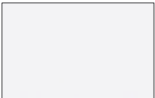
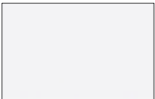
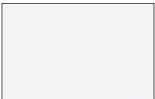
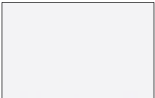


Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.



Composition shingles shall be laminated asphalt architectural shingles with a dimensional appearance.

## COLORS PARADISE POINT

Description	Color
Facade	
Building body Screen walls	 red flashed smooth standard gray mortar
Base Foundation	 white split face white mortar

Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Gutters/downspouts Fascia/soffit/frieze	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Handrails	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Entry accents Doors Window/door trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Roof Cladding	
Metal roof	 taupe BM: HC-85
Composition shingles	 weathered wood

## DETAILS

Paradise Point is known by its Georgian and Colonial Revival details. Exterior detail shall re-inforce this trend by using the following:

- Brick quoins
- Base foundations to a water table line
- Molded cornices

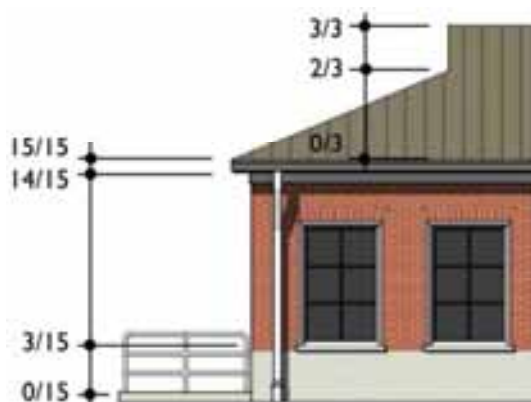


**This molded cornice on Building 2615 Officers' Club (above) and the brick quoins (below) are examples of Georgian style details for Paradise Point.**





Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:



The gable end on a gable-on-hip roof shall be equal in height to  $1/3$  of the overall roof height.

## PRECEDENTS

The significant character of Paradise Point is defined along Seth Williams Road, and specifically Marston Pavilion, the Officers Club, and the bachelor and visiting officers' quarters. These buildings embody the Georgian styles seen elsewhere on Base.



**The Officers' Club**



**Fire station, Building 2600**

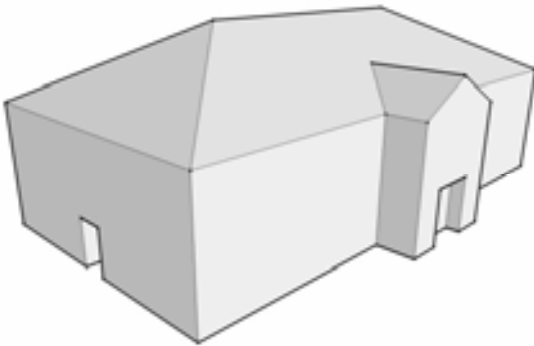
#### 4.8.1 BREWSTER ROAD



The Brewster Road area is a sub-district of Paradise Point and requires special consideration in design. This area is predominantly community buildings with a more informal contemporary character.

##### MASSING

Due to the residential nature of Brewster Road, designers must use massing which is both suitable to the character of Paradise Point, but blend with the vernacular architecture of the neighborhoods.

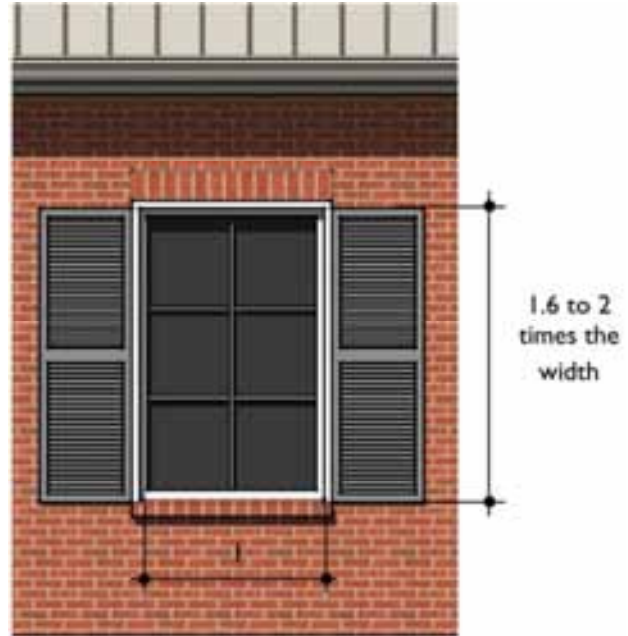


Allowable roof forms are gable and hip at slopes between 4:12 and 6:12.

##### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character of Paradise Point. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins

dividing the glazing into 6, 8, or 12 equal parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels such as the jack arch or soldier brick. Sills may be special brick shapes (preferred) or precast concrete. Shutters provide added emphasis to the window and contribute to the residential character.

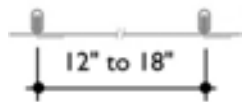
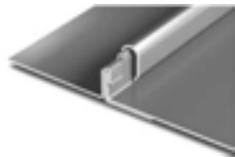
Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



This entrance to Family Services Center, Building 40, is pocketed with an arched entry and transom window


#### BODY AND ROOF MATERIALS

All facades in Paradise Point shall be face brick, modular size and base foundations architectural concrete block.

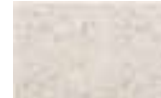


Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

#### COLORS BREWSTER ROAD

Description	Color
Facade	
Building body Screen walls	 red flashed smooth standard gray mortar

#### Base Foundation



white split face  
white mortar

#### Metal Panel



sandstone  
BM: OC-48  
PANTONE: 400  
FED STD: 17875

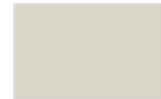
#### Painted Surfaces and Factory Finishes

##### Exterior stairs Utilities/equipment Appurtenances



slate gray  
BM: 2133-40  
PANTONE: 444  
FED STD: 36173

##### Gutters/downspouts Fascia/soffit/frieze



sandstone  
BM: OC-48  
PANTONE: 400  
FED STD: 17875

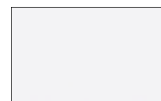


medium bronze  
BM: 2137-20  
PANTONE: 405  
FED STD: 33070


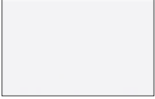
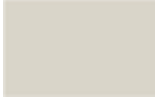
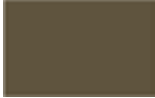


bone white  
BM: 2140-70  
PANTONE: 904 I  
FED STD: 37875

#### Handrails



bone white  
BM: 2140-70  
PANTONE: 904 I  
FED STD: 37875

Entry accents Doors Window/door trim	
	clear anodized aluminum
Roof Cladding Metal roof	
	bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	
	sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
	
	medium bronze BM: 2137-20 PANTONE: 405 FED STD: 33070

## DETAILS

Brewster Road is predominantly community buildings surrounded by residential neighborhoods and detail shall emphasize this public space and welcoming character. For example:

- Colonnades
- Shutters

Colonnades on community buildings such as Lejeune High School and the Golf Course Club House face the public way, define the entrances, and are easy to enter.



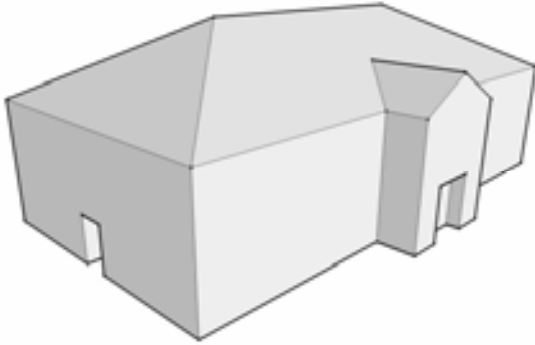
## 4.8.2 WOUNDED WARRIOR COMPLEX



The Wounded Warrior Complex is a series of facilities designed to assist Marines who are wounded, ill, or injured for eventual recovery, rehabilitation, re-assignment, or out-processing.

## MASSING

Massing in the Wounded Warrior Complex shall be largely symmetrical with formal entry elements.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

## WINDOWS AND ENTRANCES

Windows shall have detail around heads and sills to avoid a "punched" opening effect. This may include precast concrete shapes, special brick shapes or brick detailing used as lintels and sills of the window opening. Window muntins are not preferred in the Wounded Warrior Complex except where necessary to support glazing or window operation.



Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



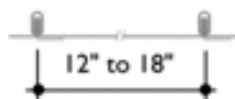
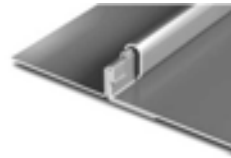
**Single door pocketed entrance**



**Double door entrance with canopy**





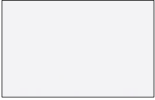
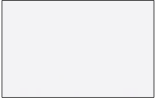

## BODY AND ROOF MATERIALS




All facades in Wounded Warrior Complex shall be face brick. Base foundations shall be architectural concrete block.



Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

## COLORS WOUNDED WARRIOR COMPLEX

Description	Color
<b>Facade</b>	
Building body Screen walls	 <p>blended flashed wire cut standard gray mortar</p>
Base Foundation	 <p>gray split face standard gray mortar</p>
Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Gutters/downspouts Fascia/soffit/frieze	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Handrails Entry accents	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
	 <p>clear anodized aluminum</p>

<b>Doors and door trim</b>	 <p>medium bronze BM: 2137-20 PANTONE: 405 FED STD: 33070</p>
<b>Window trim</b>	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
<b>Roof Cladding</b>	
Metal roof	 <p>tan BM: HC-77</p>

## DETAILS

Two predominant details separate Wounded Warrior Complex from the surrounding area in Paradise Point:

- Brick accent bands
- Round louver





**Round bricked louver in the gable end; accent band is located at the eave line**



**Dark accent bands along window jambs and heads break up the façade and create visual interest; these may be combined with a reveal for an added shadow line**



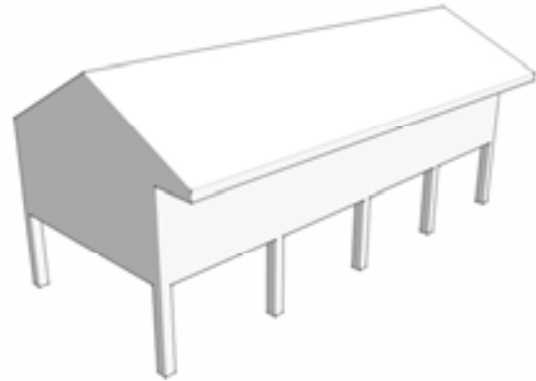
## 4.9 ONSLOW BEACH



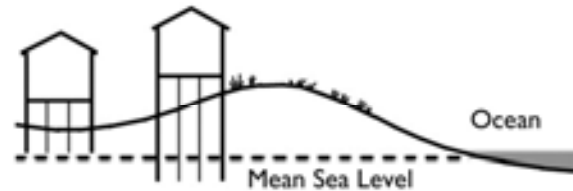
The Onslow Beach district is located on the North Carolina ocean front and as such, provides unique recreational opportunity to the Base. Its development has been primarily toward that goal, although there is a small training area on the south end of the district.

### MASSING

Onslow Beach is a mix of beach houses, residential vernacular and utilitarian buildings, but is dominated by the Shingle style. Massing is also influenced by the beach environment and compliance with coastal area environmental regulations.



The Coastal Area Management Act of North Carolina and coastal construction standards regulate development at Onslow Beach. These guidelines must be followed, but in general they contribute positively to the character of the district and protect the environment for the future recreational use of Camp Lejeune. The most obvious affect on appearance is the requirement to raise structures above grade to allow for shifting sand and minimize environmental impact.



**Refer to the Coastal Area Management Act for specifics on construction standards at Onslow Beach**

Allowable roof forms are the gable, hip, and shed roofs at slopes between 4:12 and 6:12.

### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the existing Shingle style buildings at Onslow Beach. Windows should be either casement or sash types, and grouped in two's and three's. Window glazing shall be divided into small, multiple lights.



The windows on **Building BA-95, Senior NCO Recreation Pavilion**, are grouped in two's, consistent with the **Shingle style**

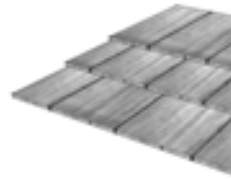
Entrances do not require the formality of many other districts, but shall be protected in some manner, either by locating under a porch roof or a separate canopy.



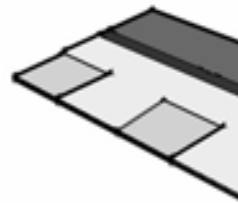
This **Officers' Beach House, BA-146**, has a covered entry door.

## BODY AND ROOF MATERIALS

Facades on recreational facilities in Onslow Beach shall be cementitious siding. Siding shall shingle style, pre-finished, random pattern, with a straight edge and 5 to 6 inch exposure.



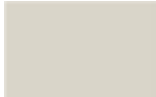





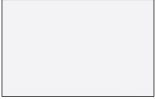


Roofing shall be either cedar shake or composition shingles.



Composition shingles shall be laminated asphalt architectural shingles with a dimensional appearance.

## COLORS ONSLOW BEACH

Description	Color
<b>Facade</b>	
Building body Screen walls	 tan wood grain
Alternate color	 gray wood grain
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875

Painted Surfaces	
Utilities/equipment Appurtenances	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Gutters/downspouts Fascia/frieze	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Exterior stairs Handrails Decking	 <p>treated wood</p>
Entry accents Doors Window/door trim	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Roof Cladding	
Wood shingles	 <p>cedar</p>
Composition shingles	 <p>slate</p>

## DETAILS

The existing buildings in this district have established character through elements common to the Shingle style. Details shall be incorporated in new structures to re-inforce this, including:

- Little or no roof overhangs
- Covered porches

- Expanses of shingles with little or no ornament



**This General Officers' Beach House has virtually no roof overhang in order to showcase the shingled facade.**



**The Enlisted Beach Pavilion, BA-96, uses a covered porch for the outdoor seating area**

## PRECEDENTS



**Building BA-146, Officers' Beach House**



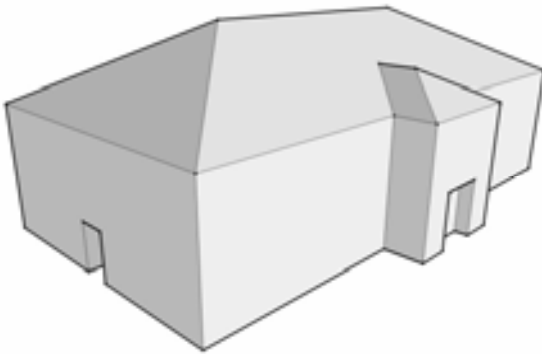
**Building BA-95, Senior Enlisted Pavilion**

## 4.10 CAMP GEIGER



Camp Geiger is located adjacent to Marine Corps Air Station New River, but its primary tenant is the School of Infantry. As a result, the nature of this area and its design requirements differ from the neighboring air station.

### MASSING

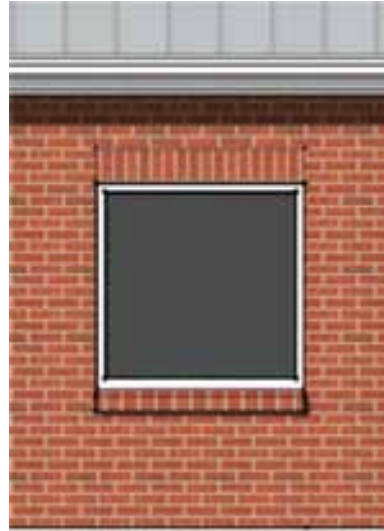


Allowable roof forms are gable, shed, mansard, and hip roofs at slopes from 4:12 to 6:12.

### WINDOWS AND ENTRANCES

Windows shall have detail around heads and sills to avoid a "punched" opening effect. This may include precast concrete shapes, special brick shapes or brick

detailing at the lintel and sill elements of the window opening. Window muntins are not preferred in Camp Geiger except where necessary to support glazing or window operation.



There are many acceptable entry elements for Camp Geiger. The basic requirement is that primary building entrances be recognizable as obvious points of entry to the facility. At a minimum, this shall include overhead cover to shelter occupants from the weather and a storefront door and side light.

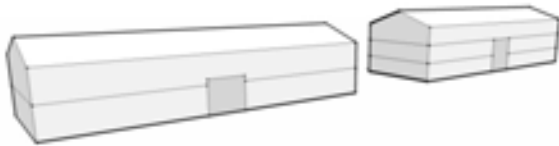


The entry element to fitness center, Building G-930, is easily recognizable



The entry element to academic facility Building G-615, is clearly called out and provides a covered space

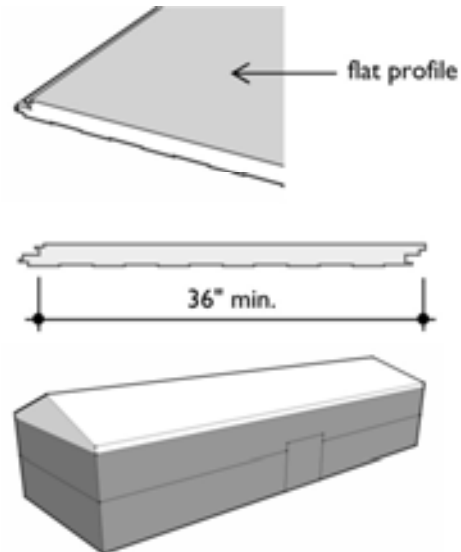
Primary entrances shall be proportional to the building mass. Two story building entry elements shall be greater than half the height of the building. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



Entry elements shall be sized proportionately to building height

## BODY AND ROOF MATERIALS

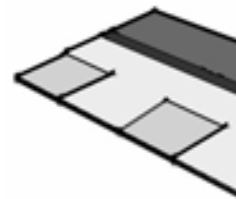
All facades in Camp Geiger shall be face brick, preferably modular size, smooth faced architectural concrete block, or metal panel. Metal panels shall have a flat profile with panel widths of 36 inches or greater.



Metal panel has the following restrictions: limited to 10 percent of the facade area and confined to gable ends and adjacent to eaves.






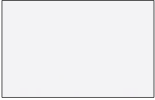







Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.



Asphalt shingles shall be laminated architectural shingles with a dimensional appearance.

## COLORS CAMP GEIGER

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed wire cut standard gray mortar
Banding	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Handrails	 clear anodized aluminum

Entry accents Doors Window and door trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	 clear anodized aluminum
<b>Roof Cladding</b>	
Prefinished metal roof	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Composition shingles	 slate gray

## DETAILS

Camp Geiger is an area of intense training activity for relatively new and young Marines, a particularly transient population. It is especially important to establish a sense of place that provides grounding for the experience of living and working at Camp Geiger.

### *Banding*

The distinctive white banding on many buildings contributes to the theme of the district and evokes a sense of rhythm, order, and discipline.





Two bands on a single story building is enough to convey the intent but not over-do the detail.

#### PRECEDENTS



This academic instruction facility, Building G-615, is good example of many design elements at Camp Geiger.



These open bay barracks, Building G-702, set a good precedent for multi-story design.



The horizontal banding on this BEQ, which is a structural element, sets the precedent for the distinctive detail on future buildings.

## 4.11 NEW RIVER



Marine Corps Air Station New River is largely an independent installation, but has a common history with Camp Lejeune and MCAS Cherry Point. It continues to share some support services with Camp Lejeune and is included in the BEAP as a separate district.

### MASSING

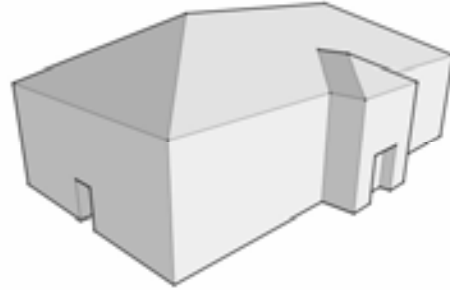
There is a wide range of architecture at New River, as well as facility types that are unique to an airfield. The utilitarian theme of the airfield function should not influence other areas of the Installation. Two types of massings are required:

#### *Administration and Support Buildings*

These buildings include offices, conference spaces, command functions, bachelor housing, base support services and any structure not solely associated with

the flight line. Massing of these buildings shall be clean, simple, and contemporary forms. Use submassing for larger structures to break up the building volume.

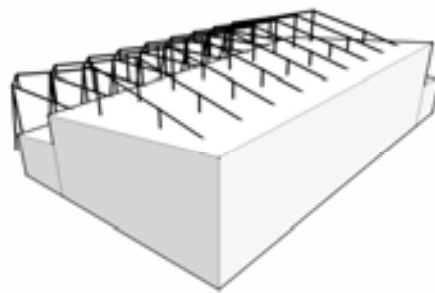
Allowable roof forms include the gable, shed, and hip roofs at slopes between 4:12 and 6:12.



#### *Airfield Facilities and Hangars*

These buildings include facilities in the airfield area such as aircraft maintenance hangars, simulator buildings, and warehouses. Massing shall be largely functional, with exposed structure. Submassing to enclose ancillary functions helps reduce the monumental scale of these buildings.

Roofs shall be gable, hip, or shed at slopes greater than 2:12 (to reduce roof heat island effects) and less than 4:12.



**This massing diagram illustrates a hangar with a cantilevered truss roof**

### WINDOWS AND ENTRANCES

Windows shall have detail around heads and sills to avoid a "punched" opening effect. This may include

special brick shapes or brick detailing as lintel and sill elements of the window opening. Window muntins are not preferred in New River except where necessary to support glazing or window operation.



Window framed by brick pilasters and soldier coursing above

There are many acceptable entry elements for New River. The basic requirement is that primary building entrances be recognizable as obvious points of entry to the facility. At a minimum, this shall include overhead cover to shelter occupants from the weather and a storefront door and side light.



The entry element to the fitness center, Building AS-4000, is emphasized with contrasting color and covered by a canopy



The entry to this community center is formally placed and faces the public open space and parking.

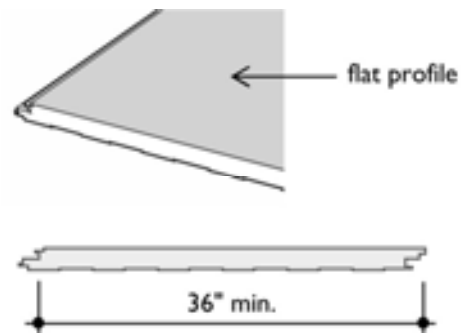


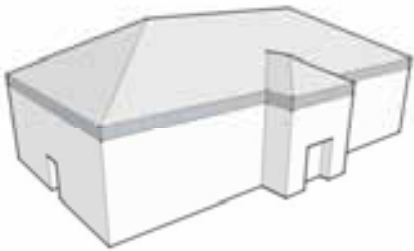
The entry to this operational trainer facility, AS-255, is facing the parking area and provides a covered area adjacent to the door.

## BODY AND ROOF MATERIALS

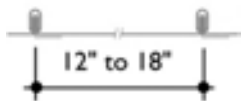
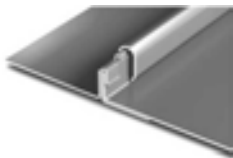
### *Administration, Support, and Airfield Facilities*

These buildings shall be face brick, preferably modular size, smooth faced architectural concrete block, or metal panel. Alternate colors are permitted where building type and location warrant – see color chart. Metal panels shall have a flat profile with panel widths of 36 inches or greater.

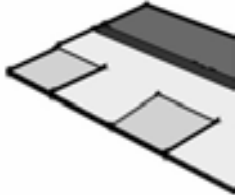




Metal panel has the following restrictions: limited to 10 percent of the facade area and confined to gable ends and adjacent to eaves.



Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

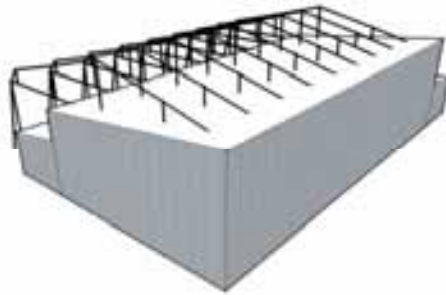


Asphalt shingles shall be laminated architectural shingles with a dimensional appearance.

### Hangars

All hangers and other airfield district buildings in New River shall be face brick, modular size, smooth faced architectural concrete block, or metal panel. Metal panels shall have a flat profile with panel widths of 36 inches or greater.


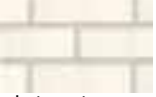
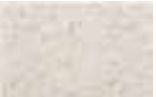
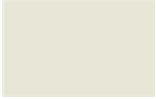
Metal panel may consist of 100 percent of the facade.













Roofing may be either standing seam metal or built-up roofing. Standing seam metal shall have high standing seams between 12 and 18 inches on center.

Built-up roofing shall have as high a solar reflectance as possible without affecting aircraft operations.

### COLORS NEW RIVER

Description	Color
Facade	
Building body Screen walls	 red flashed wire cut standard gray mortar
Alternate building body	 beige wire cut standard gray mortar
	 white matte face white mortar
Metal panel	 almond BM: OC-32 PANTONE: 9583 FED STD: 27722

	
	sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	
	slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	
	evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Handrails	
	slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
	
	medium bronze BM: 2137-20 PANTONE: 405 FED STD: 33070
	
	clear anodized aluminum
Entry accents Doors Window/door trim	
	medium bronze BM: 2137-20 PANTONE: 405 FED STD: 33070

	
	evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
<b>Roof Cladding</b>	
Metal roof	
	evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Low slope roof	
	white

### AIRFIELD BUILDINGS

Façade materials consist of a mixture of brick, block, stucco, and metal panel. Roofs range from low slope to high slope gable and gable on hip. Standing seam metal is the predominant cladding for sloped roofs, although there is some asphalt shingle. Common details include pilasters and gabled entryways, particularly on BEQs.



**Building AS-265 with its translucent, vertically-acting hangar doors**



**Conspicuous green pitched metal roof of recently-built BEQs**

The following building is adjacent to other training bays and uses the alternate color palette.



**Pilaster details are prevalent on high bay buildings, usually aligned with scuppers and downspouts;**



**Barriers placed in front of the MAG 26 Headquarters**

Anti-terrorism/Force Protection standoff should be achieved by use of more integrated and less conspicuous means such as bollards, ditches and berms, or anti-ramming knee walls incorporated into the site design and veneered with materials similar to adjacent buildings.





## 4.12 STONE BAY



Stone Bay is located along the western banks of the New River and is relatively isolated from the remainder of the special districts. Generally, Stone Bay consists of archetypal Georgian buildings found on Camp Lejeune. However, due to the rapid construction of the Marine Special Operations Command (MARSOC) complex beginning in 2008, separate styles have developed. In addition to Stone Bay "proper", there are two distinct sub-districts: the MARSOC complex, consisting of contemporary brick and standing seam metal buildings, and the Rifle Range Historic Area, the original historic area adjacent to the rifle ranges. Refer to Section 2.6 for more information on this historic district.

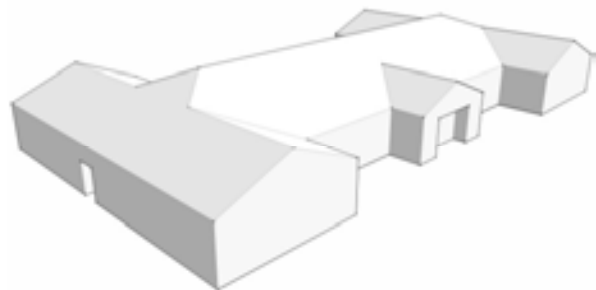
### 4.12.1 STONE BAY COMMON SUPPORT AREA



This section applies to all facilities along Rifle Range Road, Booker T. Washington Boulevard, and any structures that do not fall within the Rifle Range or MARSOC sub-districts. This represents the common support area for all activity at Stone Bay.

#### MASSING

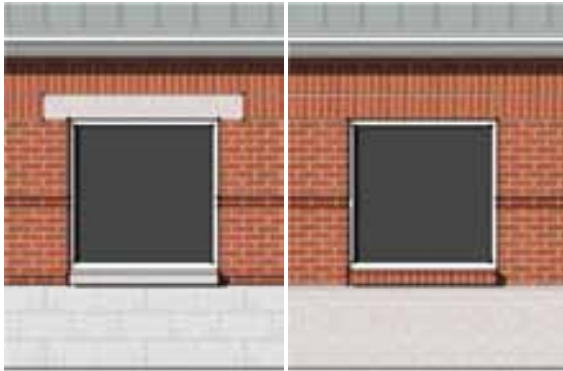
Buildings in Stone Bay Common Support Area shall be respectful of the district's historic character. However a strict adherence to a set of stylistic rules is not necessary. Massing shall be largely symmetrical with contemporary interpretations of the Georgian and Colonial Revival styles.



Allowable roof forms include the gable, gable-on-hip, and hip at slopes between 4:12 and 6:12.

## WINDOWS AND ENTRANCES

Windows shall have detail around heads and sills to avoid a "punched" opening effect. This may include precast concrete shapes, special brick shapes or brick detailing at the lintel and sill elements of the window opening. Window muntins are not required except where necessary to support glazing or window operation.



Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



This entrance to the dining facility, building RR-135, is clearly announced, covered, and faces the public way


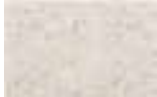


## BODY AND ROOF MATERIALS







All facades in Stone Bay Common Support Area shall be face brick, modular size. Base foundations may be architectural concrete block, precast concrete, or cast-in-place concrete with a high quality rubbed finish.



Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

## COLORS STONE BAY

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed wire cut standard gray mortar
Base foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173

Gutters/downspouts Fascia/soffit/frieze	
	silver
Handrails	
	bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Entry accents Doors Window/door trim	
	clear anodized aluminum
	
	bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Roof Cladding Metal roof	
	clear anodized aluminum
	
	silver



**Gable fronted dormers on the roof of the dining facility, Building RR-135**



**Architectural block accents this building corner; downspouts are aligned with these accents to create an orderly and modern detail**



**The base foundation of the Reserve Center buildings is architectural block**

## DETAILS

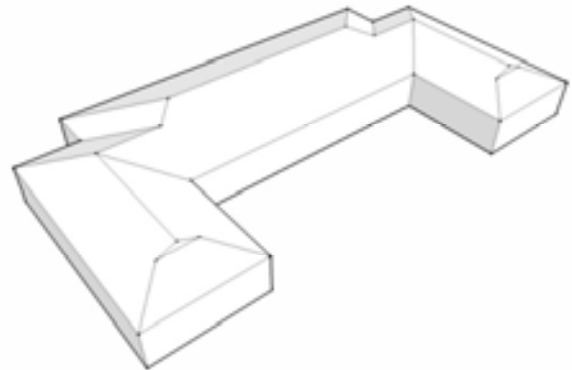
Detail suitable for Stone Bay is both respectful of the nearby historic context and contemporary design. This includes the following:

- Dormers (gable fronted)
- Downspout accents
- Masonry base foundation

## PRECEDENTS



Dining Facility, RR-135



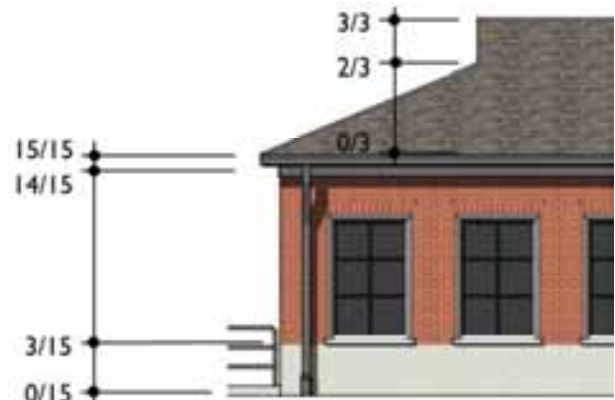
Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:



## MASSING

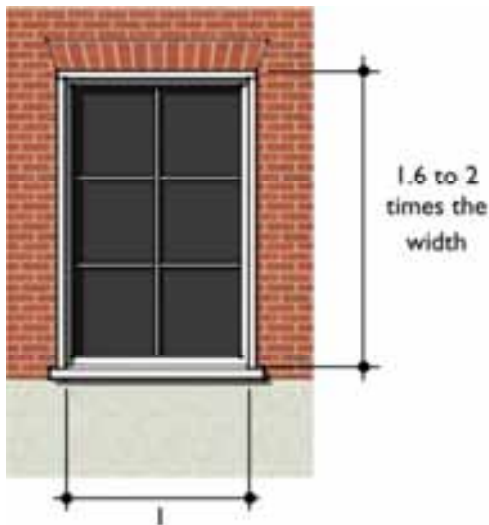
Building mass in the Rifle Range area shall be based on historical context, primarily the Georgian and Colonial Revival styles. Symmetry in building mass, windows, and roof shall be a large determinant of design.



The gable end on a gable-on-hip roof shall be equal in height to 1/3 of the overall roof height.

## WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic character of the Stone Bay Rifle Range area. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 6, 8, or 12 equal parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental arch. Sills may be precast concrete (preferred) or special brick shapes.



(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.

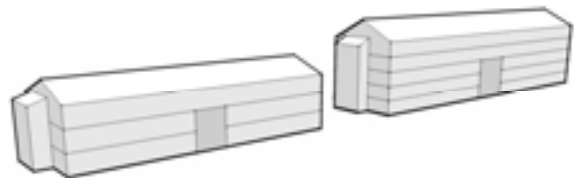


The primary entry element to Walsh Hall, Building RR-9, is framed by a glazed surround and cornice and faces on Rifle Range Road



The side entry element to Building RR-9 is pocketed and clearly announced with an ornamental surround.

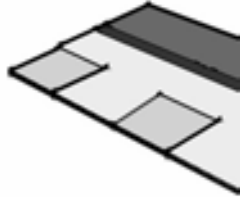
Primary entrances shall be proportional to the building mass. In three and four story buildings, entry elements shall be at least two stories in height. In five story buildings, entry elements shall be at least three stories in height.



Entry elements shall be sized proportionately to building height


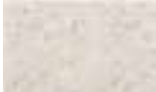


## BODY AND ROOF MATERIALS

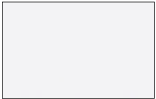



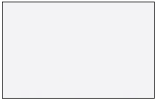


All facades in Stone Bay Rifle Range area shall be face brick, preferably modular size. Base foundations shall be architectural concrete block.



Roofing shall be composition shingle consisting of laminated asphalt with a dimensional appearance.

## COLORS RIFLE RANGE

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed smooth standard gray mortar
Base Foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173

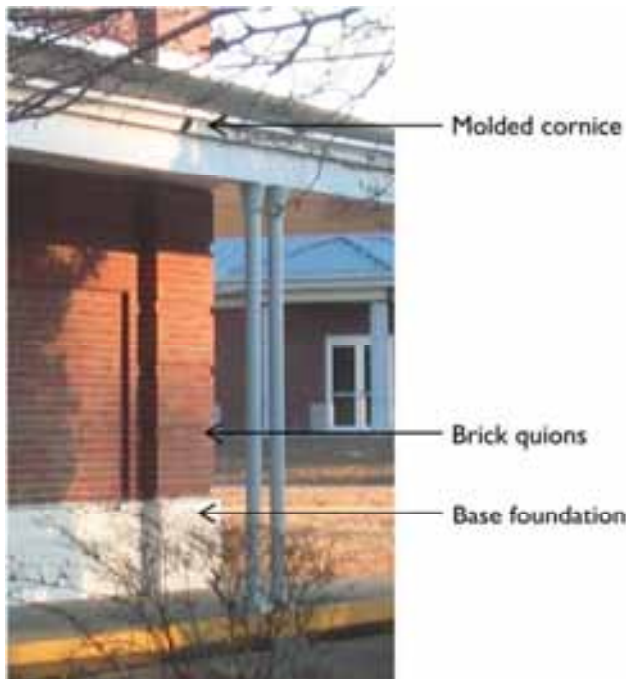
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	
 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173	Gutters/downspouts Fascia/soffit/frieze
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	
 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173	Handrails
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	Entry accents Doors Window/door trim
 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875	
 weathered wood	<b>Roof Cladding</b> Composition shingles



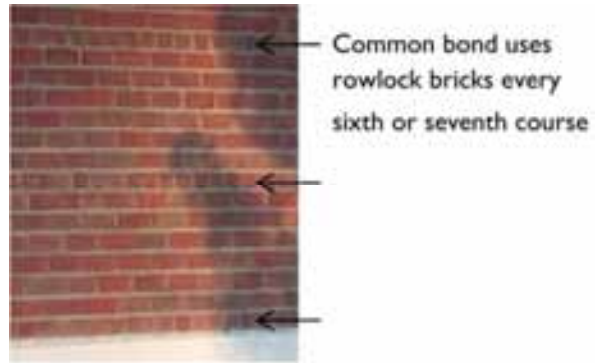
## DETAILS

This area is known by its Georgian and Colonial Revival details. Exterior detail shall re-inforce this trend. Detail commonly associated with these styles includes:

- Brick quiones
- Raised concrete foundations
- Moulded cornice detail
- Brick common bond



This gymnasium, Building RR-8, has many elements associated with the character of this area.



## PRECEDENTS

There are numerous historic buildings identified by Camp Lejeune as contributing to the character-defining elements associated with Stone Bay Rifle Range area, particularly the dining facility and surrounding barracks. The following are appropriate to use as design precedents:



Walsh Hall is typical example of the historic Georgian style that exists in the original Rifle Range area.



The gymnasium, Building RR-8, is a good precedent for its use of characteristic elements of the area

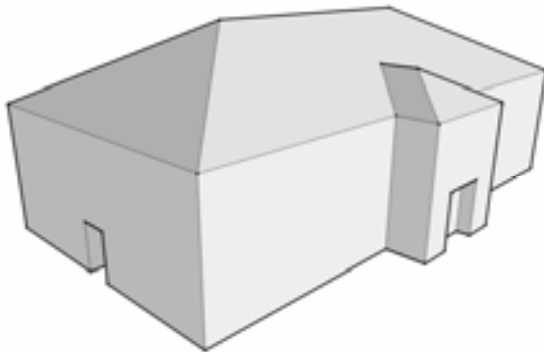


#### 4.12.3 MARSOC



##### MASSING

The MARSOC structures are more contemporary in massing and put less emphasis on classical rules of style.

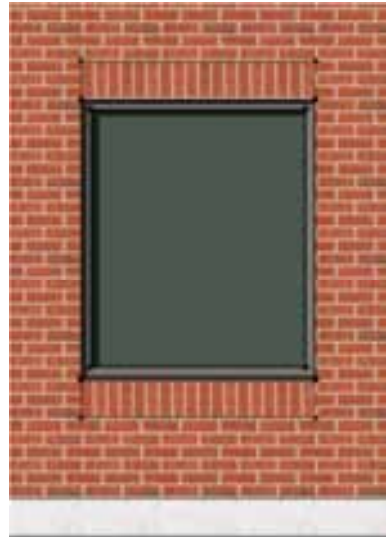


Many existing roofs in the MARSOC complex are mansards designed to appear as hip roofs. New roof forms shall be gable, mansard, or hip with slopes between 4:12 and 6:12.

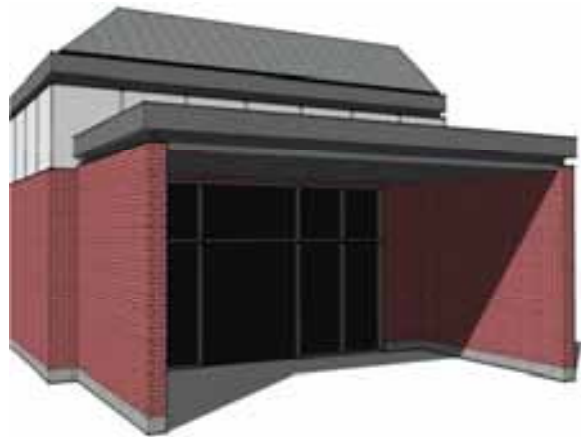
##### WINDOWS AND ENTRANCES

Windows shall have detail around heads and sills to avoid a "punched" opening effect. This may include precast concrete shapes, special brick shapes or brick detailing as lintel and sill elements of the window

opening. Window muntins are not preferred in MARSOC except where necessary to support glazing or operable windows.



There are many acceptable entry elements for MARSOC. The basic requirement is that primary building entrances be recognizable as obvious points of entry to the facility. At a minimum, this shall include overhead cover to shelter occupants from the weather and a storefront door and side light.

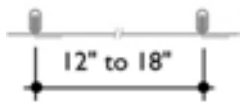
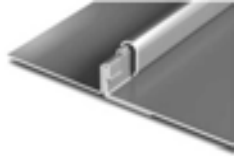


**The entrance to this facility is sheltered by a canopy**

##### BODY AND ROOF MATERIALS



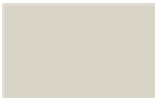

All facades in the MARSOC area shall be face brick, preferably modular size. Base foundations may be

architectural concrete block, precast concrete, or cast-in-place concrete with a high quality rubbed finish.

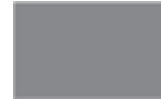


Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

#### COLORS MARSOC

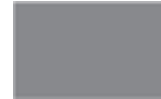
Description	Color
<b>Facade</b>	
Building body Screen walls	 <p>red flashed wire cut standard gray mortar</p>
Base foundation	 <p>gray split face standard gray mortar</p>
Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>

#### Gutters/downspouts Fascia/soffit/frieze



slate gray  
BM: 2133-40  
PANTONE: 444  
FED STD: 36173

#### Handrails



slate gray  
BM: 2133-40  
PANTONE: 444  
FED STD: 36173

#### Entry accents Doors Window/door trim



slate gray  
BM: 2133-40  
PANTONE: 444  
FED STD: 36173

#### Roof Cladding Metal roof

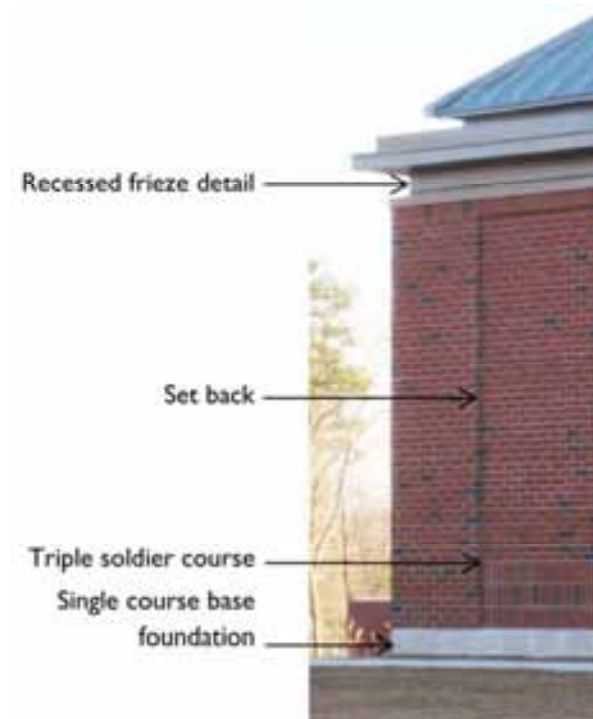


slate gray  
BM: 2133-40  
PANTONE: 444  
FED STD: 36173

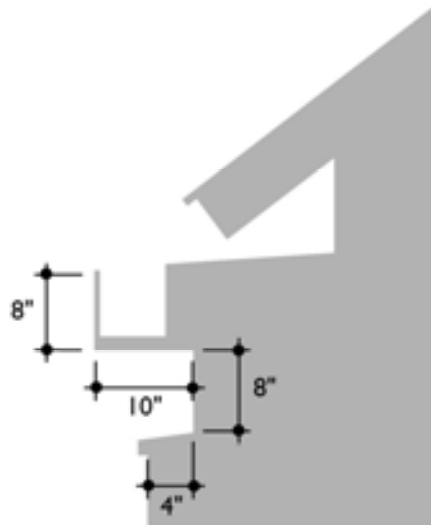
#### DETAILS

Details of the MARSOC buildings are abstracted from the classical design style. The elements that shall be used on buildings in this area include:

- Single course block base foundation
- Recessed frieze detail at cornice
- Variety of brick detail including soldier coursing, reveals, and set backs



In order to maintain the character of MARSOC, the recessed frieze detail shall be duplicated on building cornices regardless of the method of wall and roof construction.



This diagram illustrates the recommended dimensions for the recessed frieze detail at the building cornice

## PRECEDENTS

The single most dominating building on the MARSOC complex is the headquarters building, which should be used as a precedent for the majority of design elements.



The **MARSOC** Headquarters building sets the theme for the rest of the **MARSOC** complex.



This **MARSOC** facility is another good precedent for elements characteristic to the **MARSOC** complex

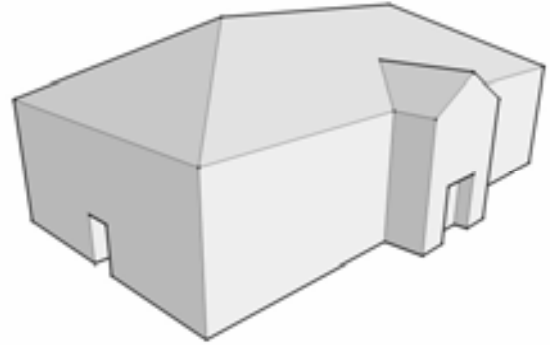
#### 4.13 CAMP JOHNSON



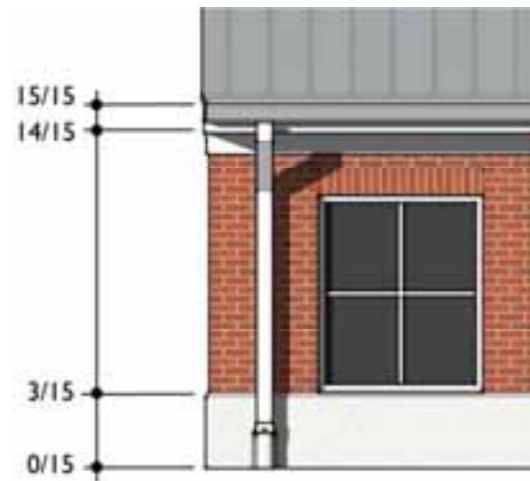
Camp Johnson experienced a large initial development in the 1940s and remained relatively unchanged for 40 years. In the mid 1980s, it began to see modest but steady development, mostly in the northern side of Montford Point.

The staggered pace of development has resulted in a fragmented character for the district. Historic structures are mostly single-story buildings with white or cream colored stucco facades, typically with simple gable roofs. Doors and windows are framed with exposed brick. Much of the original development is analogous to typologies seen at Hadnot Point.

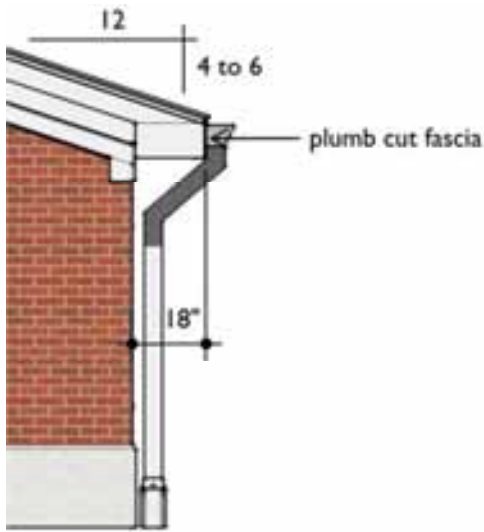
##### MASSING



Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:

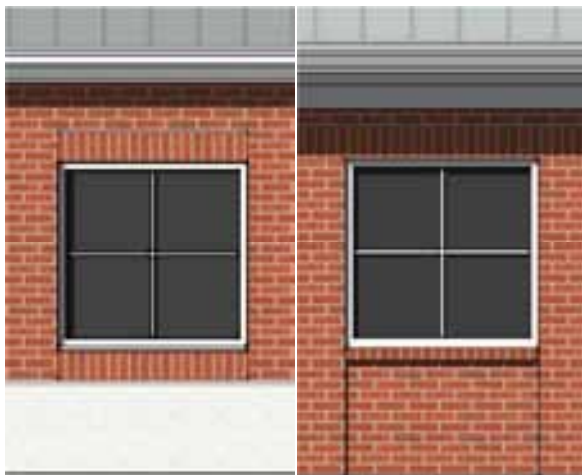


Allowable roof forms are gable, shed, mansard, and hip roofs at slopes from 4:12 to 6:12.



## WINDOWS AND ENTRANCES

Windows shall have detail around heads, sills, and jambs to avoid a "punched" opening effect. This may include special brick shapes, brick detailing at lintel and sill, or variations of material above or below the window element, such as a base foundation or recessed spandrel panel. Window muntins shall not exceed more than 4 divisions of a single window.



Two variations of acceptable window details for Camp Johnson; base foundation (left) and recessed panel below window (right)

Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.



A building such as this instruction facility, Building M-79, has a formal entry element with hardscape and canopy to announce its presence

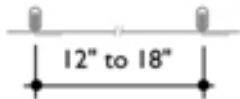
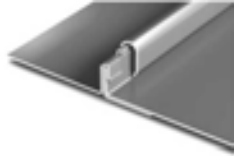


The entry element to this indoor gym, Building M-168 is framed by glazed storefront and pocketed for weather protection

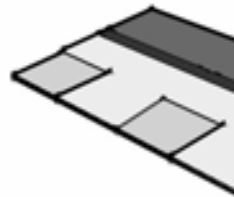
## BODY AND ROOF MATERIALS

All facades in Camp Johnson shall be face brick, preferably modular size. Base foundations may be architectural concrete block, precast concrete, or

cast-in-place concrete with a high quality rubbed finish.


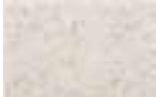
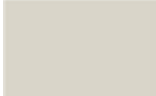


Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.



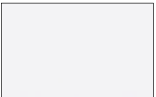


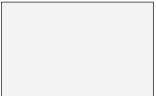



Asphalt shingles shall be laminated architectural shingles with a dimensional appearance.

## COLORS CAMP JOHNSON

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed wire cut standard gray mortar
Base foundation	 white split face white mortar
Metal Panel	 sandstone BM: OC-48 PANTONE: 400 FED STD: 17875

## Painted Surfaces and Factory Finishes

Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
Handrails	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	 clear anodized aluminum
Entry accents Doors Window/door trim	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
<b>Roof Cladding</b>	
Metal roof	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173



## Composition shingles



slate gray

## DETAILS

Camp Johnson's character is defined by a small number of dominant influential buildings (see Precedents). Details for this district shall be:

- Base foundations
- Frieze details
- Brick reveals
- Gabled entry elements



This cornice uses a frieze detail along the eave and rake



A brick reveal adds interest to a large expanse of facade; in this case, the reveal is aligned with the window muntin



Gable ends are used throughout Camp Johnson, particularly to announce the building's primary entrance

## PRECEDENTS



The academic instruction facility, M-79, is the leading precedent for design at Camp Johnson



#### 4.14 ENTRY GATES



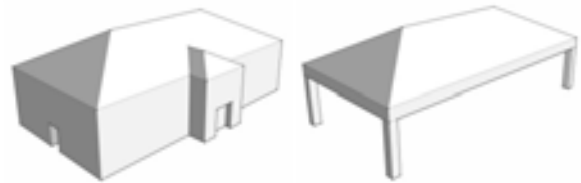
Entry gates, or entry control points, are gateways which functionally serve as check points for access, control, and security, as well as primary locations for informational and directional help. They also establish the initial impression of the Installation, both to visitors and to passers-by. This section applies to these structure directly associated with the entry gate, such as shelters, visitor centers, and pass offices.

Perimeter appearance is important to convey a positive impression of MCB Camp Lejeune and MCAS New River to the city of Jacksonville and the surrounding civilian community. Designs on the perimeter of the Installation such as these should utilize the latest technology for protection and minimize or mitigate the stronghold appearance of barbed wire and no-man zones. Public view planes must also be considered in order to enhance the appearance of the Installations from outside their borders.

#### MASSING

Building massing at Entry Gates shall be based on the Georgian and Colonial Revival styles. Symmetry in

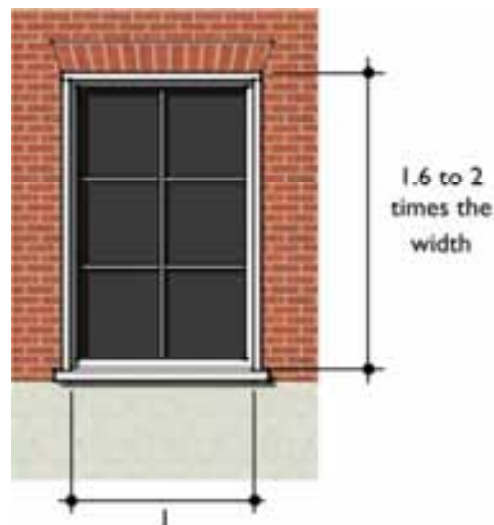
building mass, windows, and roof shall be a large determinant of design.



Allowable roof forms are gable-on-hip and hip at slopes between 4:12 and 6:12.

#### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to match the historic Georgian districts of MCB Camp Lejeune. Window dimensions shall fall within a range of 1:1.6 to 1:2 ratio of width to height, as shown in the diagram below. Windows shall have evenly spaced muntins dividing the glazing into 4, 6, or 8 parts to emphasize the historic look.



Window heads and sills shall be detailed to avoid a punched opening affect. This can be accomplished with different types of lintels which blend with the historic character, such as the jack arch or segmental arch. Sills may be precast concrete (preferred) or special brick shapes.

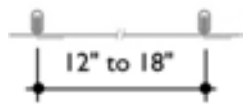
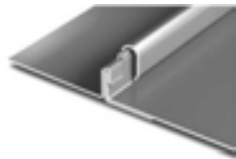


(Left) Example of jack arch using brick or precast concrete; (Right) Example of precast concrete sill

Entrances shall provide some type of weather protection, such as a pocketed door or canopy. Entrances must be formal, clearly identifiable and located toward the most common approach, preferably facing the public way or open space.


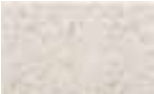
### BODY AND ROOF MATERIALS

All facades at Entry Gates shall be face brick, modular size. Base foundations may be architectural concrete block, precast concrete, or cast-in-place concrete with a high quality rubbed finish.



Roofing shall be standing seam metal with high standing seams between 12 and 18 inches on center.

### COLORS ENTRY GATES

Description	Color
<b>Facade</b>	
Building body Screen walls	 red flashed wire cut standard gray mortar
Base Foundation	 white split face white mortar

### Metal Panel



sandstone  
BM: OC-48  
PANTONE: 400  
FED STD: 17875

### Painted Surfaces and Factory Finishes

#### Exterior stairs Utilities/equipment Appurtenances



slate gray  
BM: 2133-40  
PANTONE: 444  
FED STD: 36173

#### Gutters/downspouts Fascia/soffit/frieze



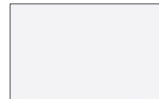
bone white  
BM: 2140-70  
PANTONE: 9041  
FED STD: 37875

#### Handrails



clear anodized aluminum

#### Entry accents Doors Window/door trim



bone white  
BM: 2140-70  
PANTONE: 9041  
FED STD: 37875



clear anodized aluminum

### Roof Cladding

#### Metal roof



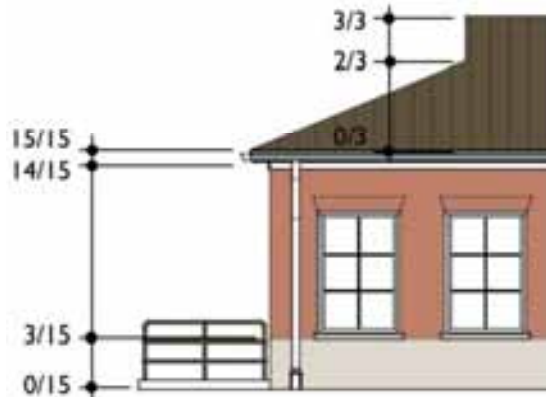
medium bronze  
BM: 2137-20  
PANTONE: 405  
FED STD: 33070

### DETAILS

Entry gates shall reflect the predominant architectural style of the Installation: Georgian and Colonial Revival. Ornament on structures at entry gate districts shall re-inforce this trend. Details commonly associated with these styles include:

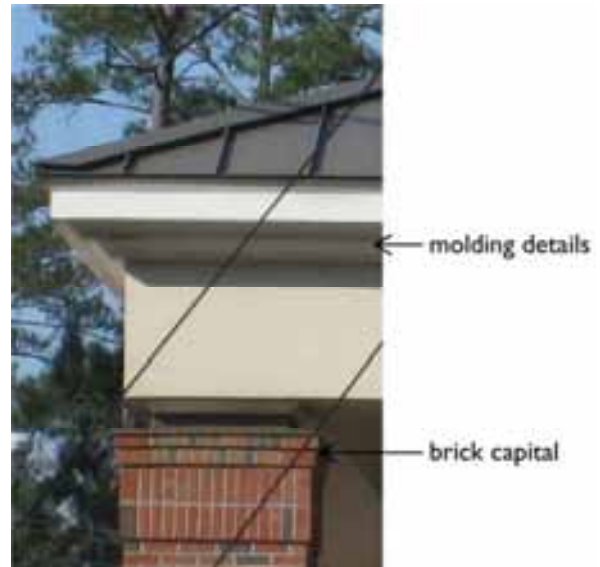
- Base foundations
- Molded cornices
- Cupolas
- Decorative fencing

Proportion of the water table line and the height of the cornice detail to the overall building height shall be carefully controlled such that the respective dimensions of these elements are as follows:



The gable end on a gable-on-hip roof shall be equal in height to 1/3 of the overall roof height.

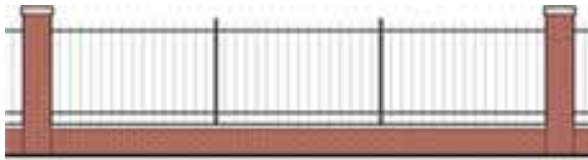
Molded details are apparent on the soffit and fascia as well as the capital of the brick column of the Holcomb Boulevard entry gate.



**Existing cupola at the Holcomb Boulevard entry gate.**

Most cupolas on MCB Camp Lejeune are eight sided with domical roofs and finials such as the ones shown above.

Fencing in Entry Gate districts shall be decorative as well as functional. Break up the visual impact of fences using a black finish on metal work and piers to provide visual interest.



**PRECEDENTS**

The precedent for canopies and gate houses at entry gates is the Holcomb Boulevard entry control point.



**Side elevation of a standard entry control point with guard house beneath.**

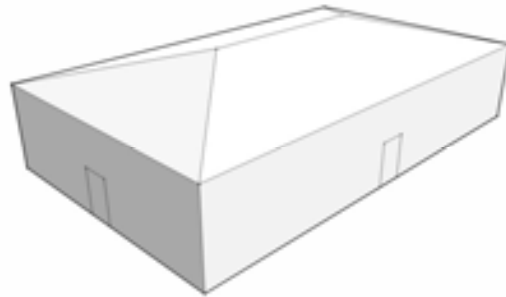
#### 4.15 GREATER SANDY RUN



This district consists of both the Greater Sandy Run training area and the training area across Highway 17, locally known as Verona Loop. This area provides Camp Lejeune with the majority of its maneuver training land. This district is outside the main cantonment area and is not intended for development. However, the few structures and facilities that are built in Greater Sandy Run shall adhere to a basic, consistent set of good design practices and color palette. Camp Devil Dog, situated in the vicinity of Verona Loop, is defined in a separate district within this document.

##### MASSING

Building mass shall be basic and functional.

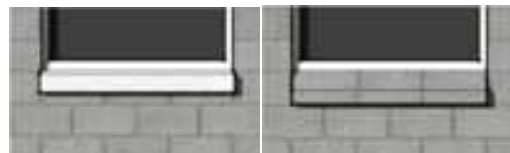


Allowable roof forms are gable and hip at slopes above 2:12 but no greater than 4:12. Eave overhangs shall be extended in order to lessen door and window exposure to the elements.



##### WINDOWS AND ENTRANCES

Windows and entrances shall be designed to meet the facility functional requirements.



Window heads and sills shall be detailed to provide maximum functionality and durability, with deeply recessed frames and properly sloped sills. Sills may be precast concrete (preferred) or special block shapes. Window size and height shall be designed

with an emphasis on providing daylight glazing over vision glazing. This may result in high rows of windows along the façade.



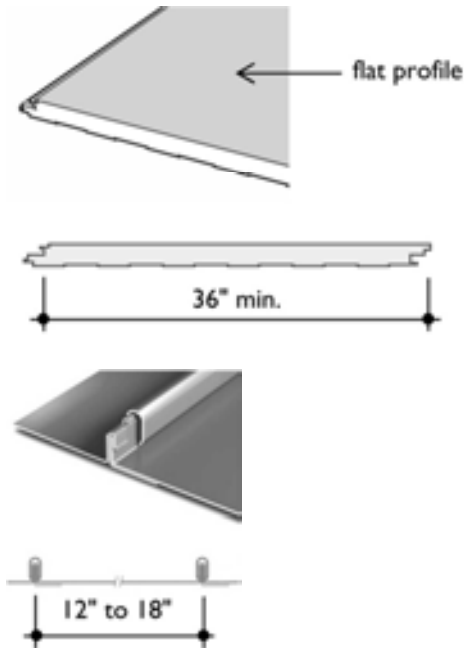
High windows provide daylighting in range facilities which might otherwise have limited or no lighting.

Entrances shall provide some type of weather protection, such as a pocketed door or canopy.

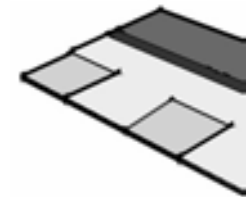


BODY AND ROOF MATERIALS

All facades shall be split face masonry, 8" high by 16" long nominal, or metal panel or a combination of the two. Metal panels shall have a flat profile with panel widths of 36 inches or greater and may consist of 100 percent of the facade.




Roofing shall be either standing seam metal or composition shingle. Metal roof shall have high standing seams between 12 and 18 inches on center.










Asphalt shingles shall be laminated architectural shingles with a dimensional appearance.

COLORS GREATER SANDY RUN

Description	Color
Facade	
Building body Screen walls	 gray split face standard gray mortar



Metal Panel	 <p>sandstone BM: OC-48 PANTONE: 400 FED STD: 17875</p>
Painted Surfaces and Factory Finishes	
Exterior stairs Utilities/equipment Appurtenances	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Gutters/downspouts Fascia/soffit/frieze	 <p>evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109</p>
Handrails	 <p>slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173</p>
Entry accents Doors Door trim	 <p>evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109</p>
Window trim	 <p>bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875</p>
Roof Cladding	
Metal roof	 <p>evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109</p>

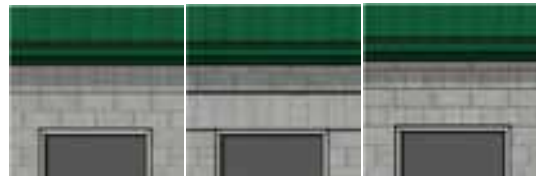
## Composition shingle



slate gray

## DETAILS

Minimal details are required in the Greater Sandy Run District and should be limited to creative use of concrete masonry units within the building façade. Soldier courses, such as shown below, are appropriate, as well as other orientations, patterns and bond types.



Typical Range Latrine Facility





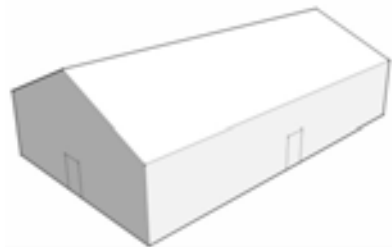
#### 4.16 CAMP DEVIL DOG



Camp Devil Dog covers approximate 134 acres and consists of austere training facilities primarily used by the School of Infantry. Buildings are generally utilitarian in nature and functional in design with little or no ornament.

##### MASSING

Building mass shall be basic and functional. Roofs to be gable with slopes between 4:12 and 6:12.



#### WINDOWS AND ENTRANCES



Window heads and sills shall be detailed to provide maximum functionality and durability, with deeply recessed frames and properly sloped sills. Sills may be precast concrete (preferred) or special block shapes. Window size and height shall be designed with an emphasis on providing daylight glazing over vision glazing. This may result in high rows of windows along the façade.



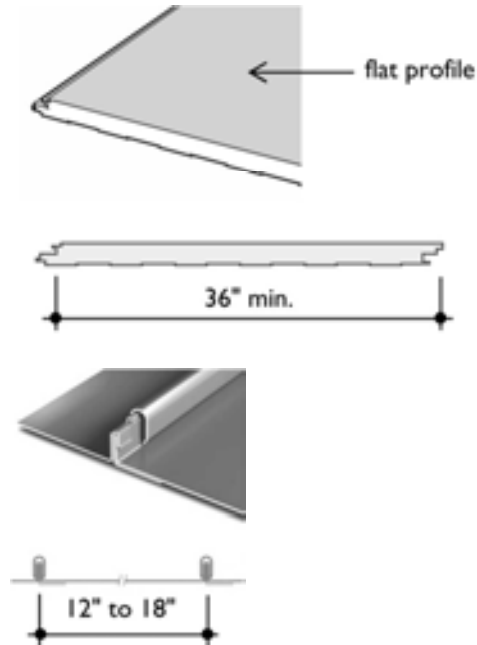
High windows provide daylighting in range facilities which might otherwise have limited or no lighting.

Entrances shall provide some type of weather protection, such as a pocketed door or canopy.

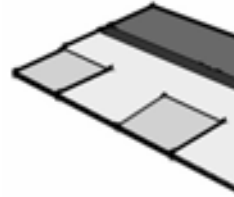


#### BODY AND ROOF MATERIALS

All facades shall be split face masonry, 8" high by 16" long nominal, or metal panel or a combination of the two. Metal panels shall have a flat profile with panel widths of 36 inches or greater and may consist of 100 percent of the facade.


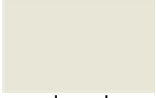

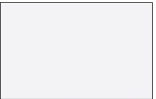




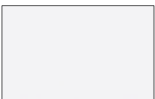

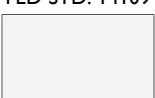
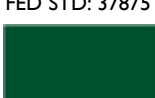
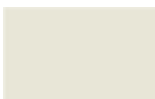
Roofing shall be either standing seam metal or composition shingle. Metal roof shall have high standing seams between 12 and 18 inches on center.



Asphalt shingles shall be laminated architectural shingles with a dimensional appearance.

#### COLORS COMMON

Description	Color
<b>Facade</b>	
Building body Screen walls	 cream split face mortar to match
Metal panel	 gray split face standard gray mortar
	 almond BM: OC-32 PANTONE: 9583 FED STD: 27722
<b>Painted Surfaces and Factory Finishes</b>	
Exterior stairs Utilities/equipment Appurtenances	 slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Gutters/downspouts Fascia/soffit/frieze	 bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875

Handrails	
	evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
	
	slate gray BM: 2133-40 PANTONE: 444 FED STD: 36173
Entry accents Doors	
	bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	
	evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Window/door trim	
	bone white BM: 2140-70 PANTONE: 9041 FED STD: 37875
	
	evergreen BM: 2040-10 PANTONE: 7484 FED STD: 14109
Roof Cladding	
Metal roof	
	almond BM: OC-32 PANTONE: 9583 FED STD: 27722

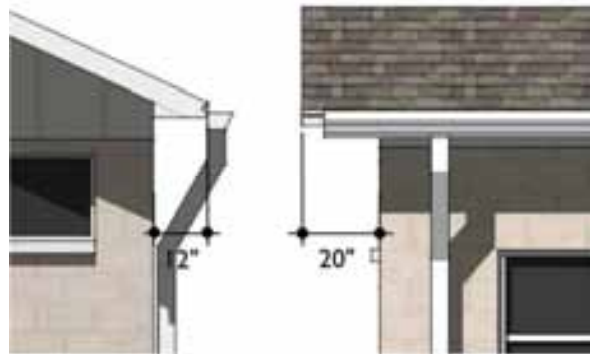
## Composition shingle



slate gray

## DETAILS

Eave and rake overhangs shall be extended in order to lessen door and window exposure to the elements.



## PRECEDENTS



Building DD34 is a good example of a basic and functional facility at Camp Devil Dog.



**Recently-constructed classroom building at Camp Devil Dog**

## 5.0 SPECIAL BEAP AREAS

Certain development on the installation involves third party organizations with its own architectural interests. Therefore this section of the BEAP addresses those areas where the designer, the installation, and the third party must cooperate to meet both the intent of the BEAP and fulfill the organization's goals.

### 5.1.1 DODEA SCHOOLS

Department of Defense Education Activity is responsible for the funding, design, and construction of K-12 schools on Camp Lejeune and New River. In the past, DODEA generally works with the Base to comply with the BEAP. **New and renovated schools shall comply with the BEAP Common District guidelines as well as other sections of this document as applicable.**

Existing DODEA schools on Camp Lejeune are generally constructed with brick facades with modest brick accent details. Roofs are often hip or gable and clad in standing seam metal, although there are several with low slope roofs. School sites are circulation intensive, have large buffers from parking and little landscaping.



Johnson Primary School can be improved with landscaping. Shading devices such as roof overhangs or

louvers are preferred for blocking direct sunlight and enrich the façade.

While the existing schools are of generally good appearance, they should appear welcoming and familiar as opposed to commercial. In addition to the guidelines in the Common District, other elements that can achieve this include:

- Improved landscaping
- Design elements that evoke a more residential character
- Covered transitional spaces between inside and outside
- Soffitted eaves

### 5.1.2 PRIVATE VENDORS

The Marine Corps Community Services (MCCS) is responsible for the coordination of private vendor facilities. Private vendors are permitted to occupy or construct retail facilities on the Installation. This benefits Marines and civilians by providing convenient and popular services on Base, while also giving the vendor a location with a high amount of traffic. While this is a mutually beneficial relationship, a vendor's brand colors, materials, and forms sometimes conflict with the standards set forth by the BEAP and the aesthetic goals of Camp Lejeune. **Nevertheless, private vendors shall comply with the BEAP.**

The commercialization of Special Districts, such as at Hadnot Point and New River, occur along highly visible main gate access roads. It is particularly important that these concentrations of vendors comply with the BEAP's unifying styles, materials and colors. In the case of Hadnot Point, the BEAP defines a Marine Corps Exchange Sub-district, which allows greater flexibility in massing and facade material.

There are many precedents for the adaptation of commercial brands to match local design guidelines as well as contextual surroundings, for example, a

substitution of colors and styles such as in the image below. This McDonald's restaurant in Sedona, Arizona uses the historical pueblo style and a teal logo in lieu of the corporate standard design, showing that compliance need not sacrifice brand recognition.



### 5.1.3 HOUSING

Family housing on MCB Camp Lejeune and MCAS New River is managed by a Public-Private Venture company and is in the process of continual upgrades to the physical appearance of the Installations' housing stock. In general, these upgrades are consistent with the local vernacular and result in a positive contribution to the overall character of the districts, particularly Paradise Point, Tarawa Terrace, and New River.



**Recently upgraded housing on MCAS New River**

New or renovated housing shall continue to be styled after regional vernacular, contemporary interpretations of early American styles, or in a classically based design, depending on the circumstance.



## 6.0 ARCHITECTURAL REVIEW BOARD

The goal of the BEAP is to establish guidelines to create a safe, productive, and attractive installation and preserve the character of the visual environment. To ensure compliance with the BEAP, an Architectural Review Board will review all projects during design phase, including new construction and major renovation.

This chapter establishes the creation and composition of a group known as the Architectural Review Board. This Board shall administer the procedural guidelines and standards adopted by the Installation under the BEAP. The Architectural Review Board derives its authority from the Base Order.

### 6.1 COMPOSITION

The Board shall consist of the following:

1. One member from the Installation Development Division
2. One member from the Public Works Division
3. One member from each Activity for which a structure is being designed
4. One Ad hoc member, as needed based on projects under consideration

The Deputy Director, Installations and Environment Department shall serve as non-sitting Chairperson and only rule on decisions when required, such as in the case of a split decision.

### 6.2 MEETINGS

The Architectural Review Board shall hold regular monthly meetings on such days and at hours as are set by the Board. In any event, the Board shall meet within 30 days after the submittal of application for a BEAP compliance certificate. If required by the complexity or scope of a project, such time may be

extended by the Board. Special meetings may be held at such times as may be fixed by the Review Board or upon the call of the board chairperson. In the event that a contractor requests emergency repairs within a historic district, the Review Board shall consider the application within five business days, or as soon as thereafter as circumstances permit.

### 6.3 DUTIES AND RESPONSIBILITIES

The Architectural Review Board shall review matters submitted for its consideration with reference to the goal of achieving coordinated and harmonious development in order to promote the safety, productivity, and beauty of Marine Corps Base Camp Lejeune and Marine Corps Air Station New River. The committee will consider the compatibility of proposed projects with the surrounding environment and such other details as scale, form, materials, color, landscaping, and site appurtenances. Reviews shall be based on their compliance with BEAP design guidelines.

The Architectural Review Board shall issue BEAP compliance certificates, administration of BEAP guidelines, procedural guidelines, and hearing of requests for reconsideration from violations of the BEAP and denials of compliance certificates.

#### 6.3.1 MATTERS WITHIN PURVIEW OF THE BOARD

Matters within purview of the Board shall include:

1. New structures, buildings and additions, including site and architecture, regardless of size.
2. Additions or renovations to structures within a historic district, regardless of size or scope.
3. Major site plan changes that involve parking, landscaping, lighting or signs

4. Statues, monuments, memorial structures and other works proposed.
5. New structures, buildings and additions undertaken by private vendors operating on the Installation.
6. Other requests by the Director, Installations and Environment Department

Exceptions:

1. Rehabilitation projects where the work involves restoration of existing materials or repair and replacement with the same materials.
2. Projects as declared exempt by the Director, Installations and Environment Department.

## 6.4 CERTIFICATE OF COMPLIANCE PROCEDURES

Projects require a two-stage application process (see Dates and Process). Applicants should include one original and 4 copies of the application form, all descriptions, specifications, plans, photographs, and sketches. Provide one set of physical samples. Submittal requirements are the same for each stage of the process.

*See Section 6.5 - Application for Certificate of Compliance*

### 6.4.1 NEW CONSTRUCTION SUBMITTAL REQUIREMENTS

- Site plan with proposed building(s) indicated, as well as adjacent streets, on-site parking, stormwater management features, landscaping and proposed plant list, and all site improvements as needed
- Color-rendered front and side elevations drawn at not less than 1/8"=1'-0" scale
- Proposed project exterior signage

- Physical samples of the primary exterior materials, which may include masonry, concrete, siding, paint finishes, and roofing material
- Samples, photographs, and/or brochures of doors, windows, ornamentation, and other exterior materials
- Photos of all adjoining or opposite buildings

Submittal materials may be used by the Board for comparison to adjacent architectural context and will not be returned.

### 6.4.2 MAJOR ALTERATIONS OR ADDITIONS TO EXISTING BUILDINGS

- Site plan with addition(s) shown if a change in the building footprint of the main structure is involved
- Elevations of front and/or sides at not less than 1/8"=1'-0" scale to show intended alterations
- Physical samples of the primary exterior materials, which may include masonry, concrete, siding, paint finishes, and roofing material
- Samples, photographs, and/or brochures of doors, windows, ornamentation, and other exterior materials
- Photos of all adjoining or opposite buildings

Submittal materials may be used by the Board for comparison to the existing architecture and will not be returned.

### 6.4.3 DATES AND PROCESS

1. Submit applications and all supporting information to the Director, Installations and Environment Department, MCB Camp Lejeune. Address to the attention of the Architectural Review Board. In case of emergencies, the Board will hear applications no later than five business days after the filing of a complete

- application. Only complete applications will be considered.
2. The Architectural Review Board will consider a project twice during design: at the Design Development and the Pre-Final Design Submittals. At Design Development or 35% Submittal, the Board will be largely concerned with site, massing, windows, entrances, and materials. At Pre-Final or 100% Submittal, the Board will be concerned with all aspects of site and architecture, and particularly ornamental details and colors. This two-stage process ensures that the design direction is in compliance with the BEAP.
  3. The Architectural Review Board will meet to review applications regularly at such time as the Board deems appropriate. Special meetings may be held upon notification by the Chairperson of the Board to all members that an emergency application has been filed. At this meeting, the application will be considered.
  4. Upon receipt of an application, the Architectural Review Board may permit modifications of an original proposal if such modifications are clearly indicated by the applicant and recorded by the Board.
  5. The Architectural Review Board will visit the project site to verify it's architectural and environmental context and judge the appropriateness of the design's form, materials, and colors.
  6. Architectural Review Board meetings are not public and there is no requirement for applicants to be present. If applicants wish to meet with Board members, they may request to do so in writing to the Board Chairperson. Applicants will be informed of the Board decision within five business days after the meeting has occurred.

#### 6.4.4 REASONS FOR DENIAL

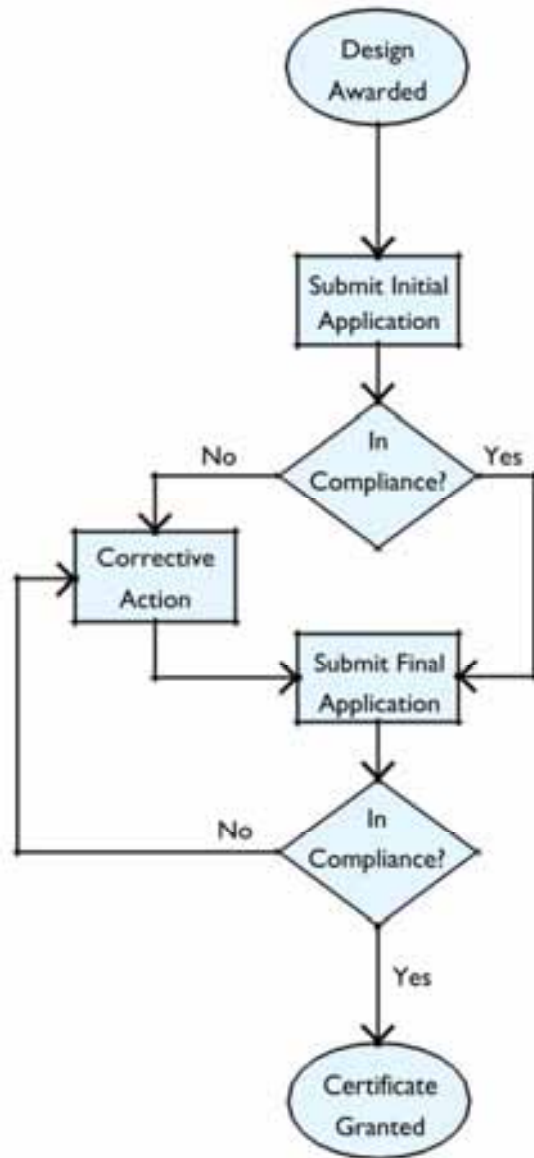
---

The Architectural Review Board shall deny the application for a certificate of compliance if it finds:

- That the action proposed would adversely affect or be incompatible with the character of the district in which it is to be taken
- That the action proposed would not be consistent with the character of a historic district
- That the proposed action would not be consistent with the Base Exterior Architectural Plan adopted by the Installation

Where certification is denied, the Architectural Review Board shall record its reasons for denial. There shall be no re-considerations until the applicant properly addresses the reasons for denial.

#### 6.4.5 PROCESS FLOW CHART



## 6.5 CERTIFICATE OF COMPLIANCE

RETURN TO:

**Director  
Installations and Environment Department  
Building 12  
MCB Camp Lejeune, NC 28542**

### APPLICATION INFORMATION

Project Number \_\_\_\_\_

Project Name \_\_\_\_\_

Contract Number \_\_\_\_\_

Project Location/Street \_\_\_\_\_

Brief Project Description \_\_\_\_\_

Type of Review

☐ Discussion Only    ☐ 35%    ☐ 100%

### APPLICANT INFORMATION

Applicant Name \_\_\_\_\_

Applicant Address \_\_\_\_\_

Phone/Email \_\_\_\_\_

### APPLICATION CHECKLIST

Scope of Project:

- ☐ New Construction
- ☐ Exterior Renovation/Alteration
- ☐ Addition
- ☐ Historic District/Building
- ☐ Signage

- ☐ Landscaping
- ☐ Re-roofing

Submittal Requirements:

- ☐ Project narrative describing context and BEAP compliance for site/building (2 pages)
- ☐ Site plan, includes the following:
  - ☐ Adjacent streets
  - ☐ Parking
  - ☐ Stormwater management features
  - ☐ Landscaping
  - ☐ Plant list
- ☐ Front elevation color rendering 1/8" scale
- ☐ Side elevations color rendering 1/8" scale
- ☐ Exterior signage
- ☐ Samples of primary exterior materials
- ☐ Samples of doors, windows, ornament
- ☐ Color photographs of adjoining or adjacent buildings

Signature of Applicant \_\_\_\_\_

Date \_\_\_\_\_

### REVIEW BOARD USE ONLY

*For This Review Only*

- ☐ IN COMPLIANCE
- ☐ NOT IN COMPLIANCE
- ☐ CERTIFICATE GRANTED

Remarks \_\_\_\_\_

Whom to contact for more information:

Name \_\_\_\_\_

Phone/Email \_\_\_\_\_



## APPENDICES

### APPENDIX A – SUMMARY OF FIELD WORK

Field work for the BEAP Study consisted of several phases:

- Initial kickoff meeting included all stakeholders and established the scope of the study and the districts to be included
- A Windshield Survey reviewed the significant structures on the Installations and prioritized future survey work; a representative sample of buildings and landscapes were identified and provided to the Installations
- An in-depth Special District Survey of each district studied individual buildings in regards to style, form, context, and site; this survey covered 300 buildings
- Final site visit and individual interviews provided details on planning, operations, and maintenance

### SCOPE OF DATA COLLECTION

The scope of work for the survey closely followed the Naval Facilities Engineer Command Installation Appearance Guide, found at <https://portal.navfac.navy.mil/portal/page/portal/iag>

Comprehensive data collection gathered information on the Installations' history, historic structures, artifacts, community and culture. The primary sources of information for data collection included:

- Real Property Inventory
- Internet Naval Facilities Assets Data Store (iNFADS)
- Facility Surveys
- Design Criteria
- Development Plans

- Building Plans
- Zoning Maps
- Base Orders
- Stakeholder Interviews
- GIS Data

The land area of interest covered by the scope of work included the coastal plains region of North Carolina, Onslow County, and the City of Jacksonville. The specific land area surveyed included:

- MCB Camp Lejeune cantonment area, including:
  - Onslow Beach
  - Courthouse Bay
  - Stone Bay
- MCAS New River cantonment area
- Sandy Run Training Area
- Camp Devil Dog Training Area
- Camp Geiger
- Camp Johnson
- Tarawa Terrace Housing Area
- Port Facilities at Morehead City
- Outlying Landing Field at Oak Grove

The Windshield Survey identified significant buildings which contributed to the character of the Installation. The team developed a Survey Matrix which contained the following items to describe each building: name, number, function, date constructed, district, materials, colors, form, style, scale, historic nature, and relationship to context. A total of 313 buildings were addressed in the matrix, located in 19 Special Districts or named areas. The iNFADS data base and GIS Data were instrumental in developing the matrix.

The in-depth Special District Survey was conducted at MCB Camp Lejeune and MCAS New River over a period of one week with several follow-up visits. The Survey Matrix was used to guide this effort, where the majority of the physical information, including photographs, was collected.



The team conducted interviews with stakeholders during the Special District Survey, follow-up visits and over the phone. These individuals included planners, property managers, maintenance personnel, and other administrative officers of the Base and Special Districts. Specifically from:

- Installation Development
- Environmental Management
- Family Housing
- Marine Corps Community Services
- MCB Camp Lejeune Public Works
- MCAS New River Public Works
- Base Operations
- DODEA Schools
- Onslow Beach General Management
- School of Infantry -- East

The field work concluded with a presentation to stakeholders on the team's findings and recommendations on how to proceed with the BEAP study.

## APPENDIX B – COMMON OPERATING LEVELS (COLS)

Common Operating Levels are a method of addressing what and where appearance items are prioritized. COLs establishes a hierarchy of treatment zones and related allocation of resources, including funding for planned maintenance (based on life-cycle costs) at the time of planning and design for the project.

For the purpose of the COLs, the Installation is defined by functional zones. The zones in this study include:

- **Waterfront:** Facilities which provides the physical interface between ship and shore side functions.
- **Airfield:** Facilities associated with activities related to aircraft and their maintenance and support functions
- **Industrial:** Facilities associated with all manner of activities not directly related to waterfronts or airfields

- **Training:** Facilities where Marines and other personnel receive training and instruction in their career field
- **Administrative:** Facilities which contain offices, conference rooms, and command settings
- **Personnel Support/Unaccompanied Quarters:** Facilities related to support of the Marine and their family members

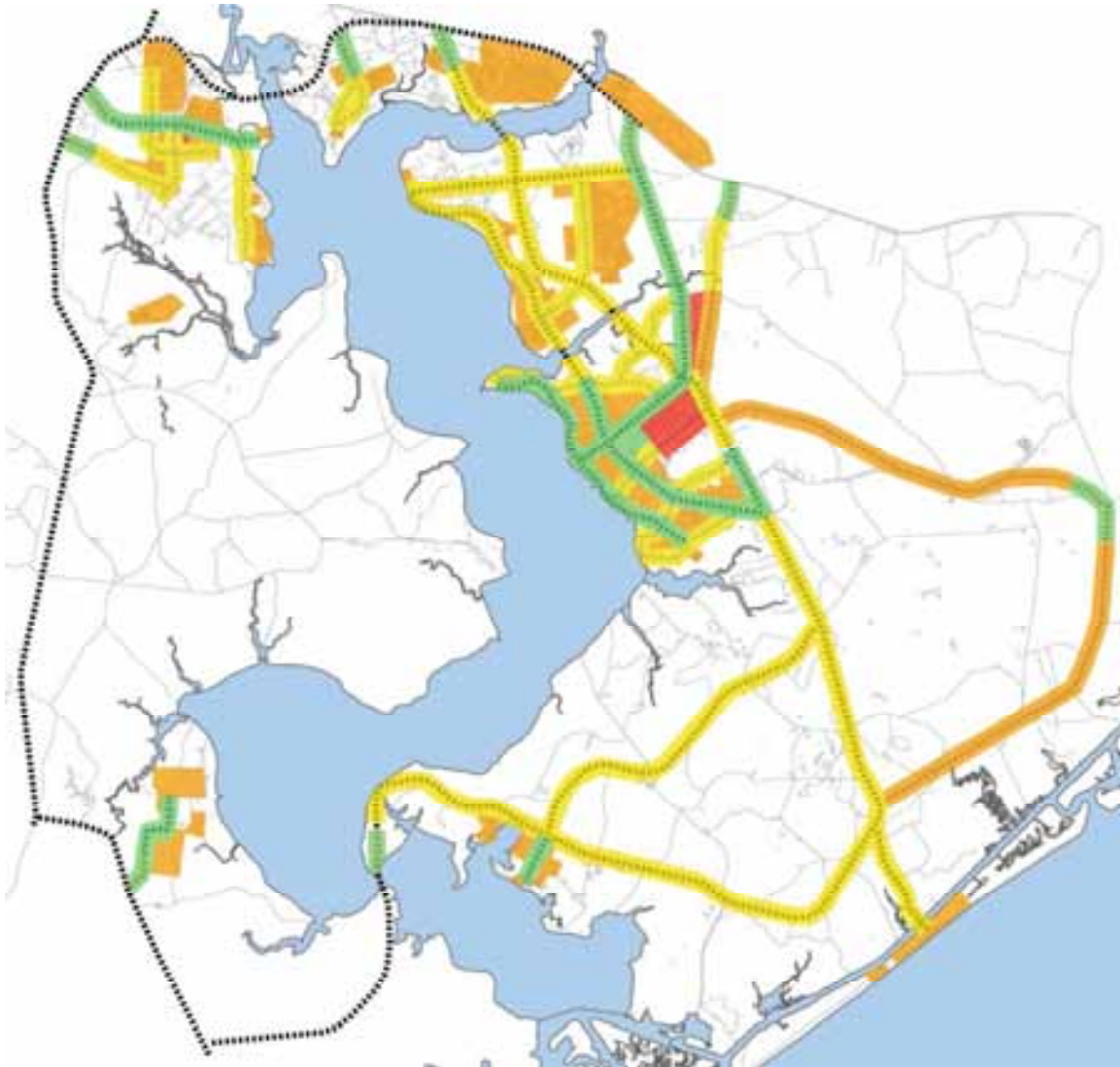
COLs are developed by overlaying these functional districts with the circulation on the Installation, resulting in a combined overlay. Circulation is established using the following categories:

- **Entry Gate:** Installation entry gates
- **Primary Roads:** Main thoroughfares, usually with 2 to 4 lanes and median
- **Secondary Roads:** Secondary or collector roads usually with 2 lanes
- **Tertiary Roads:** Roads used to access local buildings and parking lots on the Installation

Functional Zone	Circulation			
	Entry Gate	Primary	Secondary	Tertiary
Waterfront	I	II	II	III
Airfield	I	II	II	III
Industrial	I	II	III	IV
Training	I	I	II	III
Administrative	I	I	II	III
Personnel Support	I	I	II	III
Family Housing	I	I	II	III
Undeveloped	I	II	III	IV

### Legend:

I	<b>Highest priority;</b> greatest public exposure and sensitivity to image and local context
II	Lesser priority than I, but significant public exposure and sensitivity
III	Lesser priority than II; limited public exposure, but possible sensitivity
IV	Lowest priority; limited public exposure, least sensitivity; but may be redeveloped



MCB Camp Lejeune and MCAS New River COLs



## APPENDIX C – REGIONAL MATERIALS RADIUS

This map is an approximation of a 500 mile radius centered on Camp Lejeune. Materials used in projects which are extracted and manufactured within this region may qualify for LEED® points. Refer to the LEED® guidelines and other resources located on the Whole Building Design Guide (WBDG) website ([www.wbdg.org/design/sustainable.php](http://www.wbdg.org/design/sustainable.php)).





## APPENDIX D – PLANT PALETTE

	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant.	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Large Deciduous Trees																				
Acer rubrum Red Maple	40-60'	35-50'	M					•						•		•	•		•	
Liriodendron tulipifera Tulip tree	70-90'	35-50'	F		•		•	•						•		•			•	•
Liquidambar styraciflua Sweetgum	60-75'	40-50'	M		•			•						•		•			•	
Quercus cocinea Scarlet Oak	70-75'	40-50'	F					•		•	•			•		•	•			
Quercus hemisphaerica Laurel Oak	40-60'	30-40'	F						•	•	•		•	•		•	•			
Quercus phellos Willow Oak	40-60'	30-40'	F					•	•			•		•		•	•			
Quercus rubra Red Oak	60-75'	40-50'	F					•				•	•	•		•	•			•
Sophora japonica Japanese Pagoda Tree	50-75'	50-75'	F		•		•			•	•	•				•				•
Taxodium distichum Bald Cypress	50-70'	20-30'	M		•				•	•	•	•				•			•	
Tilia tomentosa Silver Linden	50-70'	25-50'	M		•	•					•					•	•		•	
Zelkova serrata Japanese Zelkova	50-80'	50-80'	F	•		•		•			•	•				•	•			

	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Medium Deciduous Trees																				
Carpinus betulus 'Fastigata' Upright European Hornbeam	30-40'	20-30'	S											•			•	•		•
Gleditsia triacanthos var. inermis Shade- master' Thornless Honeylocust	30-70'	30-70'	F		•			•			•	•	•	•		•	•			
Oxydendrum arboreum Sourwood	25-40'	20'	S				•	•						•	•	•			•	
Pyrus calleryana 'Red Spire' Red Spire Callery Pear	30-50'	20-35'	M				•	•			•	•		•		•	•		•	



	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant.	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Small Deciduous Trees																				
<i>Acer ginnala</i> <i>Amur Maple</i>	15-18'	15-25'	S					•						•	•			•	•	•
<i>Cercis canadensis</i> <i>Eastern Redbud</i>	20-30'	20-35'	M		•		•							•	•				•	•
<i>Cornus kousa</i> <i>Kousa Dogwood</i>	20-30'	20-30'	S	•		•	•							•				•	•	
<i>Cornus</i> x <i>Rutgers</i> <i>Rutgers Hybrid Dogwoods</i>	15-20'	20-30'	M	•			•	•						•					•	•
<i>Lagerstroemia</i> x. <i>indica</i> <i>Crepe Myrtle cultivars</i>	10-20'	10-15'	F			•	•		•	•		•		•					•	•
<i>Magnolia stellata</i> <i>Star Magnolia</i>	15-20'	10-15'	S				•												•	
<i>Malus</i> x <i>Flowering Crabapple varieties</i>	10-30'	20-30'	M	•	•		•	•		•				•					•	•

	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant.	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Evergreen Trees																				
<i>Cedrus deodara</i> <i>Deodar Cedar</i>	40-70'	40-70'	M	●	●						●			●		●		●	●	
× <i>Cupressocyparis leylandii</i> <i>Leyland Cypress</i>	60-70'	12-20'	F	●	●									●	●			●	●	●
<i>Ilex x attenuata</i> 'Fosteri' <i>Foster's Holly</i>	15-25'	12-15'	S	●	●		●							●	●			●	●	●
<i>Ilex x 'Nellie R Stevens'</i> <i>Nellie Stevens Holly</i>	15-25'	10-15'	F	●	●		●								●	●		●	●	●
<i>Ilex opaca</i> <i>American Holly</i>	40-50'	18-40'	M	●	●		●					●		●		●		●		●
<i>Quercus virginiana</i> <i>Live Oak</i>	40-80'	60-100'	S						●	●	●	●	●	●		●	●		●	
<i>Magnolia grandiflora</i> <i>Southern Magnolia</i>	30-50'	30-40'	M	●	●		●					●		●	●	●		●	●	
<i>Pinus strobus</i> <i>White Pine</i>	50-80'	20-25'	F	●	●					●	●			●				●		●
<i>Pinus nigra</i> <i>Austrian Pine</i>	50-60'	20-40'	M	●	●	●				●	●	●	●					●	●	●

	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant.	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Deciduous Shrubs																				
<i>Amelanchier arboria</i> <i>Downy Serviceberry</i>	15-25'	varies	M		•	•	•	•				•	•							•
<i>Aronia arbutifolia</i> 'Brilliantissima' <i>Red Chokeberry</i>	6-10'	3-5'	S			•	•	•	•			•	•							•
<i>Clethra alnifolia</i> <i>Summer Sweet Cultivars</i>	3-8'	4-6'	S			•		•				•	•	•						•
<i>Forsythia x intermedia</i> <i>Forsythia cultivars</i>	10'	10'	F				•					•		•						•
<i>Myrica pennsylvanica</i> <i>Northern Barberry</i>	5-12'	5-12'	M			•			•			•	•	•						•
<i>Rhododendron calendulaceum</i> <i>Flame Azalea</i>	4-8'	4-15'	S			•											•			
<i>Viburnum plicatum</i> var. <i>tomentosum</i> 'Shasta' <i>Marie's Doublefile Viburnum</i>	6'	10-12'	M	•		•	•								•	•	•			

	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant.	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Evergreen Shrubs																				
Ilex cornuta Dwarf Burford Holly	5-8'	5-10'	S		•		•								•			•	•	•
Ilex crenata Japanese Holly	3-5'	5'	S		•							•			•			•		
Juniperus horizontalis 'Plumosa' Andorra Juniper	2-3'	10'	S	•	•					•	•			•				•		
Morella cerifera Waxmyrtle	10-15'	5-8'	F		•		•		•	•			•	•	•			•		•
Pieris japonica Japanese Pieris	9-12'	6-8'	S		•		•						•	•	•			•		
Prunus laurocerasus 'Schipkaensis' Schipka Cherry Laurel	4-5'	8-10'	M		•		•							•	•			•		
Rhodoendron catawbiense Catawba Rhododendron	6-10'	5-8'					•							•				•		
Rhododendron obtusum Kurume Azalea	4-6'	4-6'	S		•		•							•				•		•
Taxus x media 'Densiformis', 'Repanda', 'Ever-Low' Dense Spreading Yew Cultivarscultivarscultivars	varies	varies	S		•		•						•					•		
Taxus x media "Hicksii" Upright Yew	15-20'	3-5'					•							•	•			•	•	

	Height	Spread	Growth Rate	Winter Form	Foliage	Bark	Flower / Fruit	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant.	Salt Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street Tree / Parking Area	Screen / Wind Break	Accent / Specimen	Mass Planting
Groundcovers																				
Euonymus fortunei 'Coloratus' Wintercreeper	4-6"	-	F		●					●				●	●				●	●
Hedera helix English Ivy	4-6"	-	F		4-6"					●	●	●								●
Juniperus horizontalis Spreading juniper cultivars	12"	4-6'	S	●	●					●	●	●	●	●						●
Liriope spicata Little blue Lily-turf	8-18"	-	M		●		●								●				●	●
Pachysandra terminalis Japanese spurge	6-12"	-	M		●		●								●					
Vinca minor Periwinkle	3-6"	-	M		●		●			●					●					●

## DUNE RESTORATION PLANTS – GRASSES

'Hatteras' American Beach Grass  
*Ammophila breviligulata* 'Hatteras'

Sea Oats  
*Uniola paniculata*

Bitter panicum  
*Panicum amarum*

## DUNE RESTORATION PLANTS – TREES AND SHRUBS

Yaupon Holly  
*Ilex vomitoria*

Wax myrtle

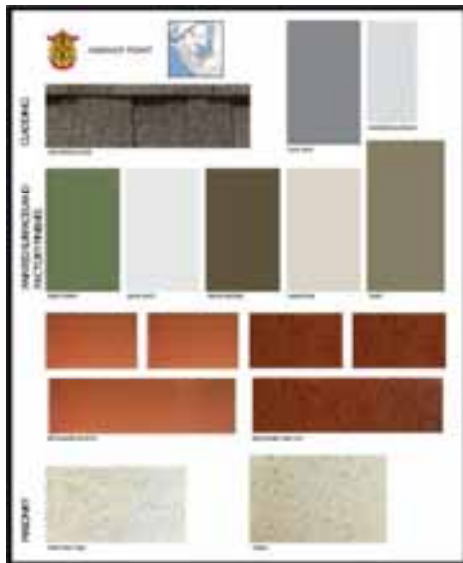
*Morella cerifera*

*More extensive dune restoration plant recommendations and details on planting dunes may be obtained from the North Carolina Cooperative Extension <http://www.ces.ncsu.edu/>.*

## APPENDIX E - COLOR BOARDS






Sample boards are included with this document to provide designers with accurate characteristics of materials and colors indicated in the guidelines. The images provided in the Special Districts section are intended for reference only and may not be an accurate color, depending on computer monitors or printers. Therefore, matching materials and textures should be done with the physical samples only. The following districts are represented on a board:

- Hadnot Point
- Hospital Point
- French Creek
- Cogdels Creek
- Wallace Creek
- Courthouse Bay
- Paradise Point
- Onslow Beach
- Camp Geiger
- Marine Corps Air Station New River
- Stone Bay
- Camp Johnson
- Entry Gates



**WARNING:** Boards only provide a sample of the colors and materials listed in the Special District sections and do not indicate which colors are appropriate to use in which architectural elements. Therefore the written sections of the BEAP and the boards should be used together to understand the guideline.

To best assist the designer in selecting the desired colors and materials, the following list of material manufacturers is provided. *This list is not an endorsement, recommendation, or suggestion of manufacturers or suppliers, but simply identifies where and from whom the samples originated.*

Color or Material	Manufacturer Supplier	Name, Number
Brick		
 red flashed smooth	Triangle Brick Riverside Brick & Supply	Flashed Common
 red flashed wire cut	Triangle Brick Riverside Brick & Supply	Flashed Wirecut
 blended sand faced	Hanson Brick Oldcastle Adams Products	Brentwood
 blended flashed wire cut	Belden Brick Custom Brick Company	Tudor Blend
Concrete masonry		
 white split face	Trenwyth Riverside Brick & Supply	Ramapo White





cream matte face

New Holland  
Concrete  
*Allied Concrete  
Company*

Cream  
NO706



grey split face

Trenwyth  
*Riverside Brick &  
Supply*

Williams-  
burg Grey

**Prefinished  
metal**



slate gray

PAC-CLAD  
*Moisture Protection  
Products*

Slate Grey



slate gray

Berridge  
Manufacturing  
Company

Zinc Grey



sandstone

PAC-CLAD  
*Moisture Protection  
Products*

Sandstone



clear anodized  
aluminum

Kawneer North  
America

Clear



bone white

PAC-CLAD  
*Moisture Protection  
Products*

Bone  
White



medium bronze

Kawneer North  
America

Medium  
Bronze



taupe

Berridge  
Manufacturing  
Company

Buckskin



evergreen

PAC-CLAD  
*Moisture Protection  
Products*

Evergreen



tan

PAC-CLAD  
*Moisture Protection  
Products*

Sierra Tan



silver

IMETCO  
Tucker, GA

Platinum  
Silver

**Sloped roof**



weathered wood

CertainTeed Saint-  
Gobain

Weathered  
Wood



cedar

cedar shingle



slate gray

CertainTeed Saint-  
Gobain

Colonial  
Slate

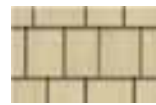
**Low slope roof**



white

roof cap sheet

**Siding**



tan wood grain

CertainTeed Saint-  
Gobain

Antique  
White



grey wood grain

CertainTeed Saint-  
Gobain

Heather

## APPENDIX F – BEAP PAMPHLET



# BEAP PAMPHLET

Base Exterior Architectural Plan  
MCB Camp Lejeune and  
MCAS New River

## OBJECTIVE

This pamphlet describes the basic appearance standards for minor landscaping, grounds maintenance, building improvements, and painting projects undertaken by Tenant Organizations on MCB Camp Lejeune and MCAS New River.

## SITE AND LANDSCAPING

Plantings provide one of the most effective means of unifying an Organization's area and the Base. Plant like-species trees in rows or clusters of three to five along walks and paths to maximize effectiveness. Small trees with low maintenance, groundcover plants (under 6" height) or turf are suitable within 33' of buildings.

Ground Cover	Remarks
Turf	
Little Blue Liriope	part shade
English Ivy	
Vinca	shade
Trees	
Red Maple	
Oak: Scarlet, Willow, Live, Laurel, Pin	
Tulip Poplar	
Sweetgum	
Crepe myrtle	
Redbud	part shade
Magnolia: Sweetbay, Star	
Pine: Japanese Black, Loblolly	
American Holly	

## ARCHITECTURE

Any modification to the exterior of a building affects its architectural character; minor changes, when dispersed across a number of buildings, can impact the overall appearance of an area. Therefore modifications must be done carefully and consistently within the approved architectural style.

The predominant styles found on MCB Camp Lejeune are early American designs. They are characterized by a formal arrangement of classical details based on a symmetrical front elevation. Building elements such as windows and doors are trimmed and roof edge details are molded, often with wood or materials with a wood appearance.

There are several historic areas on MCB Camp Lejeune. No modifications may be made within these areas without special approval from the Base.



Historic areas in Camp Geiger and Camp Johnson



Historic areas in Rifle Range, Hadnot Point, and Courthouse Bay (inset)

## MODIFICATIONS

Modifications always require a work request before executing, but the following requires prior special approval from the Base prior to undertaking:

Description	Remarks
Athletic pits	Athletic pits constructed through the Martial Arts Program must be approved through Installation Development. Units which construct athletic pits will be required to maintain them through unit resources.
Pull up/dip bars	Public Works is the proponent for design of pull up/dip bars; all such work must contact Public Works prior to construction
Memorials	Unit insignia on memorials must obtain approval from Installation Development. Units which construct memorials will be required to maintain them through unit resources.
Flagpoles	The National Flag is authorized on the basis of one per Organizational Flag. Refer to Marine Corps Order PI0520.3B for a list of authorized organizations.
Gazebos	Gazebo construction must obtain a site approval and undergo a design review from Installation Development.

## RESTRICTIONS

While the Base strongly encourages Organizations to take advantage of the Self-Help program, the uniformity of Base appearance and regular maintenance must be considered. Therefore the Base restricts the following site and building modifications:

Description	Image	Alternative
Rope and wood post fencing		None
Unauthorized parking signs		Base Order permits marking paved surfaces
Landscape timbers		Landscape paver blocks
Exposed cable television cabling		None
Roof-mounted commercial and tactical antennas		Mount to side of structure, requires approval from Tower Working Group
Painted exterior stairways		None
Car ports or other covered storage		Work request for gazebo or picnic shelter

## REFERENCES AND RESOURCES

- *Base Exterior Architectural Plan*, available from Installation Development
- *Guidelines for Historical Buildings Management*, available from Environmental Management

Public Works, Self Help.....	451-2970
Installation Development .....	451-1833
Environmental Management .....	451-5003

## ACRONYMS AND ABBREVIATIONS

ADAAG	Americans with Disability Act Accessibility Guide
ADA	Americans with Disabilities Act
ATFP	Antiterrorism/Force Protection
BEAP	Base Exterior Architecture Plan
BEQ	Bachelor Enlisted Quarters
CMU	Concrete Masonry Unit
COLs	Common Operational Levels
DoD	Department of Defense
DoN	Department of the Navy
FEC	Facilities Engineering Command
FED-STD	Federal Standard 595B Colors
HQ	Headquarters
IAG	Installation Appearance Guide
IAP	Installation Appearance Plan
IES	Illuminating Engineers Society
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCON	Military Construction Navy Project
MILCON	Military Construction Project
NRHP	National Register of Historic Places
OLF	Outlying Landing Field
POV	Privately Owned Vehicle
PPV	Public/Private Venture
PWD	Public Works Division
SHPO	State Historic Preservation Office
UFAS	Uniform Federal Accessibility Standards
UFC	United Facilities Criteria
USGBC	United States Green Building Council



## BIBLIOGRAPHY

Blumenson, John J.-G. *Identifying American Architecture*. Nashville, American Association for State and Local History, 1985.

Ching, Francis D. K. *Architecture: Form, Space, & Order*. New York, New York, Van Nostrand Reinhold, 1979.

The Louis Berger Group. *Guidelines for Historic Buildings Management*, Marine Corps Base, Camp Lejeune, Onslow County, North Carolina. August 2008.

Mullins, Lisa C, editor. *Colonial Architecture of the Mid-Atlantic*. Pittstown, New Jersey, The National Historical Society, 1987.

Mullins, Lisa C, editor. *Architectural Treasures of Early America*. Harrisburg, Pennsylvania, The National Historical Society, 1987.

Naval Facilities Engineering Command Asset Management Business Line. "Navy Installation Appearance Guide." Navy Facility Engineering Command. <https://portal.navfac.navy.mil/portal/page/portal/bd/iag>

The Onyx Group. *Base Exterior Architectural Plan Camp Lejeune*. March 1997.

This page intentionally left blank.



# Determining Compliance with the Guiding Principles for Sustainable Federal Buildings

February 2016

This document is a companion to the revised *Guiding Principles for Sustainable Federal Buildings* (Guiding Principles) issued by the Council on Environmental Quality in February 2016, per Executive Order 13693, *Planning for Federal Sustainability for the Next Decade*.

Full implementation of all principles, elements and sub-elements described in the Guiding Principles is strongly encouraged. The tables below include metrics for agencies to use to evaluate compliance with the Guiding Principles. For new construction, 20 out of 21 metrics are required, and for modernization, 19 out of 21 metrics are required. For existing buildings, although agencies are strongly encouraged to meet as many metrics as possible, 12 out of 18 metrics are required—eight specified plus four additional—in order to determine that a building is in compliance with the Guiding Principles.

When evaluating a building for compliance with the Guiding Principles, the new construction and modernization criteria should be applied when the project that an agency is undertaking in an existing building is essentially a comprehensive replacement or restoration of virtually all major systems, interior work (such as ceilings, partitions, doors, floor finishes, etc.), and building elements and features.

## **New Construction or Modernization**

For new construction, metrics number one through 20 are required, and for modernization, metrics number one through 18 and number 21 are required, as specified below.

	<b>I. Employ Integrated Design Principles</b>	<b>Yes/No</b>
1	<b>Integrated Design:</b> Consider the environmental impact of siting decisions and use an integrated project team to: establish energy and other environmental performance goals in the design process; follow sustainable landscape design principles; evaluate electric vehicle charging needs; consider design choices that improve environmental performance, support health and wellness of building occupants and consider climate risks including wildfire; and consider all stages of the building's life cycle. <b>[Required]</b>	
2	<b>Commissioning:</b> Commission and recommission at least every 4 years to optimize building performance using commissioning agents who are independent of the design and construction or operating team.	

	Commissioning should be consistent with the Energy Independence and Security Act (EISA) section 432 <sup>1</sup> and Federal Energy Management Program (FEMP) commissioning guidance. <sup>2</sup> <b>[Required]</b>	
	<b>II. Optimize Energy Performance</b>	
3	<b>Energy Efficiency:</b> A. For new construction, ensure energy efficiency is 30% better than the current American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 standard, OR B. For modernization, ensure: <ol style="list-style-type: none"> <li>1) Energy use is 20% below the fiscal year (FY) 2015 energy use baseline, OR</li> <li>2) Energy use is 30% below the FY 2003 energy use baseline, OR</li> <li>3) The building has an ENERGY STAR<sup>®</sup> rating of 75 or higher, OR</li> <li>4) For building types not in ENERGY STAR Portfolio Manager, where adequate benchmarking data exists, the building is in the top quartile of energy performance for its building type, AND</li> </ol> C. For new construction and modernization, use energy efficient products, as required by statute. <sup>3</sup> <b>[Required]</b>	
4	<b>Renewable and Clean Energy:</b> Evaluate and implement, where appropriate, life cycle cost-effective renewable energy projects on-site; consider long-term off-site renewable sources and Renewable Energy Certificates (RECs); and utilize clean and alternative energy where possible. <b>[Required]</b>	
5	<b>Metering:</b> Install building level meters for electricity, natural gas, and steam; install advanced or standard meters as appropriate. <b>[Required]</b>	
6	<b>Benchmarking:</b> Benchmark building performance at least annually, preferably using ENERGY STAR Portfolio Manager; regularly monitor building energy performance against historic performance data and peer buildings. <sup>4</sup> <b>[Required]</b>	
	<b>III. Protect and Conserve Water</b>	
7	<b>Indoor Water Use:</b> A. Build to ASHRAE standard 189.1-2014 sections 6.3.2, 6.4.2, and 6.4.3, or current comparable ASHRAE standards, AND B. Use water-efficient products; install building level water meters; optimize cooling tower operations; and eliminate single pass cooling. <b>[Required]</b>	
8	<b>Outdoor Water Use:</b> A. Separately meter water for irrigation systems greater than 25,000 square feet, AND B. Use water efficient landscapes, AND C. Limit potable water use for irrigation to 50% or more below conventional practices using methodologies from (but not the numeric requirements	

<sup>1</sup> Guidance for the Implementation and Follow-up on Identified Energy and Water Efficiency Measures in Covered Facilities (per 42 U.S.C. 8253(f), Use of Energy and Water Measures in Federal Buildings September 2012: [energy.gov/sites/prod/files/2013/10/f4/eisa\\_project\\_guidance.pdf](http://energy.gov/sites/prod/files/2013/10/f4/eisa_project_guidance.pdf))

<sup>2</sup> [energy.gov/sites/prod/files/2014/07/f17/commissioning\\_fed\\_facilities.pdf](http://energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf)

<sup>3</sup> 42 U.S.C. § 8259(b) and 10 C.F.R. § 436.40 et seq.

<sup>4</sup> 42 U.S.C. § 8253(f) (8); [energy.gov/sites/prod/files/2014/09/f18/benchmarking\\_guidance08-2014.pdf](http://energy.gov/sites/prod/files/2014/09/f18/benchmarking_guidance08-2014.pdf)

	contained in) ASHRAE standard 189.1-2014 section 6.5.1, or current comparable ASHRAE standards, to calculate water use of conventional practices. <b>[Required]</b>	
9	<b>Alternative Water:</b> Consider alternative sources of water where cost-effective and permitted by local laws and regulations. <b>[Required]</b>	
10	<b>Stormwater Management:</b> For new construction meet or exceed EISA section 438 stormwater management requirements. <b>[Required]</b>	
	<b>IV. Enhance Indoor Environmental Quality</b>	
11	<b>Ventilation and Thermal Comfort:</b> Meet current ASHRAE standards 55 and either 62.1 or 62.2 for ventilation and thermal comfort. <b>[Required]</b>	
12	<b>Daylighting and Lighting Controls:</b> Maximize opportunities for daylighting in regularly occupied space, automatic dimming controls or accessible manual controls, task lighting, and shade and glare control. <b>[Required]</b>	
13	<b>Indoor Air Quality:</b> Develop and implement an indoor air quality policy that considers the following: moisture control, use of low emitting materials and products with low pollutant emissions, necessary protocols to protect indoor air quality during construction and in the finished building, prohibition of smoking in any form inside and within 25 feet of all building entrances, operable windows, and building ventilation intakes, and use of integrated pest management techniques. <b>[Required]</b>	
14	<b>Occupant Health and Wellness:</b> Promote opportunities for voluntary increased physical movement of building occupants such as making stairwells an option for circulation, active workstations, fitness centers, and bicycle commuter facilities; and support convenient access to healthy dining options, potable water, daylight, plants, and exterior views. <b>[Required]</b>	
	<b>V. Reduce the Environmental Impact of Materials</b>	
15	<b>Material Content and Performance:</b> Procure products that meet the following requirements where applicable: A. Resource Conservation and Recovery Act (RCRA) section 6002, AND B. Farm Security and Rural Investment Act (FSRIA) section 9002, AND C. Federally Recommended Specifications, Standards and Ecolabels <sup>5</sup> or are on the Federal Green Procurement Compilation for other green products, as appropriate, <sup>6</sup> AND D. Avoid ozone depleting compounds and high global warming potential (GWP) chemicals. <b>[Required]</b>	
16	<b>Waste Diversion:</b> Where markets exist, provide reuse and recycling services for building occupants and divert at least 50% of non-hazardous, non-construction related materials from landfills. <b>[Required]</b>	
17	<b>Materials Management:</b> Where markets exist, divert at least 50% of construction and demolition materials from landfills. <b>[Required]</b>	
	<b>VI. Assess and Consider Climate Change Risks</b>	
18	<b>Mission Criticality:</b> Determine long-term mission criticality of the physical asset and operations to be housed in the facility to inform the design of new	

<sup>5</sup> [www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels](http://www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels)

<sup>6</sup> Green Procurement Compilation: [sftool.gov/greenprocurement](http://sftool.gov/greenprocurement)

	construction and modernization to increase climate resilience. <b>[Required]</b>	
19	<b>Floodplain Considerations:</b> For new construction, avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid floodplain development whenever there is a practicable alternative. <b>[Required]</b>	
20	<b>Facility Design:</b> For new construction, balance options to address predicted climate change impacts against mission criticality, cost, and security to determine design parameters; at a minimum, include low and no cost resilience measures to address predicted climate conditions. <b>[Required]</b>	
21	<b>Facility Adaptation:</b> For modernization, take action to mitigate identified risks, considering mission criticality, climate impacts, cost, and phased adaptation over time. <b>[Required]</b>	

### **Existing Buildings**

Twelve out of 18 metrics are required—eight that are specified as required plus four additional. Any metric determined to be “not applicable” cannot be counted toward the 12 required.

	<b>I. Employ Integrated Assessment, Operation, and Management Principles</b>	<b>Yes/No</b>
1	<b>Integrated Assessment, Operation, and Management:</b> Through an integrated process and team, assess building and operating conditions and identify areas for improvement; establish operational goals for environmental performance; and incorporate goals into building management. <b>[Required]</b>	
2	<b>Commissioning:</b> Commissioning reports for certification purposes must be completed within two years prior to certification date. Recommissioning should be completed at least every four years thereafter to optimize building performance. Use commissioning agents who are independent of the design and construction or operating team. Commissioning should be consistent with EISA section 432 <sup>7</sup> and FEMP commissioning guidance. <sup>8</sup> <b>[Required]</b>	
	<b>II. Optimize Energy Performance</b>	
3	<b>Energy Efficiency:</b> A) Ensure: 1. The building has an ENERGY STAR rating of 75 or higher, OR 2. Energy use is 20% below the FY 2015 energy use baseline, OR 3. Energy use is 30% below the FY 2003 energy use baseline, OR 4. Energy efficiency is 30% better than the current ASHRAE 90.1 standard, AND B) Use energy efficient products, as required by statute. <sup>9</sup> <b>[Required]</b>	
4	<b>Renewable and Clean Energy:</b> Evaluate and implement, where appropriate, life cycle cost-effective renewable energy projects on-site; consider long-term	

<sup>7</sup> Guidance for the Implementation and Follow-up on Identified Energy and Water Efficiency Measures in Covered Facilities (per 42 U.S.C. 8253(f), Use of Energy and Water Measures in Federal Buildings, September 2012: [energy.gov/sites/prod/files/2013/10/f4/eisa\\_project\\_guidance.pdf](http://energy.gov/sites/prod/files/2013/10/f4/eisa_project_guidance.pdf))

<sup>8</sup> [energy.gov/sites/prod/files/2014/07/f17/commissioning\\_fed\\_facilities.pdf](http://energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf)

<sup>9</sup> 42 U.S.C. § 8259(b) and 10 C.F.R. § 436.40 et seq.

	offsite renewable sources and RECs; and utilize clean and alternative energy were possible.	
5	<b>Metering:</b> Install building level meters for electricity, natural gas, and steam; install advanced or standard meters as appropriate.	
6	<b>Benchmarking:</b> Compare building performance with energy performance benchmarks at least annually, preferably using ENERGY STAR Portfolio Manager; regularly monitor building energy performance against historic performance data and peer buildings. <sup>10</sup>	
<b>III. Protect and Conserve Water</b>		
7	<b>Indoor water use:</b> A. Install building level water meters, reduce water use 20% below FY 2007 baseline, and use water efficient products, OR B. Install building level meters, conduct an analysis of water use, <sup>11</sup> identify and repair leaks, eliminate single pass cooling, optimize cooling tower operations, and use water efficient products. <b>[Required]</b>	
8	<b>Outdoor Water Use:</b> A. Install water meters for irrigation systems serving more than 25,000 square feet of landscape, AND B. Either: 1. Use water efficient landscaping, OR 2. Limit potable water use for irrigation to 50% or more below conventional practices using methodologies from (but not the numeric requirements contained in) ASHRAE standard 189.1-2014 section 6.5.1, or current comparable standard, to calculate water use of conventional practices.	
9	<b>Alternative Water:</b> Consider alternative sources of water where cost-effective and permitted by local laws and regulations.	
10	<b>Stormwater Management:</b> Employ strategies that reduce storm water runoff and discharges of polluted water offsite to protect the natural hydrology and watershed health.	
<b>IV. Enhance Indoor Environmental Quality</b>		
11	<b>Ventilation and Thermal Comfort:</b> Meet the current ASHRAE 55 and either 62.1 or 62.2 standards for ventilation and thermal comfort. <b>[Required]</b>	
12	<b>Daylighting and Lighting Controls:</b> Maximize opportunities for daylighting in regularly occupied space, automatic dimming controls or accessible manual controls, task lighting, and shade and glare control.	
13	<b>Indoor Air Quality:</b> Develop and implement an indoor air quality policy that considers the following: moisture control, use of low emitting materials and products with low pollutant emissions, necessary protocols to protect indoor air quality during construction and in the finished building, prohibition of smoking in any form inside and within 25 feet of all building entrances, operable windows, and building ventilation intakes, and use of integrated pest	

<sup>10</sup> 42 U.S.C. § 8253(f) (8); [energy.gov/sites/prod/files/2014/09/f18/benchmarking\\_guidance08-2014.pdf](http://energy.gov/sites/prod/files/2014/09/f18/benchmarking_guidance08-2014.pdf)

<sup>11</sup> [www.energy.gov/eere/femp/developing-water-management-plan](http://www.energy.gov/eere/femp/developing-water-management-plan) can provide an understanding of how to develop a water use analysis

	management techniques.	
14	<b>Occupant Health and Wellness:</b> Where feasible, promote opportunities for voluntary increased physical movement of building occupants such as making stairwells an option for circulation, active workstations, fitness centers and bicycle commuter facilities; and support convenient access to healthy dining options, potable water, daylight, plants, and exterior views.	
	<b>V. Reduce the Environmental Impact of Materials</b>	
15	<b>Material Content and Performance:</b> Procure products that meet the following requirements where applicable: A. RCRA section 6002, AND B. FSRIA section 9002, AND C. Federally Recommended Specifications, Standards and Ecolabels <sup>12</sup> or are on the Federal Green Procurement Compilation for other green products, as appropriate, <sup>13</sup> AND D. Avoid ozone depleting compounds and high GWP chemicals. <b>[Required]</b>	
16	<b>Waste Diversion:</b> Where markets exist, provide reuse and recycling services for building occupants and divert at least 50% of non-hazardous non-construction related materials from landfills. <b>[Required]</b>	
17	<b>Materials Management:</b> Where markets exist, divert at least 50% of construction and demolition materials from landfills.	
	<b>VI. Assess and Consider Climate Change Risks</b>	
18	<b>Climate Resilience and Adaptation:</b> A. Determine long-term mission criticality of the physical asset and operations to be housed in the facility, AND B. Evaluate climate change impacts, including wildfire, based on mission criticality and cost, AND C. Implement no and low cost actions to increase climate resilience. <b>[Required]</b>	

<sup>12</sup> [www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels](http://www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels)

<sup>13</sup> Green Procurement Compilation: [sftool.gov/greenprocurement](http://sftool.gov/greenprocurement)



# **ENGINEERING & CONSTRUCTION Bulletin**

Issue No. 2014-02

Revised 20 December 2016

Type: Policy

**Subject: NAVFAC Sustainability and Energy Building Requirements**

**References:**

- (a) Energy Policy Act of 2005 (Public Law 109-58), 8 August 2005
- (b) Energy Independence and Security Act of 2007 (Public Law 110-140), 19 December 2007
- (c) DoD Instruction 4170.11, Installation Energy Management, Change 01 (revision pending)
- (d) National Defense Authorization Act for Fiscal Year 2012, Division B, Title XXVIII, Subtitle C, Sec.2830 (b) "Prohibition on Use of Funds for LEED Gold or Platinum Certification"
- (e) Unified Facilities Criteria 1-200-02 Revision 01, High Performance and Sustainable Building Requirements
- (f) Department of Defense Meter Policy, 16 April 2013
- (g) Department of Defense Sustainable Buildings Policy, 10 November 2013
- (h) National Defense Authorization Act for Fiscal Year 2013, Division B, Title XXVIII, Subtitle C, Sec. 2823 "Continuation of Limitation on Use of Funds for Leadership in Energy and Environmental Design (LEED) Gold or Platinum Certification"
- (i) Department of Navy Sustainable Buildings Policy, 17 September 2014
- (j) Department of Energy Green Building Certification Systems for Federal Buildings; Final Rule, 14 October 2014
- (k) Executive Order 13693: Planning for Federal Sustainability in the Next Decade, 19 March 2015
- (l) DOE Final Rule, Energy Efficiency Standards for New Federal Commercial and Multi-Family High-Rise Residential Buildings' Baseline Standards Update, 6 November 2015.
- (m) Unified Facility Criteria (UFC) 1-300-08, Criteria for Transfer and Acceptance of DoD Real Property
- (n) American National Standards Institute (ANSI) / American Society of Heating, Refrigeration and air-conditioning Engineers, Inc. (ASHRAE) / Illuminating Engineering Society (IES) Standard 90.1-2013, "Energy Standard for Buildings Except Low-Rise Residential Buildings"
- (o) Department of Defense Standard Practice for Unified Facilities Criteria and Unified Facilities Guide Specifications, MIL-STD-3007F, 13 Dec 2006
- (p) Guiding Principles for Sustainable Federal Buildings and Associated Instructions, 26 Feb 2016



**Cancellation:**

- (1) ECB 2011-01, 11010.23, Navy Shore Energy Building Standard
- (2) ECB 2009-02, 11010.17, US Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Project Registration Implementation
- (3) ECB 2008-01, 11010.13, Energy Policy Act 2005 Implementation and LEED Certification

**Enclosures:**

- (1) Enclosure A: Guidance for Projects Pursuing U.S. Green Building Council's Rating Systems
- (2) Enclosure B: Guidance for Projects Pursuing Green Building Initiative's Rating Systems

**1. Purpose**

Provide overall NAVFAC policy and guidance on sustainability and energy requirements referenced in (a) through (p).

**2. Background**

This ECB provides NAVFAC's consolidated implementation guidance for references (a) through (p) and cancels the previously established ECBs referenced above, in order to effectively implement Federal and DOD energy and sustainability mandates. Reference (e) has been established by the Tri-Services and recognized by Congress, as the guidance to ensure sustainability requirements are implemented only when life cycle cost-effective.

**3. Applicability**

The Navy requires the consideration of sustainability and energy goals for all design and construction projects. This ECB provides guidance specifically on building projects in Continental United States (CONUS) and Outside Continental United States (OCONUS), and does not apply to a facility that is not defined as a building, per reference (m).

**4. Policy**

- A. This ECB is effective for projects with Final Solicitation Documentation Design Authorization (FSDDA, also known as "design start") 17 September 2014 and beyond.
- B. In accordance with reference (l), all FY18 and beyond projects must incorporate ASHRAE 90.1-2013 (reference (n)).
- C. Per Unified Facilities Guide Specifications (UFGS), ensure completion of the following:
  - a) DBB Scope of Work, Basis of Design and post-award Sustainability eNotebook (construction documentation) per UFGS 01 33 29
  - b) DB post-award Sustainability eNotebook per UFGS 01 33 29.05 20
- D. Tracking of Guiding Principles is required per reference (p). CI Project Manager (PM) and CI Design Manager (DM) must jointly ensure completed tracking for each applicable building with one of the following thresholds:
  - a) New construction


- b) Each renovation with construction cost greater than \$3M
  - 1. Complete the Sustainability and Energy tab in eProjects E2 records, for each building (as defined in reference (m)), meeting the threshold defined in 4 D above. (For all other projects, a minimum of two questions must be answered in the tab.)
  - 2. Provide a justification for each requirement not met or partially met, and enter in eProjects Sustainability and Energy tab justification boxes.
  - 3. For In-House or AE design teams, PMs must utilize the High Performance and Sustainable Building (HPSB) checklist (formerly NAVFAC Sustainability and Energy Data Record Card).
    - a) The pre-populated HPSB checklist can be downloaded directly from eProjects Sustainability and Energy tab. A blank template can be obtained using the following link:  
[http://www.wbdg.org/pdfs/navfac\\_sustainable\\_energy\\_data\\_record\\_card.pdf](http://www.wbdg.org/pdfs/navfac_sustainable_energy_data_record_card.pdf)
    - b) DMs are responsible for tracking the completion of the HPSB checklist. PMs are responsible to update the Sustainability and Energy eProjects tab, using the HPSB checklist provided by the DMs. Complete the HPSB checklist at the following project milestones:
      - 1) RFP or Statement of AE Services (for proposal purposes)
      - 2) Preliminary draft at design completion
      - 3) Final at construction completion at Beneficial Occupancy Date (BOD)
      - 4) Revised final at post-occupancy for updates, such as commissioning or Third Party Certification (TPC) when applicable.
- E. In accordance with reference (j), Third Party Certification (TPC, e.g. LEED, Green Globes) must be applied to each applicable building with one of the following thresholds:
- a) New construction greater than \$3M in construction cost
  - b) Each renovation in an existing building greater than 5,000 SF, with construction cost greater than \$3M and 50% of Estimated Replacement Cost (ERC)
- 1. Ensure appropriate TPC level and credits are obtained to help meet requirements in reference (e).
  - 2. OCONUS projects that are not located in one of the United States or its territories must utilize the most appropriate TPC rating system for their local region, approved by their NAVFAC Echelon IV Chief Engineer.
  - 3. DD1391s that are marked with the designation “Austere” are not required to pursue TPC; however, projects must meet the requirements of reference (e) to the greatest extent practical.
  - 4. Provide a justification in eProjects Sustainability and Energy tab, for TPC applicable projects that have a missed target rating level or missed certification.
  - 5. The chosen TPC rating system must meet the requirements in reference (e). Utilize one of the following rating systems for TPC applicable projects:
    - a) USGBC LEED (Enclosure A)
    - b) USGBC Guiding Principles Assessment (Enclosure A)

- c) GBI Green Globes (Enclosure B)
  - d) GBI Guiding Principles Compliance, DOD version (Enclosure B)
  - e) For OCONUS, use TPC approved by the local Echelon IV Chief Engineer
6. For applicable building projects that cannot achieve Third Party Certification for a valid reason (e.g. mission, security, etc.), an exemption must be obtained from NAVFAC Headquarters Chief Engineer (NAVFAC CHE). Exemption guidelines are outlined in reference (o).

#### 5. Point of Contact

This document has been coordinated with CNIC, NAVFAC Headquarters, ASN, OPNAV and U.S. Marine Corps (MCICOM), and is fully applicable to all Navy and USMC installations.

For NAVFAC Energy and Sustainability policy and guidance, please contact Mr. Scott Mauro, P.E., (202) 685-9280 or Ms. Deepika Cheriathundam, P.E., (202) 685-9173 within the Chief Engineer's Office.



**Joseph E. Gott, P.E.**  
**Chief Engineer and**  
**Director, Capital Improvements**

**Enclosure A: Guidance for Projects Pursuing U.S. Green Building Council's Rating Systems**

- 1) TPC applicable-buildings that choose U.S. Green Building Council (USGBC) Leadership in Energy and Environment Design (LEED) must meet the minimum requirements of LEED certification. Refer to the following guidance:
  - a. LEED certification level is determined based upon requirements of reference (e).
  - b. For FY2012 and FY2013 authorized projects only, SECDEF waiver with notification to Congress may be required if project is pursuing LEED Gold or Platinum level, based on a cost-benefit analysis showing a demonstrated payback per reference (f) and as amended by reference (h). If LEED Gold or LEED Platinum can be obtained by the Contractor with no additional cost to DoD (including DoN), it may be accepted, with the following actions:
    - i. Create memo for contractor's signature that states "Government did not award project with the funding or expectation of LEED certification beyond the LEED Silver rating level. The Government will only accept LEED Gold or LEED Platinum at delivery, when no additional costs are incurred by the Government. The contractor's signature is affirmation of this action."
    - ii. Save memo to project's eProjects record as a Design and Criteria note, and save copy to project file.
  - c. USGBC has granted a waiver to DOD from sharing energy and water data with USGBC for the building-level energy metering and building-level water metering pre-requisites in LEED v4. This new waiver is similar to the energy/water data sharing waiver in LEED version 2009. The policy remains that DOD projects must not share energy and water data with USGBC. Each project must incorporate the waiver instructions specified on the following website. [http://www.wbdg.org/references/pa\\_dod\\_sust\\_leed.php](http://www.wbdg.org/references/pa_dod_sust_leed.php).
  - d. USGBC has granted an optional waiver to DOD for Water Efficiency, Water Use Reduction pre-requisite gender ratio requirement in LEED, any version. Use the waiver instructions located at: [http://www.wbdg.org/references/pa\\_dod\\_sust\\_leed.php](http://www.wbdg.org/references/pa_dod_sust_leed.php).
  - e. For "Guidance for LEED Online Signatories" and "NAVFAC LEED Registration and Certification Instructions," refer to link: [http://www.wbdg.org/references/pa\\_dod\\_sust\\_leed.php](http://www.wbdg.org/references/pa_dod_sust_leed.php)
- 2) TPC applicable-buildings that choose USGBC Guiding Principles Assessment (GPA) must meet the minimum requirements for GPA. Refer to the following guidance:
  - a. GPA is determined based upon requirements of reference (e).
  - b. GPA may be used for any location.
  - c. The metrics cited in reference (e) have been developed into a DOD-specific GPA Checklist based on reference (e). Use only the DOD version.
  - d. Include justifications for missed targets in order to be marked "compliant."
  - e. For more information on USGBC GPA, please refer to link below: <http://www.usgbc.org/resources/guiding-principles-compliance-initiative>

**Enclosure B: Guidance for Projects Pursuing Green Building Initiative's Rating Systems**

- 1) TPC applicable-buildings that choose Green Building Initiative's (GBI) Green Globes must meet the minimum requirements for Green Globes certification. Refer to the following guidance:
  - a. Green Globes certification level is determined based upon requirements of reference (g).
  - b. Green Globes is applicable to United States. Prior to use, check with GBI for applicability overseas.
  - c. Do not pursue compliance with questions that require sharing building metered data with GBI representatives.
  - d. For more information on Green Globes, please refer to link below  
[http://www.wbdg.org/references/pa\\_dod\\_sust\\_gbi.php](http://www.wbdg.org/references/pa_dod_sust_gbi.php)
- 2) TPC applicable-buildings that choose GBI Guiding Principles Compliance (GPC) must meet the minimum requirements for GPC. Refer to the following guidance:
  - a. GPC is determined based upon requirements of reference (e).
  - b. GPC may be used for any location.
  - c. The metrics cited in reference (e) have been developed into a DOD-specific GPC Checklist based on reference (e). Use only the DOD version.
  - d. Include justifications for missed targets in order to be marked "compliant."
  - e. For more information on GBI GPC, refer to link:  
[http://www.wbdg.org/references/pa\\_dod\\_sust\\_gbi.php](http://www.wbdg.org/references/pa_dod_sust_gbi.php)

# Presidential Documents

**Title 3—****Executive Order 13834 of May 17, 2018****The President****Efficient Federal Operations**

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

**Section 1. *Policy.*** The Congress has enacted a wide range of statutory requirements related to energy and environmental performance of executive departments and agencies (agencies), including with respect to facilities, vehicles, and overall operations. It is the policy of the United States that agencies shall meet such statutory requirements in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment. In implementing this policy, each agency shall prioritize actions that reduce waste, cut costs, enhance the resilience of Federal infrastructure and operations, and enable more effective accomplishment of its mission.

**Sec. 2. *Goals for Agencies.*** In implementing the policy set forth in section 1 of this order, the head of each agency shall meet the following goals, which are based on statutory requirements, in a cost-effective manner:

(a) Achieve and maintain annual reductions in building energy use and implement energy efficiency measures that reduce costs;

(b) Meet statutory requirements relating to the consumption of renewable energy and electricity;

(c) Reduce potable and non-potable water consumption, and comply with stormwater management requirements;

(d) Utilize performance contracting to achieve energy, water, building modernization, and infrastructure goals;

(e) Ensure that new construction and major renovations conform to applicable building energy efficiency requirements and sustainable design principles; consider building efficiency when renewing or entering into leases; implement space utilization and optimization practices; and annually assess and report on building conformance to sustainability metrics;

(f) Implement waste prevention and recycling measures and comply with all Federal requirements with regard to solid, hazardous, and toxic waste management and disposal;

(g) Acquire, use, and dispose of products and services, including electronics, in accordance with statutory mandates for purchasing preference, Federal Acquisition Regulation requirements, and other applicable Federal procurement policies; and

(h) Track and, as required by section 7(b) of this order, report on energy management activities, performance improvements, cost reductions, greenhouse gas emissions, energy and water savings, and other appropriate performance measures.

**Sec. 3. *Implementation and Immediate Actions.*** (a) The Chairman of the Council on Environmental Quality (CEQ) and the Director of the Office of Management and Budget (OMB) shall coordinate in developing, issuing, and updating, as necessary, requirements and streamlined metrics to assess agency progress in achieving the goals set forth in section 2 of this order.

(b) Within 90 days of the date of this order, the Secretary of Agriculture, Secretary of Energy, Administrator of General Services, and the Administrator

of the Environmental Protection Agency (EPA) shall review relevant Government-wide guidance related to energy and environmental performance issued by their respective agencies and shall, in conjunction with CEQ, develop a plan and proposed timeline to modify, replace, or rescind such guidance, as necessary, to facilitate implementation of this order.

(c) Within 120 days of the date of this order, the Secretary of Energy, in coordination with the Secretary of Defense, the Administrator of General Services, and the heads of other agencies as appropriate, shall review existing Federal vehicle fleet requirements and report to the Chairman of CEQ and the Director of OMB regarding opportunities to optimize Federal fleet performance, reduce associated costs, and streamline reporting and compliance requirements.

(d) Within 150 days of the date of this order, the Chairman of CEQ, in coordination with the Director of OMB, shall review and, where needed, revise existing CEQ guidance related to energy and environmental performance, and shall issue instructions for implementation of this order.

**Sec. 4. *Additional Duties of the Chairman of the Council on Environmental Quality.*** In implementing the policy set forth in section 1 of this order, the Chairman of CEQ shall:

(a) in coordination with the Director of OMB, continue to oversee the Federal Interagency Sustainability Steering Committee (Steering Committee), which shall continue in effect, and shall advise the Director of OMB and the Chairman of CEQ regarding agency compliance with section 2 of this order; and

(b) issue, as necessary and appropriate and in coordination with the Director of OMB, additional guidance to assist agencies in implementing this order.

**Sec. 5. *Additional Duties of the Director of the Office of Management and Budget.*** In implementing the policy set forth in section 1 of this order, the Director of OMB shall:

(a) issue, as necessary and after consultation with the Chairman of CEQ, instructions, directions, and guidance to the heads of agencies concerning evaluation of agency progress and performance related to the implementation of this order; and

(b) prepare periodic scorecards evaluating agency performance and identify additional actions needed to implement this order.

**Sec. 6. *Duties of the Federal Chief Sustainability Officer.*** A Federal Chief Sustainability Officer, designated by the President, shall head an Office of Federal Sustainability, which shall be maintained as an interagency environmental project within CEQ, and for which EPA shall provide funding through the Office of Environmental Quality Management Fund, 42 U.S.C. 4375. In implementing the policy set forth in section 1 of this order, the Federal Chief Sustainability Officer shall:

(a) monitor progress and advise the Chairman of CEQ on agency performance and implementation of this order;

(b) lead the development of programs and policies to assist agencies in implementing the goals of this order; and

(c) chair, convene, and preside at meetings and direct the work of the Steering Committee.

**Sec. 7. *Duties of Heads of Agencies.*** In implementing the policy set forth in section 1 of this order, the head of each agency shall:

(a) within 45 days of the date of this order, designate an agency Chief Sustainability Officer—who shall be a senior civilian official, compensated annually in an amount at or above the amount payable at level IV of the Executive Schedule—and assign the designated official the authority to perform duties relating to the implementation of this order within the agency; and



(b) report to the Chairman of CEQ and the Director of OMB regarding agency implementation and progress toward the goals of this order and relevant statutory requirements.

**Sec. 8. *Revocations.*** Executive Order 13693 of March 19, 2015 (Planning for Federal Sustainability in the Next Decade), is revoked.

**Sec. 9. *Limitations.*** (a) This order shall apply only to agency activities, personnel, resources, and facilities that are located within the United States. The head of an agency may provide that this order shall apply in whole or in part with respect to agency activities, personnel, resources, and facilities that are not located within the United States, if the head of the agency determines that such application is in the interest of the United States.

(b) The head of an agency shall manage agency activities, personnel, resources, and facilities that are not located within the United States, and with respect to which the head of the agency has not made a determination under subsection (a) of this section, in a manner consistent with the policy set forth in section 1 of this order, and to the extent the head of the agency determines practicable.

**Sec. 10. *Exemption Authority.*** (a) The Director of National Intelligence may exempt an intelligence activity of the United States—and related personnel, resources, and facilities—from the provisions of this order, other than this subsection, to the extent the Director determines necessary to protect intelligence sources and methods from unauthorized disclosure.

(b) The head of an agency may exempt law enforcement activities of that agency, and related personnel, resources, and facilities, from the provisions of this order, other than this subsection, to the extent the head of an agency determines necessary to protect undercover operations from unauthorized disclosure.

(c) The head of an agency may exempt law enforcement, protective, emergency response, or military tactical vehicle fleets of that agency from the provisions of this order, other than this subsection. Heads of agencies shall manage fleets to which this paragraph refers in a manner consistent with the policy set forth in section 1 of this order to the extent they determine practicable.

(d) The head of an agency may exempt particular agency activities and facilities from the provisions of this order, other than this subsection, if it is in the interest of national security. If the head of an agency issues an exemption under this subsection, the agency must notify the Chairman of CEQ in writing within 30 days of issuance of that exemption. To the maximum extent practicable, and without compromising national security, each agency shall strive to comply with the purposes, goals, and implementation steps in this order.

(e) The head of an agency may submit to the President, through the Chairman of CEQ, a request for an exemption of an agency activity, and related personnel, resources, and facilities, from this order.

**Sec. 11. *General Provisions.*** (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) the authority granted by law to an executive department or agency, or the head thereof; or

(ii) the functions of the Director of OMB relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented in a manner consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.



THE WHITE HOUSE,  
*May 17, 2018.*

---

# Guiding Principles for Sustainable Federal Buildings and Associated Instructions

The Council on Environmental Quality  
February 2016

**Table of Contents**

I.	Purpose.....	1
II.	Applicability.....	2
III.	Agency Determination of a Building’s Compliance with the Guiding Principles .....	3
IV.	Effective Date.....	4
V.	General Provisions .....	5
VI.	Guiding Principles for Sustainable Buildings .....	5
	A. Guiding Principles for New Construction and Modernization .....	5
	1. Employ Integrated Design Principles.....	5
	2. Optimize Energy Performance .....	7
	3. Protect and Conserve Water.....	7
	4. Enhance Indoor Environmental Quality.....	8
	5. Reduce the Environmental Impact of Materials.....	10
	6. Assess and Consider Climate Change Risks.....	11
	B. Guiding Principles for Existing Buildings.....	12
	1. Employ Integrated Assessment, Operation, and Management Principles.....	12
	2. Optimize Energy Performance .....	13
	3. Protect and Conserve Water.....	13
	4. Enhance Indoor Environmental Quality.....	15
	5. Reduce the Environmental Impact of Materials.....	16
	6. Assess and Consider Climate Change Risks .....	17

## I. Purpose

In 2006, Federal agencies owning and operating more than 90% of all Federal facilities signed the *Memorandum of Understanding for Federal Leadership in High Performance and Sustainable Buildings* (2006 Guiding Principles).<sup>1</sup> The Memorandum contained the first set of Guiding Principles - overarching environmental performance goals - for new Federal buildings. The 2006 Guiding Principles addressed reducing energy and water use, conserving resources, minimizing waste, protecting indoor air quality, and requiring the use of integrated teams during the design, construction, and operation of new Federal facilities. An updated set of Guiding Principles, called “High Performance and Sustainable Buildings Guidance,” December 2008, contained “Guiding Principles for Sustainable New Construction and Major Renovation” and “Guiding Principles for Sustainable Existing Buildings.”<sup>2</sup> Previous Executive Orders (E.O.) 13423 (2006) and 13514 (2009) recognized green buildings as a key component in efforts to reduce environmental impacts, cut greenhouse gas (GHG) emissions, and lower the operating costs at Federal facilities. E.O. 13693, *Planning for Federal Sustainability in the Next Decade*, March 19, 2015, reaffirmed Federal green building efforts and called for revised Guiding Principles to reflect progress in green building design, construction, and operation practices; broaden considerations around protecting occupant health, wellness, and productivity; and address climate change risks.<sup>3</sup>

E.O. 13693 section 4(f) requires “...CEQ... [to] prepare and issue revised Guiding Principles for both new and existing Federal buildings...” For existing buildings, E.O. 13693 section 3(h)(ii) states that agencies will identify “...a percentage of at least 15 percent, by number or total square footage,” of their “existing buildings above 5,000 gross square feet (GSF) that will, by fiscal year 2025, comply with the revised Guiding Principles for Federal Leadership in...Sustainable Buildings (Guiding Principles)...and making annual progress toward 100 percent conformance with the Guiding Principles for its building inventory.” For new construction and modernization, E.O. 13693 recommits the Federal Government to these revised Guiding Principles, and beginning in fiscal year (FY) 2020, to design new buildings to be net-zero energy by FY 2030. The June 10, 2015 Implementing Instructions to E.O. 13693 confirmed that agencies “...shall ensure that all new major construction [and] renovation...of buildings over 5,000 gross square feet compl[y]with the Guiding Principles where cost-effective.”<sup>4</sup> E.O. 13693 reconfirmed that green building work is an important part of Federal efforts to protect the environment, support communities, and address climate change.

This document updates and replaces the December 2008 Guiding Principles to:

- 1) Reflect the evolution of sustainable building design, construction, and operating practices since 2008,
- 2) Incorporate other building-related E.O. 13693 requirements,
- 3) Increase the economic and environmental benefits of Federal investments in facilities,
- 4) Enhance occupant health, wellness, and productivity,

---

<sup>1</sup> [www.fedcenter.gov/ kd/Items/actions.cfm?action=Show&item\\_id=4713&destination=ShowItem](http://www.fedcenter.gov/kd/Items/actions.cfm?action=Show&item_id=4713&destination=ShowItem)

<sup>2</sup> [www.wbdg.org/pdfs/hpsb\\_guidance.pdf](http://www.wbdg.org/pdfs/hpsb_guidance.pdf)

<sup>3</sup> [www.gpo.gov/fdsys/pkg/FR-2015-03-25/pdf/2015-07016.pdf](http://www.gpo.gov/fdsys/pkg/FR-2015-03-25/pdf/2015-07016.pdf)

<sup>4</sup> [www.whitehouse.gov/sites/default/files/docs/eo\\_13693\\_implementing\\_instructions\\_june\\_10\\_2015.pdf](http://www.whitehouse.gov/sites/default/files/docs/eo_13693_implementing_instructions_june_10_2015.pdf)

- 5) Include climate resilience in building design, construction, and operations, and protect Federal facilities investments from the potential impacts of climate change, and
- 6) Provide information on tracking agency green building performance.

## **II. Applicability**

The Guiding Principles for new construction and modernization apply to all new Federally owned buildings over 5,000 square feet. The Guiding Principles for existing buildings should be adopted for agencies' existing portfolio of Federally owned buildings over 5,000 square feet. Agencies must ensure that they meet the Guiding Principles on at least 15% of these existing buildings (either by building or by square footage) no later than FY 2025. Once an agency achieves 15% compliance, it should set annual targets and continue to strive to apply the guiding principles to 100% of its building inventory. The Guiding Principles do not apply to those buildings where a Report of Excess (ROE) has been submitted to GSA, a Determination of Disposal has been made, or the building has been classified as Surplus. Agencies should check the Annual Federal Real Property Profile Guidance for additional details. For facilities located outside of the United States, consider the provisions of Section 17 of E.O. 13693 to determine applicability of the Guiding Principles.

Leases will no longer be included in calculating compliance with the Guiding Principles. However, agencies should strive to incorporate as many of the Guiding Principles as possible in new lease actions.

When evaluating compliance with the Guiding Principles, the new construction and modernization criteria should be applied for all new construction and when the project that an agency is undertaking in an existing building is essentially a comprehensive replacement or restoration of virtually all major systems, interior work (such as ceilings, partitions, doors, floor finishes, etc.), and building elements and features.

The Guiding Principles apply to buildings, as well as some functions inherent in optimizing building utilization, including integrated design and operation and maintenance. Some of these concepts, such as occupant health and wellness, overlap with multiple principles. Occupant health and wellness represents a new focus area not included in the 2008 Guiding Principles and so it is highlighted as its own new principle below, despite overlap with other principles such as integrated design and indoor environmental quality. Examples of occupant health and wellness areas that overlap with multiple principles include indoor air quality, accessibility of staircases, fitness facilities, bicycle commuter facilities, and healthy dining options. Similarly, climate resilience and adaptation, which is new and therefore has a principle dedicated to it, also applies to other principles.

Although E.O. 13693 revoked several previous E.O.s and Presidential memoranda that applied to Federal buildings, the following documents still apply and should continue to be used in implementing the Guiding Principles: Sustainable Locations for Federal Facilities of September 15, 2011; Sustainable Practices for Designed Landscapes of October 31, 2011, as supplemented on October 22, 2014; Federal Greenhouse Gas Accounting and Reporting Guidance [Revision 1] of June 4, 2012; and Federal Agency Implementation of Water Efficiency and Management Provisions of Executive Order 13514 of July 10, 2013.

### **III. Agency Determination of a Building's Compliance with the Guiding Principles**

#### **Determining a Building's Compliance with the Guiding Principles**

Each agency is responsible for evaluating its buildings for compliance with the Guiding Principles. This determination should be made on a building by building basis. Each agency should ensure that sufficient evidence and documentation is readily available to demonstrate compliance with the Guiding Principles. ENERGY STAR® Portfolio Manager is one of the tools available for agencies to use to organize and keep Guiding Principles documentation; this tool was specifically developed to assist agencies with implementation, documentation, and tracking the Guiding Principles.<sup>5</sup>

Documentation developed to meet the requirements of consensus-based third-party green building rating systems can be used to document compliance with the Guiding Principles. Note, however, that green building rating systems may meet many, but not all Guiding Principles. Therefore, required elements or sub-elements of the Guiding Principles not tracked by the third party rating system must also be met.

#### **Guiding Principles that are “Not Applicable”**

Previously, there was some ambiguity in determining compliance in buildings where one or more of the guiding principles, elements, or sub-elements were not applicable to the building under evaluation. For building evaluation purposes, “not applicable” may be used where the building’s inherent function, mission, safety, or designation prevents compliance with a specific guiding principle, element, or sub-element. The use of “not applicable” should be minimized. For new construction and modernization, “not applicable” is equivalent to compliance with that guiding principle, element, or sub-element. However, for existing buildings, criteria that an agency determines to be “not applicable” do not count toward the total number of required metrics for an individual building. Agencies should document all determinations of non-applicability.

#### **Protocols, Processes, Contracts, and Projects that May Apply to More than One Building**

Individual buildings can be compliant with a guiding principle, element, or sub-element through “campus-wide” or “installation-wide” protocols, policies, contracts, or projects only where a given building is directly subject to that protocol, process, contract, or project. Examples of this approach include:

- Green cleaning requirements in a contract servicing all buildings on a campus would mean that each building serviced under that contract meets that particular requirement.
- A centralized or aggregated renewable energy project on an installation that is designated to serve a particular building or buildings on the installation can be used to qualify each of those buildings as meeting cost effective renewable and clean energy requirements.
- A stormwater management project that serves more than a single building site can benefit multiple buildings within the project boundary.

---

<sup>5</sup> [www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager](http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager)



- Measures that protect a campus' utilities and make them more resilient can be applied to each building that benefits from those measures.

E.O. 13693 green building requirements are applied on an individual building basis to improve Federal building design, construction, and operating practices and to foster continuous improvement in building environmental performance. Thus, performance metrics such as energy use or water use cannot be applied to more than one building. Determination of compliance with the Guiding Principles cannot be determined at a campus-wide or installation-wide level.

### **Life Cycle Cost-Effective**

Section 3 of E.O. 13693 states that the Guiding Principles should be applied where life cycle cost-effective. The term "cost-effectiveness" should include the use of benefit-cost analysis in accordance with OMB Circulars A-94 as well as A-11 Part 7 *Capital Programming Guide*.

### **Updating the Sustainable Building Information in the Federal Real Property Profile**

Each agency is responsible for accurately updating Guiding Principles compliance data as part of the agency's annual Federal Real Property Profile (FRPP) submission. Currently, *Sustainability* is the data element that identifies whether or not a building has met the Guiding Principles. Agencies should check the most recent FRPP guidance documents, which are issued annually for specific reporting requirements.

Under E.O. 13693 Section 3 (h)(ii), the percentage of each agency's building inventory meeting the Guiding Principles will be calculated by: (1) gross square footage of subject buildings and (2) number of subject buildings. Agencies can report achievement toward the goal on the higher of the two calculations.

## **IV. Effective Date**

The 2008 Guiding Principles for existing buildings can continue to be used to qualify buildings as meeting the Guiding Principles where agencies have already taken significant action and made substantial progress in transforming the building to meet the Guiding Principles. For existing buildings, completion of project design and/or the issuance of contracts that will result in meeting at least half of the required guiding principles, elements, and sub-elements is evidence of significant action and substantial progress. This group of existing buildings can apply the 2008 Guiding Principles to certify a building as meeting the Guiding Principles through September 30, 2017. The 2016 Guiding Principles will apply to all applicable existing buildings that have not yet crossed the significant action and substantial progress threshold, upon issuance.

The 2008 Guiding Principles for new construction and modernization requirements can be used only to qualify any new building or modernization where project design has been completed before the issuance of the 2016 Guiding Principles. The 2016 Guiding Principles for new construction and modernization requirements shall be used to qualify any new building or modernization as meeting the Guiding Principles for all new construction and modernization where a project design has not been completed.

Buildings that were determined to have met the 2008 Guiding Principles are considered to meet the Guiding Principles through FY 2025 as long as they continue to meet ongoing requirements such as Energy Independence and Security Act of 2007 (EISA) section 432 requirements including quadrennial evaluations, ongoing commissioning, benchmarking, and operating and maintenance requirements. Also, for these [grandfathered] buildings, agencies should add the sixth Guiding Principle on Resilience as they implement the ongoing requirements for a four-year evaluation.

Likewise, buildings that have been determined to meet the 2016 Guiding Principles for new construction and modernization can be considered as meeting the Guiding Principles if they continue to meet ongoing sustainable operating requirements such as recommissioning every four years, benchmarking, waste diversion, etc.

## **V. General Provisions**

The revised Guiding Principles shall be implemented consistent with applicable law and regulations, and subject to the availability of appropriations or other authorized funding. The revised Guiding Principles do not supersede or invalidate any existing laws, regulations, or other legal requirements. If there is any conflict between the revised Guiding Principles, and a statute, regulation, or executive order, the statute, regulation, or executive order governs. This document is intended solely to improve the internal management of the Executive Branch. It is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

## **VI. Guiding Principles for Sustainable Buildings**

### **A. Guiding Principles for New Construction and Modernization**

#### **1. Employ Integrated Design Principles**

##### **a. Sustainable Locations**

Consider the environmental impact of siting decisions when making new facility investments and balance those concerns with cost and security. The guidance included in Implementing Instructions-Sustainable Locations for Federal Facilities highlights the need to strike the appropriate balance.<sup>6</sup> Consider site-specific long-term climate change impacts such as drought, flood, wind, and wildfire risks. Prioritize sites that offer robust transportation options, including walking, biking, and transit, and minimize the combined greenhouse gas emissions of the building and associated commuter and visitor transportation emissions over the project's life. Leverage existing infrastructure, and align, where possible, with local and regional planning goals; protect natural, historic, and cultural resources.

---

<sup>6</sup> Implementing Instructions-Sustainable Locations for Federal Facilities:  
[www.whitehouse.gov/sites/default/files/microsites/ceq/implementing\\_instructions\\_-\\_sustainable\\_locations\\_for\\_federal\\_facilities\\_9152011.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ceq/implementing_instructions_-_sustainable_locations_for_federal_facilities_9152011.pdf)

## **b. Integrated Design**

Use a collaborative, integrated process and team to plan, program, design, construct, commission, and transition to operation each new building project or modernization. Ensure that the process and team:

- i. Integrate the use of OMB's Circular A-11, Part 7, *Capital Programming Guide*.
- ii. Establish performance goals for energy, water, materials, indoor environmental quality, and daylighting along with other comprehensive design goals and ensure incorporation of these goals throughout the design and life cycle of the building.
- iii. Follow sustainable landscape design principles<sup>7</sup> including protection and promotion of pollinator habitat.<sup>8, 9</sup>
- iv. Evaluate and provide appropriate electric vehicle charging infrastructure, in accordance with applicable laws and regulations.
- v. Consider design choices that improve environmental performance, protect historic properties, enhance indoor environmental quality, support health and wellness of building occupants, and address climate risks, including wildfire.
- vi. Consider all stages of the building's life cycle.

## **c. Commissioning**

Employ commissioning tailored to the size and complexity of the building and its system components in order to optimize and verify performance of building systems. Commissioning should be led by an experienced commissioning provider who is independent of the project design and construction team and the operations team. At a minimum, commissioning should include a commissioning plan, verification of the installation and performance of systems being commissioned, and a commissioning report that confirms identified issues were appropriately addressed. Follow EISA 2007 section 432 and associated Federal Energy Management Program (FEMP) commissioning guidance.<sup>10, 11</sup>

---

<sup>7</sup> Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes, October 31, 2011: [www.whitehouse.gov/administration/eop/ceq/sustainability/landscaping-guidance](http://www.whitehouse.gov/administration/eop/ceq/sustainability/landscaping-guidance)

<sup>8</sup> Presidential Memorandum -- Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators, June 20, 2014: [www.whitehouse.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b](http://www.whitehouse.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b)

<sup>9</sup> Supporting the Health of Honey Bees and Other Pollinators, October 2014: [www.whitehouse.gov/sites/default/files/docs/supporting\\_the\\_health\\_of\\_honey\\_bees\\_and\\_other\\_pollinators.pdf](http://www.whitehouse.gov/sites/default/files/docs/supporting_the_health_of_honey_bees_and_other_pollinators.pdf)

<sup>10</sup> 42 U.S.C. § 8253(f): [energy.gov/sites/prod/files/2014/07/f17/commissioning\\_fed\\_facilities.pdf](http://energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf)

<sup>11</sup> Guidance for the Implementation and Follow-up of Identified Energy and Water Efficiency Measures in Covered Facilities (per 42 U.S.C. 8253(f), Use of Energy and Water Efficiency Measures in Federal Buildings), September 2012: [energy.gov/sites/prod/files/2013/10/f4/eisa\\_project\\_guidance.pdf](http://energy.gov/sites/prod/files/2013/10/f4/eisa_project_guidance.pdf)

## **2. Optimize Energy Performance**

### **a. Energy Efficiency**

Employ strategies that minimize energy usage. Focus on reducing energy loads before considering renewable or clean and alternative energy sources. Use energy efficient products as required by statute.<sup>12</sup>

### **b. Renewable and Clean Energy**

Implement life cycle cost-effective renewable electric energy and thermal energy projects on-site. Consider long-term off-site sources of renewable power or Renewable Energy Certificates (RECs) where on-site opportunities are limited. Utilize clean and alternative energy sources where possible.<sup>13</sup>

### **c. Metering**

To track and continuously optimize energy performance, install building level meters for electricity, natural gas, and steam. Install advanced meters as required by statute. Standard meters should be used when advanced meters are not appropriate.<sup>14</sup>

### **d. Benchmarking**

Benchmark building performance at least annually, preferably using ENERGY STAR Portfolio Manager. Agencies should strive to benchmark unusual buildings and space types against similar facilities within their portfolios. Regularly monitor building energy performance against historic performance data and peer buildings to identify operating inefficiencies and conservation opportunities.<sup>15</sup>

## **3. Protect and Conserve Water**

### **a. Indoor Water Use**

Employ strategies that minimize water use and waste, including:

#### **i. Water-Efficient Products**

Purchase water conserving products, including WaterSense<sup>16</sup> and FEMP-designated products, as required by statute.

---

<sup>12</sup> 42 U.S.C. § 8259b and 10 C.F.R. § 436.40 *et seq.*

<sup>13</sup> E.O. 13693, section 3(b), (c), (d), and (e) and associated definitions in section 19

<sup>14</sup> 42 U.S.C. § 8253(e): [energy.gov/sites/prod/files/2014/11/f19/metering\\_guidance.pdf](http://energy.gov/sites/prod/files/2014/11/f19/metering_guidance.pdf)

<sup>15</sup> 42 U.S.C. § 8253(f) (8): [energy.gov/sites/prod/files/2014/09/f18/benchmarking\\_guidance08-2014.pdf](http://energy.gov/sites/prod/files/2014/09/f18/benchmarking_guidance08-2014.pdf)

<sup>16</sup> [www3.epa.gov/watersense/](http://www3.epa.gov/watersense/)

**ii. Water Meters**

Install building level water meters to allow for the management of water use during occupancy, including detection of leaks.

**iii. Cooling Towers**

Optimize cooling tower operations.

**iv. Single Pass Cooling**

Eliminate single pass cooling.

**b. Outdoor Water Use**

Use water efficient landscapes that incorporate native, non-invasive, drought tolerant, and low maintenance plant species and employ water efficient irrigation strategies to reduce outdoor potable water consumption. Install water meters for irrigation systems serving more than 25,000 square feet of landscaping.<sup>17</sup>

**c. Alternative Water**

Implement cost effective methods to utilize alternative sources of water such as harvested rainwater, treated wastewater, air handler condensate capture, grey water, and reclaimed water, to the extent permitted under local laws and regulations.<sup>18</sup>

**d. Stormwater Management**

Employ design and construction strategies that reduce stormwater runoff and discharges of polluted water offsite to protect the natural hydrology and watershed health. For any new construction per EISA section 438,<sup>19</sup> use site planning, design, construction, and maintenance strategies to maintain hydrologic conditions after development, or to restore hydrologic conditions following development, to the maximum extent that is technically feasible.

**4. Enhance Indoor Environmental Quality**

**a. Ventilation and Thermal Comfort**

Provide safe and healthy ventilation and thermal comfort.

---

<sup>17</sup> DOE FEMP metering guidance:

[www.energy.gov/eere/femp/downloads/federal-building-metering-guidance-usc-8253e-metering-energy-use](http://www.energy.gov/eere/femp/downloads/federal-building-metering-guidance-usc-8253e-metering-energy-use)

<sup>18</sup> Industrial, Landscape, and Agricultural Implementing Instructions, July 10, 2013:

[www.whitehouse.gov/sites/default/files/water\\_implementing\\_instructions.pdf](http://www.whitehouse.gov/sites/default/files/water_implementing_instructions.pdf)

<sup>19</sup> <http://www.epa.gov/greeningepa/technical-guidance-implementing-stormwater-runoff-requirements-federal-projects>

## **b. Daylighting and Lighting Controls**

Maximize opportunities for daylighting in regularly occupied space, except where not appropriate because of building function, mission, or structural constraints. Maximize the use of automatic dimming controls or accessible manual lighting controls, task lighting, and appropriate shade and glare control.

## **c. Indoor Air Quality**

Take actions to ensure optimal indoor air quality, including:

### **i. Radon**

Test for radon in buildings and mitigate high levels.

### **ii. Moisture Control**

Establish policy and implement a moisture control strategy to prevent building materials damage, minimize mold growth, and reduce associated health risks.

### **iii. Low-Emitting Materials**

Use low emitting materials for building construction, modifications, maintenance, and operations. In particular, specify the following materials and products to have low pollutant emissions: composite wood products, adhesives, sealants, interior paints and finishes, solvents, carpet systems, janitorial supplies, and furnishings.

### **iv. Indoor Air Quality during Construction**

Establish a policy and implement necessary protocols to protect indoor air quality during construction and in the finished building.

### **v. Environmental Smoking Control**

Prohibit smoking in any form within the building and within 25 feet of all building entrances, operable windows, and building ventilation intakes.

### **vi. Integrated Pest Management**

Use integrated pest management techniques as appropriate to minimize pesticide usage.

## **d. Occupant Health and Wellness**

Promote opportunities for occupants to voluntarily increase physical movement such as making stairwells a desirable option for circulation, active workstations, fitness centers, and bicycle commuter facilities. Support occupant health by considering options such as providing convenient access to healthy dining options, potable water, daylight, plants, and exterior views.

## **5. Reduce the Environmental Impact of Materials**

### **a. Material Content and Performance**

Procure construction materials and building supplies that have a lesser or reduced effect on human health and the environment over their life cycle when compared with competing products or services that serve the same purpose, including:

#### **i. Recycled Content and Comprehensive Procurement Guidelines**

Use Resource Conservation and Recovery Act (RCRA) section 6002 compliant products that meet or exceed EPA's recycled content recommendations for building construction, modifications, operations, and maintenance.<sup>20</sup>

#### **ii. Biobased Content**

Per section 9002 of the Farm Security and Rural Investment Act (FSRIA), for USDA-designated products, use products with the highest content level per USDA's biobased content recommendations.<sup>21</sup>

#### **iii. Other Green Products**

Purchase products that meet Federally Recommended Specifications, Standards and Ecolabels<sup>22</sup> or are on the Federal Green Procurement Compilation.<sup>23</sup>

#### **iv. Ozone Depleting Compounds and High Global Warming Potential (GWP) Chemicals**

Do not use ozone depleting compounds and high GWP chemicals where EPA's Significant New Alternative Policy (SNAP) has identified acceptable substitutes or where other environmentally preferable products are available during construction, repair, or replacement at the end of life.<sup>24</sup>

### **b. Waste Diversion and Materials Management**

Incorporate appropriate space, equipment, and transport accommodations for collection, storage, and staging of recyclable and, as appropriate, compostable materials in building design, construction, renovation, and operation. During construction, where markets or on-site recycling exist, divert at least 50% (by weight) of construction and demolition materials, excluding land clearing debris and material used as alternative daily cover, from landfills. Maximize reuse or recycling of building materials, products, and supplies wherever possible. Provide reuse and recycling services, including composting, for building occupants, where markets or on-site

---

<sup>20</sup> 42 U.S.C. 6962, EPA's Comprehensive Procurement Guidelines for Construction:

[www3.epa.gov/epawaste/conserve/tools/cpg/products/construction.htm](http://www3.epa.gov/epawaste/conserve/tools/cpg/products/construction.htm)

<sup>21</sup> 7 U.S.C. 8102, USDA's BioPreferred website: [www.biopreferred.gov/BioPreferred/](http://www.biopreferred.gov/BioPreferred/)

<sup>22</sup> [www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels](http://www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels)

<sup>23</sup> Green Procurement Compilation: [sftool.gov/greenprocurement](http://sftool.gov/greenprocurement)

<sup>24</sup> EPA SNAP website: [www.epa.gov/snap](http://www.epa.gov/snap)



recycling exist, and divert at least 50% of non-hazardous and non-construction related materials (by weight), from landfills.

## **6. Assess and Consider Climate Change Risks**

Assess potential impacts and vulnerabilities, from both acute weather events and chronic climate changes, to inform the design of new construction and modernization and facility operations to increase climate resilience, including:

### **a. Mission Criticality**

Determine the long-term mission criticality of the physical asset and operations to be housed in the facility.

### **b. Floodplain Considerations**

For new construction, avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid floodplain development whenever there is a practicable alternative.<sup>25</sup>

### **c. Facility Design**

For new construction, based on the most recent National Climate Assessment,<sup>26</sup> determine key potential climate change impacts for the project location, identify projected climate changes, where feasible, during the useful life of the building, and incorporate those projections as performance targets for project design. Consider fire-resistant design and construction to enhance resilience to the impacts of wildfires and reduce risks to the lives of occupants in the event of a wildfire. Balance options to address predicted climate change impacts against mission criticality, cost, and security to determine design parameters. At a minimum, include low and no cost resilience measures to address predicted climate conditions.

### **d. Facility Adaptation**

For modernization, focusing on the resilience of the physical facility, take action to mitigate identified physical risks considering mission criticality, potential climate change impacts, security, and cost. Consider phased adaptation over time.

---

<sup>25</sup> [www.gpo.gov/fdsys/pkg/FR-2015-02-04/pdf/2015-02379.pdf](http://www.gpo.gov/fdsys/pkg/FR-2015-02-04/pdf/2015-02379.pdf)

<sup>26</sup> Use Climate Science Supplement Appendix 3 of the 2014 National Climate Assessment and the NOAA Technical Report NESDIS 142-9, January 2013 Regional Climate Trends and Scenarios for the U.S. National Climate Assessment Part 9, Climate of the Contiguous United States, or most recent.

## **B. Guiding Principles for Existing Buildings**

### **1. Employ Integrated Assessment, Operation, and Management Principles**

#### **a. Integrated Assessment, Operation, and Management**

Through an integrated process and team, identify and implement sustainable operations and maintenance policies that improve building environmental performance, protect natural, historic, and cultural resources, support occupant health and wellness, and improve the climate resilience of facilities and operations.

- i. Integrate the use of OMB's Circular A-11, Part 7, *Capital Programming Guide*.
- ii. Assess existing condition and operational procedures of the building and major building systems, adequacy of electric vehicle charging infrastructure, in accordance with applicable laws and regulations, and identify areas for improvement.
- iii. Establish operational performance goals for energy, water, material use and recycling, and indoor environmental quality, and ensure incorporation of these goals throughout the remaining life cycle of the building and verify that they are being met.
- iv. Incorporate goals into building management to ensure that operating decisions and tenant education are carried out with regard to integrated, sustainable building operations and maintenance.
- v. Engage building occupants with building environmental performance information. Augment building operations and maintenance as needed using occupant feedback on work space satisfaction.

#### **b. Commissioning**

Meet the commissioning requirements of EISA 2007 section 432 and FEMP guidance.<sup>27, 28</sup> Employ recommissioning, tailored to the size and complexity of the building and its system components, in order to optimize and verify performance of building systems. Recommissioning should be led by an experienced commissioning agent who is independent of the facility operations team. Building recommissioning should include a commissioning plan, verification of the performance of systems being commissioned, and a commissioning report that confirms identified issues were appropriately addressed.

---

<sup>27</sup> 42 U.S.C. § 8253(f): [energy.gov/sites/prod/files/2014/07/f17/commissioning\\_fed\\_facilities.pdf](https://www.energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf)

<sup>28</sup> Guidance for the Implementation and Follow-up of Identified Energy and Water Efficiency Measures in Covered Facilities (per 42 U.S.C. 8253(f), Use of Energy and Water Efficiency Measures in Federal Buildings), September 2012: [energy.gov/sites/prod/files/2013/10/f4/eisa\\_project\\_guidance.pdf](https://www.energy.gov/sites/prod/files/2013/10/f4/eisa_project_guidance.pdf)

## **2. Optimize Energy Performance**

### **a. Energy Efficiency**

Seek to achieve optimal energy efficiency and measure performance on a regular basis. Focus on reducing energy loads before considering renewable or clean and alternative energy sources. Use energy efficient products as required by statute.<sup>29</sup>

### **b. Renewable and Clean Energy**

Implement cost-effective renewable electric energy and thermal energy projects on-site. Consider long-term off-site sources of renewable power or RECs where on-site opportunities are limited. Utilize clean and alternative sources where possible.<sup>30</sup>

### **c. Metering**

To track and continuously optimize energy performance, install building level meters for electricity, natural gas, and steam. Install advanced meters as required by statute. Standard meters should be used when advanced meters are not appropriate.<sup>31</sup>

### **d. Benchmarking**

Compare building performance with energy performance benchmarks at least annually, preferably using ENERGY STAR Portfolio Manager. Agencies should strive to benchmark unusual buildings and space types against similar facilities within their portfolios. Regularly monitor building energy performance against historic performance data and peer buildings to identify operating inefficiencies and conservation opportunities.<sup>32</sup>

## **3. Protect and Conserve Water**

### **a. Indoor Water Use**

Employ strategies that measure and minimize water usage, including:

#### **i. Water Use Evaluations**

Conduct an analysis and take action to monitor facility water use and identify and implement conservation opportunities.<sup>33</sup>

---

<sup>29</sup> 42 U.S.C. § 8259b and 10 C.F.R. § 436.40 *et seq.*

<sup>30</sup> E.O. 13693, section 3(b), (c), (d), and (e) and associated definitions in section 19

<sup>31</sup> 42 U.S.C. § 8253(e): [energy.gov/sites/prod/files/2014/11/f19/metering\\_guidance.pdf](http://energy.gov/sites/prod/files/2014/11/f19/metering_guidance.pdf)

<sup>32</sup> 42 U.S.C. § 8253(f) (8): [energy.gov/sites/prod/files/2014/09/f18/benchmarking\\_guidance08-2014.pdf](http://energy.gov/sites/prod/files/2014/09/f18/benchmarking_guidance08-2014.pdf)

<sup>33</sup> [www.energy.gov/eere/femp/developing-water-management-plan](http://www.energy.gov/eere/femp/developing-water-management-plan) can provide an understanding of how to develop a water use analysis

**ii. Water-Efficient Products**

Purchase water conserving products, including WaterSense<sup>34</sup> and FEMP-designated products, as required by statute.

**iii. Water Meters**

Install building level water meters to allow for the management of water use during occupancy, including detection of leaks.

**iv. Cooling Towers**

Optimize cooling tower operations.

**v. Single Pass Cooling**

Eliminate single pass cooling.

**b. Outdoor Water Use**

Use water efficient landscape and irrigation strategies to reduce outdoor potable water consumption.<sup>35</sup> The installation of water meters is required for irrigation systems serving more than 25,000 square feet of landscaping.<sup>36</sup>

**c. Alternative Water**

Implement cost effective methods to utilize alternative sources of water such as harvested rainwater, treated wastewater, air handler condensate capture, grey water, and reclaimed water, to the extent permitted under local laws and regulations.<sup>37</sup>

**d. Stormwater Management**

Employ strategies that reduce stormwater runoff and discharges of polluted water offsite to protect the natural hydrology and watershed health.<sup>38</sup>

---

<sup>34</sup> [www3.epa.gov/watersense/](http://www3.epa.gov/watersense/)

<sup>35</sup> Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes, October 31, 2011: [www.whitehouse.gov/administration/eop/ceq/sustainability/landscaping-guidance](http://www.whitehouse.gov/administration/eop/ceq/sustainability/landscaping-guidance)

<sup>36</sup> DOE FEMP metering Guidance:

[www.energy.gov/eere/femp/downloads/federal-building-metering-guidance-usc-8253e-metering-energy-use](http://www.energy.gov/eere/femp/downloads/federal-building-metering-guidance-usc-8253e-metering-energy-use)

<sup>37</sup> Implementing Instructions: Federal Agency Implementation of Water Efficiency and Management Provisions of E.O. 13514, July 10, 2013: [www.whitehouse.gov/sites/default/files/water\\_implementing\\_instructions.pdf](http://www.whitehouse.gov/sites/default/files/water_implementing_instructions.pdf)

<sup>38</sup> <http://www.epa.gov/greeningepa/technical-guidance-implementing-stormwater-runoff-requirements-federal-projects>

#### **4. Enhance Indoor Environmental Quality**

##### **a. Ventilation and Thermal Comfort**

Provide safe and healthy ventilation and thermal comfort.

##### **b. Daylighting and Lighting Controls**

Maximize opportunities for daylighting within the existing structure except where not appropriate because of building function, mission, or structural constraints. Maximize the use of automatic dimming controls or accessible manual lighting controls, task lighting where life cycle cost-effective, and appropriate shade and glare control.

##### **c. Indoor Air Quality**

Take actions to ensure optimal indoor air quality, including:

###### **i. Radon**

Test for radon in buildings and mitigate high levels.

###### **ii. Moisture Control**

Establish policy and implement a moisture control strategy to prevent building materials damage, minimize mold growth, and reduce associated health risks.

###### **iii. Low-Emitting Materials**

Use low-emitting materials for building modifications, maintenance, and operations. In particular, specify the following materials and products to have low pollutant emissions: composite wood products, adhesives, sealants, interior paints and finishes, solvents, carpet systems, janitorial supplies, and furnishings.

###### **iv. Indoor Air Quality during Building Alterations**

Establish a policy and implement necessary protocols to protect indoor air quality during renovations, repairs, and alterations, and during occupancy.

###### **v. Environmental Smoking Control**

Prohibit smoking in any form within the building and within 25 feet of all building entrances, operable windows, and building ventilation intakes.

###### **vi. Integrated Pest Management**

Use integrated pest management techniques as appropriate to minimize pesticide usage.

**d. Occupant Health and Wellness**

Promote opportunities for voluntary increased physical movement of building occupants such as making stairwells a desirable option for circulation, active workstations, fitness centers, and bicycle commuter facilities. Support occupant health by considering options such as providing convenient access to healthy dining options, potable water, daylight, plants, and exterior views where possible.

**5. Reduce the Environmental Impact of Materials****a. Material Content and Performance**

Procure products and supplies that have a lesser or reduced effect on human health and the environment over their life cycle when compared with competing products or services that serve the same purpose, including:

**i. Recycled Content and Comprehensive Procurement Guidelines**

Use RCRA section 6002 compliant products that meet or exceed EPA's recycled content recommendations for building construction, modifications, operations, and maintenance.<sup>39</sup>

**ii. Biobased Content**

Per section 9002 of the FSRIA, for USDA-designated products, use products with the highest content level per USDA's biobased content recommendations.<sup>40</sup>

**iii. Other Green Products**

Purchase products that meet Federally Recommended Specifications, Standards and Ecolabels<sup>41</sup> or are on the Federal Green Procurement Compilation.<sup>42</sup>

**iv. Ozone Depleting Compounds and High Global Warming Potential Chemicals**

Eliminate, to the maximum extent practicable, ozone depleting compounds and high GWP chemicals where EPA's SNAP has identified acceptable substitutes or where other environmentally preferable products are available.<sup>43</sup>

**b. Waste Diversion and Materials Management**

During alteration and repair projects, where markets or on-site recycling exist, divert at least 50% (by weight) of construction and demolition materials, excluding land clearing debris and

---

<sup>39</sup> 42 U.S.C. 6962, EPA's Comprehensive Procurement Guidelines for Construction:

[www3.epa.gov/epawaste/conserve/tools/cpg/products/construction.htm](http://www3.epa.gov/epawaste/conserve/tools/cpg/products/construction.htm)

<sup>40</sup> 7 U.S.C. 8102, USDA's BioPreferred website: <http://www.biopreferred.gov/BioPreferred/>

<sup>41</sup> [www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels](http://www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels)

<sup>42</sup> Green Procurement Compilation: [sftool.gov/greenprocurement](http://sftool.gov/greenprocurement)

<sup>43</sup> EPA SNAP website: [www.epa.gov/snap](http://www.epa.gov/snap)

material used as alternative daily cover, from landfills. Provide reuse and recycling services, including composting, for building occupants where markets or on-site recycling exist, and divert at least 50% of non-hazardous and non-construction related materials (by weight) from landfills. Provide salvage, reuse, and recycling services for waste generated from building operations, maintenance, repair and minor renovations, and discarded furnishings, equipment, and property.

## **6. Assess and Consider Climate Change Risks**

Assess risks to facility and operations from both acute weather events and chronic climate changes, and implement action to increase climate resilience. Where possible, align with local and regional efforts to increase community resilience.

### **a. Mission Criticality**

Determine the long-term mission criticality of the physical asset and the operations housed in the facility.

### **b. Risks from Climate Change**

Assess facilities, and based on mission criticality, identify possible existing, short-term, and long-term physical and operational vulnerabilities related to potential climate impacts.<sup>44</sup> Consider fire-resistant operation and management to enhance resilience to the impacts of wildfires and reduce risks to the lives of occupants in the event of a wildfire.

### **c. Facility Adaptation**

Focusing on the resilience of the physical facility, take action to mitigate identified physical risks considering mission criticality, potential climate change impacts, security, and cost.

---

<sup>44</sup> Use Climate Science Supplement Appendix 3 of the 2014 National Climate Assessment and the NOAA Technical Report NESDIS 142-9, January 2013 Regional Climate Trends and Scenarios for the U.S. National Climate Assessment Part 9, Climate of the Contiguous United States, or most recent.



A. Possible Value Engineering

1. Southeast Site

- a. Provide gravel in lieu of paved roadway GOV parking area.

2. Southwest Site

- a. Eliminate POV parking north of Supply Building / Elec. / Communications Maintenance facilities.
- b. Eliminate POV parking east of Supply Building / Elec. / Communications Maintenance facilities.
- c. Provide gravel in lieu of paved roadway from Battalion Complex Road to southeast site.

# Determining Compliance with the Guiding Principles for Sustainable Federal Buildings

February 2016

This document is a companion to the revised *Guiding Principles for Sustainable Federal Buildings* (Guiding Principles) issued by the Council on Environmental Quality in February 2016, per Executive Order 13693, *Planning for Federal Sustainability for the Next Decade*.

Full implementation of all principles, elements and sub-elements described in the Guiding Principles is strongly encouraged. The tables below include metrics for agencies to use to evaluate compliance with the Guiding Principles. For new construction, 20 out of 21 metrics are required, and for modernization, 19 out of 21 metrics are required. For existing buildings, although agencies are strongly encouraged to meet as many metrics as possible, 12 out of 18 metrics are required—eight specified plus four additional—in order to determine that a building is in compliance with the Guiding Principles.

When evaluating a building for compliance with the Guiding Principles, the new construction and modernization criteria should be applied when the project that an agency is undertaking in an existing building is essentially a comprehensive replacement or restoration of virtually all major systems, interior work (such as ceilings, partitions, doors, floor finishes, etc.), and building elements and features.

## **New Construction or Modernization**

For new construction, metrics number one through 20 are required, and for modernization, metrics number one through 18 and number 21 are required, as specified below.

	<b>I. Employ Integrated Design Principles</b>	<b>Yes/No</b>
1	<b>Integrated Design:</b> Consider the environmental impact of siting decisions and use an integrated project team to: establish energy and other environmental performance goals in the design process; follow sustainable landscape design principles; evaluate electric vehicle charging needs; consider design choices that improve environmental performance, support health and wellness of building occupants and consider climate risks including wildfire; and consider all stages of the building's life cycle. <b>[Required]</b>	
2	<b>Commissioning:</b> Commission and recommission at least every 4 years to optimize building performance using commissioning agents who are independent of the design and construction or operating team.	

	Commissioning should be consistent with the Energy Independence and Security Act (EISA) section 432 <sup>1</sup> and Federal Energy Management Program (FEMP) commissioning guidance. <sup>2</sup> <b>[Required]</b>	
	<b>II. Optimize Energy Performance</b>	
3	<b>Energy Efficiency:</b> A. For new construction, ensure energy efficiency is 30% better than the current American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 standard, OR B. For modernization, ensure: <ol style="list-style-type: none"> <li>1) Energy use is 20% below the fiscal year (FY) 2015 energy use baseline, OR</li> <li>2) Energy use is 30% below the FY 2003 energy use baseline, OR</li> <li>3) The building has an ENERGY STAR<sup>®</sup> rating of 75 or higher, OR</li> <li>4) For building types not in ENERGY STAR Portfolio Manager, where adequate benchmarking data exists, the building is in the top quartile of energy performance for its building type, AND</li> </ol> C. For new construction and modernization, use energy efficient products, as required by statute. <sup>3</sup> <b>[Required]</b>	
4	<b>Renewable and Clean Energy:</b> Evaluate and implement, where appropriate, life cycle cost-effective renewable energy projects on-site; consider long-term off-site renewable sources and Renewable Energy Certificates (RECs); and utilize clean and alternative energy where possible. <b>[Required]</b>	
5	<b>Metering:</b> Install building level meters for electricity, natural gas, and steam; install advanced or standard meters as appropriate. <b>[Required]</b>	
6	<b>Benchmarking:</b> Benchmark building performance at least annually, preferably using ENERGY STAR Portfolio Manager; regularly monitor building energy performance against historic performance data and peer buildings. <sup>4</sup> <b>[Required]</b>	
	<b>III. Protect and Conserve Water</b>	
7	<b>Indoor Water Use:</b> A. Build to ASHRAE standard 189.1-2014 sections 6.3.2, 6.4.2, and 6.4.3, or current comparable ASHRAE standards, AND B. Use water-efficient products; install building level water meters; optimize cooling tower operations; and eliminate single pass cooling. <b>[Required]</b>	
8	<b>Outdoor Water Use:</b> A. Separately meter water for irrigation systems greater than 25,000 square feet, AND B. Use water efficient landscapes, AND C. Limit potable water use for irrigation to 50% or more below conventional practices using methodologies from (but not the numeric requirements	

<sup>1</sup> Guidance for the Implementation and Follow-up on Identified Energy and Water Efficiency Measures in Covered Facilities (per 42 U.S.C. 8253(f), Use of Energy and Water Measures in Federal Buildings September 2012: [energy.gov/sites/prod/files/2013/10/f4/eisa\\_project\\_guidance.pdf](http://energy.gov/sites/prod/files/2013/10/f4/eisa_project_guidance.pdf))

<sup>2</sup> [energy.gov/sites/prod/files/2014/07/f17/commissioning\\_fed\\_facilities.pdf](http://energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf)

<sup>3</sup> 42 U.S.C. § 8259(b) and 10 C.F.R. § 436.40 et seq.

<sup>4</sup> 42 U.S.C. § 8253(f) (8); [energy.gov/sites/prod/files/2014/09/f18/benchmarking\\_guidance08-2014.pdf](http://energy.gov/sites/prod/files/2014/09/f18/benchmarking_guidance08-2014.pdf)

	contained in) ASHRAE standard 189.1-2014 section 6.5.1, or current comparable ASHRAE standards, to calculate water use of conventional practices. <b>[Required]</b>	
9	<b>Alternative Water:</b> Consider alternative sources of water where cost-effective and permitted by local laws and regulations. <b>[Required]</b>	
10	<b>Stormwater Management:</b> For new construction meet or exceed EISA section 438 stormwater management requirements. <b>[Required]</b>	
<b>IV. Enhance Indoor Environmental Quality</b>		
11	<b>Ventilation and Thermal Comfort:</b> Meet current ASHRAE standards 55 and either 62.1 or 62.2 for ventilation and thermal comfort. <b>[Required]</b>	
12	<b>Daylighting and Lighting Controls:</b> Maximize opportunities for daylighting in regularly occupied space, automatic dimming controls or accessible manual controls, task lighting, and shade and glare control. <b>[Required]</b>	
13	<b>Indoor Air Quality:</b> Develop and implement an indoor air quality policy that considers the following: moisture control, use of low emitting materials and products with low pollutant emissions, necessary protocols to protect indoor air quality during construction and in the finished building, prohibition of smoking in any form inside and within 25 feet of all building entrances, operable windows, and building ventilation intakes, and use of integrated pest management techniques. <b>[Required]</b>	
14	<b>Occupant Health and Wellness:</b> Promote opportunities for voluntary increased physical movement of building occupants such as making stairwells an option for circulation, active workstations, fitness centers, and bicycle commuter facilities; and support convenient access to healthy dining options, potable water, daylight, plants, and exterior views. <b>[Required]</b>	
<b>V. Reduce the Environmental Impact of Materials</b>		
15	<b>Material Content and Performance:</b> Procure products that meet the following requirements where applicable: A. Resource Conservation and Recovery Act (RCRA) section 6002, AND B. Farm Security and Rural Investment Act (FSRIA) section 9002, AND C. Federally Recommended Specifications, Standards and Ecolabels <sup>5</sup> or are on the Federal Green Procurement Compilation for other green products, as appropriate, <sup>6</sup> AND D. Avoid ozone depleting compounds and high global warming potential (GWP) chemicals. <b>[Required]</b>	
16	<b>Waste Diversion:</b> Where markets exist, provide reuse and recycling services for building occupants and divert at least 50% of non-hazardous, non-construction related materials from landfills. <b>[Required]</b>	
17	<b>Materials Management:</b> Where markets exist, divert at least 50% of construction and demolition materials from landfills. <b>[Required]</b>	
<b>VI. Assess and Consider Climate Change Risks</b>		
18	<b>Mission Criticality:</b> Determine long-term mission criticality of the physical asset and operations to be housed in the facility to inform the design of new	

<sup>5</sup> [www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels](http://www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels)

<sup>6</sup> Green Procurement Compilation: [sftool.gov/greenprocurement](http://sftool.gov/greenprocurement)

	construction and modernization to increase climate resilience. <b>[Required]</b>	
19	<b>Floodplain Considerations:</b> For new construction, avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid floodplain development whenever there is a practicable alternative. <b>[Required]</b>	
20	<b>Facility Design:</b> For new construction, balance options to address predicted climate change impacts against mission criticality, cost, and security to determine design parameters; at a minimum, include low and no cost resilience measures to address predicted climate conditions. <b>[Required]</b>	
21	<b>Facility Adaptation:</b> For modernization, take action to mitigate identified risks, considering mission criticality, climate impacts, cost, and phased adaptation over time. <b>[Required]</b>	

### **Existing Buildings**

Twelve out of 18 metrics are required—eight that are specified as required plus four additional. Any metric determined to be “not applicable” cannot be counted toward the 12 required.

	<b>I. Employ Integrated Assessment, Operation, and Management Principles</b>	<b>Yes/No</b>
1	<b>Integrated Assessment, Operation, and Management:</b> Through an integrated process and team, assess building and operating conditions and identify areas for improvement; establish operational goals for environmental performance; and incorporate goals into building management. <b>[Required]</b>	
2	<b>Commissioning:</b> Commissioning reports for certification purposes must be completed within two years prior to certification date. Recommissioning should be completed at least every four years thereafter to optimize building performance. Use commissioning agents who are independent of the design and construction or operating team. Commissioning should be consistent with EISA section 432 <sup>7</sup> and FEMP commissioning guidance. <sup>8</sup> <b>[Required]</b>	
	<b>II. Optimize Energy Performance</b>	
3	<b>Energy Efficiency:</b> A) Ensure: 1. The building has an ENERGY STAR rating of 75 or higher, OR 2. Energy use is 20% below the FY 2015 energy use baseline, OR 3. Energy use is 30% below the FY 2003 energy use baseline, OR 4. Energy efficiency is 30% better than the current ASHRAE 90.1 standard, AND B) Use energy efficient products, as required by statute. <sup>9</sup> <b>[Required]</b>	
4	<b>Renewable and Clean Energy:</b> Evaluate and implement, where appropriate, life cycle cost-effective renewable energy projects on-site; consider long-term	

<sup>7</sup> Guidance for the Implementation and Follow-up on Identified Energy and Water Efficiency Measures in Covered Facilities (per 42 U.S.C. 8253(f), Use of Energy and Water Measures in Federal Buildings, September 2012: [energy.gov/sites/prod/files/2013/10/f4/eisa\\_project\\_guidance.pdf](http://energy.gov/sites/prod/files/2013/10/f4/eisa_project_guidance.pdf))

<sup>8</sup> [energy.gov/sites/prod/files/2014/07/f17/commissioning\\_fed\\_facilities.pdf](http://energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf)

<sup>9</sup> 42 U.S.C. § 8259(b) and 10 C.F.R. § 436.40 et seq.

	offsite renewable sources and RECs; and utilize clean and alternative energy were possible.	
5	<b>Metering:</b> Install building level meters for electricity, natural gas, and steam; install advanced or standard meters as appropriate.	
6	<b>Benchmarking:</b> Compare building performance with energy performance benchmarks at least annually, preferably using ENERGY STAR Portfolio Manager; regularly monitor building energy performance against historic performance data and peer buildings. <sup>10</sup>	
<b>III. Protect and Conserve Water</b>		
7	<b>Indoor water use:</b> A. Install building level water meters, reduce water use 20% below FY 2007 baseline, and use water efficient products, OR B. Install building level meters, conduct an analysis of water use, <sup>11</sup> identify and repair leaks, eliminate single pass cooling, optimize cooling tower operations, and use water efficient products. <b>[Required]</b>	
8	<b>Outdoor Water Use:</b> A. Install water meters for irrigation systems serving more than 25,000 square feet of landscape, AND B. Either: 1. Use water efficient landscaping, OR 2. Limit potable water use for irrigation to 50% or more below conventional practices using methodologies from (but not the numeric requirements contained in) ASHRAE standard 189.1-2014 section 6.5.1, or current comparable standard, to calculate water use of conventional practices.	
9	<b>Alternative Water:</b> Consider alternative sources of water where cost-effective and permitted by local laws and regulations.	
10	<b>Stormwater Management:</b> Employ strategies that reduce storm water runoff and discharges of polluted water offsite to protect the natural hydrology and watershed health.	
<b>IV. Enhance Indoor Environmental Quality</b>		
11	<b>Ventilation and Thermal Comfort:</b> Meet the current ASHRAE 55 and either 62.1 or 62.2 standards for ventilation and thermal comfort. <b>[Required]</b>	
12	<b>Daylighting and Lighting Controls:</b> Maximize opportunities for daylighting in regularly occupied space, automatic dimming controls or accessible manual controls, task lighting, and shade and glare control.	
13	<b>Indoor Air Quality:</b> Develop and implement an indoor air quality policy that considers the following: moisture control, use of low emitting materials and products with low pollutant emissions, necessary protocols to protect indoor air quality during construction and in the finished building, prohibition of smoking in any form inside and within 25 feet of all building entrances, operable windows, and building ventilation intakes, and use of integrated pest	

<sup>10</sup> 42 U.S.C. § 8253(f) (8); [energy.gov/sites/prod/files/2014/09/f18/benchmarking\\_guidance08-2014.pdf](http://energy.gov/sites/prod/files/2014/09/f18/benchmarking_guidance08-2014.pdf)

<sup>11</sup> [www.energy.gov/eere/femp/developing-water-management-plan](http://www.energy.gov/eere/femp/developing-water-management-plan) can provide an understanding of how to develop a water use analysis

	management techniques.	
14	<b>Occupant Health and Wellness:</b> Where feasible, promote opportunities for voluntary increased physical movement of building occupants such as making stairwells an option for circulation, active workstations, fitness centers and bicycle commuter facilities; and support convenient access to healthy dining options, potable water, daylight, plants, and exterior views.	
<b>V. Reduce the Environmental Impact of Materials</b>		
15	<b>Material Content and Performance:</b> Procure products that meet the following requirements where applicable: A. RCRA section 6002, AND B. FSRIA section 9002, AND C. Federally Recommended Specifications, Standards and Ecolabels <sup>12</sup> or are on the Federal Green Procurement Compilation for other green products, as appropriate, <sup>13</sup> AND D. Avoid ozone depleting compounds and high GWP chemicals. <b>[Required]</b>	
16	<b>Waste Diversion:</b> Where markets exist, provide reuse and recycling services for building occupants and divert at least 50% of non-hazardous non-construction related materials from landfills. <b>[Required]</b>	
17	<b>Materials Management:</b> Where markets exist, divert at least 50% of construction and demolition materials from landfills.	
<b>VI. Assess and Consider Climate Change Risks</b>		
18	<b>Climate Resilience and Adaptation:</b> A. Determine long-term mission criticality of the physical asset and operations to be housed in the facility, AND B. Evaluate climate change impacts, including wildfire, based on mission criticality and cost, AND C. Implement no and low cost actions to increase climate resilience. <b>[Required]</b>	

<sup>12</sup> [www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels](http://www2.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels)

<sup>13</sup> Green Procurement Compilation: [sftool.gov/greenprocurement](http://sftool.gov/greenprocurement)



TITLE: ESOP 10.1 - VAPOR INTRUSION EVALUATION PROGRAM FOR  
MARINE CORPS BASE CAMP LEJEUNE AND MARINE CORPS AIR  
STATION NEW RIVER

PURPOSE:

This ESOP establishes Vapor Intrusion (VI) procedures to assess potential volatile organic compounds (VOCs) exposure pathways and reduce building occupant exposure to VOCs from VI aboard Marine Corps Base Camp Lejeune (MCB CAMLEJ) and Marine Corps Air Station New River (MCASNR).

APPLICABILITY:

In the absence of Federal or State regulator guidance on a site-specific decision to evaluate/mitigate vapor intrusion, this ESOP prevails in determining the need for assessing vapor intrusion aboard MCB CAMLEJ and MCASNR. Construction activities proposed on Installation Restoration Program (IRP), Resource Conservation and Recovery Act (RCRA), and Underground Storage Tank (UST) assessment sites should be assessed where VOCs are present (or suspected) in the groundwater and/or soil. For proposed facilities where a "due diligence" assessment is warranted, sampling may be required to determine whether VOCs are present or absent at the site. The decision trees provided in enclosures (1) and (2) illustrate when an assessment is appropriate. Adherence to this procedure may vary based on site conditions, regulatory input and/or funding availability.

RESPONSIBILITY:

1. The Director, Environmental Management Division, G-F is assigned implementation oversight of VI Evaluations at MCB CAMLEJ and MCASNR.
2. The Head, Environmental Quality Branch (EQB), is assigned responsibility for completion of VI Evaluations at MCB CAMLEJ and MCASNR.
3. The Program Manager (IRP or UST Program), EQB, is designated the Installation point of contact to establish, direct, maintain, and coordinate the VI Program for MCB CAMLEJ and MCASNR, following this procedure and guidance in references (a) through (f) and enclosures (1) through (5). The Program Manager, EQB, is responsible for long-term planning and management to accomplish the goals and objectives of the MCB CAMLEJ VI Evaluation Program.

The following tasks, while managed by EQB, will require support from organizations/commands outside the authority of this ESOP.

a. The Installation Development Division (IDD) will aid EMD in identifying proposed buildings where "due diligence" vapor intrusion evaluations are appropriate by coordinating with other base entities such as MCASNR, the Marine Corps Community Services, Marine Corps Forces Special Operations Command, Department of Defense Education Activity, and the Naval Hospital. IDD will ensure scope and funding are built into the proposed military construction project to allow construction of a vapor intrusion mitigation system should VI potential be confirmed during the assessment process.

b. The Resident Officer in Charge of Construction (ROICC) is responsible for implementing recommendations included in the construction contract and will provide as-built drawings and other design documentation to the Program Manager, EQB, within 30 days of project completion to ensure appropriate record keeping.

c. Base Industrial Hygiene and Base Safety will be contacted for awareness and potential OSHA required sampling when Indoor-air sampling is warranted.

d. Other commands and organizations (e.g. Public Works Division) charged with planning or implementing construction projects aboard MCB CAMLEJ or MCASNR that are not coordinating design and construction efforts through IDD and the ROICC will also collect work plans, reports, data, vapor intrusion mitigation designs and as-built drawings, and other information pertaining to vapor intrusion evaluations. These documents should be provided to the Program Manager, EQB, within 30 days of project completion to ensure appropriate record keeping.

#### PROCEDURE:

##### 1. Vapor Intrusion Screening Process.

The VI screening phase is conducted to identify buildings of interest for further evaluation. Inclusion of a building at this stage in the process does not automatically imply that VI is occurring, but indicates additional data collection and evaluation is necessary. The general VI screening process flowchart is presented in enclosure (3).

It is recognized that petroleum hydrocarbon contamination behaves differently from chlorinated solvent and commingled chlorinated solvent and petroleum contamination (herein referred to as commingled sites) in terms of VI. Therefore, chlorinated solvent and commingled sites are screened differently as outlined in the following subsections.

a. Chlorinated Solvent or Commingled Sites.

The current VI screening process for chlorinated solvent or commingled sites is conducted in accordance with references (b) through (f). The current VI screening process for existing buildings present at these sites is outlined below.

(1) Identify IRP, RCRA, and Due Diligence sites where chlorinated and/or other non-aerobically degradable VOCs are present in groundwater and/or soil.

(2) Utilize the groundwater and soil VOC data from each site to identify the locations of subsurface contamination:

Groundwater data collected from the identified sites are screened against the North Carolina Department of Environmental Quality (NCDEQ) Vapor Intrusion Screening Levels (VISLs) for groundwater (Section 3). Buildings located within 100 feet of monitoring wells screened in the surficial aquifer containing chlorinated and/or other non-aerobically degradable VOC concentrations above the VISLs for groundwater are identified as buildings of interest.

Currently, speciated soil data are used to evaluate the distance of a building (or proposed building) from the primary source area and areas of residual soil contamination. Vadose zone sources in close proximity to the building can result in higher subslab soil gas concentrations (and thus a higher potential for VI) than groundwater sources alone.

Soil screening levels for VI are not available. Decisions on whether to include a building as a building of interest for further evaluation based on soil data alone are made on a site-specific basis, consistent with references (d) and (e). In most cases however, groundwater VOC concentrations will also be present in areas of soil contamination.

Identify buildings or proposed buildings located in proximity to soil and groundwater remediation systems that inject air into

the subsurface. Buildings within approximately 100 feet of these remediation systems are included as buildings of interest because this type of remediation increases the potential for VI to occur.

The buildings identified as part of this step are retained for further evaluation as described in Section 2.

#### b. Petroleum-Only Contamination Sites

The screening process for petroleum-only contamination sites is outlined below.

(1) Identify UST and Due Diligence sites where only petroleum VOCs are present in soil and/or groundwater.

(2) Utilize the groundwater and soil VOC data from each site to identify the locations of subsurface contamination.

Groundwater data collected from the identified sites are screened against the NCDEQ VISLs for groundwater (Section 3).

Soil data are used to evaluate the distance of a building (or proposed building) from the primary source area and areas of residual soil contamination. Vadose zone sources in close proximity to the building can result in higher subslab soil gas concentrations (and thus a higher potential for VI) than groundwater sources alone.

Currently, speciated soil screening levels for VI are not available. The Interstate Technology and Research Council (ITRC) VI guidance for petroleum (reference [c]) suggests 30 feet as an initial screening distance from potential petroleum vapor sources. NCDEQ defines action levels for soil as TPH > 50 mg/kg for Gasoline Range Organics (GRO); TPH > 100 mg/kg for Diesel Range Organics (DRO)). Therefore, buildings located within 30 feet of soil contamination (with TPH values as shown above) should be further evaluated unless a clean soil separation of 6 feet vertically and horizontally has already been determined.

If one or more of the following criteria are met, then retain these buildings for vapor intrusion screening, per Section 2. Note that if additional lines of evidence suggest a VI potential, i.e. utilities, groundwater flow direction, etc., buildings may be retained for additional monitoring or vapor intrusion screening regardless of the below criteria:

Buildings located within 15 feet of Light Non-Aqueous Phase Liquid (LNAPL).

Buildings located within 6 feet of monitoring wells containing total petroleum hydrocarbon (TPH) concentrations > 30 milligrams per liter (mg/L) or benzene concentrations > 5 mg/L.

Buildings located within 30 feet of monitoring wells screened in the surficial aquifer containing petroleum VOC concentrations above the VISLs for groundwater and a clean soil separation distance of 6 feet is not present or cannot be verified.

Buildings located within 6 feet of soil with TPH concentrations > 250 mg/kg or benzene concentrations > 10 mg/kg.

Building retained if groundwater petroleum contamination is within the following distance:

VOC Concentration in Surficial Aquifer > VISL	30 Feet*
LNAPL	15 Feet
TPH > 30 mg/L	6 Feet
Benzene > 5 mg/L	6 Feet

\*Unless a clean soil separation of 6 feet can be determined.

Building retained if petroleum contamination source is within the following distance:

TPH > 250 mg/kg	6 feet
Benzene > 10 mg/kg	6 feet

#### c. Sites with Active Remediation Systems

Identify buildings (or proposed buildings) located in proximity to soil and groundwater remediation systems that inject air into the subsurface. Buildings within approximately 100 feet of these remediation systems are included as buildings of interest because this type of remediation increases the potential for VI to occur.

#### d. Due Diligence Sites

Due diligence sites are evaluated against the same criteria as described above for IRP, RCRA, and UST sites. However, at these sites, the buildings have typically not been constructed.

Therefore, samples are typically collected from the proposed construction footprint when no other information is available. When groundwater and soil gas data are collected, the results are screened against the NCDEQ VISLs (Section 3). Examples of priority facilities (but not limited to) to be considered for due diligence investigation are included as enclosure (4). Sites where proposed buildings are located within 100 feet of known groundwater or soil gas concentrations above VISLs are also retained for further evaluation.

## 2. Vapor Intrusion Evaluation

Buildings that are retained as buildings of interest are further evaluated following the process outlined below. The evaluation process from this point forward is the same for all types of VOC contamination.

### a. Desktop Risk Evaluation

A preliminary Conceptual Site Model (CSM) is developed for each building. Consistent with references (b), (d), (e), and (f), multiple lines of evidence (MLE) are incorporated into the VI CSM for each building. A VI CSM addresses three components:

- (1) VOC source (soil or groundwater contamination)
- (2) Migration from the subsurface and through the slab
- (3) Building characteristics and potential receptors (building occupants)

The initial or primary source in most cases is assumed to be related to a fuel or solvent spill or leak, with the secondary source being potentially-impacted groundwater, soil, soil vapor (exterior to the building), and soil gas (subslab).

Transport mechanisms for VOCs in the vadose zone primarily include diffusion and advection. VOCs migrate following concentration gradients from source areas of high concentration to surrounding areas of lower concentration by diffusion. Soil gas is pulled into the building through openings in the slab if the building is negatively pressurized in relation to the subsurface soil. Openings in the slab may include expansion joints, cracks, or utility conduits.

The building characteristics that affect vapor transport and VOC

concentration include the pressurization of the building, indoor air volume, the rate of indoor-to-outdoor air exchange, and the integrity of the slab. Pressurization of the building is dependent on factors such as the air handling system and the construction and use of the building. The indoor air volume and indoor-to-outdoor air exchange rate affects how quickly VOCs in the building dissipate or are diluted. The location (above, on, or below grade) of the slab determines how close the building is to the source area. The integrity (thickness and lack of openings) of the slab determines how readily VOCs may enter the building.

The buildings are then evaluated using the results of any previous soil gas or indoor air sampling completed and other lines of evidence to determine whether additional sampling is required and if so, the type and amount of additional data needed. The resulting VI CSMS and/or MLE are used to make recommendations for further evaluation, mitigation, or No Further Action.

#### b. Sampling and Analysis

Sampling is conducted at the buildings identified through the steps outlined in Section 2.a., to further characterize potential VI pathways. Types of sampling may include shallow groundwater (top-of-the-water table), soil gas, subslab soil gas, indoor air, and outdoor air. Data quality objectives are developed to identify the appropriate numbers, types, and locations of samples, and project action levels for each building retained for sampling.

In general, the first step in sampling and analysis is collection of subslab soil gas samples. The results are compared to the NCDEQ VISLs for soil gas. If the results of the soil gas samples exceed the NCDEQ VISLs, concurrent subslab soil gas, indoor air samples, and outdoor air samples are collected. The target analyte list is developed based on site-specific information.

In some cases, such as buildings located in proximity to remediation systems that inject air into the subsurface, or where contaminant concentrations have been detected in groundwater several orders of magnitude above the screening level and would be expected to extend beneath the slab, concurrent subslab soil gas, indoor air, and outdoor samples are collected as the first step in the sampling chain.



### c. Risk Evaluation

Sampling results are evaluated to refine the CSMs for the buildings being evaluated. Groundwater, soil gas, and indoor air data are compared to their appropriate screening levels (Section 3). Indoor air data are also compared to outdoor air data to evaluate whether detected indoor air concentrations may be influenced by VOCs present in outdoor air. If indoor air concentrations of VOCs are detected above established project action levels (developed on a site-specific basis), the data are provided to the Naval and Marine Corps Public Health Center, Base Industrial Hygiene, and Base Safety to determine if immediate action is needed to protect building occupants. The data are also evaluated using the MLE approach that aids in decision making with regard to attributing chemical concentrations in indoor air to the VI pathway. Some lines of evidence include, but are not limited to, the following:

- a. Groundwater data
- b. Background sources (internal and external to building)
- c. Building construction
- d. Subslab soil gas data
- e. Indoor air data
- f. Outdoor air data
- g. Constituent ratios
- h. Ventilation rates
- i. Spatial and temporal variability
- j. Preferential Pathways

Risk screening, or in some cases a full human health risk assessment, is conducted for those buildings where indoor air concentrations attributable to VI have been detected above screening levels. For sites where trichloroethene (TCE) concentrations are present in indoor air and are related to VI, the USEPA Region 9 Interim TCE Indoor Air Response Action Levels (described in Section 3), are considered as part of the

evaluation. The results of the risk evaluation can be used to make decisions regarding further investigation of VI pathways, long-term monitoring, or, if appropriate, to evaluate mitigation measures.

### 3. Screening Levels

Analytical data are compared to the following screening levels:

a. NCDEQ Screening Levels - In October 2013, NCDEQ released the NCDEQ VISLs. NCDEQ Guidance for using the VISLs was subsequently published in April 2014. Subslab soil gas, groundwater, and indoor/crawlspace air data were compared to the NCDEQ VISLs for each media, which are based on a target cancer risk of  $1 \times 10^{-5}$  or a target hazard quotient (THQ) of 0.2. Data reported after release of the NCDEQ VISLs are compared to these screening criteria.

b. Base-specific Soil Gas Screening Levels (SGSLs) - Base-specific SGSLs were originally calculated at the conclusion of the Phase II Base-wide VI Evaluation in 2009 and updated in 2011 and 2014, references (g) through (i). Empirical (that is, Base-specific) attenuation factors were calculated using paired concurrent subslab and indoor air (VOCs analyzed by USEPA Method Toxic Organic [TO-15]) data collected during the Basewide VI Evaluation. Soil gas data collected from industrial (non-residential) buildings in exceedance of the NCDEQ VISLs are compared to the Base-specific SGSLs.

c. USEPA Region 9 Interim TCE Indoor Air Response Action Levels - In June 2014, USEPA Region 9 established rapid action levels for exposures to TCE in indoor air. The rapid action levels are based on a THQ of 1 for the accelerated response level (actions to be completed within a few weeks) and THQ of 3 for the urgent response level (actions to be completed within a few days). These criteria are applicable only to TCE detections in indoor air that are related to VI.

An example protocol for sampling and screening of priority facility construction is also provided as enclosure (5).

<b>EPA Region 9 Interim TCE Indoor Air Response Action Levels - Residential and Commercial TCE Inhalation Exposure from Vapor Intrusion</b>		
<b><i>Exposure Scenario</i></b>	<b><i>Accelerated Response Action Level (HQ=1)</i></b>	<b><i>Urgent Response Action Level (HQ=3)<sup>4</sup></i></b>
Residential *	<b>2 µg/m<sup>3</sup></b>	<b>6 µg/m<sup>3</sup></b>
Commercial/Industrial ** (8-hour workday)	<b>8 µg/m<sup>3</sup></b>	<b>24 µg/m<sup>3</sup></b>
Commercial/Industrial ** (10-hour workday)	<b>7 µg/m<sup>3</sup></b>	<b>21 µg/m<sup>3</sup></b>
<p>* The residential HQ=1 accelerated response action level is equivalent to the inhalation reference concentration (RfC) since exposure is assumed to occur continuously.</p> <p>** Commercial/Industrial accelerated response action levels are calculated as a time-weighted average from the RfC, based on the length of a workday and rounding to one significant digit (e.g., for an 8-hour workday: Accelerated Response Action Level = (168 hours per week/40 hours per week) × 2 µg/m<sup>3</sup> = 8 µg/m<sup>3</sup>). Time-weighted adjustments can be made as needed for workplaces with longer work schedules.</p> <p>Note: Indoor air TCE exposures corresponding to these accelerated response action levels would pose cancer risks near the lower end of the Superfund target cancer risk range, considering the IRIS toxicity assessment; thus, the health protective risk range for both accelerated response actions and long-term exposures becomes truncated to: 0.5 – 2 µg/m<sup>3</sup> for residential exposures and 3 – 8 µg/m<sup>3</sup> for 8-hour/day commercial/industrial exposures.</p>		

REFERENCES:

- (a) MCIEAST-MCBCAMLEJO 5090.10
- (b) DOD, DOD Vapor Intrusion Handbook, 2009
- (c) ITRC, Petroleum Vapor Intrusion; Fundamentals of Screening investigation, and Management, 2014
- (d) North Carolina Department of Environment and Natural Resources, Vapor Intrusion Guidance, 2014
- (e) USEPA, OSWER 9200.2-154, OSWER Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil, 2015
- (f) USEPA, EPA 510-R-15-001, Guidance for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites, 2015
- (g) CH2M HILL, Final Vapor Intrusion Evaluation Report, MCB CAMLEJ, NC, 2009
- (h) CH2M HILL, Final Phase III Vapor Intrusion Evaluation Report, MCB CAMLEJ, NC, 2011
- (i) CH2M HILL, Vapor Intrusion Monitoring - Installation Restoration Program, MCB CAMLEJ, NC, 2015

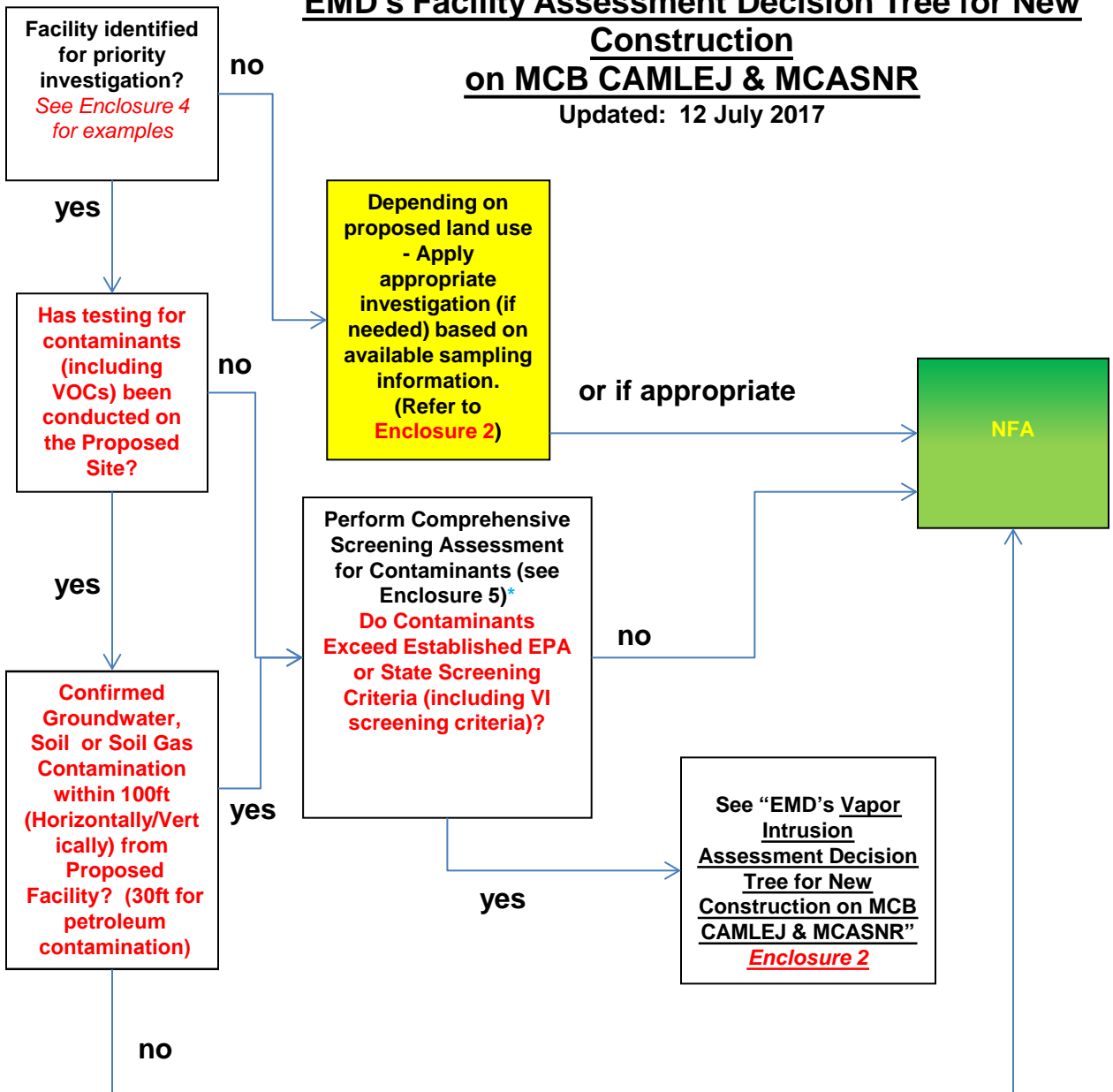
ENCLOSURES:

- (1) EMD's Facility Assessment Decision Tree for New Construction on MCB CAMLEJ
- (2) EMD's Vapor Intrusion Assessment Decision Tree for New Construction on MCB CAMLEJ
- (3) Decision Flow Chart for Vapor Intrusion Screening
- (4) Examples of Priority Facilities to be Considered for Investigation
- (5) Example Comprehensive Environmental Screening Assessment Protocol for New Construction of Priority Facilities

## EMD's Facility Assessment Decision Tree for New Construction

on MCB CAMLEJ & MCASNR

Updated: 12 July 2017

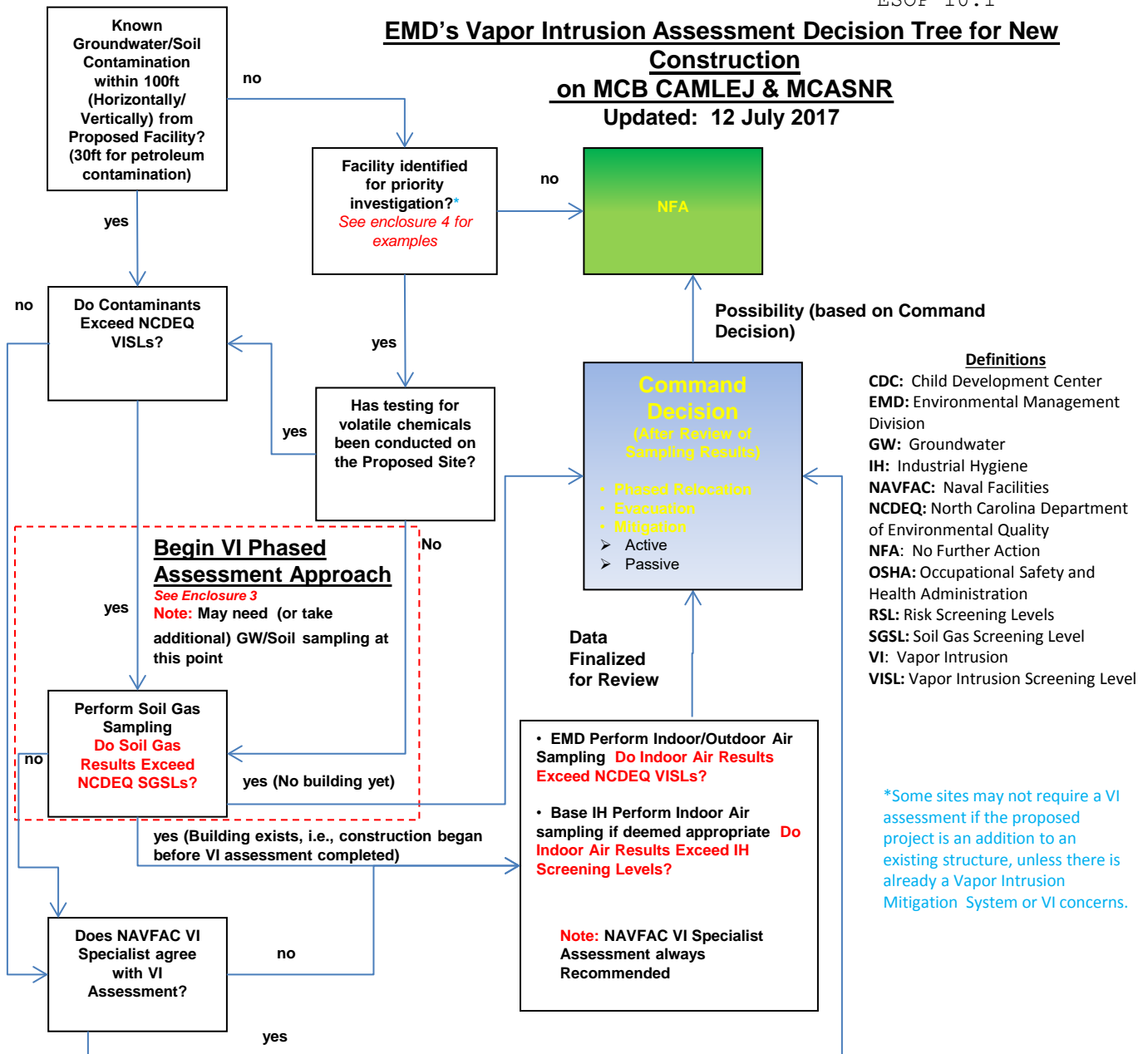


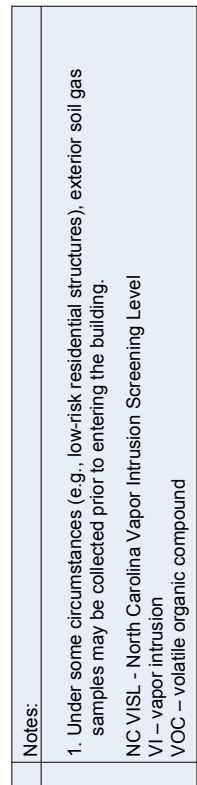
### Definitions

**CDC:** Child Development Center  
**EMD:** Environmental Management Division  
**GW:** Groundwater  
**IH:** Industrial Hygiene  
**NAVFAC:** Naval Facilities  
**NCDEQ:** North Carolina Department of Environmental Quality  
**NFA:** No Further Action  
**OSHA:** Occupational Safety and Health Administration  
**RSL:** Risk Screening Levels  
**VI:** Vapor Intrusion  
**VOC:** Volatile Organic Compounds

\*Some sites may not require a Comprehensive Screening Assessment if the proposed project is an addition to an existing structure, unless there is already a Vapor Intrusion Mitigation System or VI concerns.

# **EMD's Vapor Intrusion Assessment Decision Tree for New Construction** **on MCB CAMLEJ & MCASNR** Updated: 12 July 2017







## **Examples of Priority Facilities to be Considered for Investigation**

- BEQ/BOQ/Housing
- Primary and Secondary Schools
- Child Development Centers
- School Age Centers and Youth and Teen Centers
- Community Centers
- Medical Facilities (depending on construction and occupancy)
- Administrative Facility – The majority of the building (>50%) will be used in a capacity for administrative/office function in which workers would be present for 8 hours per day, 5 days per week. Any chemicals of concern would not be used in any adjoining space within the facility.
- Any other Facility deemed “Sensitive” by the Command

**Example Comprehensive Environmental Screening Assessment Protocol for New Construction of Priority Facilities**

This example sampling protocol can be followed when assessing the footprint of proposed facilities considered a priority for due diligence investigation aboard Marine Corps Base Camp Lejeune and Marine Corps Base New River.

**Recommended Sampling:**

<b><u>Contaminant</u></b>	<b><u>Method</u></b>
TPH	EPA-SW-846-8015
VOC	EPA-SW-846-8260
SVOC	EPA-SW-846-8270
Explosives	EPA-SW-846-8330
PCB	EPA-SW-846-8082
Pesticides	EPA-SW-846-8081
Herbicides	EPA-SW-846-8151
Perchlorate	EPA-314
RCRA Metals	EPA-SW-846-6010/6020 <sup>1</sup>
Mercury	EPA-SW-846-7470A <sup>1</sup>
Chromium-6	EPA-SW-846-7199 <sup>1</sup>
Soil Gas	EPA-TO15

**General Sampling Procedure (to be tailored pending on size of construction footprint):**

- Perform historic records review of proposed area of construction, to include but not limited to: 1) review of available historic aerial photographs and base maps; 2) interviews with knowledgeable persons; and 3) review of Federal and State records for evidence of past contamination. A site walk through the project area should also be conducted.
- Based on information collected on the site history, perform soil borings<sup>2</sup> to the groundwater table. Soil samples should be collected every 2-5 feet for field screening using an organic vapor analyzer (OVA) equipped with a photo ionization detector (PID).
- If there are no existing monitoring wells (MWs), install 3 temporary MWs and analyze for TPH, VOCs, SVOCs, Pesticides, and Herbicides. Additional analyses can be conducted if historic review indicates potential concern (see footnote below). Calculate groundwater flow direction. Well locations should be based on field observations and targeted towards locations with highest potential for contamination (PID results, visual, historic documentation, etc.).
- Collect soil samples<sup>2</sup> for TPH, VOCs, SVOCs, Pesticides, and Herbicides. Number and location of samples should be based on information collected on the site history (historic records review, PID results, visual, etc.) and biased in areas with highest potential for contamination. If evidence of contamination is not identified, sampling locations should be selected to obtain good coverage of the site. Collect 3 soil gas samples per building footprint. Analyze for VOCs (TO-15). Soil gas sampling should be completed in accordance with the U.S. Environmental Protection Agency, Environmental Response Team (EPA-ERT). Standard Operating Procedures, Soil Gas Sampling (SOP 2042). This guidance document is currently available online at: <http://www.epaosc.org/sites/2107/files/2042-R00xx.pdf>

<sup>1</sup> Or equivalent method required to meet appropriate regulatory screening criteria.

<sup>2</sup> The number of soil borings and samples should be based on the size of the site, number of buildings, and areas of potential concern.

Analyze these contaminants if historic site review indicates these contaminants might be of concern.

Environmental Standard Operating Procedure (ESOP) 5090.21

Last Date Updated: 28 September 2021

TITLE: Marine Corps Base Camp Lejeune (MCB CAMLEJ) and Marine Corps  
Airs Station New River (MCAS NR) Soil Screening Procedures for  
Construction Sites

RELATED MCIEAST-MCB CAMLEJO: 5090.10

PURPOSE: This ESOP outlines the procedures for managing excess soil  
and construction debris at construction sites aboard MCB CAMLEJ and  
MCAS NR.

BACKGROUND:

Former policy allowed construction contractors to dispose of excess soil (cut) in any legal manner they see fit, including disposing of soil off-Base. In 2012, construction activities resulted in the removal of soil containing munitions-related items to property out of Base control. This resulted in a blanket requirement that no soil from construction projects leave the base. Two designated areas were identified, to be managed by G-3/5, where excess soil from construction projects could be stockpiled for use on ranges, such as repairs to roads, berms, etc. In addition, excess soil could be taken to the base's active landfill for use as cover. However, the two G-3/5 designated areas have not been well policed and as a result, one location (OP-5) can no longer be used due to improper staging of unsuitable soils by construction contractors.

With the upcoming volume of construction associated with Task Force Florence, a new review of the soil disposal policy was needed since on-base storage capacity for excess soil is limited. In response to how soils have been mismanaged since 2012, the surplus soil specification has been updated to require all soil to be screened, as detailed below in this SOP. Based on this new requirement, after discussions with Marine Corps Systems Command and the MCIEAST Explosives Safety Officer, the blanket policy to require on-base disposal or a separate on-site unexploded ordnance (UXO) screening is no longer required for the majority of construction projects. Construction projects located in areas known or suspected to contain munitions or explosives of concern (MEC) may still require additional UXO screening requirements, in addition to the soil screening requirements for deleterious material listed below.

In addition to the purpose outlined above, this ESOP also addresses the requirements outlined in the 30 Jan 2021 Naval Facilities Mid-Atlantic OPSNOTE 2021-001, which requires an SOP to address management of excess soil and construction debris.

Lastly, new Navy, Marine Corps, and Department of Defense (DoD) guidance requires management of per- and polyfluoroalkyl substances

(PFAS) impacted soil and groundwater so as to minimize liability and reduce or prevent spread of PFAS to non-impacted areas. Because PFAS are not currently regulated, guidance is needed on how to manage PFAS-impacted soil during construction. Enclosure (1) provides details on how best to manage PFAS-impacted soil and/or groundwater aboard MCB CAMLEJ or MCAS NR.

#### APPLICABILITY:

This ESOP applies to organizations organic to or tenanted aboard MCB CAMLEJ/MCAS NR, and contractors conducting work on the installations that intend to excavate soil (to include topsoil, grub material, and unsuitable soil) and potentially remove excess soil material from either the originating construction site or Base property.

#### PROCEDURE:

1. Project managers should coordinate with the Environmental Management Division (EMD) early on in the project (design kickoff or Request for Proposal development) to discuss any concerns with soil contamination or UXO. Points of contact are listed at the end of this ESOP.

2. All construction workers must receive "3R" UXO Safety Awareness Training, and maintain documentation on-site for the Contracting Officer to review, as needed. Training can be obtained by watching the MCB CAMLEJ specific video online at:

<https://www.lejeune.marines.mil/Offices-Staff/Environmental-Mgmt/Training-Video/>

3. Prior to transportation of surplus soil off its originating site, mechanically screen all surplus soil to **remove all objects greater than 3 inches and deleterious material**. Deleterious material consists of organic debris such as roots, stumps, timber, and construction debris. Construction debris shall include, but is not limited to wood, plastic, glass, concrete, brick, and metal. Dispose of deleterious material and objects larger than 3 inches in accordance with state and federal regulations, and applicable contract requirements. Construction debris, to include hazardous- and non-hazardous waste cannot and shall not be reburied or left on-site, but rather properly disposed in accordance with 42 U.S.C 6901 Resource Conservation and Recovery Act (RCRA) and other federal and state regulations.

a) Soil screening will be done mechanically. In special circumstances (i.e., site is <1 acre) manual screening can be done with proper justification and written approval by the contracting officer. Details on how the screening is being performed shall additionally be provided to the Contracting Officer. Spreading

material out on the ground in lifts, for example, and manually removing debris larger than 3 inches is an adequate method to visually inspect soil prior to leaving a site. Observing an excavator direct load into a dump truck is not considered an acceptable method of screening soil.

b) Any suspect munitions-related items identified should immediately be called into emergency response (911) or Blackburn (910-451-3064/4449) for proper identification, in accordance with MCO 8020.10. Munitions-related items should be reported to the Contracting Officer, and subsequently to the Explosives Safety Officer (ESO) and Installation's Environmental Management Division (910-451-5003). Base Explosives Ordnance Disposal (EOD) will make the proper notifications to the ESO. The Contracting Officer should report the incident to EMD as soon as possible to assist in determining if follow-on UXO construction support actions are warranted.

4. The contractor shall provide a written certification statement on a daily basis, signed by the Quality Control (QC) Manager, indicating volume, in cubic yards (CY), stating that the material is free of deleterious material greater than 3 inches, stating where the surplus soil was delivered, and confirming the material is free of contaminants. Documentation regarding disposal of deleterious material shall also be provided in writing.

5. Screened, surplus soil can be stored at one of the designated locations on government property (see stipulations below), reused on base at another approved location, or it can be disposed of off-base as determined by the contractor. The government has first right of refusal for screened soil. **Written documentation of proper screening and where the soil will be going is required a minimum 10 days prior to allowing any soil to leave the base.**

6. The contractor will be held liable if they transport soil impacted with contaminants, munitions, solid waste, or other possible harmful contaminants to an on- or off-base location without proper approval from the Government and permitting requirements (i.e., the contractor will be held liable if they do not follow the proper soil screening methodologies described above).

#### On-Base Surplus Soil Storage Locations

1. Screened, surplus soil can be stored at one of the following designated locations on government property, if capacity is available and the area manager agrees to accept it. Note, the area manager can refuse the material with no required explanation. Contact the points of contact (POCs) listed below prior to contract award (while developing the design or RFP), verify again at the start of project to

determine capacity available, and contact POCs listed below 7 to 10 days in advance to coordinate delivery of material at the storage locations. Provide an estimate of the volume of soil to be delivered and an estimated timeline for soil delivery.

On base locations include the following:

a) Area managed by G-3/5 for reuse on training areas for various maintenance activities:

3.5-acre storage, adjacent to TLZ Condor off Verona Loop Road, approximate coordinates 34°38'07.3"N 77°26'41.7"W.

Coordinate with G-3/5 Project Development Specialist, MCIEAST-MCB CAMLEJ at (910) 451-5772 to determine capacity available at the storage location, prior to delivery.

This site operates Monday through Thursday between 0730 and 1500.

b) Area managed by PWD for use as daily cover:

Base landfill, located on Piney Green Road, approximate coordinates 34°41'26.9"N 77°19'27.4"W.

All deliveries will be screened and weighed at the Landfill scale house.

Contractor shall provide temporary silt fencing around designated stockpile areas as needed.

Coordinate with Landfill Manager at (910) 451-4998 or the Landfill MVO Supervisor at (910) 451-8666. Landfill use letters will be provided by the Contracting Officer so that deliveries can be tracked.

This site operates Monday through Thursday between 0730 and 1500 and on Friday between 0700 and 1400.

2. All contractors will be provided a designated area in which they will be responsible for all management of soil, to include: constructing and maintaining a perimeter silt fence; installing signage to identify the Contract, Contractor POC, and Government POC; frequent shaping of stockpiled material to ensure economical use of space and proper drainage, as determined by the Landfill Manager or G-3/5 Project Development Specialist; applying grass seed as needed or monthly at a minimum to minimize erosion; properly closing out site by removing silt fencing/signage, and properly shaping and seeding the stockpiled material.

3. The contractor is responsible for providing all material, equipment, and labor for placement and management of the surplus material at the designated on-base locations. Grade surplus material to a flat condition and slope to provide positive drainage daily.

4. Submit the following verification documents to the Contracting Officer and the landfill manager or G-3/5 Project Development Specialist (whoever is the point of contact for the storage location) for review and approval at the end of each day soil is delivered, worked, and/or site work is completed.

1) Photographic documentation that surplus soil has been properly placed. Photograph will include time and date of image. Photos of each truck delivery are required.

2) Certification statement, signed by the QC Manager, indicating volume, in cubic yards (CY), stating that the material is free of deleterious material greater than 3 inches, stating where the surplus soil was delivered, and confirming the material is free of contaminants.

5. If soil delivered does not meet the requirements outlined in this ESOP (i.e., it is not properly screened, or is not being stacked and managed properly at the on-base soil storage location), the contractor will be responsible for correcting or may be held responsible for removing said soil and will no longer be allowed to use on-base soil storage locations.

#### On-Base Reuse on an Active Construction Site

1. If not taken to one of the soil storage locations listed above, screened, surplus soil can be reused on base at another construction site, if the following conditions are met:

- The proposed site has an active erosion control permit in place
- The soil has already been mechanically screened **prior to** leaving its originating construction site (cannot be screened at the new location)
- The contractor has received written authorization to use the soil at the new construction site by the contracting officer(s) for both the originating and receiving sites (i.e., for reuse, not to be "disposed of" at the new site)
- The contractor shall provide a written certification statement to the contracting officer on a daily basis, signed by the QC Manager, indicating volume, in CY, and stating that the material is free of deleterious material greater than 3 inches, where the



surplus soil was delivered, and confirming the material is free of contaminants.

- Documentation regarding disposal of deleterious material shall also be provided in writing.

#### Off-Base Disposal of Surplus Soil

Screened, surplus soil can be disposed of off-base if the following conditions are met:

- Soil has been properly screened on-site, prior to removal, as outlined in the previous sections.
- The contractor shall provide a written certification statement to the contracting officer on a daily basis, signed by the QC Manager, indicating volume, in CY, and stating that the material is free of deleterious material greater than 3 inches, where the surplus soil was delivered, and confirming the material is free of contaminants.
- Documentation regarding disposal of deleterious material shall also be provided in writing.

#### Contaminated Soil

1. Soil contaminated with debris or chemicals (including PFAS) cannot be disposed at the designated on-base surplus soil storage locations listed above, or taken off-base without proper documentation (i.e., hazardous or non-hazardous waste manifest signed by a Base representative designated in writing by the Commanding General to sign hazardous waste manifests). Under no circumstances shall a contractor sign on behalf of the government on a waste profile or a waste manifest.

2. Details on whether your site has or is suspected of having contaminated soil can be found in the Decision Memorandum, which can be obtained from the EMD, National Environmental Policy's Act (NEPA) Program Manager. Additionally, you can contact EMD to confirm known site conditions. EMD contacts are listed at the end of this ESOP.

3. Soil that is contaminated by regulated compounds must be properly characterized, manifested, and disposed of at a permitted landfill or incinerated, as allowed by State and Federal regulations. Testing requirements will be determined by the receiving facility.

4. Soil impacted with PFAS should be reused on its originating construction footprint to the maximum extent possible, as there are currently no regulations regarding management and disposal of PFAS-impacted soil. All PFAS-impacted media should be managed so as to minimize the future impacts to the environment, should they become

regulated.

- a) If PFAS-impacted soil needs to leave the originating site, it must be properly characterized, manifested, and disposed of at a permitted subtitle D or C landfill (lined landfill). Waste manifests must clearly indicate that PFAS compounds are present. The Base landfill can additionally accept PFAS-impacted soil, but soil analytical results and waste manifest documentation must also be provided. Testing requirements for PFAS-impacted soil will be dictated by the receiving facility.
- b) Refer to enclosure (1), *Marine Corps Base Camp Lejeune Per and Polyfluoroalkyl Substances Guidance for Construction*, for additional guidance.

5. If contaminated soils are suspected or confirmed through presence of UXO, odors, or visual staining, or was previously identified in the project (i.e., constructing in a known impacted area) affected soils must be properly tested, manifested, and disposed of in accordance with RCRA regulations. Contact Base Environmental Management Division (910) 451-5003, for more information. Refer to the most current *Investigation and Remediation Waste Management Plan* for additional guidance.

NOTE: Rubbish and other construction debris shall be taken off-base for disposal, in accordance with RCRA and Solid Waste regulations. A minimum 24-hours advanced written notice shall be provided to the contracting Office of the Contractor's intention to dispose of rubbish and debris off-base. Disposal at sites or landfills not holding a valid state of North Carolina permit is specifically prohibited. The prohibition also applies to sites where a permit may have been applied for but not yet obtained. If construction debris has been disposed off-base outside the parameter of this ESOP at a site without state permits or not in accordance with regulatory requirements, the Contractor is to remove, transport, and relocate the debris to a state-approved site at the Contractor's expense. Any fines, penalties, or fees related to the illegal disposal of construction debris will be paid for by the Contractor, not the Government. All soil taken off its originating site shall be screened for construction debris and other trash prior to disposal, either on-base or off-base.

**Addressing Munitions Concerns.** The above screening stipulations will likely capture any potential munitions-related items (should they be present). However, sites with a potential for MEC or material potentially presenting an explosive hazard (MPPEH) may still require an additional level of UXO construction support. Sites recommended to

have UXO soil screening or UXO construction support include the following:

a. Construction is located on Munitions Response Program (MRP) Site, which is a former live-fire range that has been officially closed and assessed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERLA). MRP sites that are currently or have previously been assessed and documented to have MEC/MPPEH present will have UXO screening requirements specific to their project site. Contact the Installation Restoration (IR) Program Manager for details on what munitions have been found and what level of UXO Construction Support will be required. Reference MCO 8020.10 for guidance.

b. Construction is located within operational training area. This may require some level of UXO construction support, depending on the current and historic use of the property. Consult with G-3/5 and the MCIEAST Explosives Safety Officer (not EMD) on what level of UXO screening and/or construction support is warranted.

c. Documentation exists that the property was previously used for training (maneuver and live fire areas, to include firing lines and impact areas), and was administratively closed as a training area in accordance with Marine Corps Order (MCO) 5090.2, Volume 10 (administrative closure), **and** there exists documentation or evidence that MEC or MPPEH have been found on or close to the property.

(1) Recent construction on sites documented as non-live fire maneuver areas have resulted in practice munitions being discovered during survey and ground intrusive activities supporting construction. Consult with the IR Program Manager, Base EOD, and/or the Explosives Safety Officer on whether additional UXO construction support is warranted.

d. Documentation exists that MCB EOD has responded to and identified munitions-related items on the proposed project site. This may include the current project (i.e., if munitions items are found during the course of the project, UXO screening and/or construction support may be required to complete the project, which will likely require a change order). The items found will determine what level of UXO screening or construction support are warranted e.g., finding a flare would not necessarily require soil screening, but finding a 3.5" practice rocket might).

(1) This can be determined through interviews of EOD or MCIEAST Explosives Safety Office (ESO) personnel.

(2) Confirm with MARCORSYSCOM and the ESO if the items found by EOD require soil screening and/or UXO construction support.

e. Exceptions:

(1) Sites currently or previously assessed under the MRP with documentation concluding no further action (NFA) with regards to munitions would **not** need to be rescreened for UXO or require the soil from that site to remain on base. The IR Program Manager will identify sites that have been assessed under the MRP. **Note, soil screening to remove deleterious material is still required.**

(2) Sites that have already been developed and are being redeveloped (i.e., demolish and rebuild, installation of utilities, etc.), regardless of their historic use as a training area are not recommended for UXO soil screening, unless EOD has responded to the area, or if there is past or current documentation to indicate the presence of munitions-related items (i.e., MRP). **Note, soil screening to remove deleterious material is still required.**

**Drilling Mud Disposal:** Prior to using drilling fluid additives, the Safety Data Sheets shall be submitted to Contract Representative and EMD/RCRS for review to ensure harmful chemicals are not being injected into the ground. Excess soil cuttings and drilling fluids shall be managed so as to not impact surface water or stormwater conveyance systems. Assuming the material is not contaminated by regulated compounds or impacted by PFAS, excess drilling mud and soil cuttings can either be spread on site around the borehole, or, once dried on site, transported to the base landfill for use as daily cover. Material transported to the base landfill must be coordinated in advance with the Base Landfill Manager and must pass paint filter test for excess moisture. Additional testing requirements may be required; coordinate with the landfill manager.

**RECORD RETENTION:** Copies of soil screening documentation/certification shall be maintained in accordance with Navy Document retention policies (reference SECNAV M5210.1), shall be kept on-site through the duration of the construction project, and shall be made available for inspection upon request. Copies of all waste manifests, including those for soil going to the base landfill, shall be maintained by EMD Resource Conservation and Recovery Section, the transporter, and the receiving facility for a minimum of 3 years in accordance with for soil disposal shall be maintained in accordance with 40 CFR 262.40(a).

**REGULATORY CITATION:**

MCO 5090.2  
 BO5090.12  
 OPNAVINST 8020.15A-MCO 8020.13A  
 MCO 8020.10  
 MCIEAST-MCB CAMLEJO 5090.10  
 MCO 8023.3B

DDESB TP-18  
SECNAV M5210.1  
RCRA, 42 USC 6901  
CERCLA of 1980, 42 U.S.C. 9601 and Superfund Amendments and  
Reauthorization Act (SARA) of 1986  
MCIEAST-MCB CAMLEJ Decision Memorandum ER13-321 (dtd 24 Oct 2013)  
OPSNOTE 2021-001

TRAINING:

"3R" UXO Safety Training, available through the ROICC, OICC, EMD, or  
following website:

<https://www.lejeune.marines.mil/Offices-Staff/Environmental-Mgmt/Training-Video/>

REFERENCE:

CH2M, 2016. *Investigation and Remediation Waste Management Plan  
Marine Corps Base Camp Lejeune and Marine Corps Air Station New  
River, North Carolina. October.*

Enclosure: 1. *Marine Corps Base Camp Lejeune Per and  
Polyfluoroalkyl Substances Guidance for Construction*

POINTS OF CONTACT:

Environmental Management Division (EMD):

- EMD Administrative Assistant: (910) 451-5003  
o

Environmental Quality Branch:

- Installation Restoration (IR) Program Manager, Thomas Richard:  
(910) 451-9641, [Thomas.Richard@usmc.mil](mailto:Thomas.Richard@usmc.mil)
  - o PFAS, UXO, and non-petroleum impacts
- Petroleum (POL) Remediation Program Manager, Thomas Richard:  
(910) 451-9641, [Thomas.Richard@usmc.mil](mailto:Thomas.Richard@usmc.mil)
  - o POL impacts

Environmental Conservation Branch:

- National Environmental Policy Act (NEPA) Program Manager, Jessi  
Baker: (910-) 451-4542, [Jessi.Baker@usmc.mil](mailto:Jessi.Baker@usmc.mil)

# Per and Polyfluoroalkyl Substances Guidance for Construction

## Marine Corps Base Camp Lejeune

Updated: 5 October 2021

---

### Background

Per- and Polyfluoroalkyl Substances (PFAS) are a set of chemicals with evolving regulatory requirements and PFAS-impacted soil and water require special handling considerations. PFAS-Impacted media are known to be in existence throughout the installation; two PFAS, PFOA and PFOS, are associated with Aqueous Film Forming Foam and other industrial use. As of September 2021, PFAS concentrations aboard Marine Corp Base (MCB) Camp Lejeune or Marine Corp Air Station (MCAS) New River are not fully known. Suspect areas have been identified and limited sampling has been conducted, but the full nature and extent of PFAS impacts aboard the installation will take many years to determine. If significant PFAS impacts are suspected at a construction site, site-specific sampling is prudent to determine soil and dewatering management requirements. This guidance provides guidelines for managing PFAS-impacted soil and water at MCB Camp Lejeune, which will prevent future contamination and ensure health and environmental protections.

### Guidance

Naval Facilities Engineering Systems Command (NAVFAC) Capital Improvements (CI) can provide comments on PFAS impacts for NAVFAC Military Construction (MILCON). Additionally, PFAS data can be obtained through review of your project Decision Memorandum (DM, March 2020 and beyond), review of the most current PFAS maps (available through the IR Program), or by contacting the IR Program directly. If you do not have a DM, or your DM was finalized prior to March 2020, contact the NEPA Program at [Lejeune\\_REIR@usmc.mil](mailto:Lejeune_REIR@usmc.mil) or at 910-451-9454.

Base Environmental Management Division (EMD), G-F maintains shapefiles and basewide maps, based on Navy Environmental Restoration Program PFAS investigations, currently available to all government employees and government contractors. Request up-to-date copies of shapefiles and maps by contacting Laura Spung, [laura.spung@usmc.mil](mailto:laura.spung@usmc.mil), (910) 451-9610.

Should your construction site be identified in the DM as having PFAS concerns, or is within a PFAS buffer area, assume groundwater and/or soil is impacted and follow the guidance below. *Note: sampling may be required to determine if PFAS-impacted media is present and to what extent.*

PFAS-impacted media: PFAS-impacted groundwater is defined as any exceedances of PFAS levels per current DOD guidance, which encompasses 18 PFAS compounds sampled per EPA Method 537.1 via DOD ELAP accredited laboratory by LCMSMS, Compliant with Table B-15 of QSM 5.3 or latest Version). Refer to the 'Laboratory Information' section below for more details. (*Note: see PFAS-impacted soils below*)

- Dewatering PFAS-impacted groundwater: Per DON Policy<sup>1</sup>, groundwater impacted above 70 parts per trillion (ppt) Perfluorooctanoic acid (PFOA) and/or Perfluorooctanesulfonic acid (PFOS) must be treated to below 70 ppt prior to release (*additional permitting may be required*); otherwise it must be containerized and properly manifested for disposal at a permitted facility. For construction sites identified as impacted and groundwater concentrations are unknown, sampling should be conducted to determine PFAS concentrations in groundwater if dewatering is required. If groundwater is found to be above 70 ppt PFOA or PFOS individually or 70 ppt combined, TREATMENT is required prior to discharging onsite.

- If soils are to leave the originating construction site, testing shall be conducted on soils within PFAS groundwater buffer areas, unless existing soil data is available. Further soil impact details are provided below.

PFAS-impacted soils: PFAS-impacted soils are defined as soil with **any** detections of PFAS compounds (presence/absence) per current DOD guidance (18 PFAS compounds sampled per EPA Method 537.1 via DoD Environmental Laboratory Accreditation Program (ELAP) accredited laboratory by liquid chromatography/mass spectrometry/mass spectrometry (LCMSMS) Compliant with Table B-15 of QSM 5.3 or latest Version). Laboratory guidance is provided in the 'Laboratory Information' section below. While there are currently no promulgated State of North Carolina or Federal soil cleanup standards, the State of North Carolina Department of Environmental Quality verbally clarified that soils containing PFAS compounds may only be disposed in a subtitle C or D landfill.<sup>2</sup>

PFAS-impacted soil management options are provided below:

#### 1. Left on-site:

This is the preferred management practice and reduces sampling requirements. Impacted or potentially-impacted materials can be left on site (i.e., within the original construction footprint/area of disturbance) in a manner which minimizes cross-contamination and prevents the spread of the impacted footprint. Materials should not be allowed to create run off (i.e., stockpiled on site without sediment and erosion controls in place). Materials can be used as fill within the area of generation, but cannot be transported to other, non-contiguous locations aboard the installation, even if the other areas are also impacted by PFAS. Sampling is not required if the soil does not leave the site.

#### 2. Landfilled:

Landfilling will require the contractor to perform sampling and testing of soil via EPA Method 537.1, per above. The majority of environmental consultants in the environmental remediation and site assessment industry should be familiar with PFAS sampling. PFAS sampling protocols have stringent requirements, very low detection levels, and cross contamination is a concern. It is recommended that an experienced environmental professional should collect samples and interpret results. PFAS-impacted soil must go to a permitted landfill. It cannot be reused/recycled, or land-farmed. Please consult your environmental professional on disposal facilities that will accept PFAS-impacted media.

Once analytical data are generated, a waste profile must be created. The waste must then be manifested through the Resource Conservation and Recovery Section (RCRS), Environmental Compliance Branch, EMD, G-F, to document volume and concentrations of the PFAS impacted materials. The waste manifests must properly characterize and clearly indicate that PFAS compounds are present and should be coordinated with RCRS.

RCRS Contacts:

Tony Recob, [Anthony.recob@usmc.mil](mailto:Anthony.recob@usmc.mil)

Felicia Padilla, [Felicia.padilla@usmc.mil](mailto:Felicia.padilla@usmc.mil)

**ON BASE LANDFILL:** As of October 5, 2021, the Base Landfill will not accept PFAS-impacted soil until further notice<sup>3</sup>.

Contacts:



Jaime Harrell, [jaime.harrell@usmc.mil](mailto:jaime.harrell@usmc.mil)  
Pete Woodall, [brian.d.woodall@usmc.mil](mailto:brian.d.woodall@usmc.mil)

**OFF BASE LANDFILL:** Arrange for the materials to be transported to an off-base permitted subtitle D landfill (i.e., non- hazardous waste lined landfill); this will require disclosure that the soil contains or may contain PFAS. PFAS-impacted soils can be disposed of at a Subtitle C landfill (i.e., hazardous waste landfill); however, this may be costly. A copy of the landfill's current permit license and a recent ECHO report from the EPA's website must be provided to RCRS, along with the Waste Profile to validate the receiving facility is approved and not out of compliance.

Note: Testing requirements for the receiving facility may vary. Due to the nature of PFAS impacted materials, disposal facilities in the state of North Carolina may not accept the materials and the contractor should be prepared to transport the material out of state for disposal if the material cannot stay on installation property.

No Impacts: If neither groundwater nor soil is impacted, this area is not considered "impacted." Note: receiving facilities may have their own sampling requirements, which may require PFAS testing even if the base does not. Any and all analytical results should be provided to the base for their records. If soil and/or groundwater are determined to be "impacted" at any point, including if the contractor has tested the soil due to off-base soil receiving facility testing requirements, the requirements outlined above for impacted media will apply. In addition, due to the limited nature and extent of current PFAS data available, there are no "guarantees" in the applicability of this data set and appropriate precautions and contingency cost planning should be done accordingly.

***Construction Managers (CMs)/Contractors Responsibilities:***

- CMs/Contractors are responsible for testing, generating waste profiles, and coordinating manifesting of impacted materials through RCRS.
- CMs/Contractors are responsible for contacting the base landfill and inquiring on capacity.
- CMs/Contractors are required to disclose presence or potential presence of PFAS in soil disposed off-base; testing requirements for an off-base receiving facility may vary and should be confirmed by the CM/Contractor.
- The contractor on behalf of the government cannot sign waste Profiles and Manifests; they must be routed through either G-F/EMD/RCRS or MCAS NR/Installation and Environmental Department (if on MCAS NR).

***Additional Resources:***

The Installation Restoration Program is conducting a PFAS Site Investigation on the majority of the installation. This site investigation data is very limited in scope at this time and can only be utilized for screening (i.e., it may not give a clear "clean" determination for PFAS, as PFAS impacts have not been delineated, and only limited sampling has been done). The full nature and extent of PFAS impacts aboard the installation will remain unknown until the full remedial investigation can be completed; this process may take many years to complete.

### ***Laboratory Information:***

The publicly accessible DENIX database should be used as a starting point when selecting a laboratory for a project. It does not provide all information needed (e.g., version of method or requirements and list of analyte lists under accreditation). To ensure the laboratory you select is accredited for your project analytes, the project manager/chemist must review the laboratory's scope of accreditation, which is found on their accreditation body's website. The DoD-ELAP accredited laboratory database can be found by following the link under the heading "Search Accredited Labs" on the EDQW page on the DENIX website:

<http://www.denix.osd.mil/edqw/home/>

(<https://www.denix.osd.mil/edqw/accreditation/accreditedlabs/index.html> )

- Drinking Water: PFAS sampling in drinking water can be conducted using EPA Method 537.1. A list of DoD-ELAP laboratories that are currently accredited to perform analysis of drinking water samples can be generated by performing a method search for the analytical method (e.g., EPA 537.1). In order to determine the version of EPA Method the laboratory is accredited for, the laboratory's DoD-ELAP Scope of Accreditation Certificate must be reviewed. Soil or groundwater: There is currently no EPA method for PFAS testing other than drinking water that is authorized by DOD; testing PFAS in soil or groundwater requires compliance with DoD Quality Systems Manual (QSM) requirements. Currently, a list of DoD-ELAP laboratories that are currently accredited to perform analysis of other media in accordance with the requirements of the DoD Quality Systems Manual (QSM) can be generated by performing a method search on DENIX for "PFAS by LCMSMS Compliant with Table B-15 of QSM 5.3 or latest Version". In order to determine which version of the DoD QSM the laboratory is accredited for, the laboratory's DoD-ELAP Scope of Accreditation Certificate must be reviewed.

### ***Contact information:***

#### IR Program:

Laura Spung, [laura.spung@usmc.mil](mailto:laura.spung@usmc.mil), (910) 451-9610

Thomas Richard, [thomas.richard@usmc.mil](mailto:thomas.richard@usmc.mil), (910) 451-9641

#### NAVFAC DC:

Resident Officers in Charge of Construction (ROICC): Angela Jones, [angela.jones1@navy.mil](mailto:angela.jones1@navy.mil), or Jeff Ghent, [jefferson.ghent.ctr@navy.mil](mailto:jefferson.ghent.ctr@navy.mil)

Hurricane Florence ROICC: Mike Therrien [michael.v.therrien@navy.mil](mailto:michael.v.therrien@navy.mil)

#### RCRS (Waste Manifesting):

Tony Recob, [Anthony.recob@usmc.mil](mailto:Anthony.recob@usmc.mil)

Felicia Padilla, [Felicia.padilla@usmc.mil](mailto:Felicia.padilla@usmc.mil)

#### Base Landfill:

Jaime Harrell, [jaime.harrell@usmc.mil](mailto:jaime.harrell@usmc.mil)

Pete Woodall, [brian.d.woodall@usmc.mil](mailto:brian.d.woodall@usmc.mil)

### ***References:***

<sup>1</sup> DASN (E) POLICY MEMO, "ADDITIONAL AQUEOUS FILM FORMING FOAM (AFFF) CONTROL, REMOVAL, AND DISPOSAL REQUIREMENTS," 6 MARCH 2018

<sup>2</sup> BASED ON DISCUSSIONS WITH NCDEQ AND MCIEAST ON DISPOSAL OF PFAS CONTAINING SOILS.

<sup>3</sup>DISCUSSION WITH PWO CDR CAMPBELL AND E-MAIL FROM B. WOODALL DATED 5 OCTOBER 2021.

## EXPRESS APPLICATION REVIEW FEES

Permit Programs the Legislation specifically identifies for availability of Express Review. *Express meetings are by appointment.*  
The fees for express review of these permit applications are as follows:

**Chart 1: State Stormwater, 401 & Buffer Permitting, Erosion/Sedimentation & Coastal Management**

Permit Type	Express Application Fees		Standard Fees	Express Notes	Express Process Time	Application Processing Location			
State Stormwater <sup>1</sup>	New Permit	\$4,000 <sup>2</sup> High Density	\$505	New High Density permits (only) will expire 8 years later after issuance. [15A NCAC 02H.1040(4)(b)]	~30 calendar days	Region			
		\$2,000 Low Density							
		\$2,000 Offsite							
		\$1,000 General Permit							
		\$500 Redevelopment Exclusions							
		\$500 Exemption							
	Major Modification	\$4,000 <sup>2</sup> High Density		A project with outstanding violations may not be accepted.					
		\$2,000 Low Density							
		\$2,000 Offsite							
		\$1,000 General Permit							
		\$500 Redevelopment Exclusions							
		\$500 Exemption							
	Minor Modification	\$1,500 High Density		A project with outstanding violations may not be accepted.					
		\$1,000 Low Density							
		\$750 Offsite							
		\$750 General Permit							
		\$500 Redevelopment Exclusions							
		\$500 Exemption							
	Rescission Request	\$500 Any Permit Type							
	<a href="#">Learn more</a> about the State Stormwater Program and fees.								
Stream Origination Certification including Intermittent vs. Perennial Determinations	\$200 for 1-2 calls/property		No fee (60 days)	*Stream origin (intermittent vs. perennial stream) calls of more than 20/property would follow a similar schedule	~ 9 working days	Region			
	\$500 for 3-6 calls/property								
	\$1000 for 7-9 calls/property								
	\$1200 for 10-12 calls/property*								
	\$1500 for 13-16 calls/property*								
	\$2000 for 17-20 calls/property*								
Water Quality Certifications, Including Isolated Wetland Permits & Riparian Buffer Variance (Var.)	\$1000 Minor \$2000 Major		\$240 Minor	<u>Minor project</u> : < 1 acre of wetlands/ < 150 linear feet of stream impact	~ 30 calendar days	Region			
				<u>Major project</u> : impacts higher than above thresholds					
	\$1000 Isolated Wetland General Permit		\$570 Major						
	\$2000 Riparian Buffer Approval								
	\$1000 Coastal General Major Variance \$500 Minor Variance		No fee	Tar-Pamlico & Neuse Basin, only for now		Region			
<a href="#">Learn more</a> about the 401 & Buffer Permitting Branch and fees.									

## EXPRESS APPLICATION REVIEW FEES

Erosion and Sedimentation Control	\$250 per acre up to 8 acres at a maximum fee of \$2000; plus \$100 per acre (unlimited)	\$100 per acre disturbed		~ 3 working days	Region
<a href="#">Learn more</a> about the Erosion / Sedimentation Control Program and fees.					
CAMA (Major only)	\$2000	\$400	Limited up to 4 boat slips (including existing and proposed); no NEW dredging projects, No maintenance dredging unless previously permitted	~ 30 calendar days	Region
<a href="#">Learn more</a> about the Coastal Management Program and fees.					

**Note: The legislation allows additional fees, not to exceed 50% of the original express review permit application fee, to be charged for subsequent reviews due to the insufficiency of the permit applications.**

### Multiple Express Permit Fees:

When an applicant requests express review of more than one type of permit application associated with a single project, **and the applications are submitted to DEQ at the same time**, the maximum fee paid may not exceed the following amounts:

**Chart 2 – Permit Fee Caps as stated in the Legislation, applicable to the programs listed in Chart 1**

	Situation A	Situation B	Situation C
If applications submitted include →	All of the five types of applications listed above in <b>Chart 1</b>	The first four of the applications listed above in <b>Chart 1</b> (all but a CAMA permit application)	Any other combination of the applications listed above
Then, the total application fee <sup>3</sup> is →	\$5500	\$4500	\$4000

<sup>1</sup> For transfers, name changes, and renewals, see [the State Stormwater Permit Standard Process Application Fee schedule](#). Please note that expired permits cannot be modified until renewed and returned to an active status. The following projects are not eligible for the express process:

- i. High density projects that propose or modify more than five (5) stormwater control measures (SCMs). Up to three (3) additional SCMs, for a total of eight (8), may be allowed if approved by the stormwater supervisor and/or discussions during the scoping meeting determine the modifications to be minor in nature.
- ii. Projects that impact another permit, overlap another permit, or cause another permit to become out of compliance. The only exception is when the necessary resolution to the adjacent or impacted permit is also submitted to the express stormwater permitting program and accepted at the same time.
- iii. Alternative designs. The express program is designed for those projects that meet all established rules, policy and guidance. Projects that propose alternatives to these established requirements require additional review time that cannot be met under the timelines established for the express stormwater permitting program.
- iv. Projects with compliance issues where the issues will not be resolved by the proposed permitting action.

<sup>2</sup> Please refer to the [Express Permitting Program](#) and the Express coordinators regarding the option to bundle express fees when more than one type of express permit application is submitted at the same time (*please refer to chart 2 above*).

<sup>3</sup> If application is made for an Erosion & Sedimentation Control (E&SC) permit, under one of the situations provided above, the applicant must pay a fee equal to \$100 per acre of land disturbed plus the fee indicated in the table.

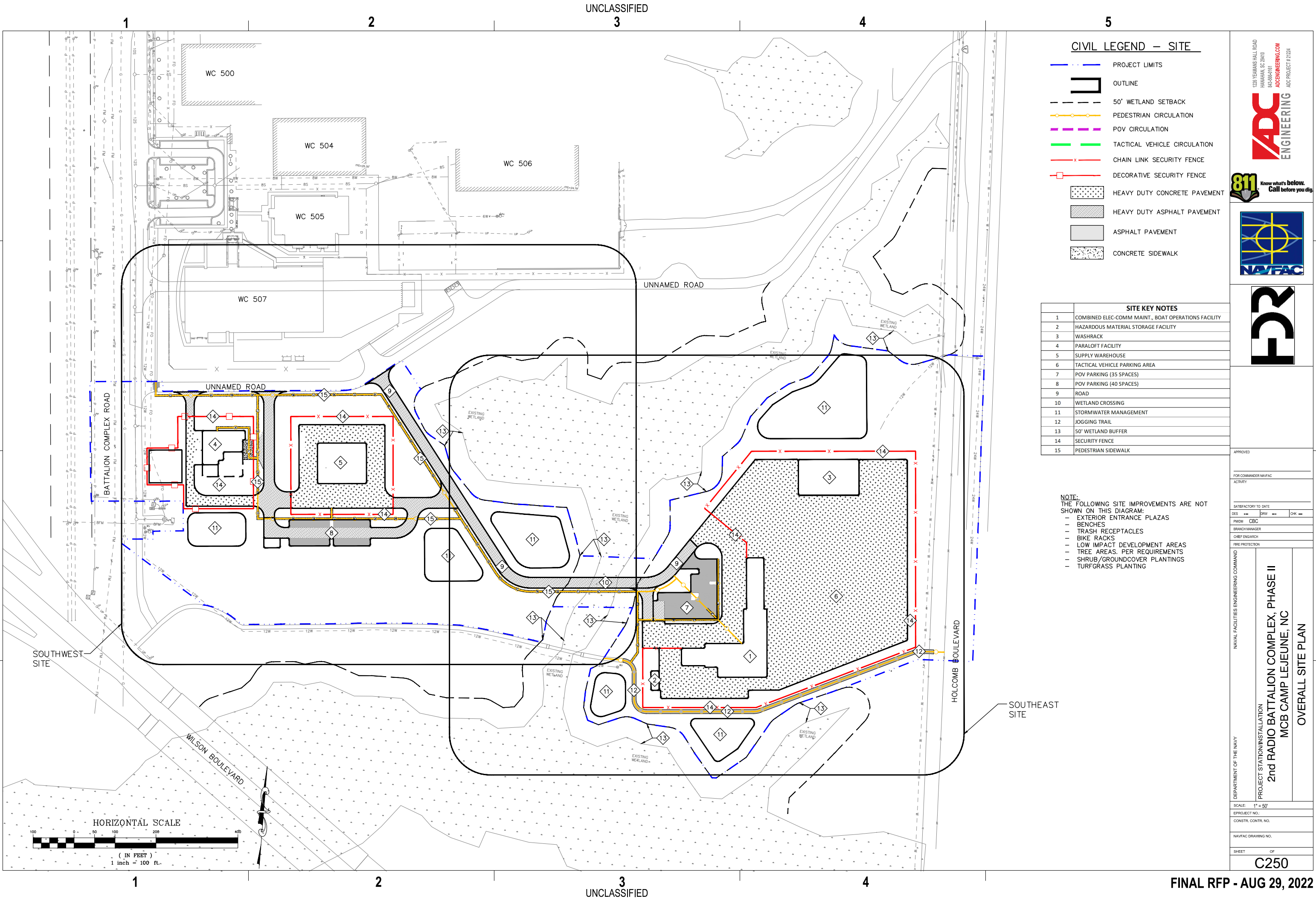
*Example: If an applicant requests express review of applications submitted for state storm water permit (high density project) and an E&SC permit (8 acres disturbed) the fee for this project is \$4000 for the express fee and \$800 (\$100 per acre x 8 acres). The Department prefers these Land Quality Acreage fees be paid separately. **All checks should be made out to NC DEQ.***

## **Part 6 - Attachments**

### Chapter B - Drawings

- Overall Site Plan
- Topographic Survey
- Partial Survey

This page intentionally left blank.



APPROVED

FOR COMMANDER NAVFAC ACTIVITY

SATISFACTORY TO DATE

DES -- DRW -- CHK --

PMCM CBC

BRANCH MANAGER

CHIEF ENGINEER

FIRE PROTECTION

NAVAL FACILITIES ENGINEERING COMMAND

DEPARTMENT OF THE NAVY

PROJECT STATION/INSTALLATION

2nd RADIO BATTALION COMPLEX, PHASE II

MCB CAMP LEJEUNE, NC

OVERALL SITE PLAN

SCALE: 1" = 50'

E/PROJECT NO.:

CONSTR. CONTR. NO.:

NAVFAC DRAWING NO.:

SHEET OF

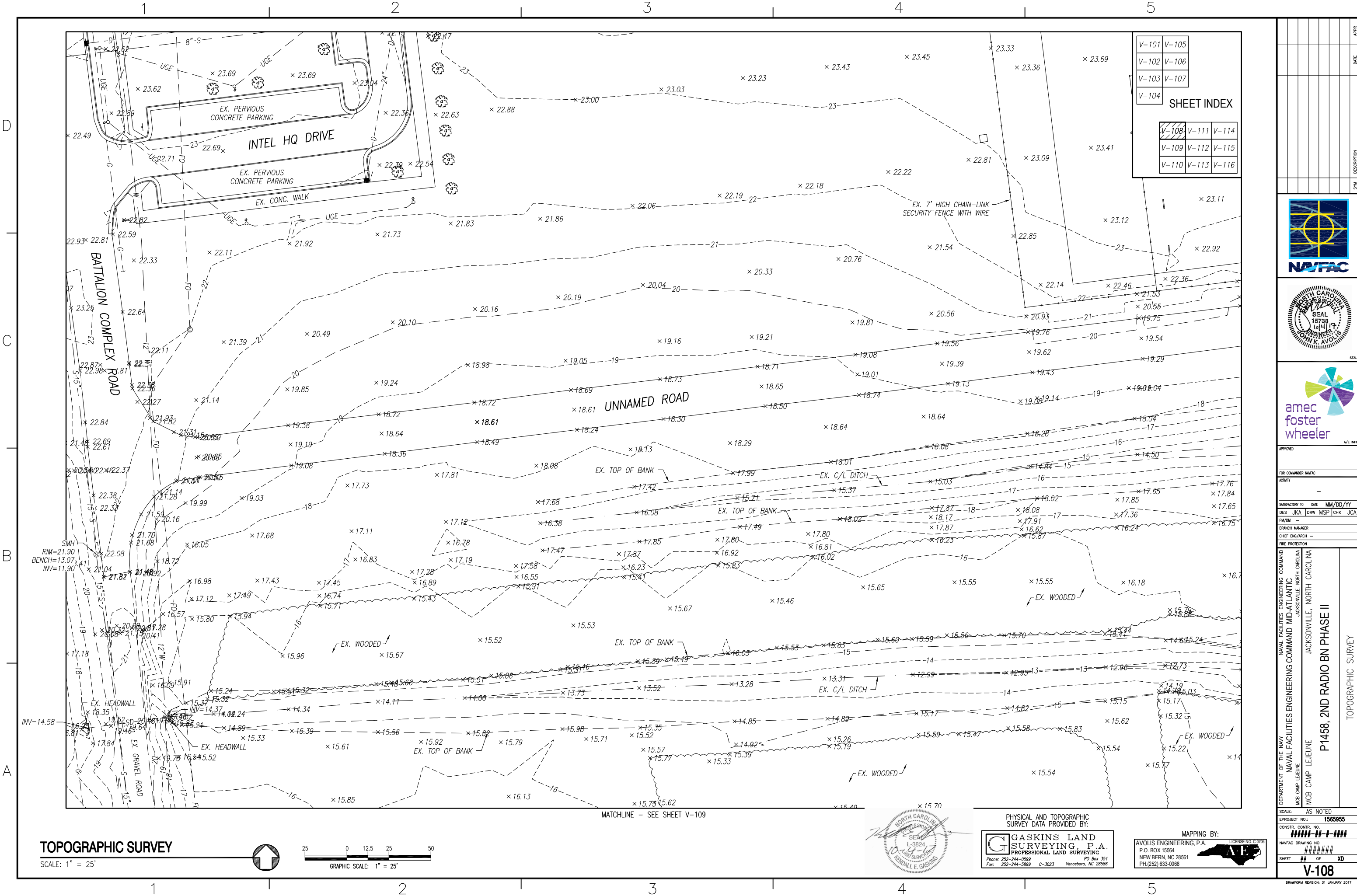
C250



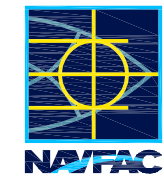








V-101	V-105
V-102	V-106
V-103	V-107
V-104	
SHEET INDEX	
V-108	V-111
V-109	V-112
V-110	V-113
V-114	V-115
V-116	



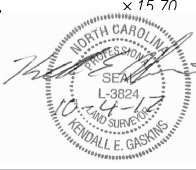
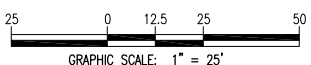
APPROVED
FOR COMMANDER NAFAC
ACTIVITY
SATISFACTORY TO
DES JKA
PA/DM
BRANCH MANAGER
CHIEF ENGINEER/ARCH
FIRE PROTECTION

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC  
JACKSONVILLE, NORTH CAROLINA  
P1458, 2ND RADIO BN PHASE II  
TOPOGRAPHIC SURVEY

SCALE:	AS NOTED
PROJECT NO.:	1565955
CONSTR. CONTR. NO.	#####
NAFAC DRAWING NO.	#####
SHEET	11 OF 11
V-108	

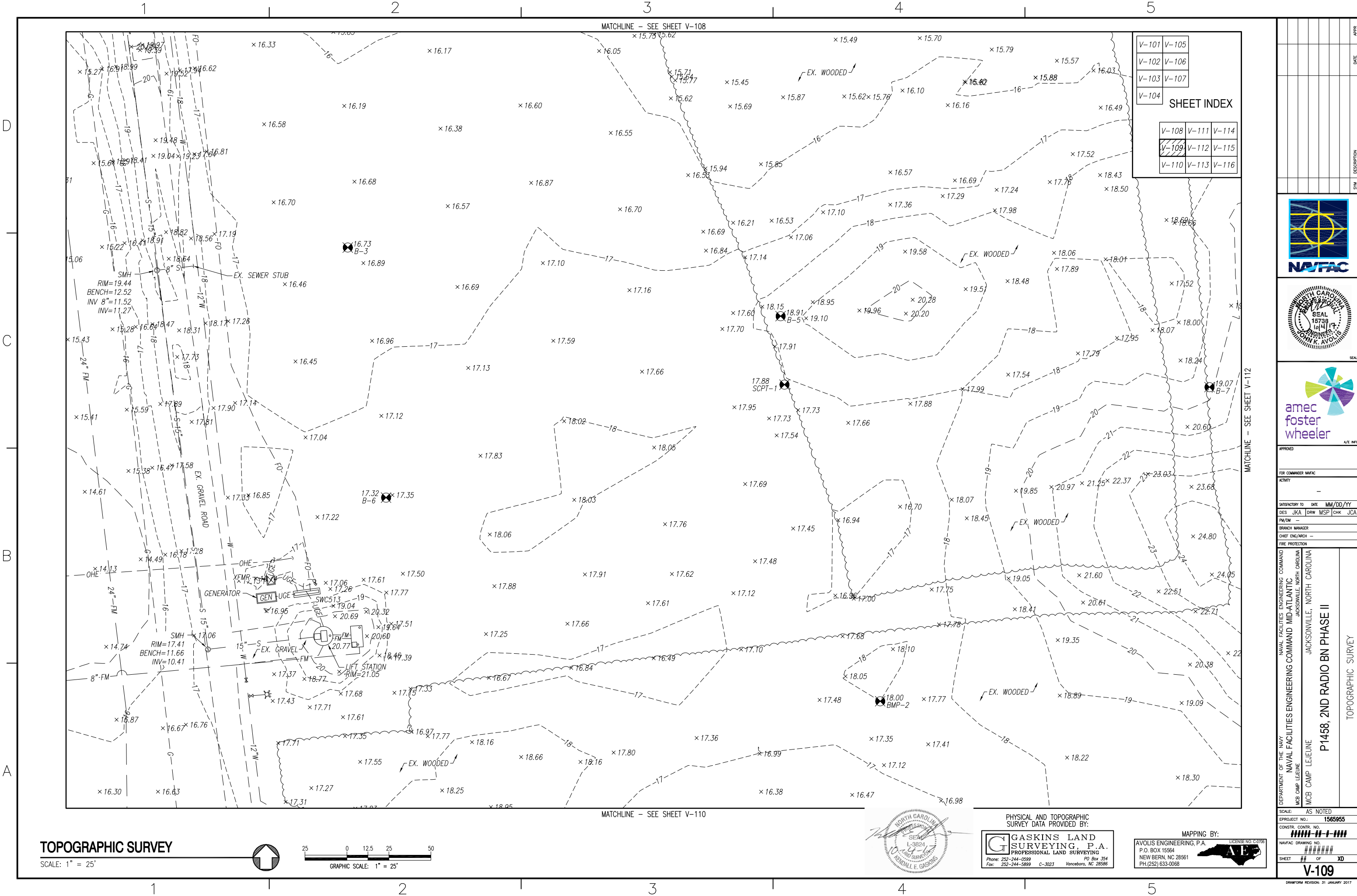
TOPOGRAPHIC SURVEY

SCALE: 1" = 25'



PHYSICAL AND TOPOGRAPHIC  
SURVEY DATA PROVIDED BY:  
**GASKINS LAND SURVEYING, P.A.**  
PROFESSIONAL LAND SURVEYING  
Phone: 252-244-0599 C-3023 Vanceboro, NC 28586  
Fax: 252-244-5899

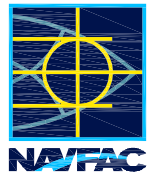
MAPPING BY:  
**AVOLIS ENGINEERING, P.A.**  
P.O. BOX 15564  
NEW BERN, NC 28561  
PH(252) 633-0068



V-101	V-105
V-102	V-106
V-103	V-107
V-104	

SHEET INDEX

V-108	V-111	V-114
V-109	V-112	V-115
V-110	V-113	V-116



APPROVED

FOR COMMANDER NAFAC

ACTIVITY

SATISFACTORY TO DATE MM/DD/YY

DES JKA DRW MSP CHK JKA

PM/DM

BRANCH MANAGER

CHIEF ENG/ARCH

FIRE PROTECTION

NAVAL FACILITIES ENGINEERING COMMAND

NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC

JACKSONVILLE NORTH CAROLINA

JACKSONVILLE, NORTH CAROLINA

MCB CAMP LEJEUNE

MCB CAMP LEJEUNE

P1458, 2ND RADIO BN PHASE II

TOPOGRAPHIC SURVEY

SCALE: AS NOTED

PROJECT NO.: 1565955

CONSTR. CONTR. NO.

NAFAC DRAWING NO.

SHEET 11 OF 11

V-109

DRAWING REVISION: 31 JANUARY 2017

PHYSICAL AND TOPOGRAPHIC  
SURVEY DATA PROVIDED BY:

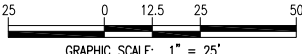
**GASKINS LAND  
SURVEYING, P.A.**  
PROFESSIONAL LAND SURVEYING  
L-3824  
Phone: 252-244-0599 C-3023 Vanceboro, NC 28586  
Fax: 252-244-5899

MAPPING BY:

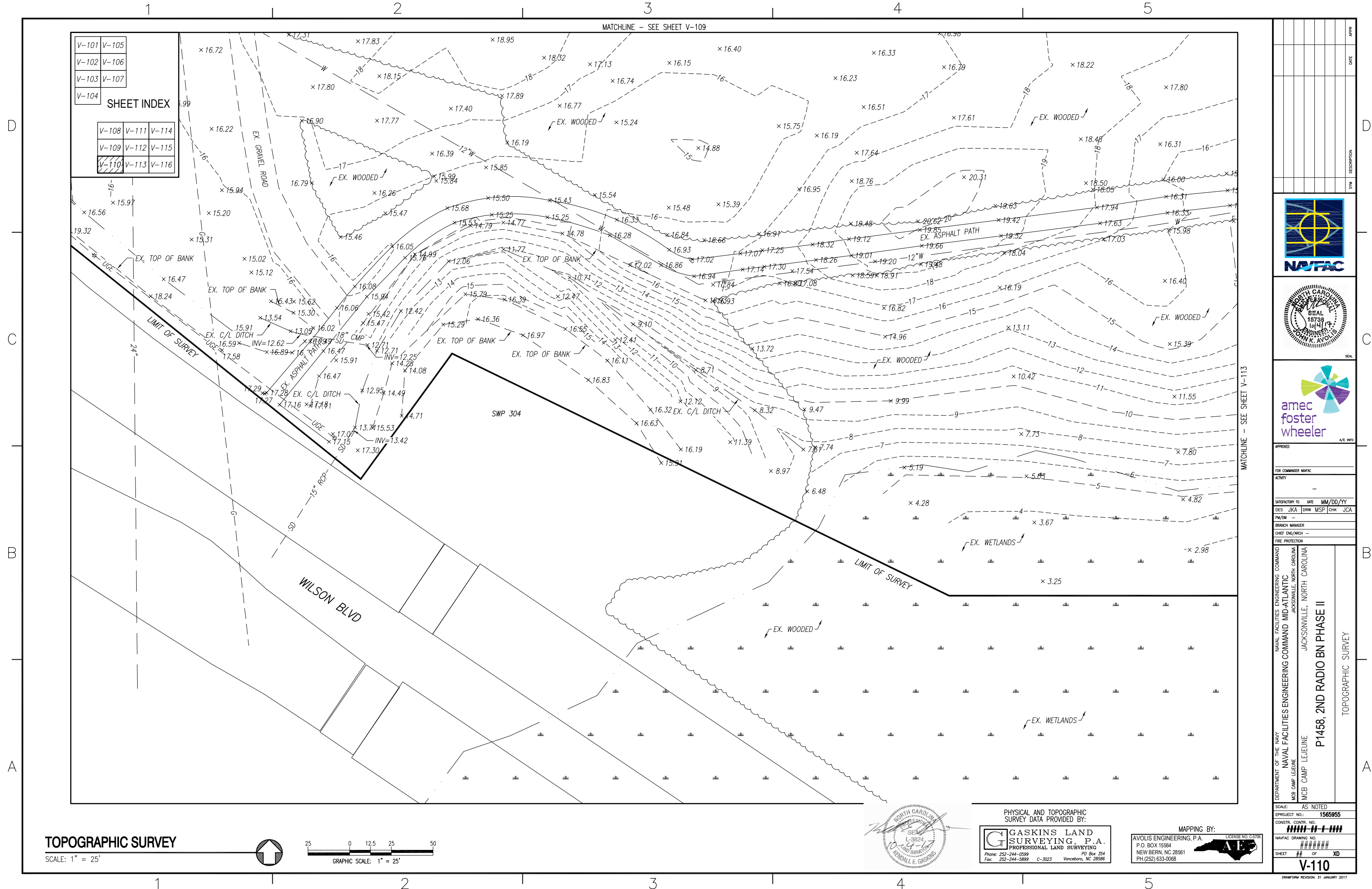
**AVOLIS ENGINEERING, P.A.**  
P.O. BOX 15564  
NEW BERN, NC 28561  
PH: (252) 633-0068

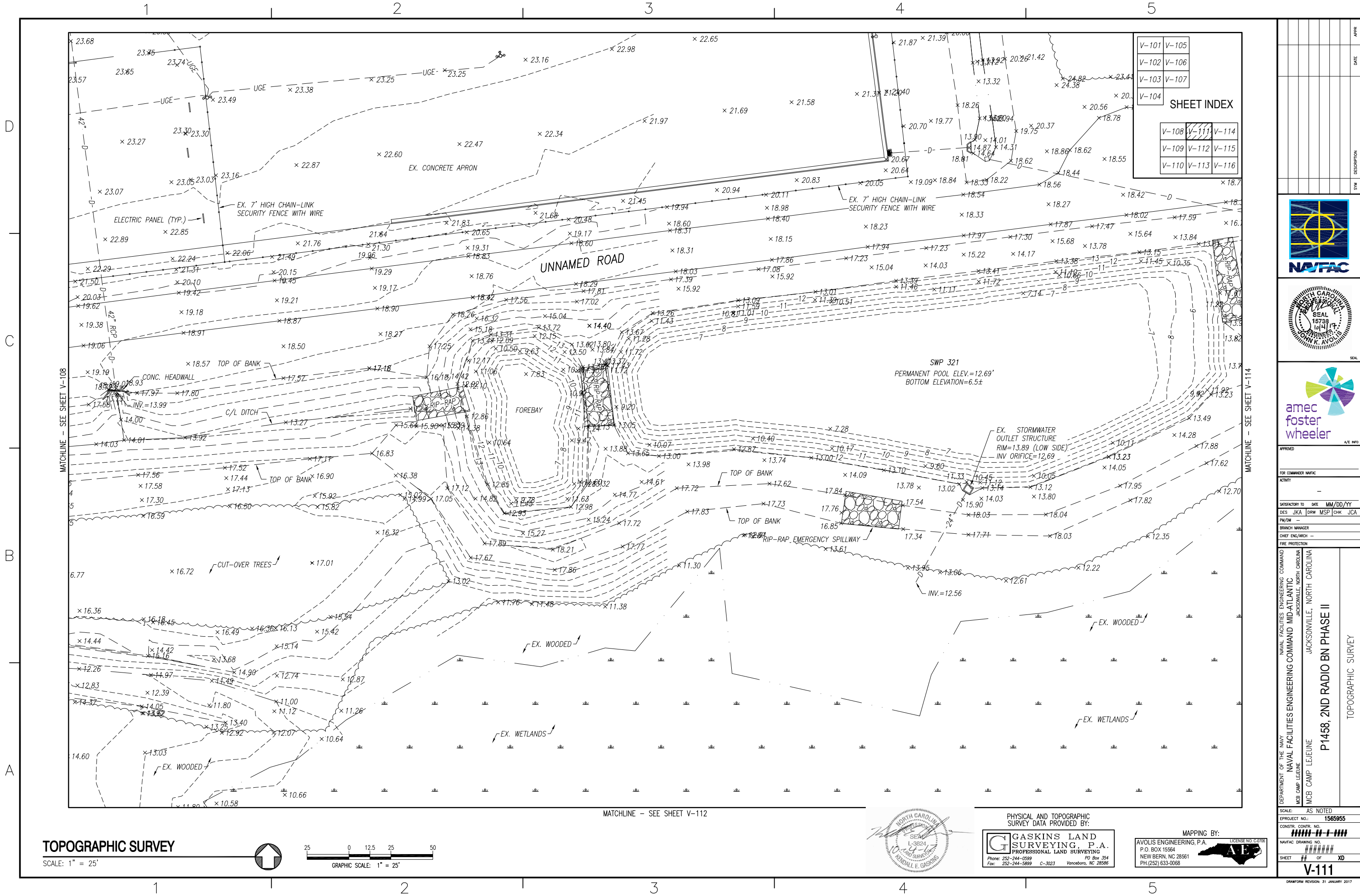
TOPOGRAPHIC SURVEY

SCALE: 1" = 25'





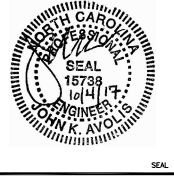




V-101	V-105
V-102	V-106
V-103	V-107
V-104	

SHEET INDEX

V-108	V-111	V-114
V-109	V-112	V-115
V-110	V-113	V-116

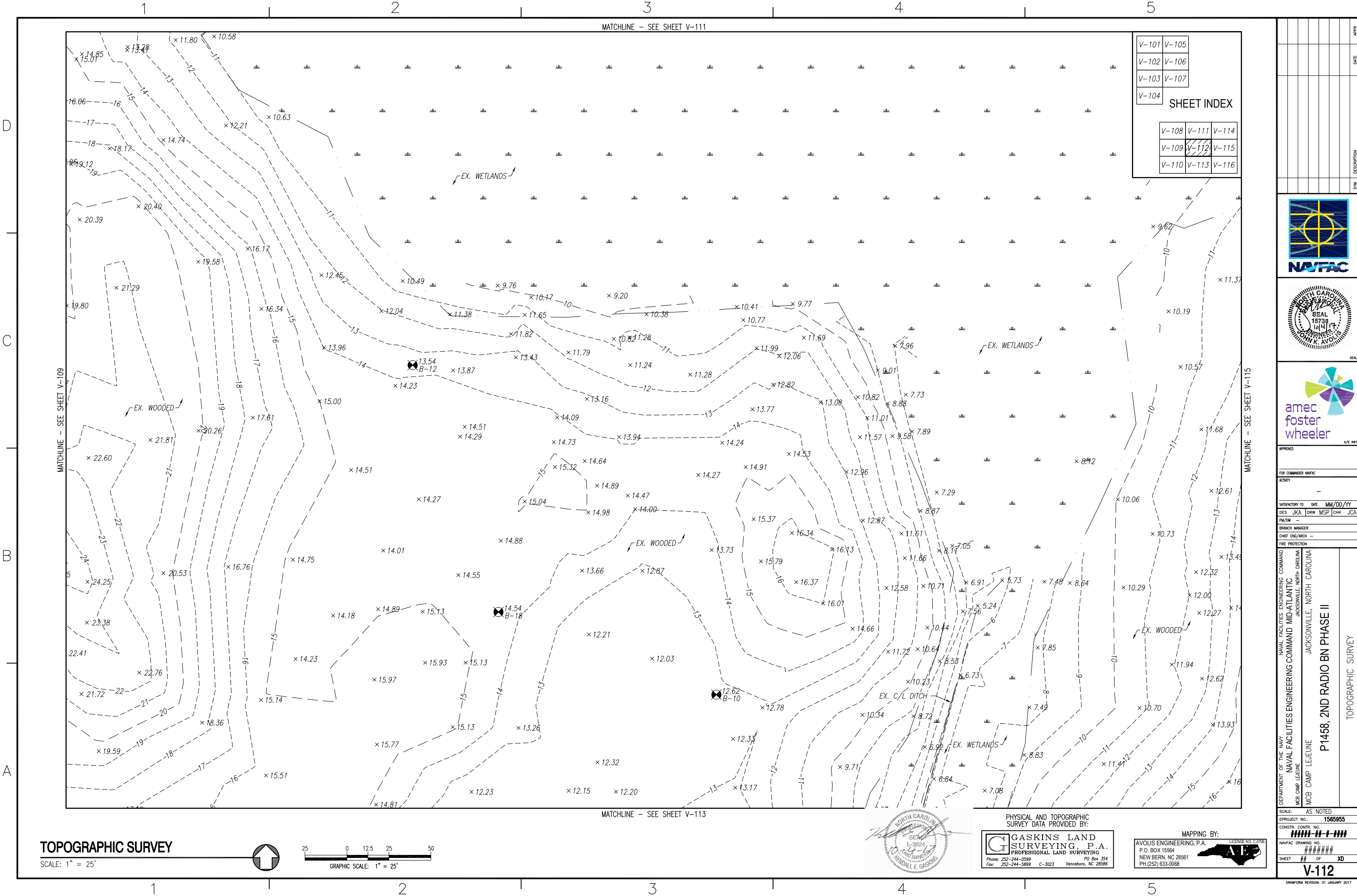


APPROVED	
FOR COMMANDER NAFAC	
ACTIVITY	
SATISFACTORY TO	DATE MM/DD/YY
DES JKA	DRW MSP
PA/DM	CHK JKA
BRANCH MANAGER	
CHIEF ENGINEER/ARCH	
FIRE PROTECTION	

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC  
JACKSONVILLE, NORTH CAROLINA  
MCB CAMP LEJEUNE  
MCB CAMP LEJEUNE  
P1458, 2ND RADIO BN PHASE II  
JACKSONVILLE, NORTH CAROLINA  
TOPOGRAPHIC SURVEY

SCALE:	AS NOTED
PROJECT NO.:	1565955
CONSTR. CONTR. NO.	#####
NAFAC DRAWING NO.	#####
SHEET	11 OF 11
V-111	

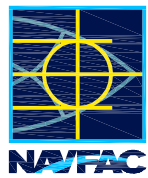
DRAWING REVISION: 31 JANUARY 2017



V-101	V-105
V-102	V-106
V-103	V-107
V-104	

SHEET INDEX

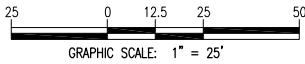
V-108	V-111	V-114
V-109	V-112	V-115
V-110	V-113	V-116



APPROVED
FOR COMMANDER NAVFAC
ACTIVITY
SATISFACTORY TO DATE MM/DD/YY
DES JKA DRW MSP CHK JKA
PA/DM
BRANCH MANAGER
CHIEF ENG/ARCH
FIRE PROTECTION

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC  
JACKSONVILLE, NORTH CAROLINA  
MCB CAMP LEJEUNE  
P1458, 2ND RADIO BN PHASE II  
TOPOGRAPHIC SURVEY

TOPOGRAPHIC SURVEY  
SCALE: 1" = 25'



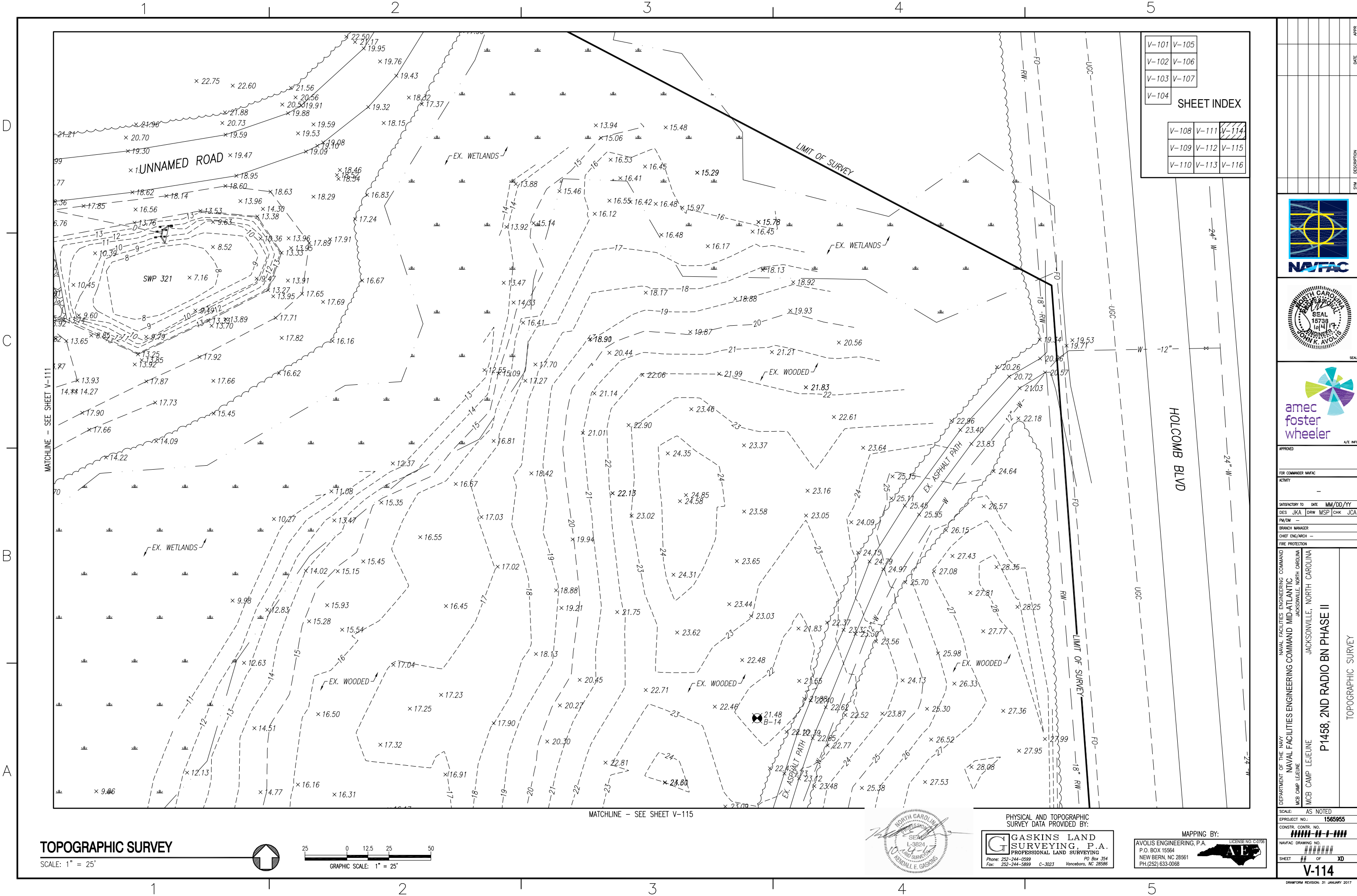
PHYSICAL AND TOPOGRAPHIC  
SURVEY DATA PROVIDED BY:  
**GASKINS LAND SURVEYING, P.A.**  
PROFESSIONAL LAND SURVEYING  
Phone: 252-244-0599 C-3023 PO Box 354  
Fax: 252-244-5899 Vanceboro, NC 28586

MAPPING BY:  
**AVOLIS ENGINEERING, P.A.**  
P.O. BOX 15564  
NEW BERN, NC 28561  
PH (252) 633-0068  
LICENSE NO. C-5706

SCALE:	AS NOTED
PROJECT NO.:	1565955
CONSTR. CONTR. NO.	#####
NAVFAC DRAWING NO.	#####
SHEET	## OF XD
V-112	
DRAWING REVISION: 31 JANUARY 2017	







V-101	V-105
V-102	V-106
V-103	V-107
V-104	

SHEET INDEX

V-108	V-111	V-114
V-109	V-112	V-115
V-110	V-113	V-116



APPROVED \_\_\_\_\_

FOR COMMANDER NAVFAC \_\_\_\_\_

ACTIVITY \_\_\_\_\_

SATISFACTORY TO DATE MM/DD/YY

DES JKA DRW MSP CHK JCA

PA/DM \_\_\_\_\_

BRANCH MANAGER \_\_\_\_\_

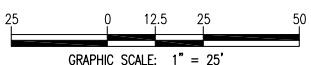
CHIEF ENG/ARCH \_\_\_\_\_

FIRE PROTECTION \_\_\_\_\_

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC  
JACKSONVILLE, NORTH CAROLINA  
MCB CAMP LEJEUNE  
P1458, 2ND RADIO BN PHASE II  
JACKSONVILLE, NORTH CAROLINA  
TOPOGRAPHIC SURVEY

TOPOGRAPHIC SURVEY

SCALE: 1" = 25'



PHYSICAL AND TOPOGRAPHIC  
SURVEY DATA PROVIDED BY:

**GASKINS LAND SURVEYING, P.A.**  
PROFESSIONAL LAND SURVEYING  
Phone: 252-244-0599 PO Box 354  
Fax: 252-244-5899 C-3023 Vancoro, NC 28596

MAPPING BY:

**AVOLIS ENGINEERING, P.A.**  
P.O. BOX 15564  
NEW BERN, NC 28561  
PH (252) 633-0068

SCALE: AS NOTED

PROJECT NO.: 1565955

CONSTR. CONTR. NO. #####

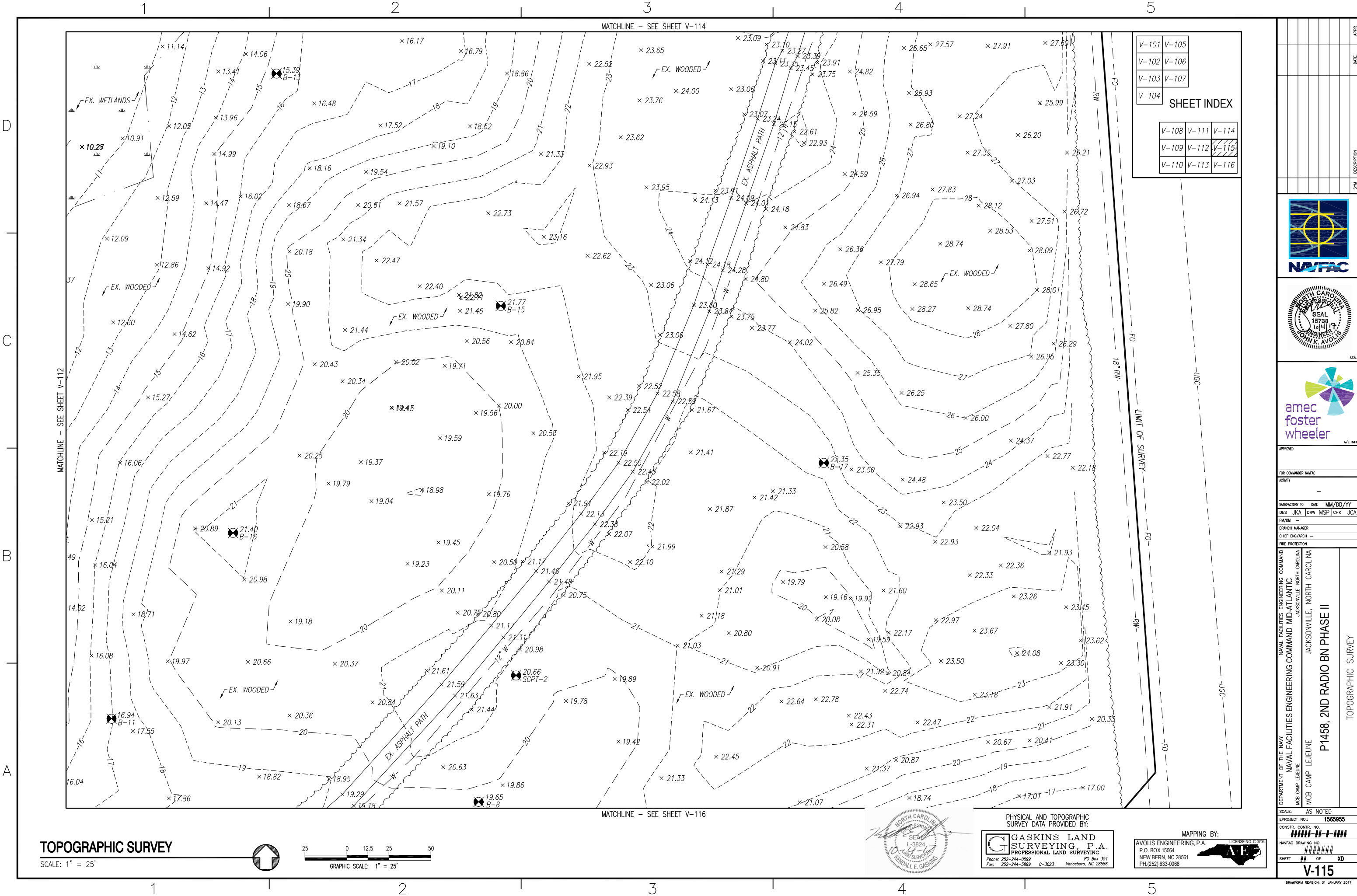
NAVFAC DRAWING NO. #####

SHEET # OF XD

**V-114**

DRAWING REVISION: 31 JANUARY 2017





V-101	V-105
V-102	V-106
V-103	V-107
V-104	

SHEET INDEX

V-108	V-111	V-114
V-109	V-112	V-115
V-110	V-113	V-116



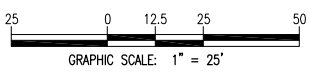
APPROVED
FOR COMMANDER NAFAC
ACTIVITY
SATISFACTORY TO DATE MM/DD/YY
DES JKA DRW MSP CHK JCA
PA/DM
BRANCH MANAGER
CHIEF ENG/ARCH
FIRE PROTECTION

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC  
JACKSONVILLE, NORTH CAROLINA  
MCB CAMP LEJEUNE  
P1458, 2ND RADIO BN PHASE II  
TOPOGRAPHIC SURVEY

SCALE: AS NOTED
PROJECT NO.: 1565955
CONSTR. CONTR. NO.
NAFAC DRAWING NO.
SHEET 11 OF 11
V-115

TOPOGRAPHIC SURVEY

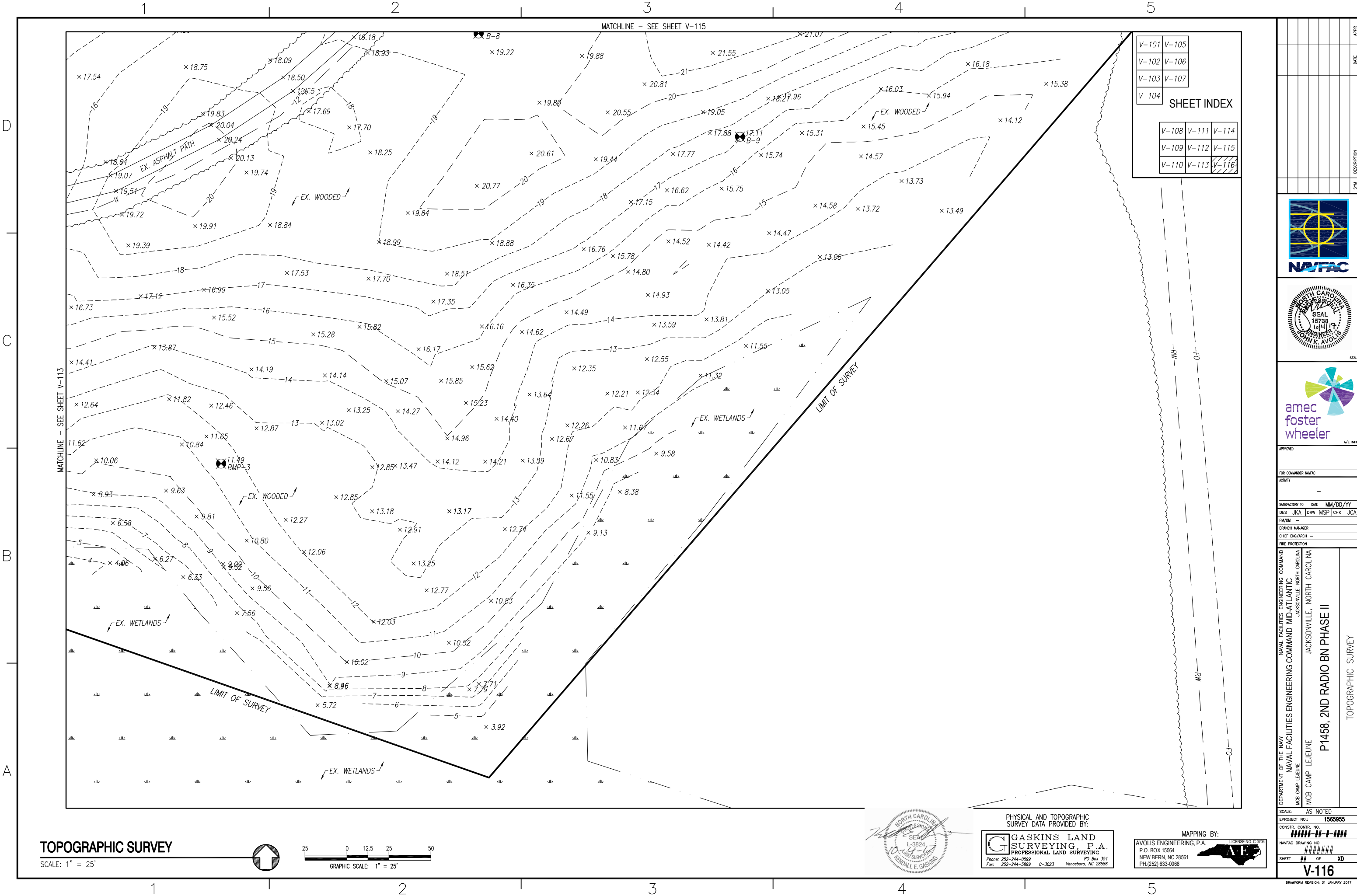
SCALE: 1" = 25'



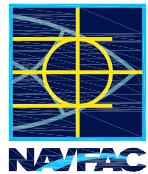
PHYSICAL AND TOPOGRAPHIC  
SURVEY DATA PROVIDED BY:  
**GASKINS LAND SURVEYING, P.A.**  
PROFESSIONAL LAND SURVEYING  
Phone: 252-244-0599 C-3023 Vanceboro, NC 28586  
Fax: 252-244-5899

MAPPING BY:  
**AVOLIS ENGINEERING, P.A.**  
P.O. BOX 15564  
NEW BERN, NC 28561  
PH (252) 633-0068





V-101	V-105	
V-102	V-106	
V-103	V-107	
V-104		
SHEET INDEX		
V-108	V-111	V-114
V-109	V-112	V-115
V-110	V-113	V-116



AVE INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE MM/DD/YY

DES JKA DRW MSP CHK JCA

PA/DM

BRANCH MANAGER

CHIEF ENG/ARCH

FIRE PROTECTION

NAVAL FACILITIES ENGINEERING COMMAND

NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC

JACKSONVILLE, NORTH CAROLINA

MCB CAMP LEJEUNE

MCB CAMP LEJEUNE

P1458, 2ND RADIO BN PHASE II

JACKSONVILLE, NORTH CAROLINA

TOPOGRAPHIC SURVEY

DEPARTMENT OF THE NAVY

NAVFAC DRAWING NO.

PROJECT NO. 1565955

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

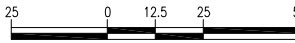
SHEET 11 OF 11

V-116

DRAWING REVISION: 31 JANUARY 2017

TOPOGRAPHIC SURVEY

SCALE: 1" = 25'



GRAPHIC SCALE: 1" = 25'



PHYSICAL AND TOPOGRAPHIC  
SURVEY DATA PROVIDED BY:  
**GASKINS LAND  
SURVEYING, P.A.**  
PROFESSIONAL LAND SURVEYING  
Phone: 252-244-0599 PO Box 354  
Fax: 252-244-5899 C-3023 Vanceboro, NC 28586

MAPPING BY:  
**AVOLIS ENGINEERING, P.A.**  
P.O. BOX 15564  
NEW BERN, NC 28561  
PH: (252) 633-0068

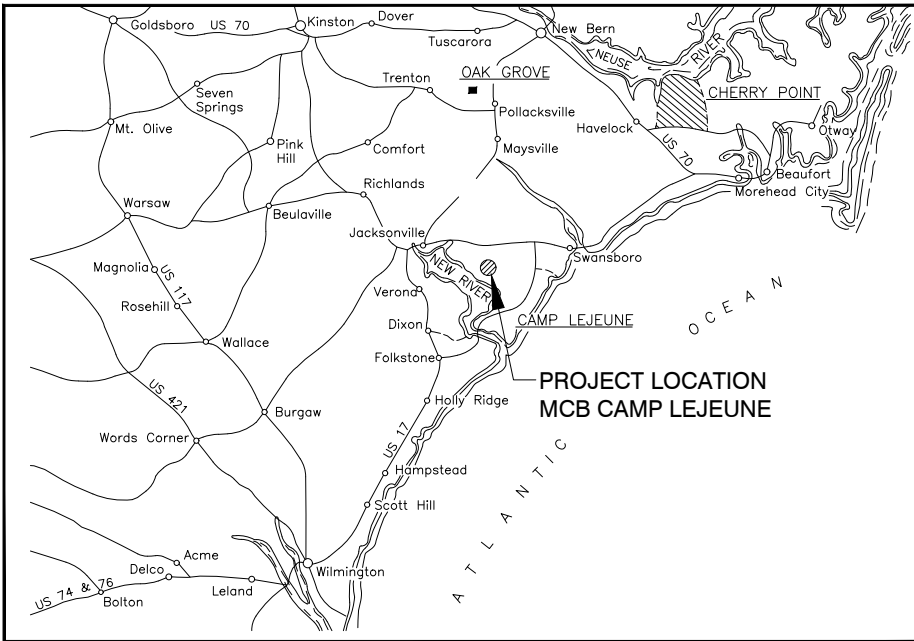


MCB CAMP LEJEUNE

JACKSONVILLE, NORTH CAROLINA

2ND RADIO BATTALION COMPLEX, PHASE II

NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC

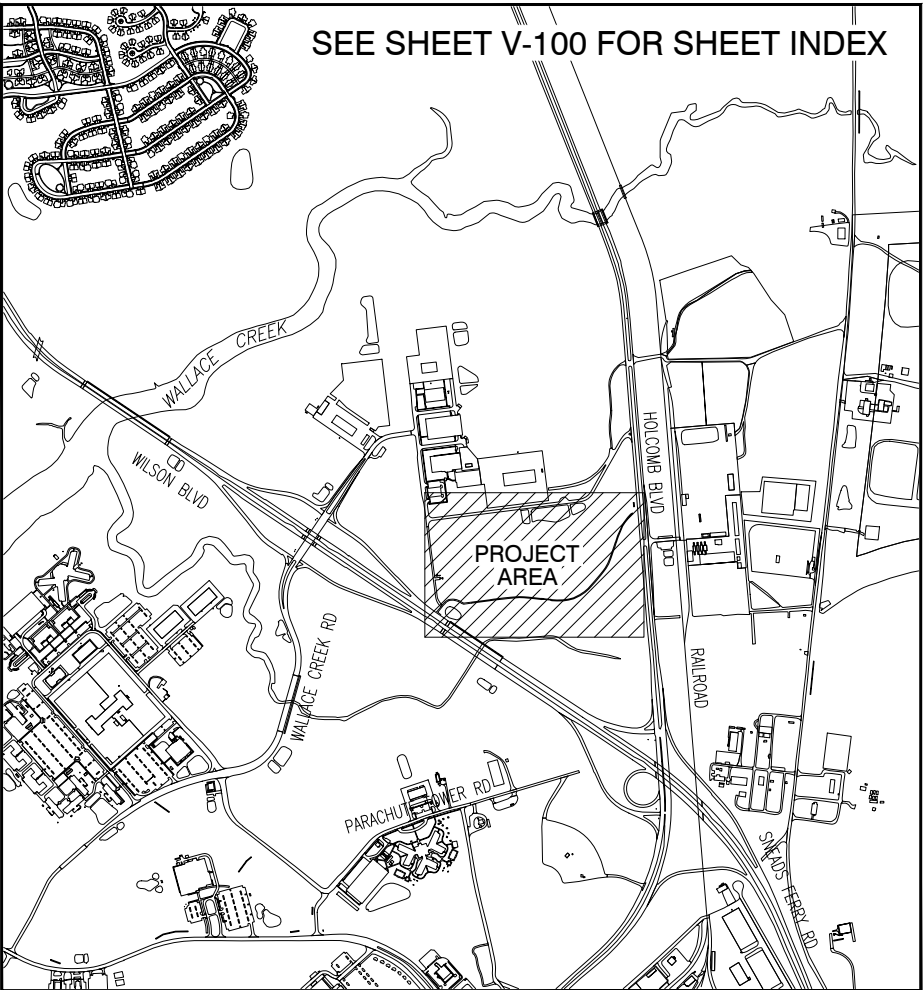


VICINITY MAP

NOT TO SCALE



INDEX OF DRAWINGS		
SHEET NO.	SHEET NAME	SHEET TITLE
1 OF 15	V-001	TITLE SHEET, VICINITY AND LOCATION MAP
2 OF 15	V-100	SHEET INDEX & SURVEY CONTROL DATA
3 OF 15	V-101	TOPOGRAPHIC SURVEY
4 OF 15	V-102	TOPOGRAPHIC SURVEY
5 OF 15	V-103	TOPOGRAPHIC SURVEY
6 OF 15	V-104	TOPOGRAPHIC SURVEY
7 OF 15	V-105	TOPOGRAPHIC SURVEY
8 OF 15	V-106	TOPOGRAPHIC SURVEY
9 OF 15	V-107	TOPOGRAPHIC SURVEY
10 OF 15	V-108	TOPOGRAPHIC SURVEY
11 OF 15	V-109	TOPOGRAPHIC SURVEY
12 OF 15	V-110	TOPOGRAPHIC SURVEY
13 OF 15	V-111	TOPOGRAPHIC SURVEY
14 OF 15	V-112	TOPOGRAPHIC SURVEY
15 OF 15	V-113	TOPOGRAPHIC SURVEY



LOCATION MAP

NOT TO SCALE



SURVEY NOTES:

1. THE MERIDIAN SOURCE OF THIS TOPOGRAPHIC SURVEY IS BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, 3200 ZONE, NORTH AMERICAN DATUM 1983(2011).
2. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. THIS SURVEY WAS PREPARED TO SHOW EXISTING FEATURES AS OF 08/4/2022 AND DOES NOT CERTIFY TO CHANGES TO SITE CONDITIONS WHICH OCCUR SUBSEQUENT TO THIS DATE AND OR TO PROPOSED IMPROVEMENTS.
4. THIS SURVEY DOES NOT CONSTITUTE A BOUNDARY SURVEY NOR A SUBDIVISION OF LAND.
5. NO PROPERTY AND RIGHT-OF-WAY LINES WERE INCLUDED WITH THIS SURVEY.
6. THIS SURVEY DOES NOT INTEND TO DEPICT ANY HAZARDOUS WASTE AND ENVIRONMENTAL FEATURES THAT MAY AFFECT SAID PROPERTY EXCEPT AS SHOWN.
7. PIPE MATERIAL TYPES ARE DETERMINED BY FIELD OBSERVATIONS TO THE BEST OF OUR ABILITY. PMI DOES NOT WARRANT THE MATERIAL TYPE OF PIPES LOCATED IN CONFINED OR INACCESSIBLE SPACES.
8. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN DESIGNATED BY ACCUMARK UTILIZING QL-B METHODS AND STANDARDS AND THE PAINT DESIGNATION LINES HAVE BEEN LOCATED IN THE FIELD. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. THE SURVEYOR FURTHER NOTICES ALL PARTIES THAT NORTH CAROLINA REQUIRES 811 TO BE CONTACTED PRIOR TO ANY EXCAVATION. SIZE AND MATERIAL INFORMATION IS BASED ON PLAN OR GIS DATA AND HAS NOT BEEN FIELD VERIFIED.
9. THE TOPOGRAPHY AND PHYSICAL FEATURES SHOWN ON THIS MAP WERE OBTAINED UNDER THE DIRECT AND RESPONSIBLE CHARGE AND SUPERVISION OF KENNETH E. LEITZ. THIS PLAT, MAP, OR DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

LEGEND

CONC.	CONCRETE
EOW	EDGE OF WATER
FFE	FINISHED FLOOR ELEVATION
PVC	POLYVINYL CHLORIDE
GV	GAS VALVE
GWP	GAS WITNESS POST
	SIGN
DI	DRAINAGE INLET
SDMH	STORM DRAIN MANHOLE
SMH	SANITARY MANHOLE
	FLOW ARROW
L/P	GUY WIRE
P/P	LIGHT POLE
SFMV	POWER POLE
FO PED	SANITARY FORCEMAIN VALVE
FH	FIBER OPTIC PEDESTAL
WV	FIRE HYDRANT
	WATER VALVE
	TREE
	CENTERLINE OF DITCH/SWALE
TOB	TOP OF BANK
TOS	TOE OF SLOPE
SIZE/TYPE	FENCELINE
SIZE/TYPE	STORM DRAIN
SIZE/TYPE	SANITARY SEWER
	EDGE OF PAVEMENT
COMM	UNDERGROUND COMMUNICATIONS LINE
W	UNDERGROUND WATERLINE
ES	OVERHEAD ELECTRIC LINE
ES	UNDERGROUND ELECTRIC LINE
G	UNDERGROUND GAS LINE
SS	UNDERGROUND SANITARY SEWER FORCEMAIN
UNK	UNKNOWN UNDERGROUND UTILITY LINE
	RIP-RAP

TOPOGRAPHIC SURVEY PROVIDED BY  
**PRECISION MEASUREMENTS, INC.**  
SURVEYORS - GPS - UAS - MAPPING - 3-D LASER SCANNING  
770 LYNNHAVEN PARKWAY, SUITE 240  
VIRGINIA BEACH, VA. 23452  
(757) 368-0945  
WWW.PRECISIONMEASUREMENTS.COM  
VIRGINIA BEACH - NEWPORT NEWS - RICHMOND, VIRGINIA



APPROVED:

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES DRW CHK

DEPARTMENT OF THE NAVY

NAVAL FACILITIES ENGINEERING COMMAND

PROJECT STATION/INSTALLATION

2nd RADIO BATTALION COMPLEX, PHASE II

MCB CAMP LEJEUNE, NC

SCALE:

PROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

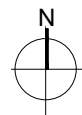
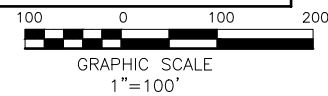
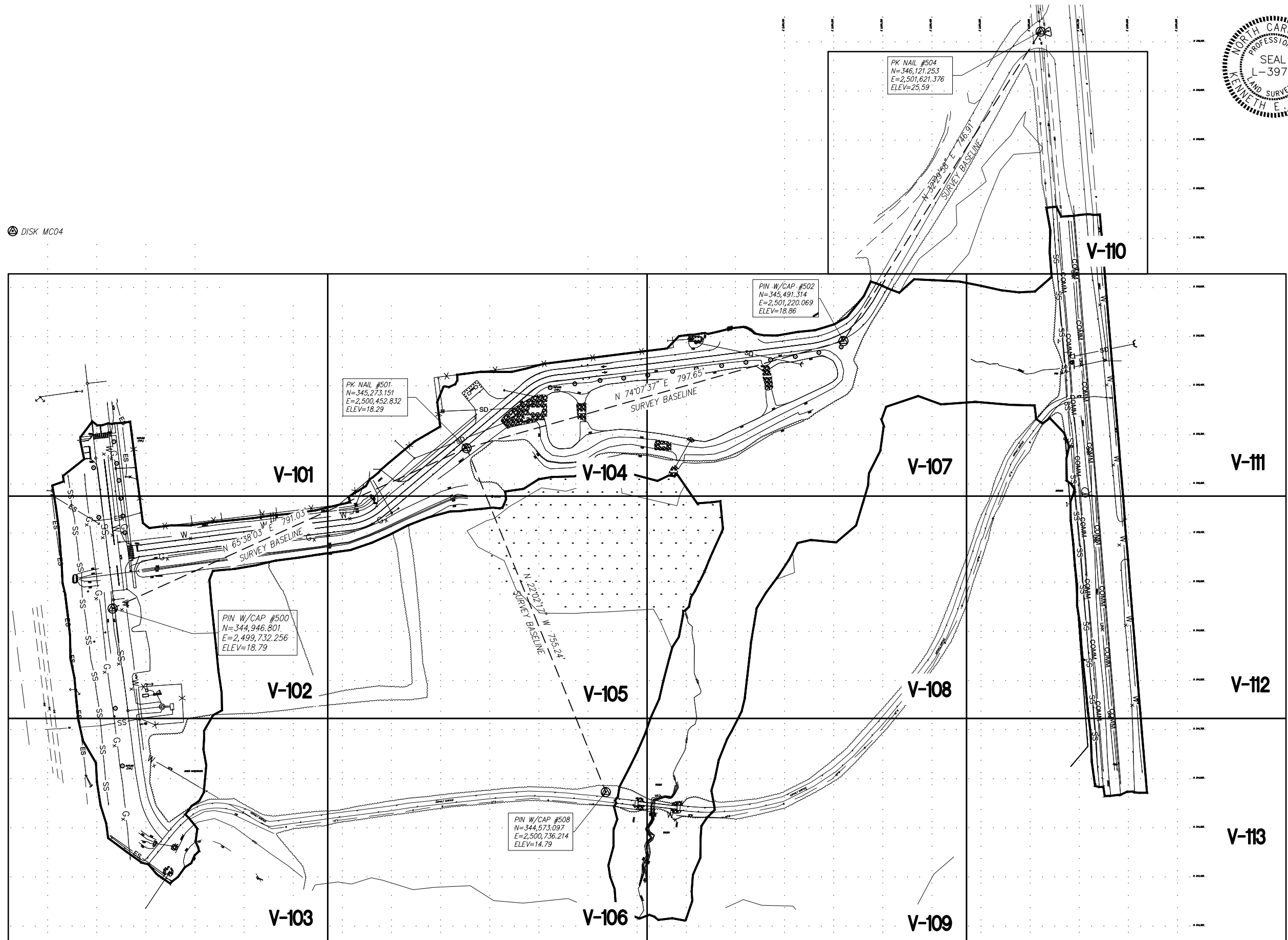
SHEET 1 OF 15

DRAWING REVISION: 12 APRIL 2018

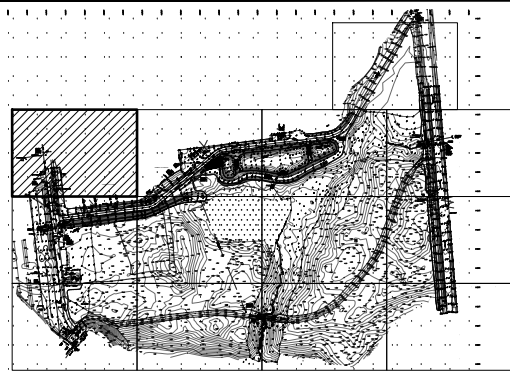
Final - 26 AUGUST 22



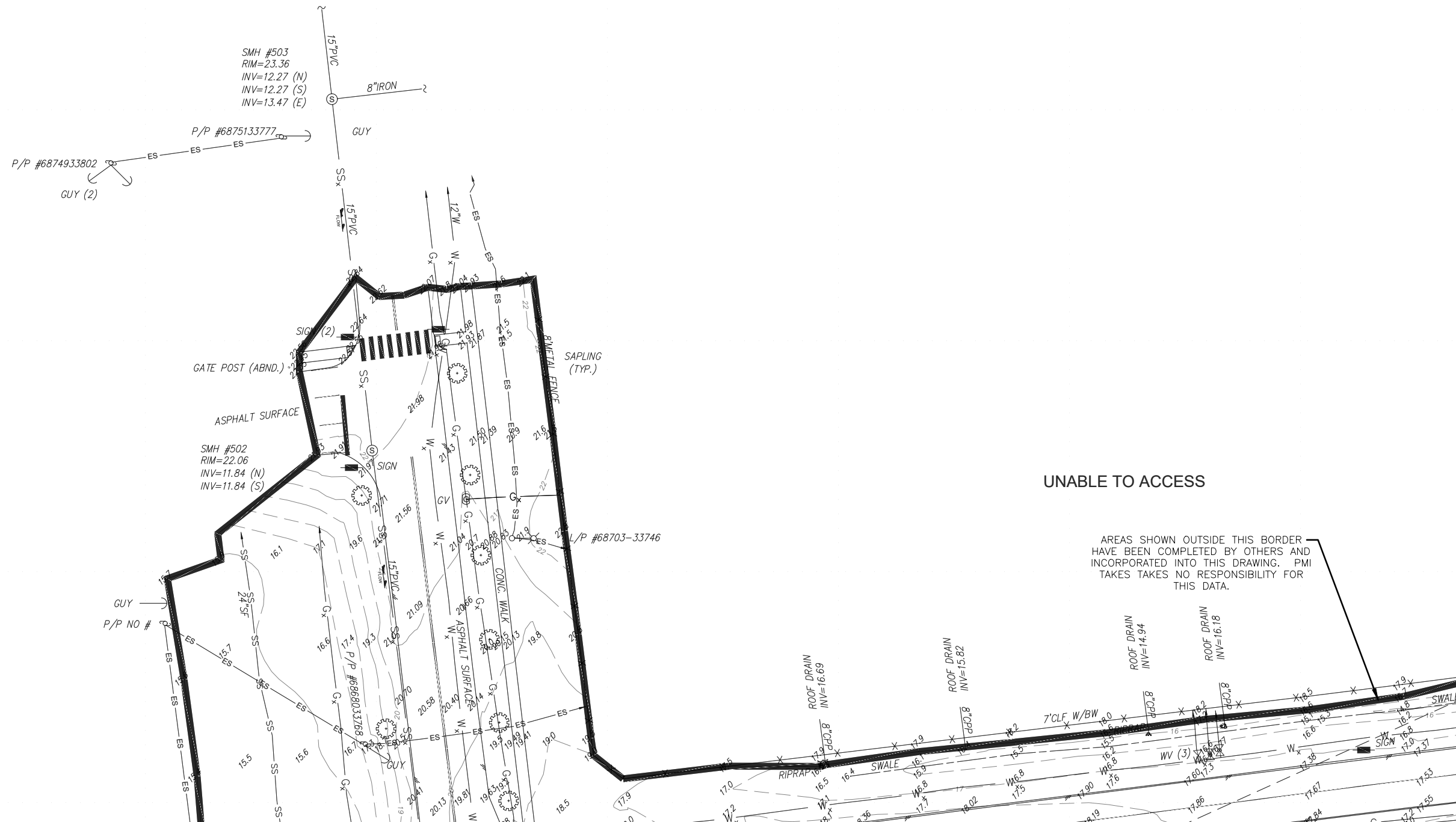
DISK MC04



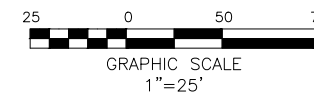
APPROVED		DATE	APPD
FOR COMMANDER NAVFAC			
ACTIVITY			
SATISFACTORY TO		DATE	
DES	DRW	CHK	
DEPARTMENT OF THE NAVY			
NAVAL FACILITIES ENGINEERING COMMAND			
PROJECT STATION/INSTALLATION			
2nd RADIO BATTALION COMPLEX, PHASE II			
MCB CAMP LEJEUNE, NC			
INDEX SHEET & SURVEY CONTROL DATA			
SCALE:			
EPROJCT NO.:			
CONSTR. CONTR. NO.			
NAVFAC DRAWING NO.			
SHEET 2 OF 15			
V-100			
DRAWING REVISION: 12 APRIL 2018			



KEY SHEET

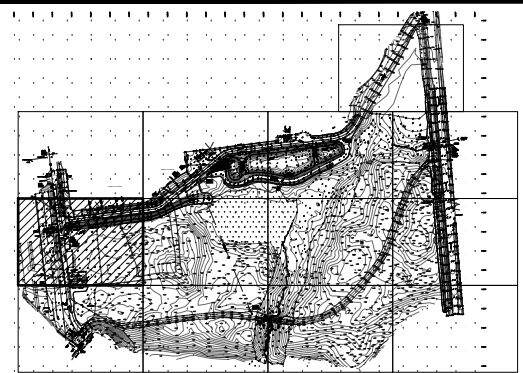


MATCHLINE - SEE SHEET 102



MATCHLINE - SEE SHEET V-104

APPROVED		DATE	APPR
FOR COMMANDER NAVFAC			
ACTIVITY			
SATISFACTORY TO		DATE	
DES	DRW	CHK	
DEPARTMENT OF THE NAVY			
NAVAL FACILITIES ENGINEERING COMMAND			
PROJECT STATION/INSTALLATION			
2nd RADIO BATTALION COMPLEX, PHASE II			
MCB CAMP LEJEUNE, NC			
TOPOGRAPHIC SURVEY			
SCALE:			
EPROJECT NO.:			
CONSTR. CONTR. NO.:			
NAVFAC DRAWING NO.:			
SHEET 3 OF 15			
V-101			
DRAWING REVISION: 12 APRIL 2018			



KEY SHEET

MATCHLINE - SEE SHEET V-101

MATCHLINE - SEE SHEET V-105

MATCHLINE - SEE SHEET V-103

AREAS SHOWN OUTSIDE THIS BORDER  
HAVE BEEN COMPLETED BY OTHERS AND  
INCORPORATED INTO THIS DRAWING. PMI  
TAKES NO RESPONSIBILITY FOR  
THIS DATA.

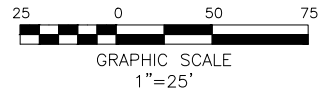
SMH #501  
RIM=19.34  
INV=11.14 (N)  
INV=11.06 (S)  
INV=11.29 (E)  
  
PIN & CAP #500  
N=344,946.801  
E=2,499,732.256  
ELEV.=18.79

SMH #500  
RIM=17.29  
INV=10.25 (E)  
INV=10.25 (S)



APPROVED	
FOR COMMANDER NAVFAC	
ACTIVITY	
SATISFACTORY TO DATE	
DES	CHK

DEPARTMENT OF THE NAVY	
NAVFACILITIES ENGINEERING COMMAND	
PROJECT STATION/INSTALLATION	
2nd RADIO BATTALION COMPLEX, PHASE II	
MCB CAMP LEJEUNE, NC	
TOPOGRAPHIC SURVEY	
SCALE:	
PROJECT NO.:	
CONSTR. CONTR. NO.:	
NAVFAC DRAWING NO.:	
SHEET 4 OF 15	
V-102	





MATCHLINE - SEE SHEET V-102

AREAS SHOWN OUTSIDE THIS BORDER -  
HAVE BEEN COMPLETED BY OTHERS AND  
INCORPORATED INTO THIS DRAWING. PMI  
TAKES TAKES NO RESPONSIBILITY FOR  
THIS DATA.

MATCHLINE - SEE SHEET V-106



APPROVE

[illegible]

**ACTIVE**

SATISFACTORY TO DATE

DES	DRW
-----	-----

NAVAL FACILITIES ENGINEERING COMMAND

DEPARTMENT OF THE NAVY

PROJECT STATION/INSTALLATION  
2nd RADIO BATTALION COMPLEX, PHASE II  
MCB CAMP LEJEUNE, NC

ТОРОСБАРИС СИП/ЕУ

SCAL

EPROJECT NO.

CONSTR. CONTR. NO

NAVFAC DRAWING NO.

SHEET 5 OF 15

V-103

DRAWFORM REVISION: 12 APRIL 20

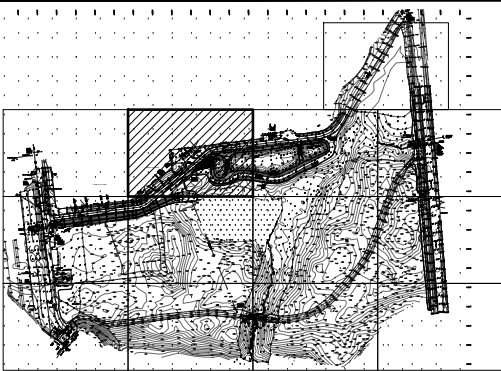
5 Final - 26 AUGUST 22

UNCLASSIFIED



D

D



KEY SHEET



APPROVED	
FOR COMMANDER NAVFAC	
ACTIVITY	
SATISFACTORY TO DATE	
DES	CHK

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
PROJECT STATION/INSTALLATION	
2nd RADIO BATTALION COMPLEX, PHASE II	
MCB CAMP LEJEUNE, NC	
TOPOGRAPHIC SURVEY	

SCALE:	
PROJECT NO.:	
CONSTR. CONTR. NO.:	
NAVFAC DRAWING NO.:	
SHEET 6	OF 15
V-104	

DRAWING REVISION: 12 APRIL 2010

UNCLASSIFIED

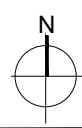
MATCHLINE - SEE SHEET V-101

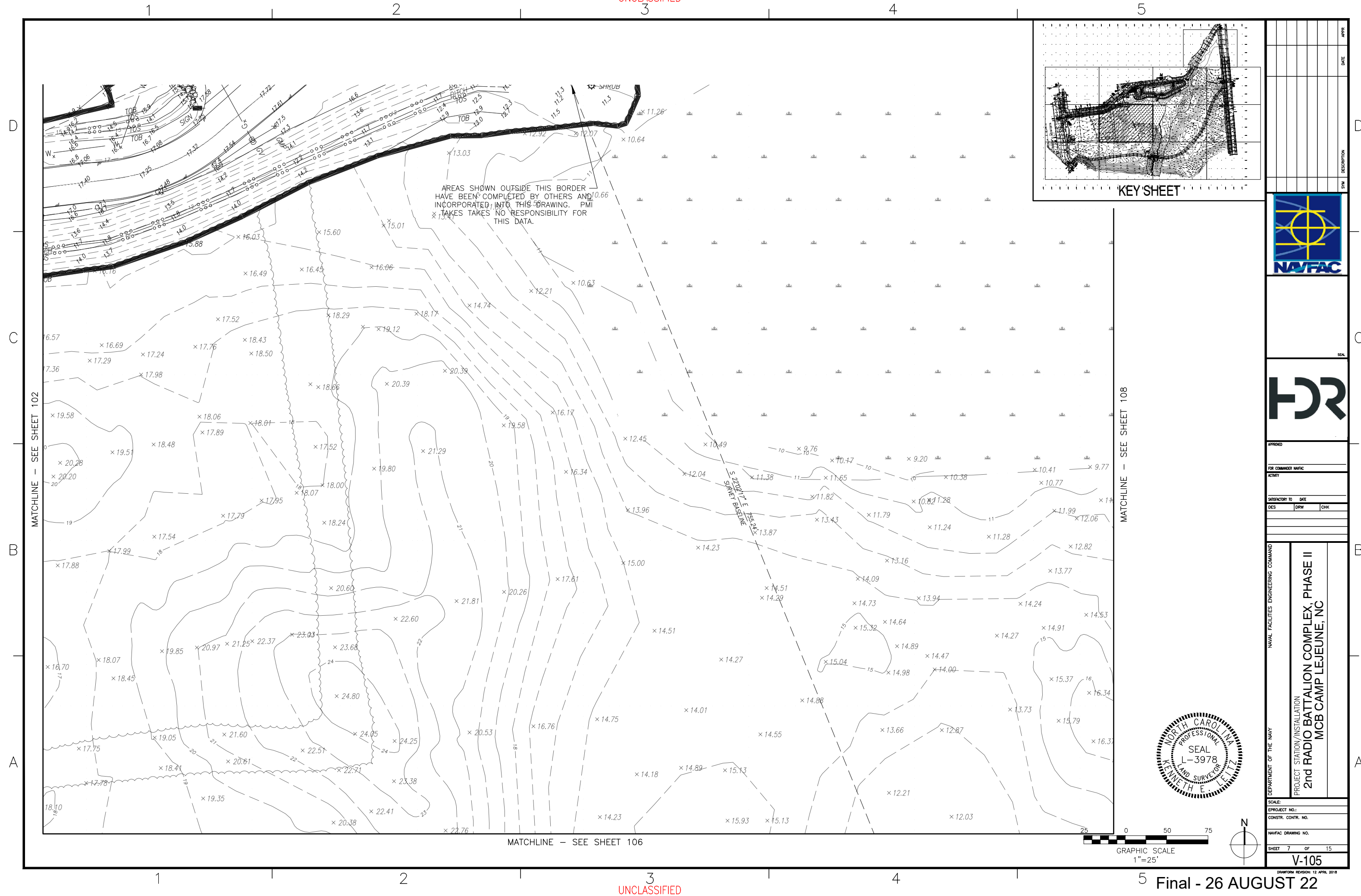
MATCHLINE - SEE SHEET V-107

AREAS SHOWN OUTSIDE THIS BORDER  
HAVE BEEN COMPLETED BY OTHERS AND  
INCORPORATED INTO THIS DRAWING. PMI  
TAKES TAKES NO RESPONSIBILITY FOR  
THIS DATA.

UNABLE TO ACCESS

MATCHLINE - SEE SHEET V-105





D

C

B

A

D

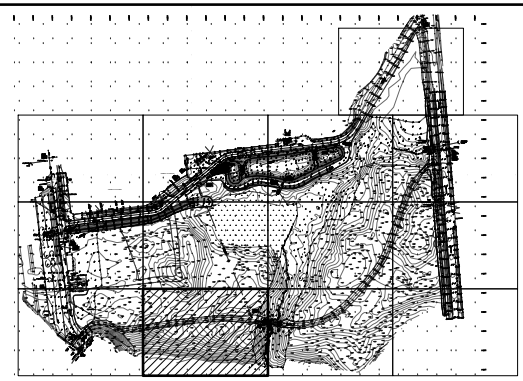
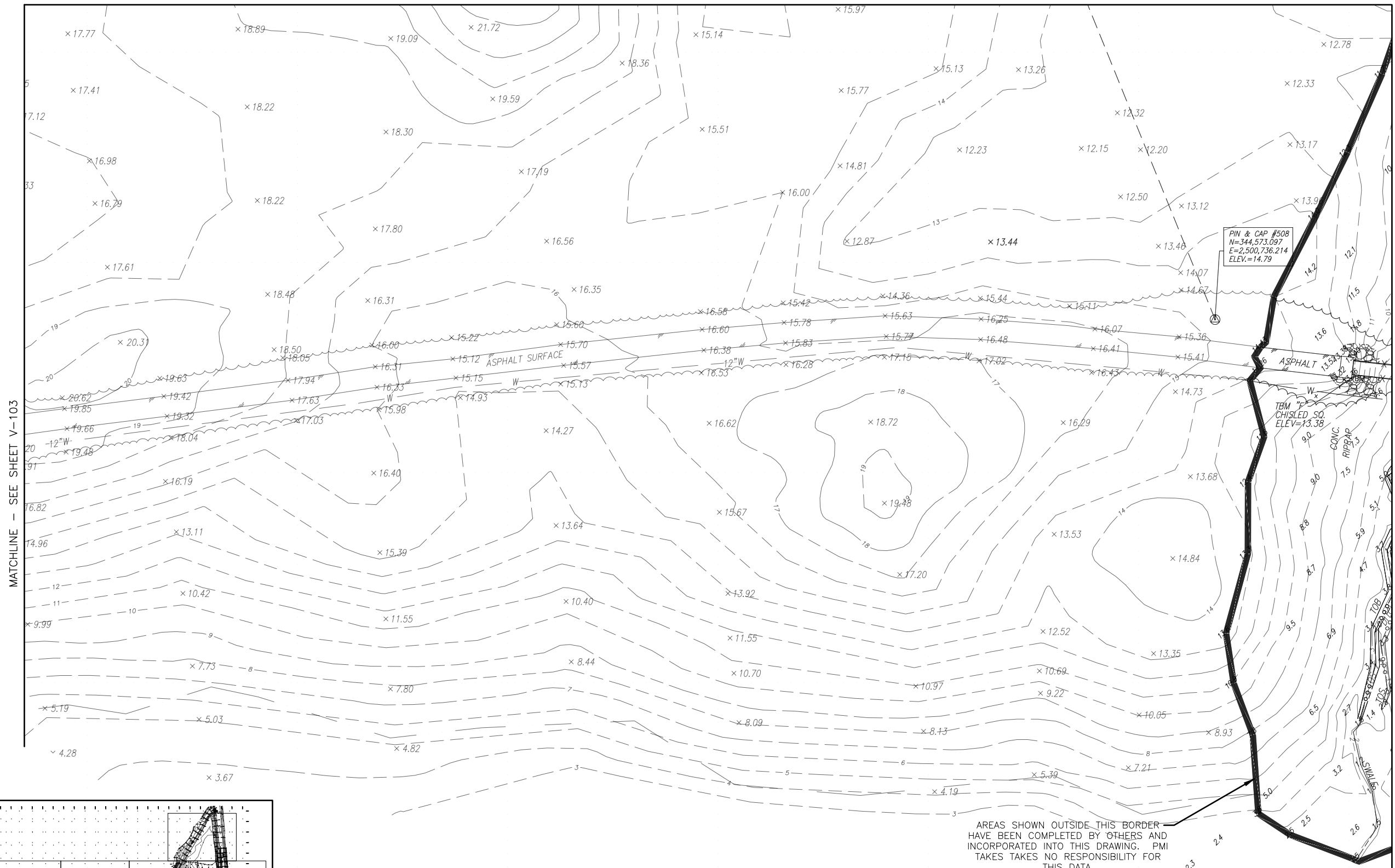
C

B

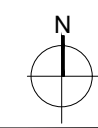
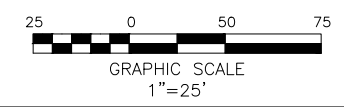
A

MATCHLINE - SEE SHEET V-105

MATCHLINE - SEE SHEET V-109

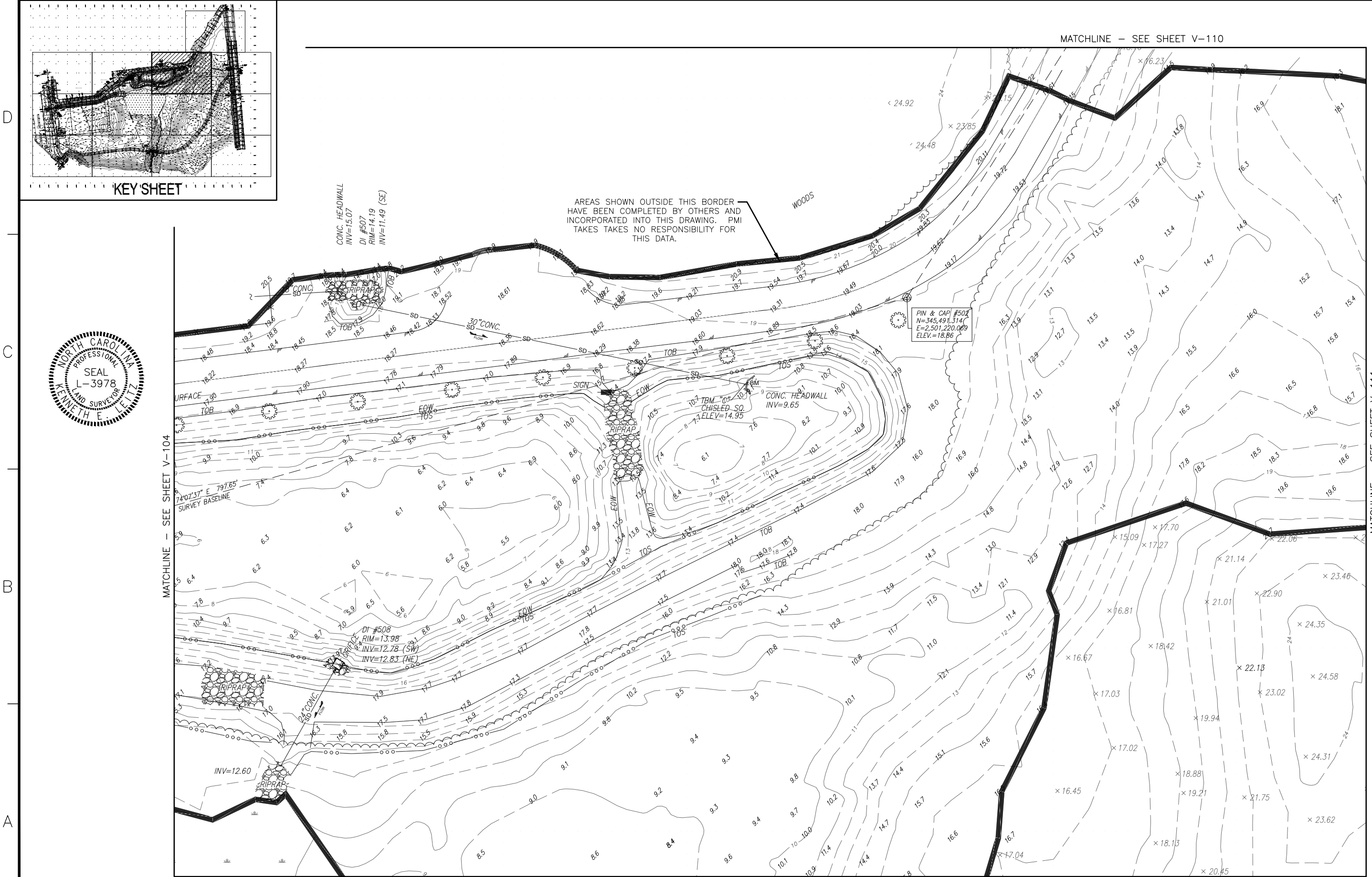


KEY SHEET



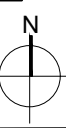
APPROVED		DATE	APPR
FOR COMMANDER NAVFAC			
ACTIVITY			
SATISFACTORY TO		DATE	
DES	DRW	CHK	
NAVAL FACILITIES ENGINEERING COMMAND			
PROJECT STATION/INSTALLATION		TOPOGRAPHIC SURVEY	
2nd RADIO BATTALION COMPLEX, PHASE II			
MCB CAMP LEJEUNE, NC			
SHEET 8 OF 15		V-106	
DRAWING REVISION: 12 APRIL 2018			





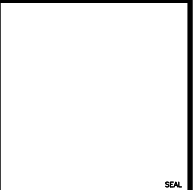
MATCHLINE - SEE SHEET V-110

MATCHLINE - SEE SHEET V-108



MATCHLINE - SEE SHEET V-111

SYN	DESCRIPTION	DATE	APPR



APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES DRW CHK

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
PROJECT STATION/INSTALLATION  
**2nd RADIO BATTALION COMPLEX, PHASE II**  
**MCB CAMP LEJEUNE, NC**

SCALE:

PROJECT NO.:

CONSTR. CONTR. NO.:

NAVFAC DRAWING NO.:

SHEET 9 OF 15

V-107

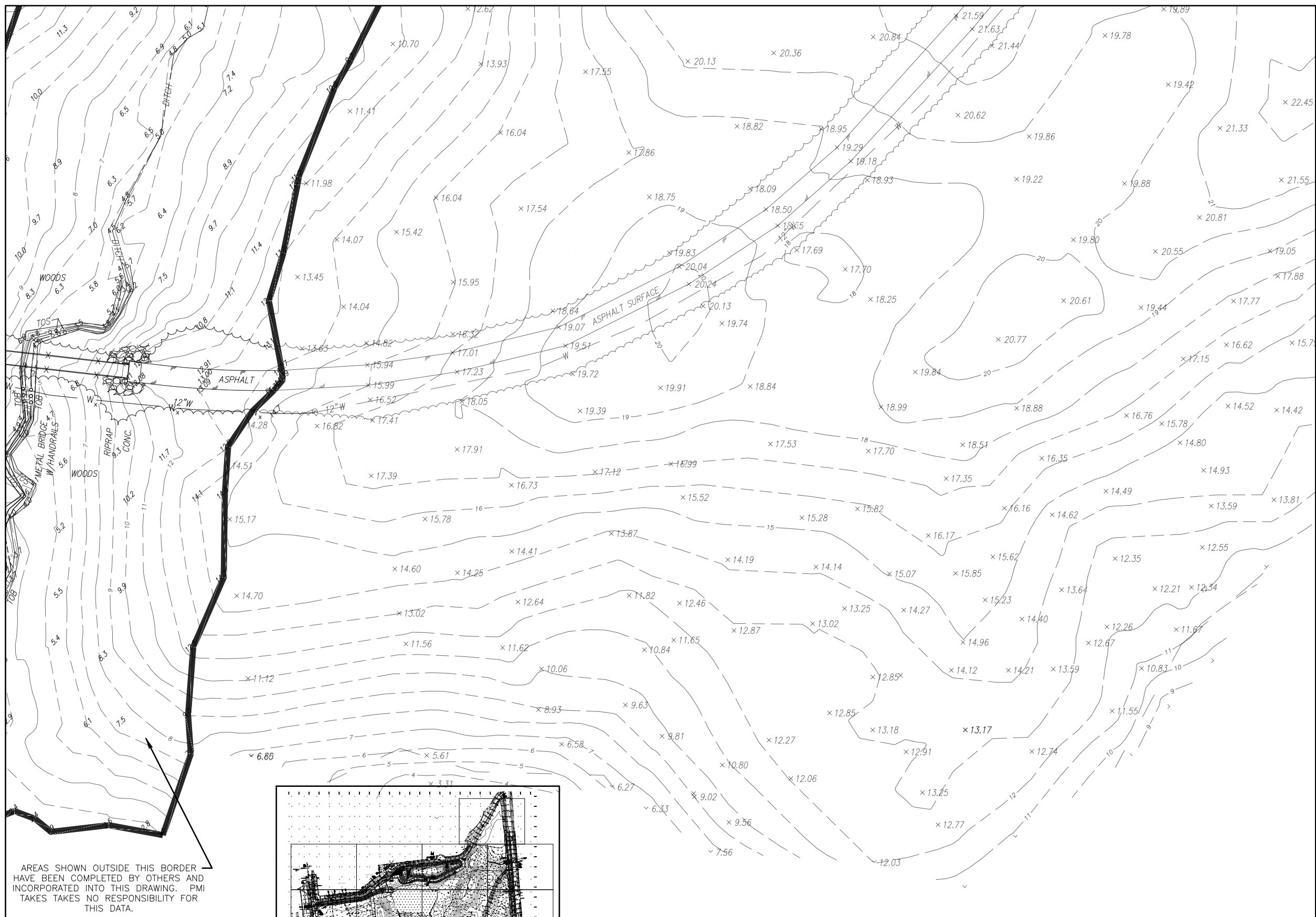
DRAWING REVISION: 12 APRIL 2018



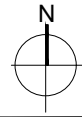
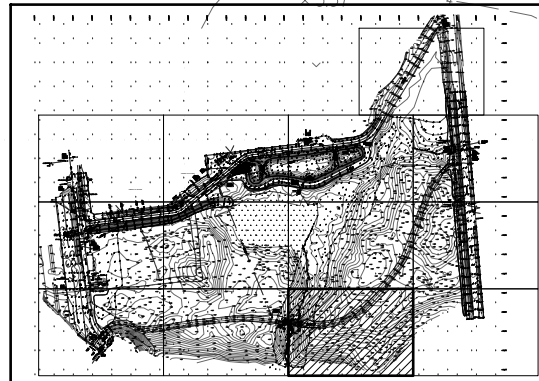




MATCHLINE - SEE SHEET V-106



AREAS SHOWN OUTSIDE THIS BORDER HAVE BEEN COMPLETED BY OTHERS AND INCORPORATED INTO THIS DRAWING. PMI TAKES TAKES NO RESPONSIBILITY FOR THIS DATA.



MATCHLINE - SEE SHEET V-108

MATCHLINE - SEE SHEET V-113

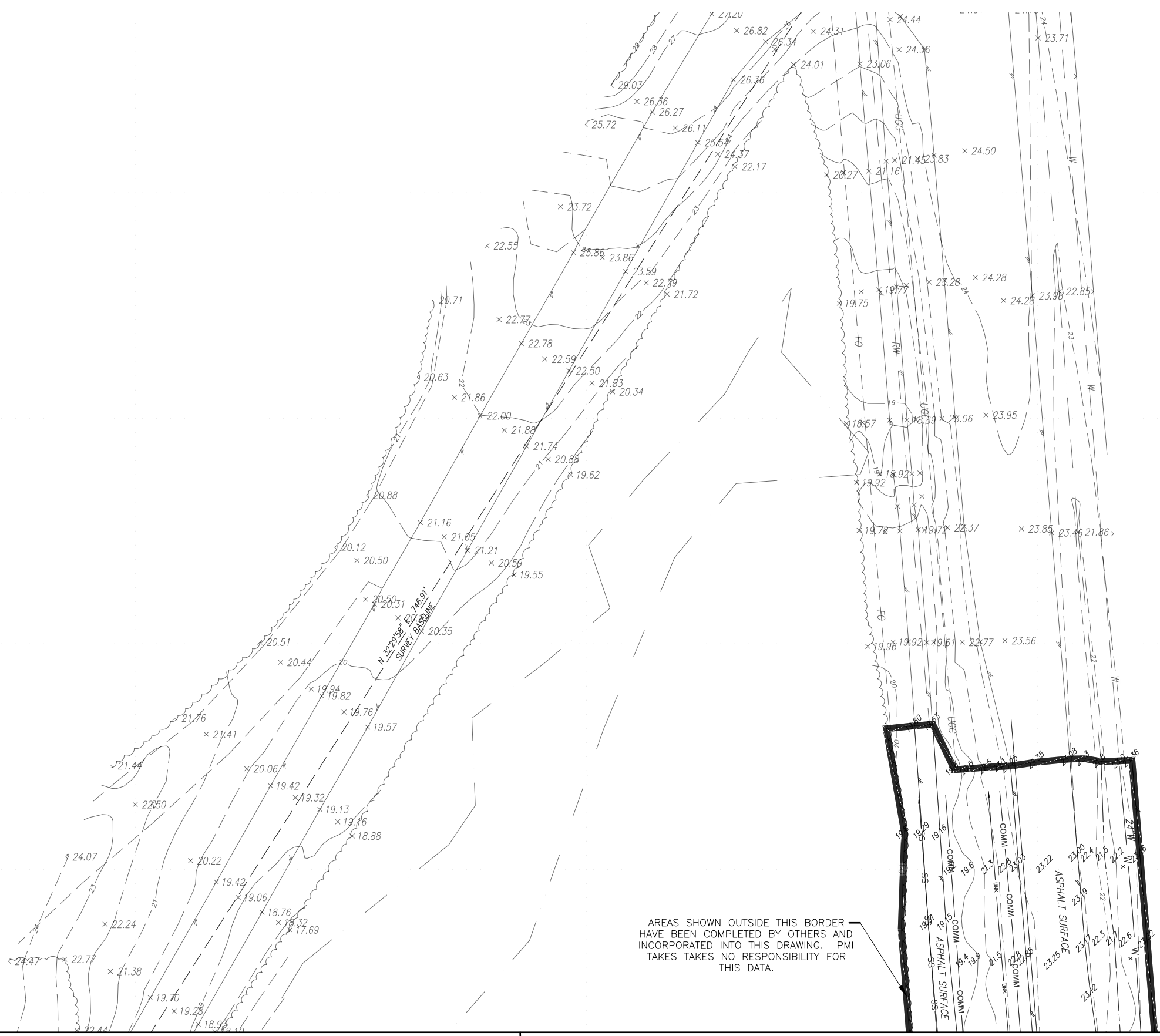
APPROVED		DATE	APPR
FOR COMMANDER NAVFAC			
ACTIVITY			
SATISFACTORY TO		DATE	
DES	DRW	CHK	
DEPARTMENT OF THE NAVY			
NAVAL FACILITIES ENGINEERING COMMAND			
PROJECT STATION/INSTALLATION			
2nd RADIO BATTALION COMPLEX, PHASE II			
MCB CAMP LEJEUNE, NC			
TOPOGRAPHIC SURVEY			
SCALE:			
PROJECT NO.:			
CONSTR. CONTR. NO.:			
NAVFAC DRAWING NO.:			
SHEET 10 OF 15			
V-109			
DRAWING REVISION: 12 APRIL 2018			

D

C

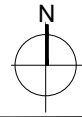
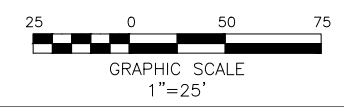
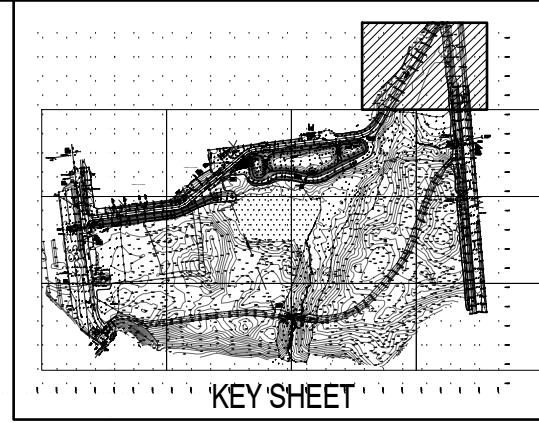
B

A



MATCHLINE - SEE SHEET V-107

MATCHLINE - SEE SHEET V-111



APPR	
DATE	
SYN	
DESCRIPTION	
SEAL	
H&R	
APPROVED	
FOR COMMANDER NAVFAC	
ACTIVITY	
SATISFACTORY TO	
DES	CHK
DATE	
DRW	
CHK	
DEPARTMENT OF THE NAVY	
NAVAL FACILITIES ENGINEERING COMMAND	
PROJECT STATION/INSTALLATION	
2nd RADIO BATTALION COMPLEX, PHASE II	
MCB CAMP LEJEUNE, NC	
TOPOGRAPHIC SURVEY	
SCALE:	
PROJECT NO.:	
CONSTR. CONTR. NO.:	
NAVFAC DRAWING NO.:	
SHEET 12 OF 15	
V-110	
DRAWING REVISION: 12 APRIL 2010	

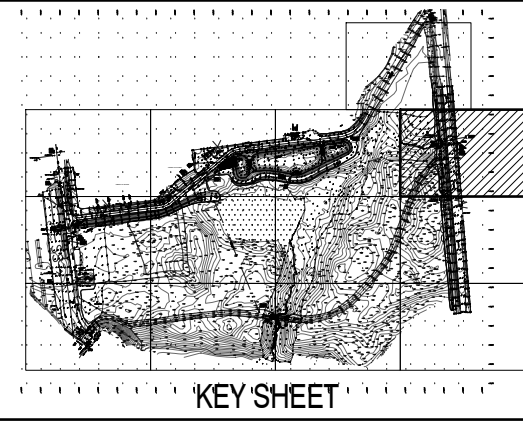
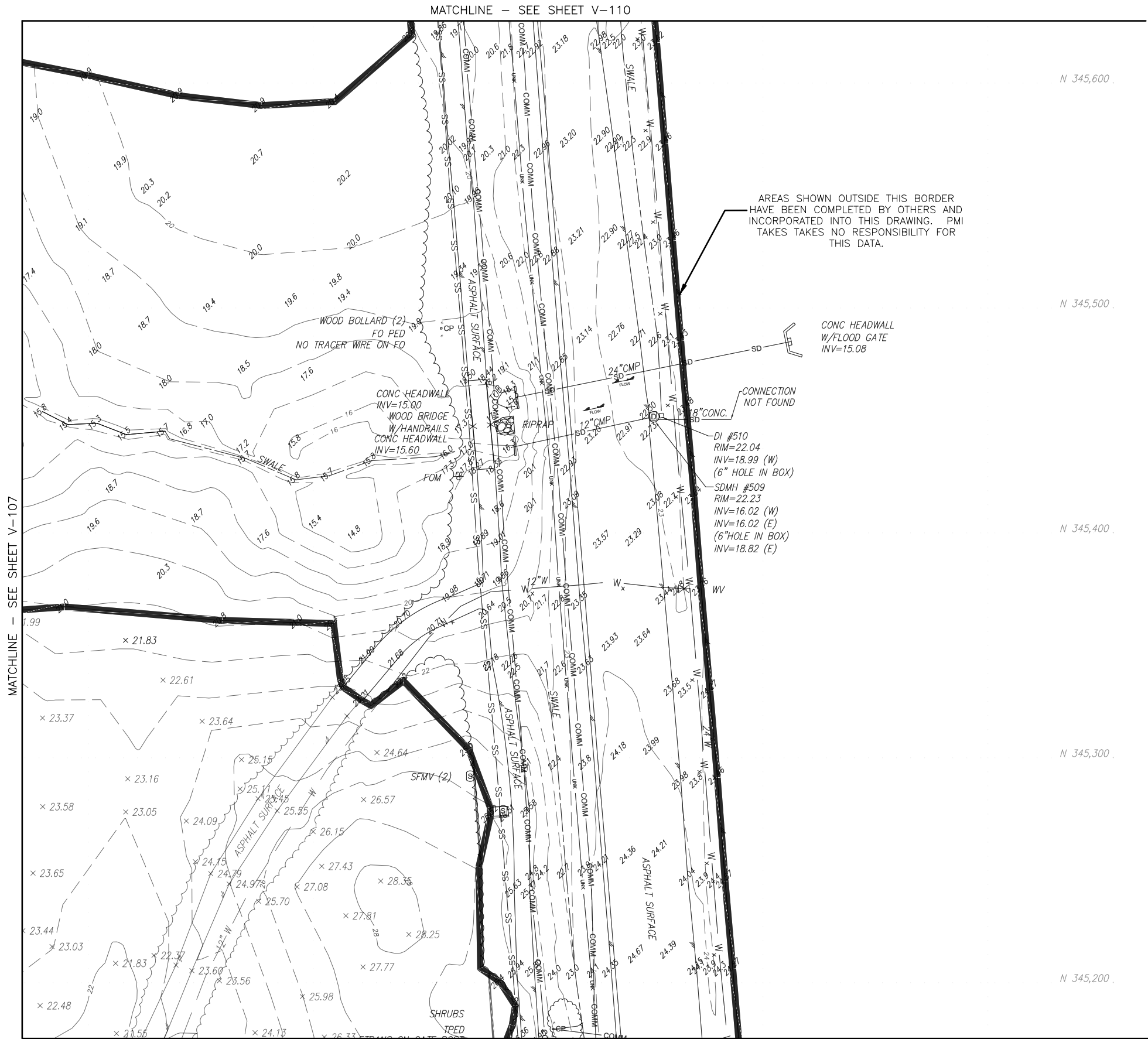
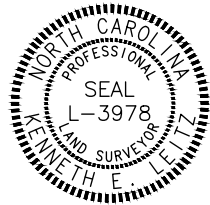
D

C

B

A



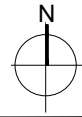


AREAS SHOWN OUTSIDE THIS BORDER  
HAVE BEEN COMPLETED BY OTHERS AND  
INCORPORATED INTO THIS DRAWING. PMI  
TAKES NO RESPONSIBILITY FOR  
THIS DATA.

CONC HEADWALL  
W/FLOOD GATE  
INV=15.08

DI #510  
RIM=22.04  
INV=18.99 (W)  
(6" HOLE IN BOX)  
SDMH #509  
RIM=22.23  
INV=16.02 (W)  
INV=16.02 (E)  
(6" HOLE IN BOX)  
INV=18.82 (E)

MATCHLINE - SEE SHEET V-112



APPROVED		DATE	APPR
FOR COMMANDER NAVFAC			
ACTIVITY			
SATISFACTORY TO		DATE	
DES	DRW	CHK	
DEPARTMENT OF THE NAVY			
NAVAL FACILITIES ENGINEERING COMMAND			
PROJECT STATION/INSTALLATION			
2nd RADIO BATTALION COMPLEX, PHASE II			
MCB CAMP LEJEUNE, NC			
SCALE:			
PROJECT NO.:			
CONSTR. CONTR. NO.:			
NAVFAC DRAWING NO.:			
SHEET 13 OF 15			
V-111			
DRAWING REVISION: 12 APRIL 2018			

D

C

B

A

D

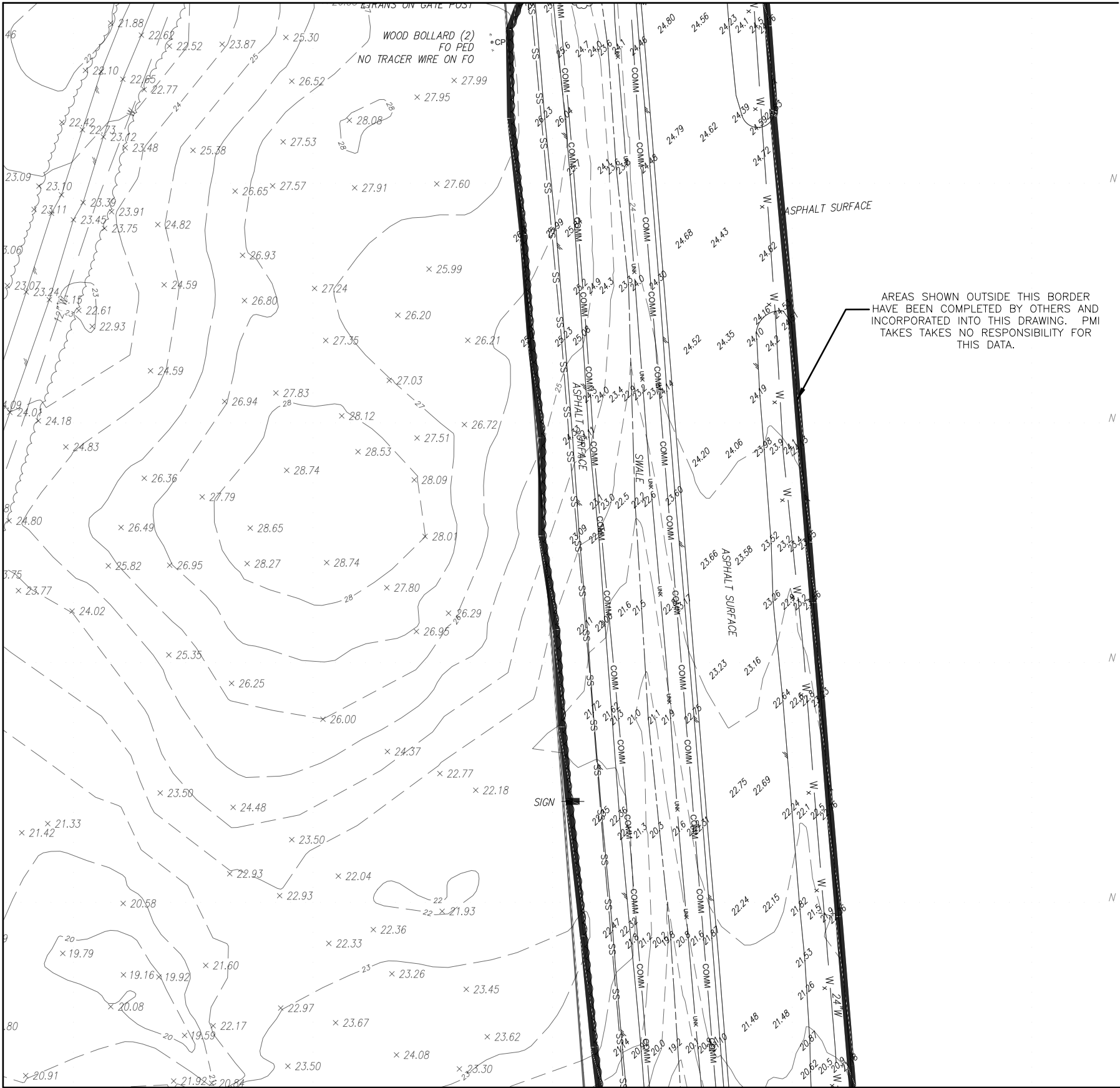
C

B

A

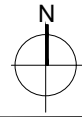
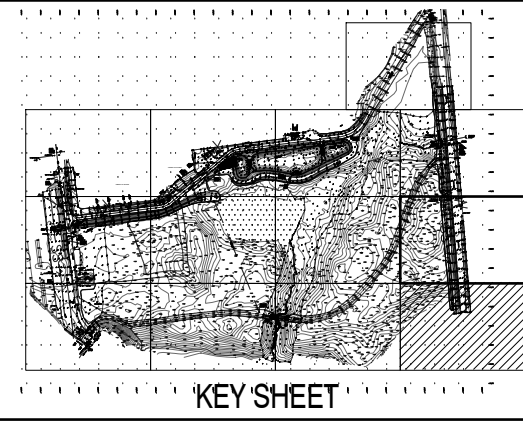
MATCHLINE - SEE SHEET V-108

MATCHLINE - SEE SHEET V-111

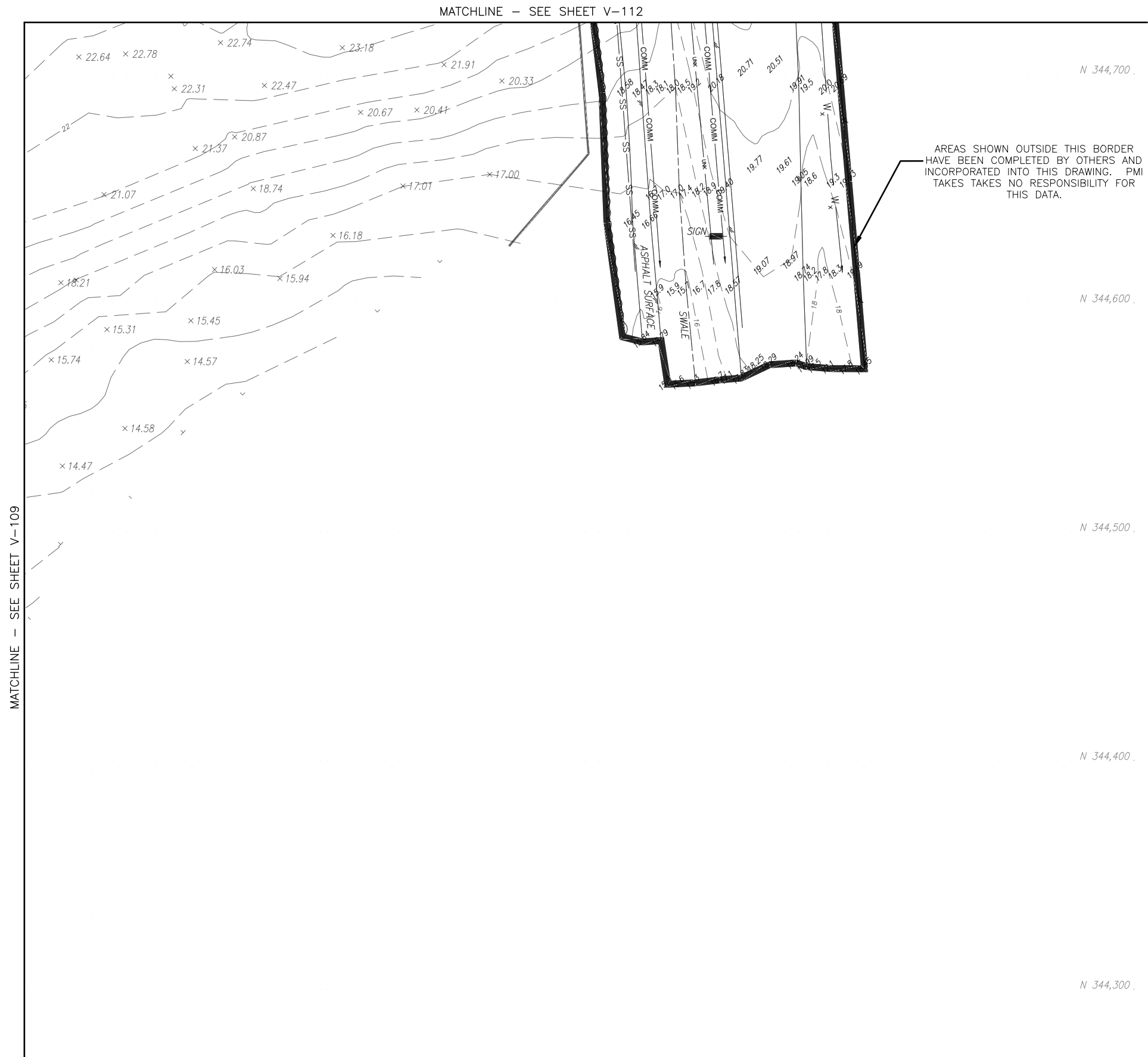


AREAS SHOWN OUTSIDE THIS BORDER HAVE BEEN COMPLETED BY OTHERS AND INCORPORATED INTO THIS DRAWING. PMI TAKES NO RESPONSIBILITY FOR THIS DATA.

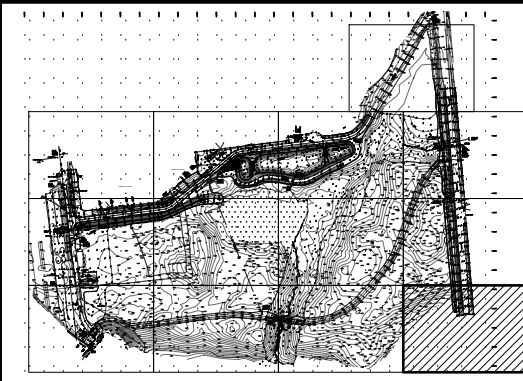
MATCHLINE - SEE SHEET V-113



APPROVED		DATE	APPR
FOR COMMANDER NAVFAC			
ACTIVITY			
SATISFACTORY TO		DATE	
DES	DRW	CHK	
DEPARTMENT OF THE NAVY			
NAVAL FACILITIES ENGINEERING COMMAND			
PROJECT STATION/INSTALLATION			
2nd RADIO BATTALION COMPLEX, PHASE II			
MCB CAMP LEJEUNE, NC			
SCALE:			
PROJECT NO.:			
CONSTR. CONTR. NO.:			
NAVFAC DRAWING NO.:			
SHEET 14 OF 15			
V-112			
DRAWING REVISION: 12 APRIL 2018			



AREAS SHOWN OUTSIDE THIS BORDER  
— HAVE BEEN COMPLETED BY OTHERS AND  
INCORPORATED INTO THIS DRAWING. PMI  
TAKES TAKES NO RESPONSIBILITY FOR  
THIS DATA.



APPROVED

FOR COMMANDER NAVFAC

### ACTIVITY

SATISFACTORY TO DATE

DES

	DRW
--	-----

CHK
-----

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND

NAVAL FACILITIES ENGINEERING COMMAND

PROJECT STATION/INSTALLATION  
2nd RADIO BATTALION COMPLEX, PHASE II  
MCB CAMP LEJEUNE, NC

SCALE:

EPROJECT NO.:

CONSTR. CONTR. NO.

© 2006 The Authors

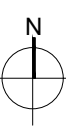
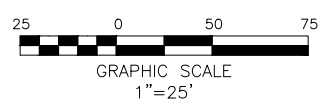
NAVFAC E

DRAWING NO.

15 0

1118

DRAINFORM REVISION: 12 APRIL 2018



This page intentionally left blank.

## Part 6 - Attachments

### Chapter C – Affinity Diagrams

- Parachute Maintenance and Paraloft
- Supply Warehouse
- Combined Electrical / Communications / Vehicle Maintenance, and Boat Operations Facility
- Hazardous Material Storage Facility
- Wash Rack and Pad
- Overall Site Plan
- Southwest Site – Parachute Maintenance with Paraloft and Supply Warehouse Site Plan
- Southeast Site – Vehicle Maintenance/Boat Operations Facility, and Hazardous Material Storage Facility Site Plan

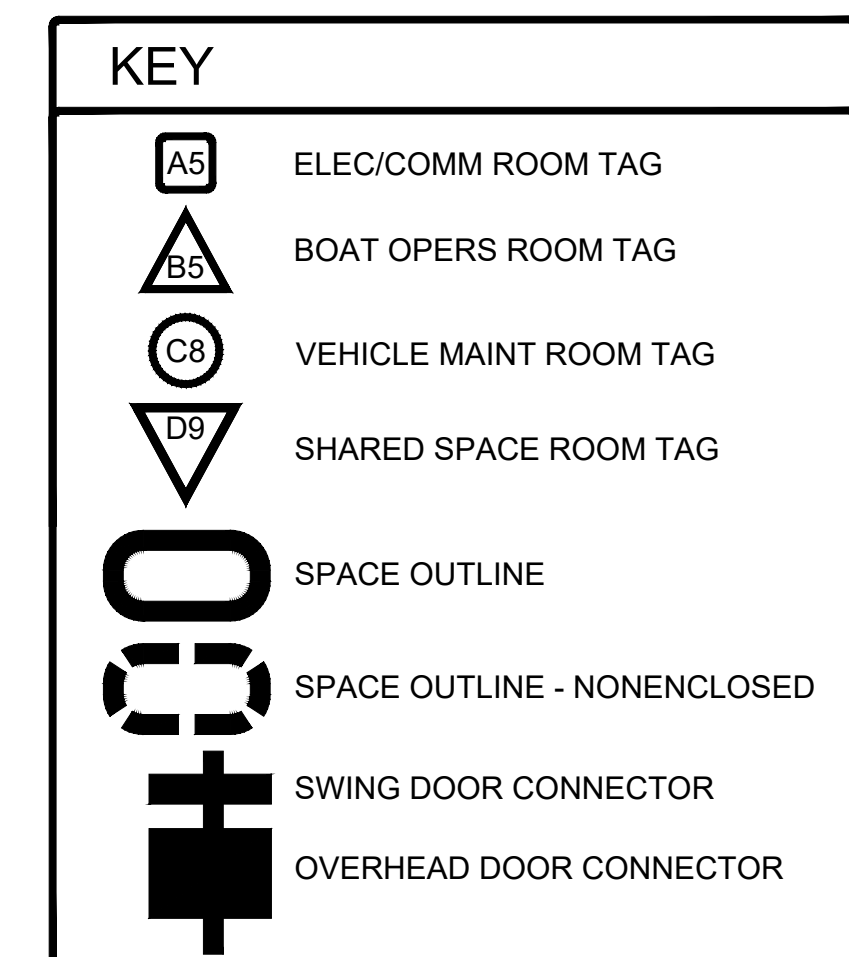
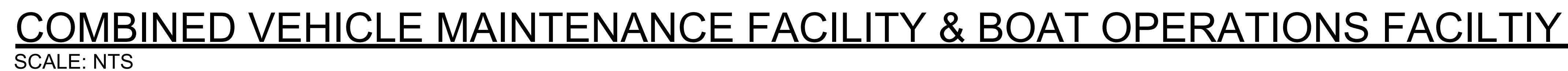
This page intentionally left blank.











D

C

B

A

1

2

3

4

5

UNCLASSIFIED

SPACE INVENTORY	
#	Name
1	NEW POL
2	NEW NON-POL
3	USED POL & NON-POL
4	MISC
5	EXPENDED BATTERIES



APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES DRW CHK

NAVAL FACILITIES ENGINEERING COMMAND

DEPARTMENT OF THE NAVY

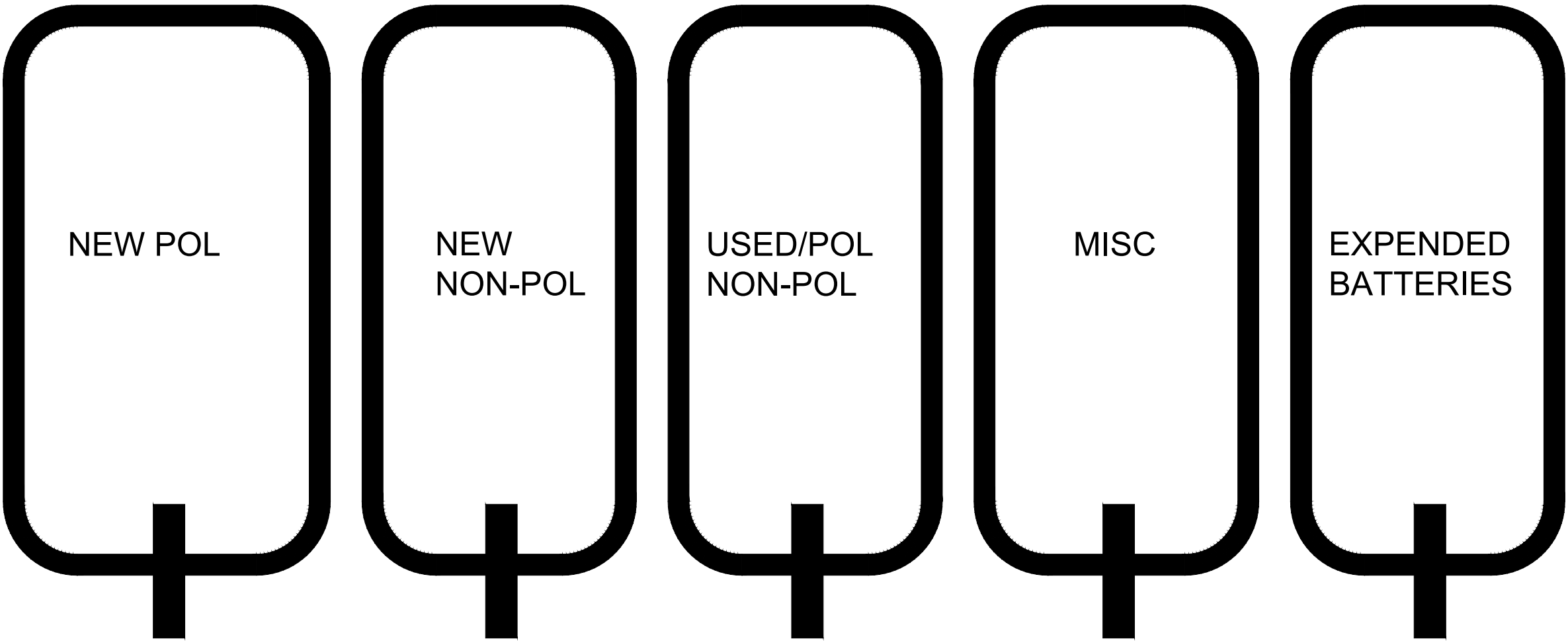
PROJECT STATION/INSTALLATION

2nd RADIO BATTALION COMPLEX, PHASE II

MCB CAMP LEJEUNE, NC

SCALE:	
EPROJECT NO.:	
CONSTR. CONTR. NO.	
NAVFAC DRAWING NO.	
SHEET	OF

DRAWFORM REVISION: 12 APRIL 2018



# HAZARDOUS MATERIAL STORAGE FACILITY

SCALE: N.T.S.

KEY

5

ROOM TAG

SPACE OUTLINE

SPACE OUTLINE - NONENCLOSED

SWING DOOR CONNECTOR

OVERHEAD DOOR CONNECTOR

1

2

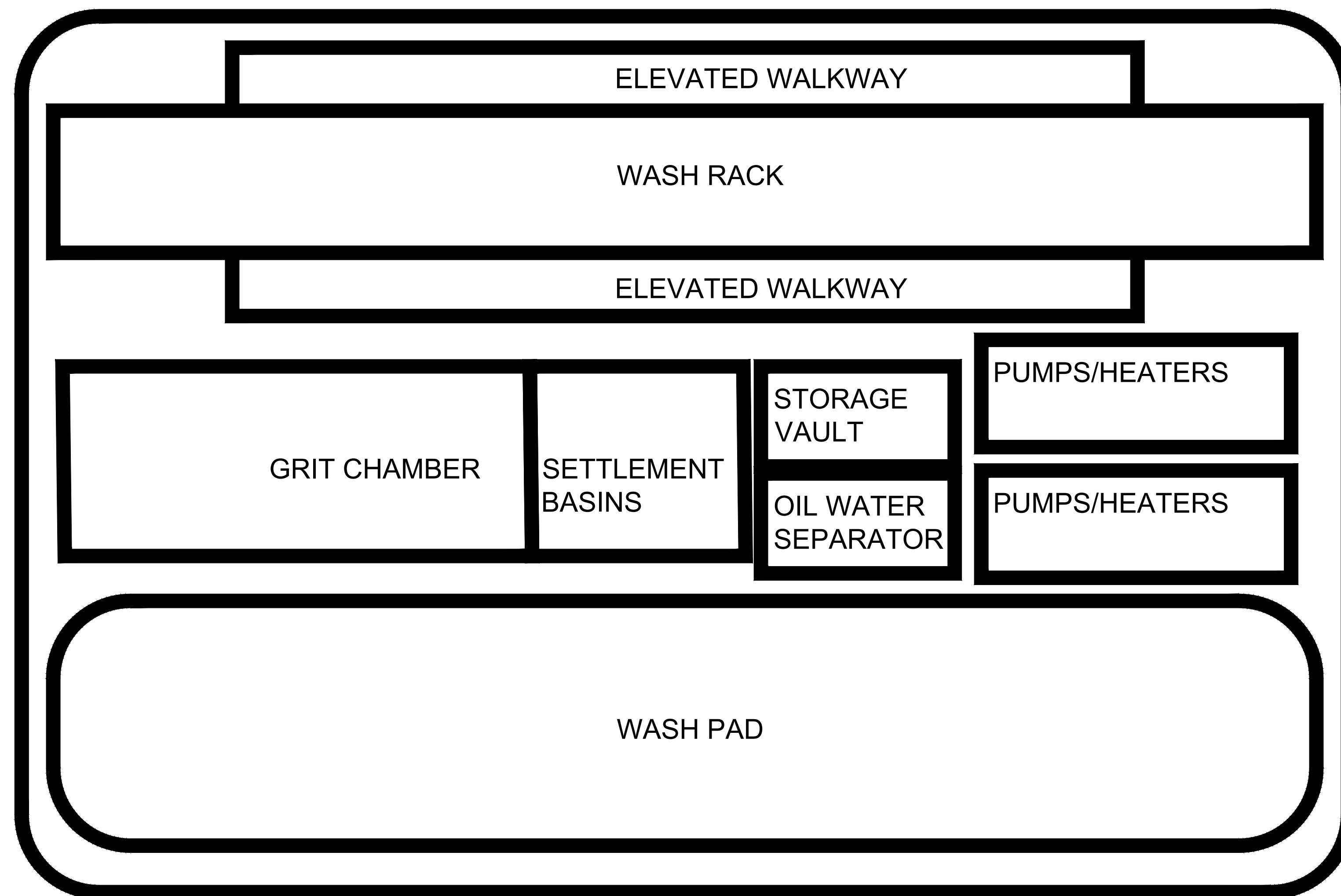
3

4

5






UNCLASSIFIED

UNCLASSIFIED



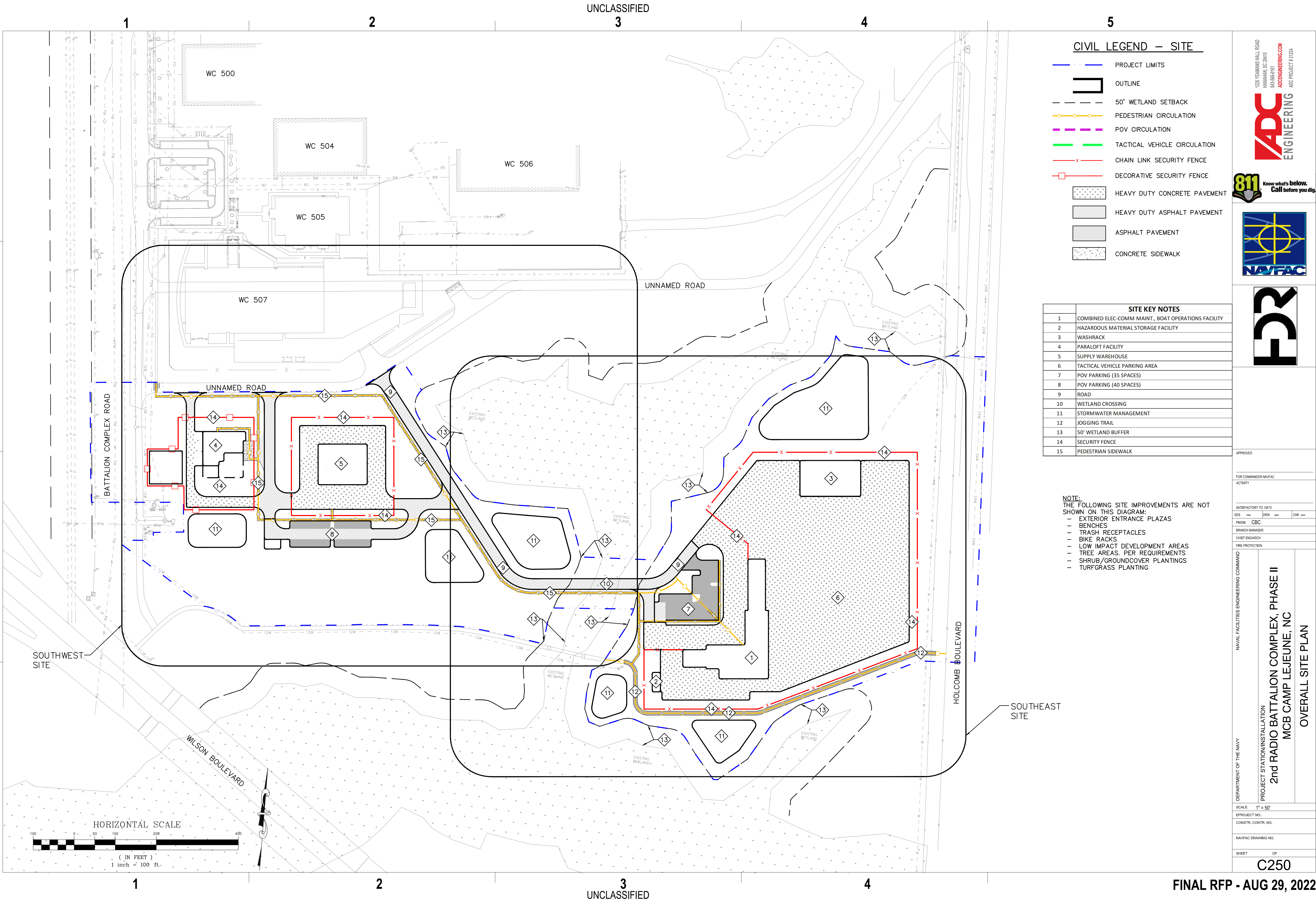
## SCALE: N.T.S.

# KEY

	ROOM TAG
	SPACE OUTLINE
	SPACE OUTLINE - NONENCLOSED
	SWING DOOR CONNECTOR
	OVERHEAD DOOR CONNECTOR

[illegible]





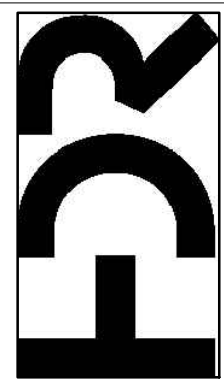
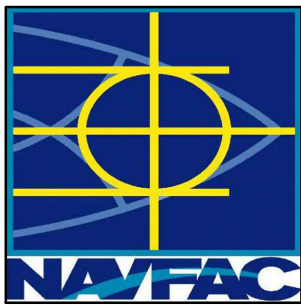
CIVIL LEGEND – SITE

- PROJECT LIMITS
- OUTLINE
- 50' WETLAND SETBACK
- PEDESTRIAN CIRCULATION
- POV CIRCULATION
- TACTICAL VEHICLE CIRCULATION
- CHAIN LINK SECURITY FENCE
- DECORATIVE SECURITY FENCE
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- ASPHALT PAVEMENT
- CONCRETE SIDEWALK

SITE KEY NOTES

1	COMBINED ELEC-COMM MAINT., BOAT OPERATIONS FACILITY
2	HAZARDOUS MATERIAL STORAGE FACILITY
3	WASHRACK
4	PARALOFT FACILITY
5	SUPPLY WAREHOUSE
6	TACTICAL VEHICLE PARKING AREA
7	POV PARKING (35 SPACES)
8	POV PARKING (40 SPACES)
9	ROAD
10	WETLAND CROSSING
11	STORMWATER MANAGEMENT
12	JOGGING TRAIL
13	50' WETLAND BUFFER
14	SECURITY FENCE
15	PEDESTRIAN SIDEWALK

NOTE:  
THE FOLLOWING SITE IMPROVEMENTS ARE NOT SHOWN ON THIS DIAGRAM:  
- EXTERIOR ENTRANCE PLAZAS  
- BENCHES  
- TRASH RECEPTACLES  
- BIKE RACKS  
- LOW IMPACT DEVELOPMENT AREAS  
- TREE AREAS, PER REQUIREMENTS  
- SHRUB/GROUNDCOVER PLANTINGS  
- TURFGRASS PLANTING



APPROVED  
FOR COMMANDER NAVFAC  
ACTIVITY

SATISFACTORY TO: DATE  
DES --- DRW --- CHK ---  
PMO: CBC  
BRANCH/MANAGER  
CHIEF/ENGINEER  
FIRE PROTECTION

NAVAL FACILITIES ENGINEERING COMMAND  
DEPARTMENT OF THE NAVY  
PROJECT STATION/INSTALLATION  
2nd RADIO BATTALION COMPLEX, PHASE II  
MCB CAMP LEJEUNE, NC  
OVERALL SITE PLAN

SCALE: 1" = 50'  
EPROJECT NO.:  
CONSTR. CONTR. NO.:  
NAVFAC DRAWING NO.:  
SHEET OF  
C250



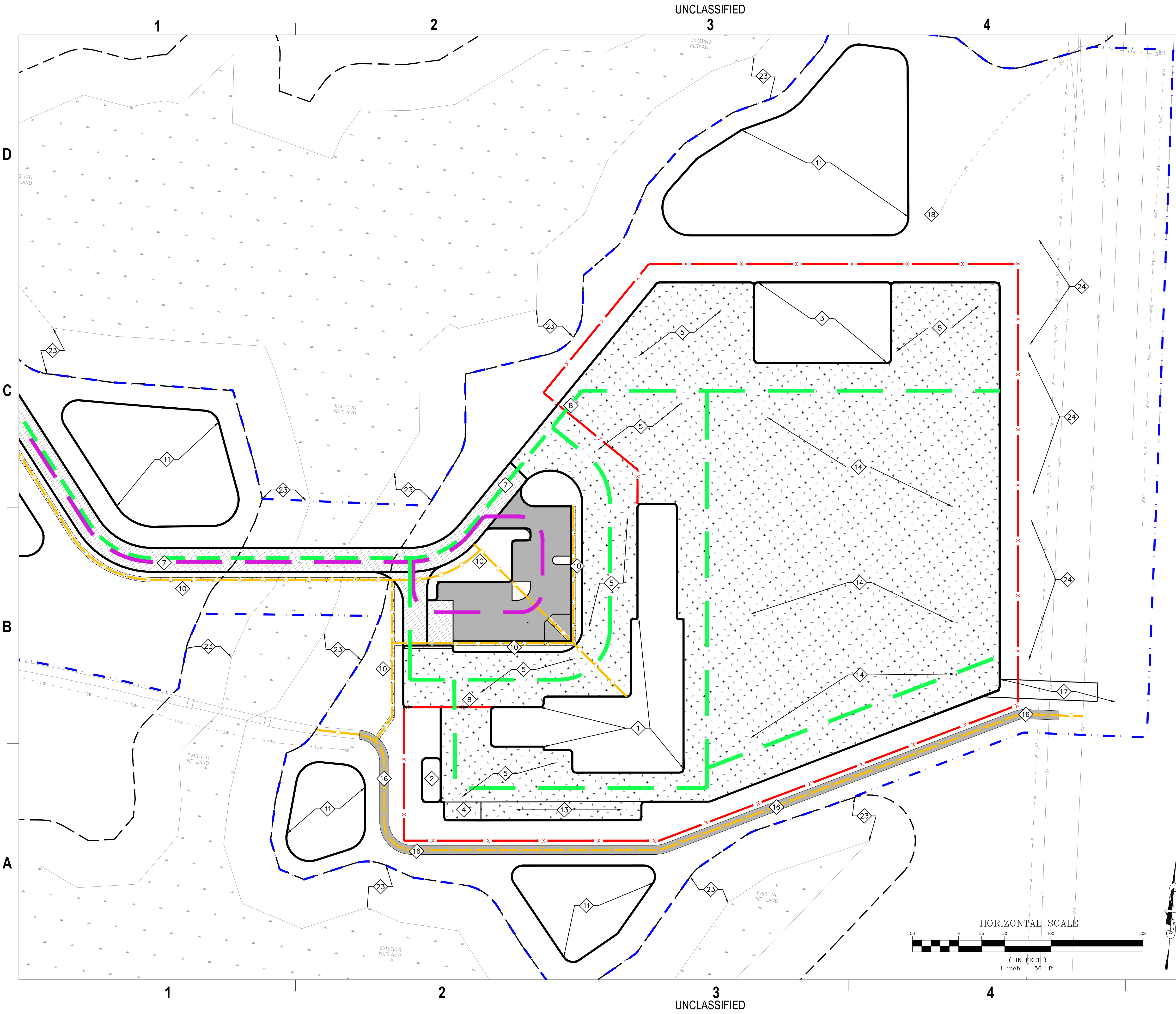


**NOTE:** THE FOLLOWING SITE IMPROVEMENTS ARE NOT SHOWN ON THIS DIAGRAM:

- EXTERIOR ENTRANCE PLAZAS
- BENCHES
- TRASH RECEPTACLES
- BIKE RACKS
- LOW IMPACT DEVELOPMENT AREAS
- TREE AREAS, PER REQUIREMENTS
- SHRUB/GROUNDCOVER PLANTINGS
- TURFGRASS PLANTING

1" = 30'
CT NO.:
CONTR. NO.
DRAWING NO.
OF
C251





CIVIL LEGEND – SITE

- PROJECT LIMITS
- OUTLINE
- 50' WETLAND SETBACK
- PEDESTRIAN CIRCULATION
- POV CIRCULATION
- TACTICAL VEHICLE CIRCULATION
- CHAIN LINK SECURITY FENCE
- DECORATIVE SECURITY FENCE
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- ASPHALT PAVEMENT
- CONCRETE SIDEWALK

SITE KEY NOTES	
1	COMBINED ELEC-COMM MAINTENANCE, BOAT OPERATIONS FACILITY
2	HAZARDOUS MATERIAL STORAGE
3	WASHRACK
4	TRIPLE DUMPSTER PAD/ENCLOSURE
5	TACTICAL VEHICLE HARDSTAND
6	POV PARKING (35 SPACES)
7	NEW ACCESS ROAD
8	SLIDING GATE
9	PEDESTRIAN GATE
10	SIDEWALK
11	STORMWATER MANAGEMENT
12	MECHANICAL EQUIPMENT AREA
13	SHELTER STORAGE AREA
14	TACTICAL VEHICLE PARKING AREA
15	PEDESTRIAN EGRESS GATE
16	ASPHALT JOGGING TRAIL
17	EMERGENCY VEHICLE ACCESS & GATE TO HOLCOMB BL
18	WATER CONNECTION
19	SANITARY CONNECTION
20	GAS CONNECTION
21	POWER CONNECTION
22	COMMUNICATION CONNECTION
23	50' WETLAND BUFFER
24	UNDISTURBED, WOODED AREA BETWEEN FENCE CLEAR ZONE AND EXISTING TRAIL

NOTE:  
THE FOLLOWING SITE IMPROVEMENTS ARE NOT SHOWN ON THIS DIAGRAM:  
- EXTERIOR ENTRANCE PLAZAS  
- BENCHES  
- TRASH RECEPTACLES  
- BIKE RACKS  
- LOW IMPACT DEVELOPMENT AREAS  
- TREE AREAS, PER REQUIREMENTS  
- SHRUB/GROUNDCOVER PLANTINGS  
- TURFGRASS PLANTING

1228 YEAMANS HALL ROAD  
HANAHAN, SC 29410  
843-566-0151  
ADCENGINEERING.COM  
ADC PROJECT # 4124

811 Know what's below.  
Call before you dig.

NAVAFAC

FDR

APPROVED

FOR COMMANDER NAVAFAC ACTIVITY

SATISFACTORY TO DATE

DES --- DRW --- CHK ---

PM/DN CBC

BRANCH/MANAGER

CHIEF ENGINEER

FIRE PROTECTION

NAVAL FACILITIES ENGINEERING COMMAND

DEPARTMENT OF THE NAVY

PROJECT STATION/INSTALLATION

2nd RADIO BATTALION COMPLEX, PHASE II

MCB CAMP LEJEUNE, NC

SOUTHEAST SITE PLAN

SCALE: 1" = 30'

PROJECT NO.:

CONSTR. CONTR. NO.

NAVFAC DRAWING NO.

SHEET OF

C252



## Part 6 - Attachments

### Chapter D – Low Impact Development

- Department of Navy Policy November 2007 Memorandum
- Low Impact Development Data – January 2017, Version 3.0
- Report Documentation Page – Standard Form 298 (Rev. 8-98)
- Low Impact Development Waiver Form
- LID Waiver Form Instructions

This page intentionally left blank.

DESIGN STAGE

UFC 3-210-10 (DoD Policy for EISA Section 438)

FC 1-300-09N (Navy LID Policy)

Footprint: \_\_\_\_\_ SF

LID Implemented: ☐ Yes ☐ No

Applies to both UFC 3-210-10 (DoD Policy for EISA Section 438) and FC 1-300-09N (Navy LID Policy)

Location of LID features: ☐ On Site ☐ Off Site ☐ Both

**LID Features:** select all that apply

- |  |  |  |  |  |
|--|--|--|--|--|
| <input type="checkbox"/> Bioretention                                  | <input type="checkbox"/> Cisterns                  | <input type="checkbox"/> Dry Wells       | <input type="checkbox"/> Grass Buffers | <input type="checkbox"/> Grass Swales      |
| <input type="checkbox"/> Infiltration Trenches                         | <input type="checkbox"/> Permeable Pavers          | <input type="checkbox"/> Porous Concrete | <input type="checkbox"/> Rain Barrels  | <input type="checkbox"/> Rain Gardens      |
| <input type="checkbox"/> Re-vegetation                                 | <input type="checkbox"/> Roof Leader Disconnection | <input type="checkbox"/> Soil Amendments | <input type="checkbox"/> Tree Boxes    | <input type="checkbox"/> Tree Preservation |
| <input type="checkbox"/> Impervious Area Reduction (Square Feet) _____ |  |  |  |  |
| <input type="checkbox"/> Other _____                                   |  |  |  |  |
| <input type="checkbox"/> Other _____                                   |  |  |  |  |
| <input type="checkbox"/> Other _____                                   |  |  |  |  |

Percent Change in Runoff Volume (Increase or Decrease): \_\_\_\_\_% if increase, indicate technical constraints

**Technical Constraints:** select all that apply

- ☐ Non-potable water demand (for irrigation, toilets, washwater, etc) is too small to warrant water harvesting and reuse systems
- ☐ Retaining storm water onsite would adversely impact receiving water flows
- ☐ Site has shallow bedrock, ☐ contaminated soils, ☐ high groundwater, ☐ underground facilities or utilities
- ☐ Site is too small to infiltrate significant volume
- ☐ Soil infiltration capacity is limited
- ☐ State of local requirements restrict the use of green infrastructure / LID
- ☐ Structural, plumbing, or other modifications to existing buildings to manage storm water infeasible
- ☐ Other (explain): \_\_\_\_\_

LID Notes:

This page intentionally left blank.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE		2. REPORT TYPE		3. DATES COVERED	
4. TITLE AND SUBTITLE				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			

This page intentionally left blank.

# Capital Improvements



## LOW IMPACT DEVELOPMENT WAIVER FORM

UNCLASSIFIED

1. DATE SUBMITTED		2. DATE RECEIVED	
3. WON		4. PROJECT NUMBER	
5. PROJECT TITLE		6. FISCAL YEAR OF PROJECT	
7. NEW CONSTRUCTION GREATER THAN \$750K		8. RENOVATION GREATER THAN \$5M	
<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> YES <input type="checkbox"/> NO	
9. DESIGN/CONSTRUCTION ORGANIZATION NAME, ADDRESS AND TELEPHONE NUMBER/EMAIL ADDRESS		9a. RESPONSIBLE PERSON/TITLE (print)	
		9b. SIGNATURE OF RESPONSIBLE PERSON/DATE	
10. OFFICE (FEC/IPT//PWD/OICC/ROICC etc.)		10a. CONTRACT NUMBER/TASK ORDER NUMBER (if applicable)	
10b. NAME OF RESPONSIBLE PERSON/TITLE		10c. TELEPHONE NUMBER/EMAIL ADDRESS	
11. PROJECT SUMMARY			
12. REASON LID IS NOT APPROPRIATE			
<input type="checkbox"/> TECHNICAL <input type="checkbox"/> MISSION <input type="checkbox"/> OTHER			
13. SIGNATURE		COMMENTS	
_____ Commanding Officer      Date		<input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED	



This page intentionally left blank.

# Capital Improvements



## LID WAIVER FORM INSTRUCTIONS

This form is for UNCLASSIFIED use only.

Navy Low Impact Development (LID) Policy (commonly referred to as the Penn Memo) authorized a waiver process to be used in those infrequent situations where LID is not appropriate given the characteristics of the site. This waiver process is required to include Regional Engineer (FEC Commander) level review and approval.

Navy and Marine Corps projects are required to comply with Navy LID policy. The Navy LID policy sets a goal of no net increase in stormwater and sediment or nutrient loading from major renovation and construction projects. Major renovation projects are defined as having a stormwater component and exceeding \$5 million. Major construction projects are defined as exceeding \$750,000. If LID is not implemented to the METF as defined in UFC 3-210-10, a Navy LID policy waiver must be obtained from the Regional Engineer. Coordinate waiver review and approval with the Government's civil technical discipline coordinator (TDC).

**Note: If LID is implemented to the METF as defined in UFC 3-210-10 a waiver is not required.**

Request for waivers are discouraged except in those infrequent cases where there are compelling reasons. The waiver process is time consuming and waiver requests should be submitted as early as possible in the development of the project to avoid delays. Submit the LID waiver form along with DD 1391, basis of design, drawings, and specifications. For Post Award Design Build projects, the construction contractor is responsible for making the submittal to the Construction Manager (CM). For Pre Award Design Build and Design Bid Build projects, the Designer of Record (DOR)<sup>1</sup> is responsible for making the submittal to the Project Manager (PM). Refer to the FC 1-300-09N *Navy and Marine Corps Design Procedures* for additional criteria.

**Note: The Navy LID Waiver is not applicable where LID is required in accordance with EISA Section 438. UFC 3-210-10 addresses DoD requirements for complying with EISA Section 438. Use UFC 3-210-10 paragraph titled Applicability to determine when LID is required to comply with EISA Section 438.**

Block 1. Enter date submitted to the CM/PM by the Contractor/DOR. Date format is DD/MM/YYYY.

Block 2. The NAVFAC CM/PM shall enter the date received by the Contractor/DOR. Date format is DD/MM/YYYY.

Block 3. Enter project Work Order Number (WON).

---

1. The Architectural/Engineering firm or the design manager can be substituted as the DOR for pre award design build projects.

# Capital Improvements



## LID WAIVER FORM INSTRUCTIONS

Block 4. Enter project number. Example: P-999

Block 5. Enter project title.

Block 6. Enter the fiscal year of the project.

Block 7. Indicate if the project is new construction greater than \$750,000.

Block 8. Indicate if project is renovation greater than \$5,000,000 with a stormwater component.

**Note: If 7 and 8 are no, the Navy LID policy does not apply and a LID waiver is not required.**

Block 9. Enter name, address, telephone number and email address of the Contractor/DOR.

Block 9a. Print the name of the responsible person and position title (Lead Engineer, Manager, President, etc). This information is especially important to ensure any questions related to the project and site design can be quickly directed to the appropriate point of contact, avoiding delays in processing.

Block 9b. Include signature and date of the responsible person.

Block 10. Enter the office (FEC, PWD, IPT, OICC, ROICC, etc.) in responsible charge of the project.

Block 10a. Enter the contract number. Include the task order number if applicable.

Block 10b. Enter name of the CM/PM for office indicated in block 10.

Block 10c. Enter the office phone number and email address for the person indicated in block 10b.

Block 11. Provide a brief summary of the project. Be sure to included details such as the project location, and size. The final approval authority should fully understand what the project is and why this project is necessary.

Block 12. Indicate the reason LID is not practical for this project, (e.g., conflicts with existing state or local regulations, site is contaminated, etc.) and select the appropriate check box.

Block 13. The Project Manager shall make the FEC CI Business Line Coordinator (CI BLC) aware of the waiver request and obtain approval or disapproval and signature of NAVFAC FEC Commanding Officer. Return the signed waiver to the PM who must add the signed waiver as an internal note in eProjects.

## Part 6 - Attachments

### Chapter E – Mechanical and Fire Protection

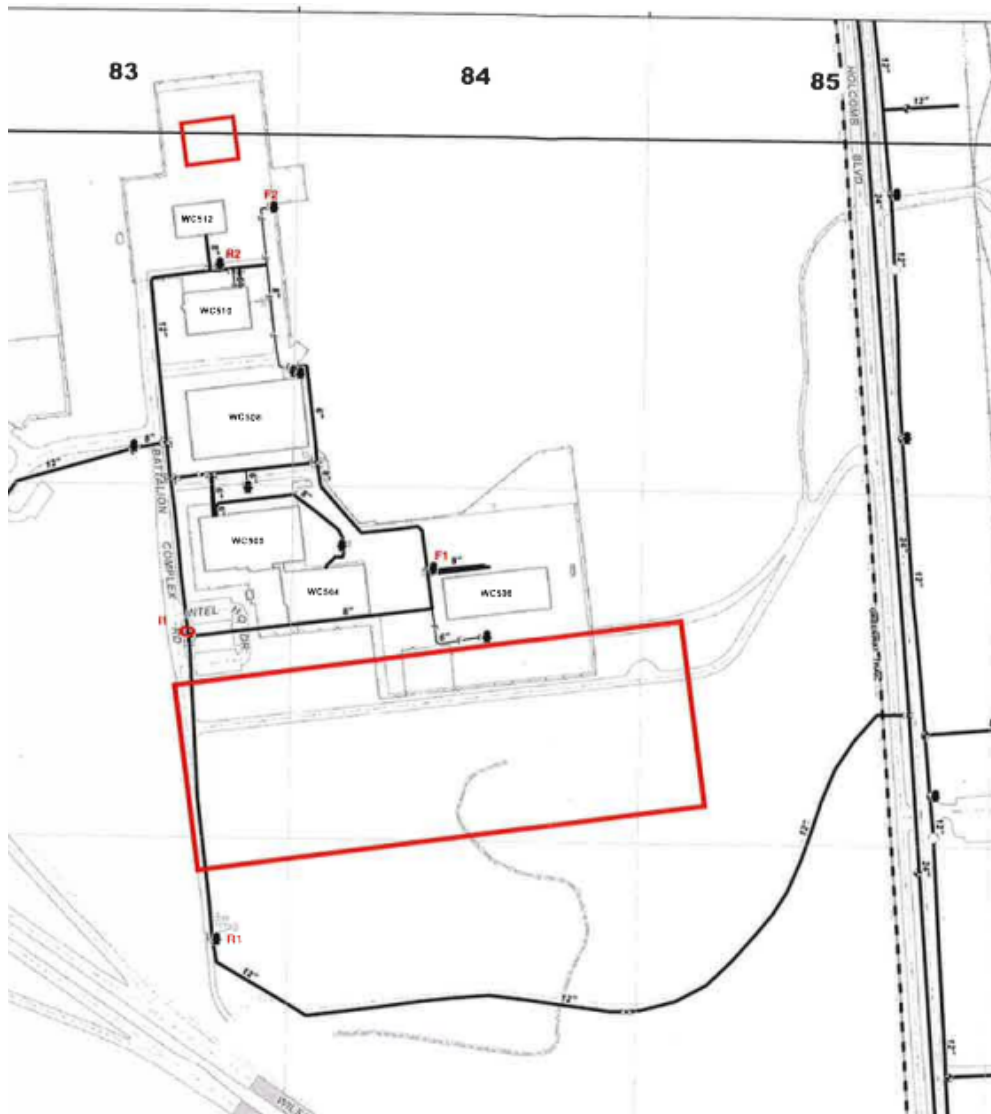
- Fire Hydrant Flow Test
- IWD-MILCON FACP MNS 28 JAN 2015 Typical (US Version - Alkurdi)
- MNS Riser
- Baseline Energy Cost Data
- 22 14 00.00 22 - Rainwater Harvesting
- 22 33 30.05 22 - Solar Water Heating Equipment (Integrated Solar Hot Water)
- 22 33 31.05 22 - Integrated PV-Thermal System (Integrated Solar Hot Water & PV)
- 22 81 28.10 22 - Variable Refrigerant Flow (VRF) Multi-Split Air Conditioning and Heat Pump
- Equipment
- Camp Lejeune Mechanical Design Guidance Rev. Aug 2022
- 28 31 76 - Interior Fire Alarm and Mass Notification System, Addressable

This page intentionally left blank.

## Part 6 - Attachments

### Chapter E – Fire Hydrant Flow Test

The Fire Hydrant Flow Test Data shall be utilized to develop Technical Evaluation Factor Six (6) – Energy and Sustainable Design. This data shall serve no other purpose. The following documents are included.



Following are test results obtained at the proposed Parachute Maintenance and Paraloft Facility Site (Hydrants F2/R2) on 01/23/2019:

Static:	62.5 PSIG
Residual Pressure:	55 PSIG
Flow:	1,200 GPM

Following are test results obtained at the proposed Electronic/Communication/Vehicle Maintenance and Boat Operations Facility Site (Hydrants F1/R1) on 01/23/2019:

Static:	65 PSIG
Residual Pressure:	64 PSIG
Flow:	1,270 GPM

This page intentionally left blank.



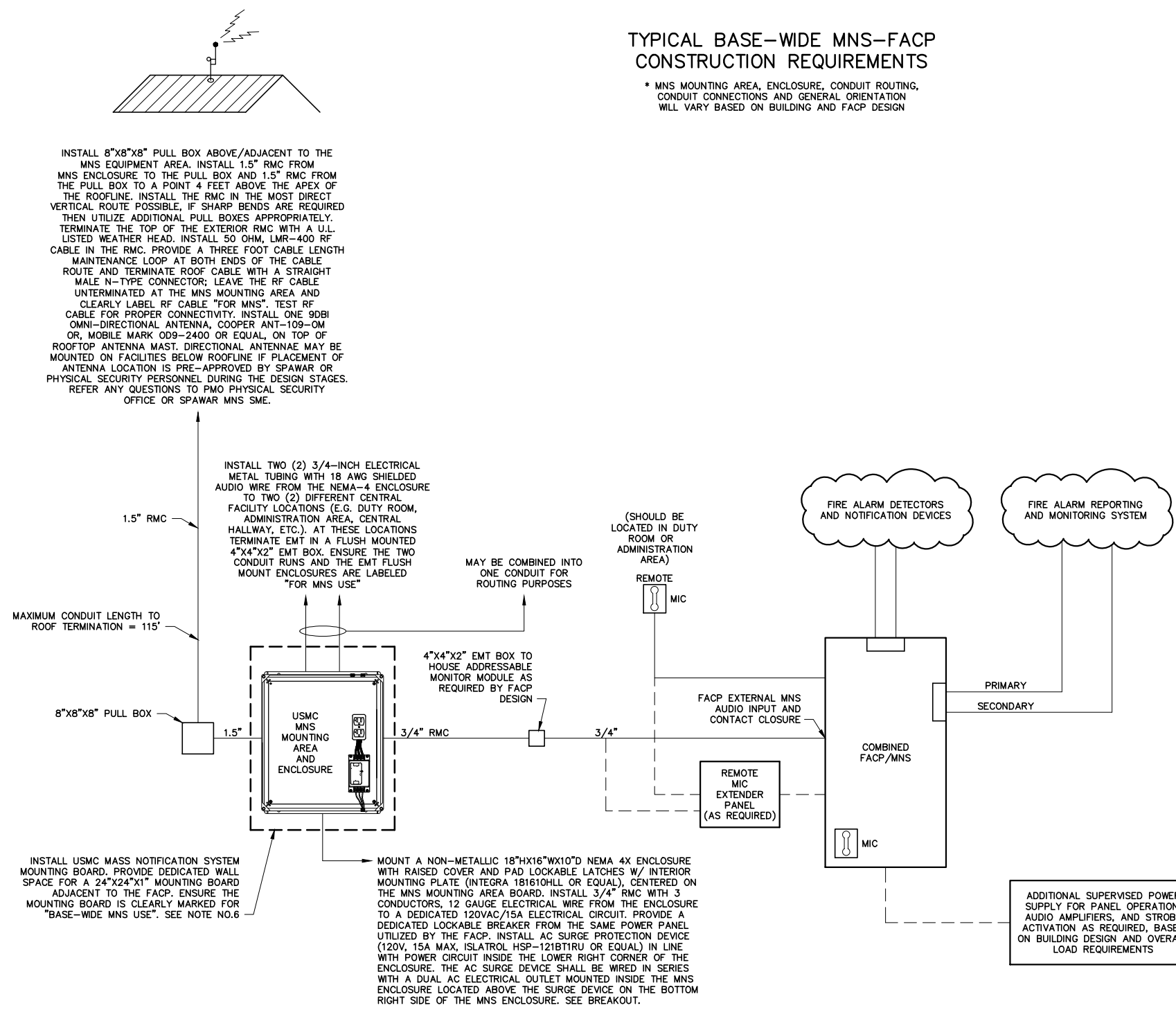
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

## TYPICAL BASE-WIDE MNS-FACP CONSTRUCTION REQUIREMENTS

\* MNS MOUNTING AREA, ENCLOSURE, CONDUIT ROUTING,  
CONDUIT CONNECTIONS AND GENERAL ORIENTATION  
WILL VARY BASED ON BUILDING AND FACP DESIGN

MNS AND MONITORING NOTES:

1. THE FIRE ALARM AND DETECTION SYSTEM IS TO BE FULLY COMPLIANT WITH THE CURRENT EDITION OF NFPA 72 FOR AN EMERGENCY VOICE ALARM COMMUNICATION SYSTEM. THE SYSTEM SHALL INTEGRATE WITH THE INSTALLATION BASE-WIDE MASS NOTIFICATION SYSTEM (WAVES).
2. THE FACP SHALL BE CAPABLE OF ACCEPTING AN AUXILIARY LINE LEVEL AUDIO INPUT OF 1 VOLT PK-PK OR .354 VRMS.
3. FACP SHALL BE CONFIGURED TO ACCEPT DRY CONTACT INPUT FROM THE TRX-GOI INTERFACE TO ALERT THE FIRE ALARM PANEL THAT A MNS MESSAGE IS FORTHCOMING. THE FIRE ALARM PANEL SHALL BE CONFIGURED SO THAT WHILE THIS INPUT IS ACTIVE (CONTACT CLOSED) THE FIRE ALARM PANEL SHALL ROUTE AUDIO PROVIDED BY THE MNS INTERFACE DIRECTLY TO ALL CONNECTED FIRE ALARM SPEAKERS. THE SYSTEM SHALL BE PROGRAMMED SO THIS EXTERNAL AUDIO INPUT WILL RECEIVE PRIORITY AND OVERRIDE ALL FIRE ALARM NOTIFICATION SO LONG AS THE INPUT IS ACTIVE. WHEN THE INPUT GOES INACTIVE (CONTACT OPEN) THE EXTERNAL AUDIO ROUTING WILL CEASE AND THE FIRE ALARM PANEL SHALL AUTOMATICALLY RETURN TO THE PRIOR NOTIFICATION PROGRAM THAT WAS ACTIVE BEFORE THE MNS MESSAGE. FACP LOCAL MIC HAS PRIORITY OVER ALL ANNOUNCEMENTS.
4. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR REQUIRED TO CONNECT THE NEW FIRE ALARM AND DETECTION SYSTEM TO THE BASE'S SUPERVISING STATION. ALL FIRE ALARM PANEL POINTS MUST BE PROGRAMMED AS INDIVIDUAL POINTS AT THE HEAD END. THE CONTRACTOR IS RESPONSIBLE FOR PROGRAMMING THE FIRE ALARM AND REPORTING SETTINGS AND HEAD END EQUIPMENT. ALL PROGRAMMING TO BE BY THE EQUIPMENT MANUFACTURER OR MANUFACTURERS CERTIFIED REPRESENTATIVE IN ACCORDANCE WITH BASE STANDARDS AND APPROVED BY THE FIRE ALARM REPORTING SYSTEM (FARS) ADMINISTRATOR.
5. UTILIZE COMBINATION SPEAKER/STROBE NOTIFICATION DEVICES WHENEVER POSSIBLE. ALL NOTIFICATION DEVICES WILL BE LABELED "ALERT." FIRE MARKINGS ARE NOT USED SINCE THIS IS A COMBINATION FIRE AND VOICE EVACUATION SYSTEM. ALL STROBES UTILIZED SHALL BE WHITE. THE USE OF DISPLAY SIGNS ARE NOT AUTHORIZED FOR INSTALLATION/USE AT EGRESS POINTS OF FACILITY.
6. ENSURE MNS EQUIPMENT AREA IS WITHIN 15 CONDUIT FEET OF THE FACP.
7. CONTRACTOR IS RESPONSIBLE FOR PROVIDING SPEAKERS FOR EACH FACILITY TO MEET ALL MASS NOTIFICATION SYSTEM INTELLIGIBILITY REQUIREMENTS IN ACCORDANCE WITH UFC 4-021-01. ALL SPEAKERS/STROBES WILL BE LABELED "ALERT". ALL STROBES UTILIZED SHALL BE WHITE.
8. ON THE EXTERIOR ANTENNA MAST OF FACILITY INSTALL ONE 9DBI OMNI-DIRECTIONAL 2400MHZ ANTENNA OR PRE-APPROVED 9DBI DIRECTIONAL 2400MHZ ANTENNA AND ASSOCIATED IN-LINE LIGHTNING ARRESTOR MODULE.
9. PROVIDE A SINGLE REMOTE MICROPHONE PANEL LOCATED IN THE DUTY ROOM OR MAIN ADMINISTRATIVE OFFICE AS REQUIRED BY BUILDING SIZE AND DESIGN. IF A REMOTE MICROPHONE IS UTILIZED THEN A REMOTE MICROPHONE EXTENDER PANEL MAY BE REQUIRED TO ALLOW FOR AN ADDITIONAL MNS AUXILIARY AUDIO INPUT TO THE FACP. THIS IS DEPENDANT ON FACP MODEL.
10. ALL KNOWN BUILDING STRUCTURAL FIRE BARRIER PENETRATIONS SHALL BE SEALED WITH FIRE CAULK. IF UNCONFIRMED THEN SEAL STRUCTURAL PENETRATIONS WITH FIRE CAULK. DRESS AND SECURE ALL WIRE, CABLES, AND EQUIPMENT IN A NEAT AND PROFESSIONAL MANNER. ENSURE THE ENCLOSURE AND INSTALLATION AREA IS CLEAN AND FREE OF ANY DEBRIS. CONNECT ALL NEWLY INSTALLED EQUIPMENT/MATERIALS AND TEST FOR PROPER OPERATION. CONDUCT LOCAL/REMOTE DIAGNOSTICS AND LOCAL/REMOTE AUDIO ACTIVATION. INSTALLED COMPONENTS SHALL BE PERFORMANCE TESTED BY PHYSICAL SECURITY, SPAWAR MCESS, BASE FIRE DEPARTMENT, ROICC, AND CONTRACTOR PERSONNEL.
11. REFER TO SPAWAR MNS SME'S, BASE PHYSICAL SECURITY PERSONNEL, MCO 5530.14B-PHYSICAL SECURITY PROGRAM GUIDE, AND UFC 04-021-01 MASS NOTIFICATION SYSTEMS FOR ADDITIONAL MARINE CORPS SPECIFIC GUIDANCE.



TYPICAL DIAGRAM

- ALARM PRIORITY**
1. LOCAL MICROPHONE
  2. MASS NOTIFICATION SYSTEM
  3. FIRE ALARM

MNS INSTALLATION

INTERCONNECTING WIRING DIAGRAMS  
SPECIFIC LOCATION (BLDG XX, ROOM XX)  
FOURTH LINE IF NEEDED

PREFIX AND SITE NAME				STATE ABBREVIATION	
SIZE	CAGE CODE	IA CODE	SPAWAR DRAWING NO.		REV.
F	29355	29355-A	XXXXXXXX-XX		X
FILENAME			XXX XXX XXX XXXXXXX-XX X 600		SHEET 600

This page intentionally left blank.

The diagram illustrates the electrical connections for a fire alarm system. Key components and their connections are as follows:

- Remote Annunciator (Located in Lobby):** Contains an R/A indicator and is connected to the FAMN panel.
- Local Operators Console (Located in Lobby):** Includes a microphone and a LOG indicator, connected to the FAMN panel.
- Fire Alarm & Mass Notification Control Panel (FAMN):** The central unit containing a microphone and a battery backup. It provides outputs for:
  - TYPICAL SLC (Single Line Circuit)
  - TYPICAL NAC (Notification Appliance Circuit)
  - HVAC EQUIPMENT SHUT OFF CONTROL (IF REQ'D)
  - DACT (Direct Alarm Control Terminal) with PRIMARY and SECONDARY outputs
- USMC MNS Transceiver (By Other):** A dashed-line enclosure containing a microphone and a speaker. It is connected to the FAMN panel and the Remote Annunciator.
- Power and Grounding:**
  - 120 VAC W/ SURGE SUPPRESSOR: Connected to the FAMN panel and the USMC MNS Transceiver.
  - BATTERY BACKUP: Connected to the FAMN panel.
  - GROUNDING: Indicated by a ground symbol and a connection point labeled 7.
- Numbered Callouts:**
  - 1: Connection from FAMN microphone to USMC MNS Transceiver microphone.
  - 2: Connection from FAMN LOG indicator to USMC MNS Transceiver speaker.
  - 3: Connection from USMC MNS Transceiver microphone to FAMN microphone.
  - 4: Connection from USMC MNS Transceiver speaker to FAMN LOG indicator.
  - 5: Connection from USMC MNS Transceiver speaker to the Remote Annunciator.
  - 6: Connection from USMC MNS Transceiver microphone to the Remote Annunciator.
  - 7: Grounding connection point.
  - 8: Connection from USMC MNS Transceiver speaker to the Local Operators Console.

9

1. PROVIDE AUDIO INPUT AND CONTACT CLOSURE IN THE FAMN PANEL TO ACCEPT EXTERNAL SIGNAL FROM THE MNS TRANSCIVER.
2. PROVIDE  $\frac{3}{4}$ " RIGID METAL CONDUIT (RMC) BETWEEN FAMN PANEL AND MNS TRANSCIVER PANEL.
3. PROVIDE DEDICATED WALL SPACE FOR 24"x24"x1" MOUNTING BOARD ADJACENT TO THE FAMN PANEL (WITHIN 15 FT MAX). ENSURE THE MOUNTING BOARD IS CLEARLY MARKED FOR "BASE-WIDE MNS USE".
4. PROVIDE 1-1/2" RIGID METAL CONDUIT.
5. PROVIDE 8"x8"x8" PULL BOX.
6. PROVIDE (2) 3/4-INCH ELECTRICAL METAL CONDUITS (EMT) WITH 18 AWG SHIELD AUDIO WIRE FROM THE NEMA-4 ENCLOSURE TO 2 DIFFERENT CENTRAL FACILITY LOCATIONS (DUTY ROOM, ADMINISTRATION AREA, CENTRAL HALLWAY - COORDINATE WITH THE BASE SECURITY FOR LOCATION). AT THESE LOCATIONS, TERMINATE RMC IN A FLUSH MOUNTED 4"x4"x2" EMT BOX. ENSURE THE 2 CONDUIT RUNS AND THE EMT FLUSH MOUNTED ENCLOSURES ARE LABELED "FOR MNS USE".
7. 1-1/2" RMC FROM PULL BOX TO THE ROOF. MAXIMUM CONDUIT LENGTH TO ROOF TERMINATION IS 115 FT. TERMINATE THE TOP OF THE EXTERIOR RMC WITH UL LISTED WEATHER HEAD. PROVIDE 50 OHM, UMR-400 RF CABLE IN THE RMC. PROVIDE 3-FT CABLE LENGTH MAINTENANCE LOOP AT BOTH ENDS OF THE CABLE ROUTE AND TERMINATE ROOF CABLE WITH A STRAIGHT MALE N-TYPE CONNECTOR. DO NOT TERMINATE THE RF CABLE AT THE MNS MOUNTING AREA AND CLEARLY LABEL THE RF CABLE "FOR MNS". TEST RF CABLE FOR PROPER CONNECTIVITY. PROVIDE ONE 9DBI OMNI-DIRECTIONAL ANTENNA, COOPER ANT-109-OM OR, MOBILE MARK OD9-2400 OR EQUAL, ON TOP OF ROOFTOP ANTENNA MASS. DIRECTIONAL ANTENNA MAY BE MOUNTED ON FACILITY BELOW ROOFLINE IF PLACEMENT OF ANTENNA LOCATION IS PRE-APPROVED BY SPAWAR OR PHYSICAL SECURITY PERSONNEL. CONTACT CONTRACTING OFFICER FOR LOCATION OF ANTENNA DURING SHOP DRAWING FOR PRE-APPROVED ANTENNA LOCATION.
8. PROVIDE A NON-METALLIC 18" HEIGHT X 16" WIDTH X 10" DEPTH NEMA 4X ENCLOSURE WITH RAISED COVER AND PAD LOCKABLE LATCHES W/INTERIOR MOUNTING PLATE. MOUNT THE PANEL IN THE CENTER OF THE MNS MOUNTING BOARD. PROVIDE  $\frac{3}{4}$ " RMC WITH 3 CONDUCTORS, 12 AWG ELECTRICAL WIRE FROM THE ENCLOSURE TO A DEDICATED 120VAC/15A ELECTRICAL CIRCUIT. PROVIDE A DEDICATED LOCKABLE BREAKER FROM THE SAME POWER PANEL FOR FIRE ALARM CONTROL PANEL. PROVIDE AC POWER SURGE SUPPRESSOR DEVICE IN LINE WITH POWER CIRCUIT INSIDE THE LOWER RIGHT CORNER OF THE ENCLOSURE. PROVIDE A DUAL ELECTRICAL OUTLET MOUNTED INSIDE THE MNS ENCLOSURE ABOVE THE SURGE SUPPRESSOR ON THE BOTTOM RIGHT OF THE MNS ENCLOSURE. WIRE SURGE SUPPRESSOR IN SERIES WITH DUAL ELECTRICAL OUTLET. WIRING MUST BE IN ACCORDANCE WITH NFPA 70.

## WATER-BASED FIRE PROTECTION SPRINKLER SYSTEM PRELIMINARY CALCULATIONS

PROJECT: 10151490

### SPRINKLER SYSTEM SUMMARY:

LT = ESTIMATED UNDERGROUND PIPING FRICTION LOSSES

HT = ESTIMATED ELEVATION HEAD LOSS

$\Delta P_{BLDG}$  = ESTIMATED BUILDING PIPE FRICTION LOSSES (5 TO 10 PSI)

$\Delta PS$  = SPRINKLER PRESSURE LOSS =  $(QP/K)^2$ , (MINIMUM RESIDUAL  $\geq 7$  PSIG)

$\Delta PB$  = BACKFLOW PREVENTER ASSEMBLY PRESSURE LOSSES

$\Delta PT$  = SYSTEM PRESSURE LOSS (LT + HT +  $\Delta P_{BLDG}$  +  $\Delta PS$  +  $\Delta PB$ ) =

THE ESTIMATED SPRINKLER SYSTEM DEMAND REQUIRED IS **625 GPM AT 62 PSI.**

WATER SUPPLY AVAILABLE AT THE CONNECTION OF THE CITY MAIN IS **3,062 GPM AT 20 PSI.**

2.27	PSI
32.51	PSI
10.00	PSI
10.30	PSI
7.00	PSI
<b>62.09</b>	<b>PSI</b>

### SUPPORTING CALCULATIONS:

#### I. ESTIMATED SPRINKLER SYSTEM FLOW REQUIREMENTS:

HAZARD CLASSIFICATION:

AREA OF SPRINKLER OPERATION

FLOW DENSITY - USE BOTTOM OF 7-2.3.1.2 CURVE IF NOT SPECIFIED IN BY AHJ

AREA ADJUSTMENT IF APPLICABLE (40% REDUCTION FOR QUICK RESPONSE SPRINKLERS, CEILING < 10 FT.)

MAXIMUM FT<sup>2</sup> LIMITATION PER SPRINKLER PER OCCUPANCY CLASSIFICATION

REVISED AREA OF SPRINKLER OPERATION

MINIMUM NUMBER OF SPRINKLERS

AREA DENSITY CURVE VALUE = GPM/SFT X SFT

25% IMBALANCE

AREA DENSITY CURVE VALUE + 25% IMBALANCE

TOTAL COMBINED INSIDE AND OUTSIDE HOSE STREAM DEMAND (AT HYDRANT)

TOTAL DEMAND

DURATION OF SUPPLY

TOTAL WATER SUPPLY

QP = MINIMUM FLOW AT THE HYDRAULICALLY MOST DEMANDING SPRINKLER

PENDENT K-FACTOR, ORIFICE SIZE

ORDINARY HAZARD	
2,500	SFT
0.20	GPM/SFT
0.00%	%
130	SFT
2,500	SFT
19	
500	GPM
125	GPM
625	GPM
250	GPM
875	GPM
60	MINUTES
52,500	GALLONS
26	GPM
8.10	

#### II. HYDRANT FLOW TEST DATA:

	HYDRANT FLOW (GPM)	PSI
A. LOCAL HYDRANT FLOW TEST DATA (REF.):		
B. TEST HYDRANT STATIC PRESSURE (CLOSEST TO BUILDING)	0	62.5
C. FLOW HYDRANT RESIDUAL PRESSURE	1,200	55
FLOW RATE AT RESIDUAL PRESSURE	3,062	20

HYDRANT TEST DATED 01/23/19	
62.5	PSIG
55	PSIG
1,200	GPM

CREATE A SEMI-LOG GRAPH Q VS. DP (N =1.85)

(NOTE: TYPICAL MINIMUM CITY RESIDUAL PRESSURE IS 20 PSI)

### III. ESTIMATED UNDERGROUND PIPING FRICTION LOSSES FROM CITY MAIN TO FIRE SERVICE ENTRANCE:

<b>HAZEN WILLIAMS FORMULA:</b>	
DH =	SIZE (IN) AND TYPE/SCHEDULE
C =	PIPE DIAMETER (YARD - CEMENT LINED)
Q =	HAZEN-WILLIAMS COEFFICIENT
V =	FLOW RATE
$\mu$ =	PIPE VELOCITY
R =	KINEMATIC VISCOSITY, 50°F WATER
L =	REYNOLDS NUMBER, NR = DH/12 X V/ $\mu$
LF =	ESTIMATED PIPE LENGTH
LT =	ESTIMATED EQUIV. LENGTH FITTING/VALVES
	TOTAL ESTIMATED EQUIVALENT LENGTH
	FRICTION LOSSES

$$HF = 10.44 L Q^{1.852} / C^{1.852} DH^{4.8655}$$

Base of riser to Fire Main	
8 DIP CL	
8.210	IN.
140	
875	GPM
5.31	FT/SEC
0.0000141	FT²/SEC
257,476	
400	FT.
75	
475	
5.24	FT.

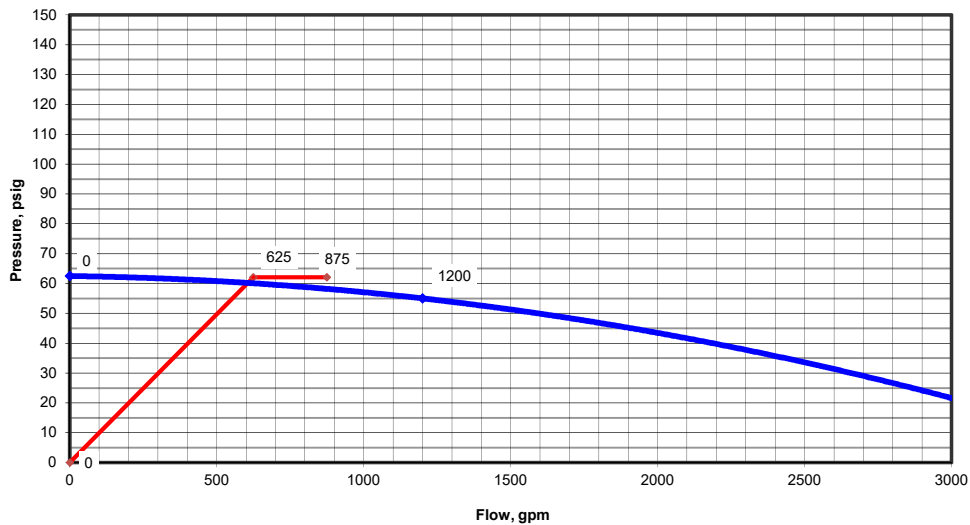
### IV. ESTIMATED ELEVATION HEAD LOSS:

HF =	ELEVATION 1 - STARTING REFERENCE
H1 =	ELEVATION 2 - HIGHEST ELEVATION
HT =	ELEVATION HEAD LOSS (H1-HF)

Elevation	
-5.00	FT.
70.00	FT.
75.00	FT.

#### NOTES:

- DESIGN VALUE OF HAZEN-WILLIAMS'S ROUGHNESS FACTOR PER NFPA 13-2019, CHAPTER 27 PLANS AND CALCULATIONS  
DIP CLASS 50 CEMENT LINED C = 140, BLACK STEEL (WET PIPE SYSTEM) = 120, DIP CL 50 = 100
- EQUIVALENT LENGTH FOR MINOR LOSSES FROM NFPA 13-2019, CHAPTER 27 PLANS AND CALCULATIONS  
AND DESIGN OF WATER-BASED FIRE PROTECTION SYSTEMS, ROBERT M. GAGNON 1996
- GRAPH SHOWN IS FOR VISUALIZATION ONLY AND IS NOT A TRUE N1.85 GRAPH.



This page intentionally left blank.

## Part 6 - Attachments

### Chapter E – Baseline Energy Cost Data

The Baseline Energy Cost Data must be utilized to develop Technical Evaluation Factor Six (6) – Energy and Sustainable Design. This data must serve no other purpose. The following documents are included.

#### Activity Rates:

Electricity:	\$70.92/MWh
Water:	\$2.34/kgal
Wastewater:	\$2.24/kgal

NG (Rates published monthly, rates reflect FEB posting):

Nov-March	\$8.66/Dth
April-October	\$8.34/Dth



This page intentionally left blank.

# CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

---

Rev Aug 2022  
Previous 1 Jul 2017

New revisions are bolded, new removals are lined through. Revisions since 10.14.08 are dated. Re-ordering of comments, grammar and typo corrections are not annotated.

**The target audience of this guidance is locally administered and designed projects (FSRM) and Military Construction (MILCON) at MCB Camp Lejeune and MCAS New River. Use as appropriate for other projects. (8.10.22)**

## GENERAL

1. Use Camp Lejeune Guide Specifications as available. These specifications have been pre-edited for use at Camp Lejeune and save time for both the designer and the reviewer. Edit as necessary. Add equipment and materials as necessary. Direct any questions, comments, and suggestions to the Mechanical Branch, Camp Lejeune Public Works Design. We welcome your input. (7.1 2017)
2. All equipment shall be removable from the building without removing/displacing other equipment (8.8.12).
3. Isolate “steam” mechanical rooms from building. All steam equipment is more prone to leaking, thus making the room humidity saturated. Provide the steam room with an exterior door; do not provide a door(s) to adjacent spaces. Keep electrical equipment out of this room. If possible separate steam rooms from cold equipment rooms. Minimize controls in steam mechanical rooms. Only controls necessary for equipment in the room shall be allowed. If it is convenient put controls in adjacent room. It is preferable to keep air handlers out of this room also. Do not run high pressure steam outside the steam room (ie steam entrance should be directly into steam mechanical room). Separate building for steam equipment and pumps is good. Provide exhaust fan ventilation with 20ac/hr on cooling thermostat.
4. **Designs shall** separate fuel fired equipment and other heat producing equipment from air handlers and other equipment that has a cool surface temperature into different mechanical rooms. (8.10.22) Fuel fired equipment and other heat producing equipment require ventilation to meet building codes and for practical reasons. Air handlers, and chilled water pumps do not require ventilation. Rooms with only chilled/hot water air handlers are not classified as mechanical rooms by the international building code and therefore do not require ventilation.(8.29.14)
5. **Provide an exterior rollup door for the cold mechanical room to allow for the removal of the air handler along with a single man door. Layout should incorporate a “maintenance aisle” of open space adjacent to the air handler to facilitate the maintenance or replacement of any air handler component. At a minimum, the maintenance aisle dimensions should be equal to the footprint of the air handler it serves and should provide a direct route to the exterior rollup door. Rollup door should be at least one foot larger in each direction than the cross section of the air handler. It is acceptable to just provide a set of double doors to the exterior for the hot mechanical room provided that all boilers/equipment can easily fit through the opening. (8.10.22)**

6. **Provide impervious surface outside the rollup door for equipment staging (minimum 12'x12'). Provide impervious pathway for service van/truck to all mechanical rooms (do not provide reinforced turf). Rollup doors not at grade shall be provided with ramp. (8.10.22)**
7. Ventilate "hot" rooms and electrical rooms sufficient to mitigate heat gain.
8. Do not ventilate cold equipment rooms. Cold equipment rooms are those rooms with chilled water pumping, cooling air handlers, etc. These rooms should be unvented and with small dehumidifier. Drain condensate to floor drain or other disposal location. Summer dew point ranges from low to high 70's at Camp Lejeune causing condensation on equipment and piping. Dehumidifier should be wall mounted with wheels removed and hard wired with disconnect (no pigtail with plug) to discourage theft/relocation. Dehumidifier should be hard piped to drain to avoid drainage blockage. (8.30.10)
9. Keep in mind fall hazards when locating equipment. Provide necessary fall protection.
10. During renovations; remove unused pipe, duct, and equipment. It is not necessary to disassemble building components. Abandon in place piping sub slab or buried in a wall that is not getting demolished for other reasons. (8.29.14)
11. Install ice dams on metal roofs over or near outside mechanical equipment (8.29.14)
12. Designer shall ensure that all plumbing and mechanical work includes the following requirement. "All material and equipment shall be installed in accordance with the manufacturer's recommendations for the intended purpose. Use the more stringent methods when manufacturer's recommendations, and plans & specification requirements differ. Bring any conflicts between manufacturer's recommendations and plans & specification requirements to the government's attention." The Camp Lejeune guide specifications should include this but it may be need added to other specifications. (7.15.16)
13. Do not traverse telecom rooms with piping. This removes the risk of water damage to equipment from leaks/breaks/condensation. (7.1.17)
14. Avoid traversing telecom rooms with ducts. Ducts unrelated to the telecom room take up space, pose a risk of water damage (condensation), and cause a smoke spread risk. If it is unavoidable, the duct must have fire dampers at both ends. (7.1.17)

### **HVAC: General**

15. Design conditions for Camp Lejeune are: 91/77F 1%DB/MCWB and 140 grains/lb with a 84F MCDB. 26F 99% and 22F 99.6% heating conditions. Equipment selection shall meet all conditions. (8.29.14)
16. Rooftop HVAC equipment should be used with discretion. Maintenance access is more difficult, controls and water piping are exposed to more extreme conditions and roof is exposed to more abuse and wear. Ladders permanent or temporary inhibit personnel, material and equipment access, and therefore stairways shall be provided to roof top equipment.
17. Avoid use of chilled water fan coil (FCU) systems due to the high maintenance associated with them. Coil condensate drain pans are especially problematic. If FCU's are used, ensure adequacy of the drain system.

## CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

---

18. HVAC equipment should not be installed in attics or above suspended ceilings, unless absolutely necessary. When placement in an attic is dictated by necessity, provide stairs to access the attic, and maintenance access to and space around equipment; ships ladders are undesirable. Provide drain pan float switch to shut down condensing unit or close chilled water valve to the coil. (6.26.9)
19. A/C terminal units with compressors shall be easily removed. On water source equipment that means unions on the equipment side of the service valves.
20. In refrigerated rooms/boxes: specify all evaporators on a condensing unit to defrost together, separate evaporator/condensing unit pairs should defrost non-concurrently.
21. Provide phase monitors on all 3 phase equipment. For chillers the following shall be included:
  - a) phase unbalance protection
  - b) over/under voltage protection
  - c) phase loss protection
  - d) Delay of break timer to delay automatic restarts
  - e) non critical fault delay
  - f) programmable auto/manual restart
  - g) load and line side monitoringFor all other equipment only phase loss, phase reversal, and phase unbalance need to be monitored. Standard internal functions of VFD are acceptable. Reset shall be automatic upon correction of the fault.
22. When connecting to existing air or hydronic system, require contractor to test existing equipment or system to establish conditions. Be specific as to what needs to be tested and when. It may be necessary to adjust flow or static (head) pressures of new equipment and measuring before ordering new equipment will reduce contract modification costs.(8.29.14)
23. In buildings where cooling is not available 12 months/year, consider the use of ductless split systems for conference rooms. Consider the use of Package Terminal Heat Pumps or ductless split system (8.29.14) for high internal heat spaces such as server rooms.
24. Geothermal coupled heat pump systems shall be designed and installed in accordance with NAVFAC MidAtlantic Policy (8.8.12).
25. Recommended HVAC system types are (8.8.12):
  - a. All packaged units less than 120,000 Btu/hr shall be either heat pumps with auxiliary gas heat or heat pumps with auxiliary electric heat.
  - b. All packaged units greater than 120,000 Btu/hr shall be either air conditioners with gas heat or heat pumps with auxiliary gas heat.
  - c. All split systems less than 120,000 Btu/hr shall be either heat pumps with auxiliary electric heat or heat pumps with auxiliary gas heat.
  - d. All split systems greater than 120,000 Btu/hr shall be heat pumps with auxiliary gas heat.
26. VRF(Variable Refrigerant Flow): In most cases heat reclaim system is preferable to heat pump system. For systems with interior spaces and or rooms with significant internal heat gain specify that all interior units be capable of full heating capacity while other units are in the cooling mode(this requires a 3 pipe system), or schedule the minimum heating required for each indoor zone when outdoor unit is in the

cooling(this allows a 2 pipe system, but sets minimum heating performance requirement). 8.29.14

27. **VRF systems shall require the installation of an enhanced power and energy meter per the MCBCL DDC specifications. This electrical meter will be in addition to the standard ITRON power meter for the building. This DDC meter will monitor and log the incoming power at the MDP as we often have VRF stability issues where the site has dirty power or inconsistent voltages. This meter shall also be provided for any other HVAC equipment that is sensitive to power quality, such as magnetic bearing chillers, etc. (8.10.22)**
28. Consider using gas fired unit heaters in boiler rooms in lieu of hot water unit heaters. These reduces the freezing risk if the boiler trips, but there is still gas and power. 8.29.14
29. All R22 in existing equipment/systems to be demolished by the contractor will be recovered by Camp Lejeune. This should be included in the demolition specification 02 41 00 and on the drawings. The project manager will notify Public Works Ops to instigate a work order to the base maintenance contractor prior to construction contractor starting work. (12.8.16)
30. Camp Lejeune shall be given the chance to salvage existing DDC controllers and parts before demolition. The project manager will notify Public Works Ops to instigate a work order to the base maintenance contractor prior to construction contractor starting work. (12.8.16)
31. **All interior housekeeping pads shall be a minimum of 6" high (2x6 form). The top all exterior equipment pads shall be a minimum of 6" above grade. (8.10.22)**
32. **All exterior mechanical equipment yards shall be concrete Not only will the weeds/weedeaters be eliminated, but it will also keep out the dust/dirt/debris that gets sucked in to the evaporator coils and affect unit performance. Any condensate created by the equipment in the mechanical yard (DOAS) should be collected and piped directly to the storm drain. (8.10.22)**
33. **Specification 01 91 00.15, Total Building Commissioning: Change Sample Strategy requirements from 20% to 100% for all equipment. (8.10.22)**

### **HVAC: Pipes and Pumping**

34. Provide primary/secondary pumping systems on multiple building chiller systems **or** on systems larger than 150 tons. Keep flow thru the chiller constant. Be very careful to maintain minimum chiller flow and avoid erratic or rapid chiller flow. **For primary only systems, maintain chiller minimum flow through the use of 3-way control valves – avoid the use of a bypass valve (8.10.22) ~~Minimum flow bypass valve if used and dp sensor should both be direct connected to plant controller, do not use a comm bus due to polling delays. (7.1.17).~~** Ensure primary loop has sufficient thermal inertia. Be aware that the secondary loop has little influence on staging cycling during low load conditions. (6.20.8)
35. Do not use plastic preinsulated pipe for buried dual temperature water distribution; use preinsulated copper pipe. HDPE is acceptable for chilled water applications. (6.13.8)
36. Do not specify or permit mineral fiber on pipes cooler than 70F. Cellular glass, polystyrene(8.29.14), or polyisocyanurate is required on chilled water pipes and

## CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

---

- domestic cold water. (1.25.10) Allow flexible Unicellular when rigid insulation is not practical, such as small refrigerant lines sets, and tight piping.(8.29.14)
37. Use rigid insulation on all pipes subject to being stepped on or damaged.
38. Use coalescing type combination air/solid separators on all hydronic systems regardless of pipe material (steel or copper). 7.15.16
39. Do not specify or permit automatic flow control balancing valves (flow limiting valves). Specify manually TAB'd circuit setters. (1.18.13).
40. **Hydronic coils shall have a minimum flow of 1 gpm to aid with TAB. (8.10.22)**
41. Design and specify bladder type expansion tanks (when available) with automatic air relief valve on the air separator. Bladder type expansion tanks have a full tank acceptance volume, and bladder is replaceable. Diaphragm type expansion tanks have an acceptance volume less than tank volume and the diaphragm is not replaceable. If the pre-charge air is discharged the diaphragm tank will overflow and rupture. Bladder tanks may not be available in the smaller sizes. 7.15.16
42. Paint all dual temp and chilled water steel pipe and equipment before insulation is installed. This in addition to shop primer and or mill coating. (1.28.10)
43. Do not permit grooved couplings in piping system other than the chiller connection. (6.13.8)
44. Extruded Tee's in copper piping are acceptable for mains 2" and larger with the branch ½ or less than the main. Joint must be brazed. (6.13.8)
45. Do not permit press type fittings in copper. (6.13.8)
46. Pump Packages: In general do not specify pump/heat exchanger packages. Most of our mechanical rooms are on the smallish side. Pump packages require maintenance space on all sides. If specifying a pump package, designer must work out general lay out of package and mechanical room to ensure maintenance access.
47. **Provide inline or close couple pumps are preferred (8.10.22)** for circulating pumps. Provide redundant system pumps; each pump shall carry the design flow, with the second pump as an alternating backup. A single pump is adequate for equipment pumps, such as a boiler pump. Inline and close coupled pumps do not have a coupling between the motor and the pump, do not require alignment or stringent grouting requirements and therefore cause less maintenance issues.(8.29.14) For inline pumps 5 hp and larger, include rigging points for maintenance.
48. When a partial renovation of a building HVAC system re-uses existing piping, specify the contractor to clean and flush the existing piping. (1.8.10)
49. Add valves, drains, and vents at each piece of equipment to aid servicing(8.31.11). All equipment including heat exchangers shall have P/T ports on inlet and discharge of all water connections(8.8.12). **All hydronic coils shall be installed with unions, P/T ports on both the coil inlet and outlet. In addition, for coils larger than 1 gpm, provide thermometers and pressure gauges on both the coil inlet and outlet. (8.10.22)** Include in-situ thermometers in mechanical rooms to aid in onsite trouble shooting.(8.29.14)
50. ~~Require balance valves of the venturi type where the throttling valve and the measuring station are separate. i.e. the pressure is not read across the valve. 8.29.14 (7.1.17)~~
51. Specify that all refrigerant piping be vacuum tested to 300 microns for 24 hours after the high pressure test. The system fails the test if with the vacuum pump

- disconnected from the system, the pressure rises above 300 microns after 24 hours.(8.29.14)
52. Do not specify or permit gate valves. Require ball or butterfly valves. We seem to get better longevity from the ball and butterfly valves. 7.15.16
  53. Provide emergency chilled water connections for portable chillers on installations with a single chiller. The connection shall be a full size TEE with lugged type butterfly valve for both the portable and insitu chillers. Cap the portable connection with blind flanges. 7.15.16
  54. **Size all chilled water piping, pumps, and coils for a 10 degree delta T across the chiller evaporator. (8.10.22)**
  55. **Chilled water piping above ground 4 inch and smaller shall be Type L copper. Chilled water piping above ground larger than 4 inch shall be Type L copper or Schedule 40 Black steel piping. Chilled water piping below ground shall be pre-insulated Type K copper sticks and kits or SDR11 HDPE piping with PVC jacket. (8.10.22)**
  56. **Heating hot water piping above ground 4 inch and smaller shall be Type L copper. Heating hot water piping above ground larger than 4 inch shall be Type L copper or Schedule 40 Black steel piping. Heating hot water piping below ground shall be pre-insulated Type K copper sticks and kits. (8.10.22)**
  57. **All exterior piping between equipment and buildings must be buried unless otherwise specified. (8.10.22)**
  58. **Do not stack utilities in corridors. All piping/components should be able to be serviced without removing other services. (8.10.22)**
  59. **When a building contains multiple heating and cooling loops (such as individual modules in a hangar), interconnect all chilled water piping and interconnect all heating hot water piping with manual valves. (8.10.22)**
  60. **All glycol systems must be filled with inhibited propylene glycol solution. Provide test report of glycol solution concentration and composition after filling. (8.10.22)**

### **HVAC: Air Systems**

61. Duct drawings shall be a minimum 3/16" scale.(8.29.14) Show TAB air flow quantities for supply, return and exhaust terminals. (7.15.16)
62. Use the latest revision of ASHRAE 62 for guidance on indoor air quality. For the purposes of outside air ventilation only, typical occupancy is considered that which happens at least once a week for buildings that follow a regular schedule or at least 15 times a year for non-schedule type buildings.
63. Buildings shall be kept at a slight positive pressure to reduce/avoid infiltration in the walls that can cause condensation. Consider the tightness of the building, also consider inaccuracies in TAB. Having outside volumes 10% in excess of exhaust volumes should be always be considered.(8.29.14)
64. Chilled water VAV with zone reheat is the preferred HVAC system for offices and should be considered wherever appropriate. VAV zone boxes without fans are preferable to units with fans. In non-fan powered zone boxes, when specifying minimum air flow the designer shall consider diffuser dumping. If a zone has a large variance of load profile from neighboring zones a fan powered box should be



considered to avoid dumping of diffusers. Chilled water VAV with fan powered terminal units with reheat is the preferred HVAC system for BEQ/BOQ's. Fan powered VAV terminal units shall be series type with the secondary fan 10-20% (50 cfm minimum) greater than maximum primary flow. (7.1.17) Minimum primary air flow shall be the greater of the minimum controllable flow or (8.29.14) the ventilation rate required. (5.12.10).

65. **For single duct boxes, the VAV minimum cooling and heating airflow (CFM) must be the same, and the minimum airflow (CFM) must not be less than 50% of the cooling maximum airflow. VAV discharge leaving air reheat temperature must be a minimum of 90 degrees Fahrenheit. (8.10.22)**
66. Particular attention should be given to humidity control by air conditioning equipment. Constant volume (8.29.14) cooling units 7.5 tons and smaller shall not have modulating water controls unless based on a constant 55 F supply temperature. Larger units may have split face coils to give capacity step control (progressive modulating chilled water valves may be used). Modulating face and bypass dampers are okay on any size equipment.
67. Avoid HVAC systems that modulate cooling supply air temperatures unless outside air is separately conditioned.
68. Air handling unit filter access doors should be specified as hinged with non-tool captive latching devices, i.e. captive thumb screws, quarter turn latches etc. Do not specify or approve access panels that are unhinged and/or retained by sheet metal screws.
69. Require contractors to provide a listing of the HVAC filters for each piece of equipment along with their dimensions (width, height and thickness) and types (permanent/washable, throwaway, etc)
70. Require contractor to provide 2 extra complete sets of air filters to be left in the mechanical room at BOD. Require contractor to provide and change all air filters at second season TAB if included. In all, the contractor will provide at least 5 sets of filters. 1 for startup, 1 at BOD, 2 in the box for government, 1 at 2<sup>nd</sup> season TAB.(8.29.14)
71. Outside air intakes should be in compliance with force protection criteria, ie; minimum of 10' above finished grade **or 10' away from wall/enclosure. (8.10.22)**
72. DUCT WORK: specify and draw 45 degree expanded throat take offs with balance damper for all supply run outs to diffusers and grills. Do not permit flexible duct runs exceeding 5'(8.29.14) long. Specify that all 90 degree turns be accomplished with hard metal elbows, such as on top of diffusers, and if top take off of trunk duct. Show balance dampers on return systems with branches. Give return flows to TAB (8.29.10).
73. Specification 23 05 93, Testing, Adjusting, and Balancing for HVAC: Change DALT requirement from 20% to 100% duct air leakage test on all projects. Specify on the drawings, duct seal class A for all ducts. (1.2.13) Specify the SMACNA leakage class (CL) on the mechanical drawings: round and oval duct= 3, rectangular duct =6, test pressure of 1" (1.2.13). Contact Camp Lejeune project management concerning scope of work for existing ducts to be re-used. (9.8.10) Consider removing all insulation on existing duct and resealing and reinsulating it.

74. The use of ceiling return air plenums is discouraged and shall not be used in new construction. (2.10.10)
75. Bull headed tees should be limited to below 900 fpm duct systems. (8.31.11)
76. Provide filters on upstream side of the ~~wheel~~ **heat exchanger** (8.10.22) on both airstreams (7.15.16) of an energy recovery ~~device wheel~~. (8.31.11)
77. BEQ's: Fan powered VAV boxes: secondary air shall come directly from the conditioned space via a ducted return with a filter return grille. Secondary air shall not come from the closet. Closets shall return direct back to the air handler. (8.31.11)
78. Specify electronically commutated motors (ECM) for fan powered terminal units. Design consideration should be provided to address the degradation of power quality and potential problems with overheating of neutral wiring conductors, connectors, and transformers (8.31.11).
79. Interior duct liner shall not take the place of exterior duct insulation. All cooling supply duct shall be insulated including duct inside conditioned space (8.8.12).
80. **Provide pre-engineered, pre-insulated exterior ductwork (such as Thermaduct, Dual-Tech, Qduct), composed of fortified panels composed of fiber-free closed cell foam insulation with either vinyl or aluminum shell (such as Kingspan KoolDuct). Duct systems which require thru penetrations with fasteners shall not be permitted. (8.10.22)** ~~Exterior duct shall be externally insulated with 1.5" thick foam rubber insulation with robust weather jacket. Insulation shall be 100% adhered to the duct. The weather jacket shall be either a sheet metal overlay or factory adhered multilayer (mylar and aluminum) covering. (1.18.13)~~
- ~~81. Use total energy recovery cores - Enthalpy wheels are not permitted. Size cooling coils, water flow, and chillers for complete failure of the core. (8.10.22)~~ **Size cooling coils downstream of Enthalpy recovery wheels for degradation of wheel performance. For BEQ's, the EAT of the coil shall be schedule as though the coil has lost one half of its scheduled performance. This will aid in system recovery after outages, and in during periods of high shower use. For non-BEQ's, EAT of the coil shall be scheduled as though the enthalpy wheel has lost 15% of its scheduled performance. The economic analysis and energy study shall use the scheduled core wheel effectiveness. Water flow and chiller sizing shall be based on the reduced wheel performance.(8.29.14)**
82. Specify duct access doors at fire dampers and special duct mounted equipment requiring regular access such as duct mounted coils. Duct access doors are not desired at control dampers, manual dampers, and turning vanes. 8.29.14
83. On 5 ton unitary and smaller require the secondary drain pan to be pre-formed plastic with float or dampness type switch. Require a float switch in the secondary drain connection of the unit. Both switches to shut off unit upon activation. (7.15.16)
84. On unitary air conditioning equipment and small fan coil units, consider filter return grilles in lieu of unit mounted air filters for ease of access, meeting face velocity limits. Meeting the higher MERV ratings may not be practical on unitary equipment regardless of location. (12.8.16).
85. **Single-type channel suspension ductwork hangers and supports are not permitted. All ductwork hangers must be as directly prescribed in the SMACNA**

**HVAC Duct Construction Standards 3rd Edition 2005, Chapter 5 - no alternative duct hanger systems must be permitted. (8.10.22)**

- 86. **Label all ductwork in mechanical rooms with sticker indicating service (supply/return/exhaust/outside air) and arrow indicating direction (8.10.22)**
- 87. **Provide a minimum of R8 duct insulation on all ductwork. (8.10.22)**
- 88. **Do not specify airflows for supply, return, or exhaust grilles to be less than 30 cfm to aid in TAB measurements. (8.10.22)**

### **HVAC: Chillers and outdoor equipment**

- 89. Provide aluminum fins on copper tubes or aluminum micro channel coils (8.8.12). Require coils on all outdoor equipment larger than 10 tons, and on DX, chilled water, and hot water coils with greater than 50% outside air regardless of capacity (8.31.11) to pass ASTM B117 90 3000 hour salt spray resistance test as installed. For equipment within 1000 feet of the ocean, intracoastal waterway, New River, Wallace Creek require 6000 hour resistance.(8.29.14) The heat transfer rating of phenolic-coated coils should be as installed (i.e. after coating). Although UFC does not exempt small equipment from coating standards. It is more cost effective to replace small equipment with a shorter life span than to special order what is normally standard equipment. (7.1.17)
- 90. Air cooled equipment is (8.29.14) preferred to water cooled equipment for individual equipment smaller than **400 tons** (8.10.22). Camp Lejeune weather is mild and humid which only gives slight efficiency advantage to water cooled equipment. Larger plants such as multiple 400 ton chillers should be water cooled. The efficiency advantage overcomes the additional maintenance of cooling towers. This is not in reference to ground source or ground coupled systems. This statement is for open or closed type evaporative cooling towers. 7.15.16
- 91. **Supply cooling towers with factory provided access platforms, ladders, and motor davits. All cooling tower sections to be minimum 304 SST. (8.10.22)**
- 92. Do not use steam absorption chillers. ~~Helical screw compressors are desirable. Reciprocating and scroll compressors are acceptable.~~ **Provide multiple scroll compressors for chillers up to 200 tons. Provide screw compressors for chillers greater than 200 tons. (8.10.22)** Where applicable on large installations centrifugal equipment is acceptable, (greater than **400 tons**).(8.10.22) Oilless centrifugal is acceptable (1.25.10). Specify high lift compressors for air cooled oilless centrifugal chillers (8.29.14).
- 93. Provide adequate thermal mass in chilled water systems to ensure proper control and longevity of chillers. Chiller manufacturers recommend 2 to 7 minute water loop return times; **use a minimum of 5 minutes to size inertia tanks or size inertia tanks for 7 gallons/ton at full load – whichever is greater. (8.10.22)** ~~and/or increase pipe sizing/length.~~
- 94. Do not permit 400 series refrigerants except 407C and 410A. 400 series refrigerants are zeotropes and cause maintenance problems. ~~Use of 407C is discouraged, as it is a short term stop gap measure that the manufacturers can drop into basically a R22 machine. Designer shall research the availability of 410A and/or 134A equipment. If sufficient competition is available with 410A and/or 134A, prohibit the use of 407C and R22. 5.22.09.(7.15.16).~~

## CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

95. Do not permit/specify engine driven refrigeration equipment.
96. On chillers and large condensing units; provide core filter dryer on suction line as available as standard option.
97. On chillers and large condensing units; provide liquid and suction line service valves as available as standard option.
98. Do not permit welding on chillers. Water connections shall be by grooved coupling or flanges. Provide 16-20 mesh strainer on water inlet.
99. Require 5 year warranty on compressor parts. Require 5 year warranty on labor if available.
100. Use multiple chillers on loads above 160 tons. (7.15.16)

### **GAS PIPING**

101. The design for LP gas tanks shall be as follows:
  - a) construction contractor to provide:
    - i. 6" thick concrete slab, 6'x8' for 500 gallon tank, 6'x16' for 1000 gallon tank (6.10.9)
    - ii. Underground gas line to stub up through oversized sleeve in slab, 3" from edge
    - iii. 1<sup>st</sup> stage regulator
    - iv. Protective bollards, 7' long, 4" schedule 40 galvanized steel, concrete filled, 3' bury with concrete encased, paint bright yellow/black with 4" stripes.
    - v. Make tank hook up
    - vi. Purchase at construction contractor's expense, LP gas for startup, and construction period.
  - b) Camp Lejeune will arrange rental, including placement, but not hook up, of the tank. Camp Lejeune will contract for tank fill up after BOD of project.
  - c) Designer shall specify size of the tank (typical sizes are 123, 500, & 1000 gallon), size and location of the concrete pad, and placement/number of protective bollards. Bollards shall be placed to protect from the grass cutters (each open corner), and nearby traffic (may require intermediate bollard spacing). Design shall comply with all applicable codes. As a reminder, 500 gallon tank shall be minimum of 10' from the building, 1000 gallon tank shall be minimum of 25' from the building. The long axis of the tank shall be parallel with the building.
  - d) AROICC will notify Camp Lejeune metering & LP tank inspector (currently Rich Barnes @ 451-4785) of the need/timing of tank placement, and tank fill after BOD.
102. On LP systems, first stage regulator is located at the LP tank and should be set for 10 psig. The second stage regulator should be located on the exterior of the building wall in a protected location. Provide a building shut off valve on all systems. (1.19.2010).
103. Size interior gas piping with a 15% safety buffer. I.E. Size the piping for 15% more demand than anticipated. (1.28.10)
104. Common interior gas pressures are 7", 2 psi, and 5 psi. Use 7" if 2" or smaller piping can serve the load, otherwise use 2psi with regulators at each appliance. (1.28.10) **Any installation that requires the use of gas pressure greater than 2 psi will have the require overpressure safety devices as required by NFPA 54 (8.10.22)**

- 105. Require sediment traps before each appliance and each medium pressure regulator. (8.29.14)
- 106. **Specify all gas piping to be painted safety yellow. (8.10.22)**
- 107. **For natural gas installations, indicate on design drawings for the contractor to provide a union and lockable ball valve when connecting to the natural gas meter. The natural gas meter will be provided by the utility company, not the contractor. (8.10.22)**

### CONTROLS

- 108. Avoid use of economizers (dry bulb or enthalpy). High humidity and poor control reliability prohibit success with economizers except in extremely high internal load buildings.
- 109. Direct Digital Control (DDC) systems are the preferred HVAC control systems for new and replacement control systems.
- 110. Where DDC is not practical, such as with small unitary equipment, use standalone programmable thermostats. (8.29.14)
- 111. CO2 sensors and outside air modulation should be considered in facilities with highly varying occupancies.
- 112. Specify that pneumatic control devices be able to withstand 30 psi without damage.
- 113. Control valve actuators shall be spring return normally open on preheat coils and other coils subject to freezing, spring return closed on hot water converters, and spring return closed on outside air dampers. (10.22.08)
- 114. Specify individual scheduling for air handlers. Specify a gradual (progressive) startup and a gradual (progressive) shut down of air handlers. A sudden startup or shut down of the entire building is too fast for chiller controls to react and sometimes causes safety trips.
- 115. Do not specify or provide air filter status alarms. Filters are changed on a schedule and filter alarms cause nuisance reporting. (1.2.13)
- 116. For Combined heating/cooling systems such as VAV with zone reheat; provide **single common** heating-cooling global set point that is reset based on ambient conditions. For most applications, allow occupants to adjust the zone set point +/-3F from the global set point. Global set point shall be 70F at less than 50F ambient; and 76F at greater than 80F ambient. Between 50F and 80F, the global set point shall reset linearly or in no fewer than 3 steps. ~~The single set point prevents the zone temperature from swinging between heating and cooling set points in low load conditions.~~ (8.29.14) Use a +/- 1F differential from the common set point to make effective cooling and heating setpoints. UFC requires two set points, heating of 68F and cooling of 78F. Note that this is not practical as the system will cool to the heating set point at minimum cooling capacities. The Federal mandated heating and cooling set points were rescinded many years ago. UFC 3-410-01 para 3-4.3 allows indoor conditions as approved by the authority having jurisdiction (AHJ). CMC has a policy of allowing individual installations to govern the set point. (7.1.17)
- 117. Set points for Unitary air conditioning/heat pumps (unless agreed otherwise): 70F htg/76F cooling Occupied; cooling set back 85F, gas heating set back 60F, heat pump set back 65F. (12.8.16) UFC requires heating set point of 68F and cooling set point

- of 78F. This creates excessive maintenance work tickets for failed HVAC systems because occupants are unhappy with indoor environment. UFC requires unoccupied heating set back of 55F. Recovery from 55F is impractical with heat pumps and it drives the equipment into using electric resistance heat. UFC 3-410-01 para 3-4.3 allows indoor conditions as approved by the authority having jurisdiction (AHJ). CMC has a policy of allowing individual installations to govern the set point. (7.1.17)
118. Specify on the drawings occupied/unoccupied schedules. Use Monday thru Friday 6am to 6pm as a default if a more precise schedule cannot be identified. (12.8.16)
119. Do not specify VFD's with external bypass. Do specify VFD's with 5% bus reactors.(7.15.16)
120. The project drawings for DDC shall include: system architecture including each type terminal device and any allowable gateways etc; detailed control sequences with P&ID, I&O Point Table, any exterior conduit runs (min 1"), conduit home run (min 1") from the BACnet Building Controller to the telephone equipment room. The points table may include 2 different sets of points; local view and EMCS view. Coordinate control power requirements with electrical sheets. Show circuits dedicated to controls for all control cabinets. (7.15.16).
121. Energy Monitoring Requirements are met by: supplier billing for gas, dedicated Itron metering system for electric and water. ~~and connection to the DDC for water.~~ (7.15.16/7.1.17)
122. **Do not provide occupancy sensors for VAV control or setback. (8.10.22)**
123. **Avoid the use of supply air temperature reset or static pressure reset control strategies. Air handler to supply air at a constant temperature and static pressure setpoint. If supply air temp reset is approved by PWD, sequence must have a dehum override with dewpoint setpoint less than coil temperature. (8.10.22)**

### **PLUMBING**

124. Lubrication oil lines should not be installed below building floor slabs. It is preferred that lubrication oil lines be installed overhead. If this is not possible or desirable by the customer, lines within service bays should be installed in trenches with removable tops. (6.26.9)
125. Install shop air compressors in accessible locations with appropriate space for periodic service. Shop air compressors are serviced by the building occupants and (6.26.09) should not be installed within mechanical rooms since occupant access is prohibited by base maintenance. Shop air compressors should be provided with sufficient cooling ventilation. Install air compressors associated with building HVAC controls within mechanical rooms.
126. Air compressor receivers over 5 cubic feet (37.4 gal) are unfired pressure vessels that must undergo hydrostatic and operational tests witnessed by the base boiler inspector. (5.19.8)
127. Air Compressors should be mounted on vibration pads/mounts. Specify/show flexible connectors on the piping. (10.22.08)
128. **When a building contains multiple individual compressed air loops (such as in maintenance bays or classrooms), provide interconnection piping and manual valves between all systems. (8.10.22)**



## CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

---

129. Where practical provide hose bibs near all HVAC coils for wash down/cleaning purposes.
130. Provide floor drains in all mechanical rooms.
131. Provide trap primers on all floor drains ~~except locations that are expected to get regular use throughout the year.~~ Trap primer shall be pressure type installed on a cold water line and shall not be installed on a flush valve.(2.27.9) **Trap guards are not permitted. (8.10.22)**
132. Provide sectional shut off valves for domestic hot & cold water for each bathroom (group).
133. Do not permit lever type control handles on pressure balance shower valves in BEQ's. This type of handle invites the user to pull for volume control, thereby breaking the handle.
134. Avoid frost proof hose bibs. Use standard hose bibbs. Frost proof hose bibbs will break when they freeze, whereas standard hose bibbs are less likely to be damaged by freezing.(8.29.14) **Provide exterior wall hydrants/hose bibbs with an accessible interior ball valve. (8.10.22)**
135. Provide strainers on RPZ back flow preventers.
136. ~~Double Check and RPZ type~~ **All (8.10.22)** back flow preventers (BFP) shall be tested/certified by the installing contractor prior to BOD. Add the following paragraph to any specification section that includes a BFP(10.22.08). "3.X Back Flow Preventer Certification: After installation all double check and reduce pressure zone type back flow preventers shall be inspected, tested and certified by a certified tester. Submit tester certification and Test Data Certification Sheet."
137. Extruded Tee's in copper piping are acceptable for mains 2" and larger with the branch ½ or less than the main. Joint must be brazed. (6.13.8)
138. Do not permit grooved connections in domestic water copper piping.
139. Do not permit press type fittings in copper. (6.13.8)
140. Combination waste & vent is discouraged and may be used only for floor drains and floor sinks when other venting methods are not possible. Venting lavatories and sinks other than floor sinks is not permitted with combination waste & vent(8.8.12). Make use of circuit venting where appropriate.
141. Drain lines serving commercial dishwashers should be high silicone cast iron. Drains serving low temperature mild acid such as carbonated beverage machine drains should be PVC. Indicate on the drawings drain line material.
142. Domestic water piping shall be type L copper for above ground and type K copper for below grade. Do not permit press fittings. For O&M projects cross linked Polyethylene (PEX) is permitted when largest pipe can be served by 1" PEX. (5.19.8)
143. Domestic waste and vent drawings shall include a plan view of the plumbing fixtures and the waste piping serving those fixtures for each floor level, and an isometric view riser diagram. Vent piping does not need to be shown on the plan view; but do show the connection points to the waste piping. Waste piping shall be represented as a single continuous line. Vent piping shall be represented as a single dashed line. Indicate pipe sizing on the isometric riser diagram. (8.8.12) **Drain piping must be shown on the same floor as fixture it serves. (8.10.22)**



144. Domestic hot and cold water drawings shall include a plan view of the plumbing fixtures and the water piping serving those fixtures for each floor level, and a riser diagram. The riser diagram may be an isometric view. The cold water shall be represented as a single line with a single dash. The hot water shall be represented as a single line with a double dash. (8.8.12)
145. Do not combine waste/vent drawings with hot/cold water drawings. Waste/vent plans, hot/cold plans, and riser diagrams may be included (8.29.14) on the same sheet if project size and space permits. (8.8.12)
146. Do not install whole building tempering valve for BEQ domestic hot water system heated by geothermal heat pumps that do not output 140F in a single pass. These heat pumps have trouble consistently heating storage tanks to 140F year-round and therefore tempering valve performance is affected (8.29.14). Store the hot water at 130-140 degrees, and deliver at the storage temperature. (1.18.13)
147. Provide pre-heat tank on solar hot water systems. Tank shall be sized for 1 day's worth of peak heat production (60F to 180F) for BEQs and 3 day's worth of peak heat production for other buildings, but not more than 1 day's use of hot water. (8.29.14). Mess Halls may have limited or no preheat storage as the day time demand is likely to exceed the collector capacity and the system will act only in the preheat manner (7.15.16).
148. Provide a testable **reduced pressure zone (RPZ)** back flow preventer (8.10.22) on the building domestic water service unless otherwise noted in the scope of work. Locate in the mechanical room. (7.15.16).
149. **Provide floor mounted flush valve water closets with hard-wired automatic flush control in all public restroom spaces. Provide flush valve urinals with hard-wired automatic flush control in all public restroom spaces. Provide countertop lavatories with hard-wired automatic control in each public restroom space. (8.10.22)**
150. Specify that all sprinkler piping shall be painted red. (8.10.22)

### **FUEL FIRED DOMESTIC WATER HEATERS, WATER BOILERS and SMALL STEAM BOILERS (8.30.10)**

151. Boilers 399,000 btu/hr and smaller are heating appliances. Boilers 400,000 btu/hr and larger are utility boilers and have increased surveillance, inspection, and maintenance requirements. Utility boilers are serviced, inspected, and operated by Utilities Department. Heating appliances are serviced and maintained by the Base Maintenance Contractor. Use multiple condensing boilers under 400,000 btu/hr input for applications where the total load is less than 2,200,000 btu/hr for heating, and 1,440,000 btu/hr for domestic water. (8.29.14) ~~Size the boilers for N+1 of 75% of the peak load, and all boilers no less than 100% of the peak demand. Where N equals the number of boilers to produce 75% peak demand (8.8.12).~~ Except for very small buildings provide at least two boilers. Combined boiler capacity greater than building load is not necessary or desired. (12.8.16).
152. **Boiler shall be floor mounted on concrete pad without the use of any original equipment manufacturer, aftermarket, or field fabricated device/accessory. Boilers intended to be wall mounted are not permitted. Boiler field connections located at the bottom of the boiler are not permitted. Boiler circulating pumps**

- integral to the boiler are not permitted. Boiler heat exchanger shall have an ASME H stamp with a working pressure of no less than 160 PSI. (8.10.22)**
153. Dining Facilities: Provide separate steam boilers for the process loads (dishwashers, steam kettles etc). Size each boiler for 110% of the process load in an N+1 configuration. Boilers shall be 150psig maximum allowable working pressure, wet back fire tube. Operate boiler at 50psig with a minimum pressure of 25psig (accounting for dead band during burner cycling). Burner shall be modulating type or two firing rate (hi/low fire) type. Provide steam pressure reducing station in a 1/3-2/3 configuration to reduce pressure to operating pressure of the equipment. (8.8.12)
154. Specify emergency gas shutoff **for all boiler and hot water heater installations. (8.10.22)** This is a remotely operated shut off valve. The labeled red mushroom valve shall be located next to the exit door. **Required at all points of egress for gas water heaters and all boilers. (8.10.22)**
155. Per NBIC, two means of exit shall be provided for equipment rooms exceeding 500 sqft of floor area and containing one or more boilers or potable water heaters having a combined fuel capacity of 1,000,000 Btu/hr or more. (8.10.22)
156. Specify Gas pressure gage.
157. Specify lockable disconnect.
158. All boiler controls shall meet CSD-1. Show on the drawings the emergency shutdown switch required by CSD-1 CE 110 (a). The preferred method is a single illuminated 50mm dia mushroom switch with one set of normally open contacts on the inside of the exit door. On single boiler installations this switch shall trip a shunt trip breaker for the boiler. On multiple boiler installations this switch shall trip a shunt trip breaker that energizes a normally open contactor. (i.e. when shunt trip breaker trips, it no longer holds the contactor closed). Contactor shall have one set of contacts for each boiler circuit. The idea is to require a manual reset of the shut trip breaker after an emergency activation. Provide appropriate signage (1.2.13)
159. Specify service valves on inlet and outlet connections.
160. Boilers and ~~tankless~~ (8.10.22) domestic water heaters shall have a minimum ~~30"~~ **36" (8.10.22)** piping and maintenance clearance on all sides **and 24" on top of equipment (8.10.22)**. At least every other side shall have 30" clear floor space for personnel access (8.8.12). Do not stack boilers. **Encroachment of other equipment in the mechanical room is not permitted. (8.10.22)**. All boilers shall sit on housekeeping pad on floor. Pumps may be stacked. (8.29.14)
161. **Domestic water heaters shall be integrated storage tank type. Separate storage tanks (without heating elements) or instantaneous/tankless type water heaters are not permitted. Allow glass lined with anode on 119 gallon and below. Provide duplex stainless steel storage tank without anodes for larger volumes. (8.10.22)** Tank type domestic water heaters shall have 15" clearance to the sides and rear, and minimum 30" piping and maintenance clearance to the front (8.8.12).
162. **Do not use domestic hot water piping volume in DHW heater sizing calculations. DWH is not "stored" in piping, only tanks. (8.10.22)**
163. **Water heater safety temperature/pressure relief valve pressure rating will meet and not exceed the lowest pressure of equipment in that system.( ex. Tanks**

- are rated at 125 psi then the safety temperature/pressure relief valves on the water heaters and tanks will not exceed 125 psi.) (8.10.22)
164. **Install a union on the Safety Relief Valve discharge line for ease of removal for testing and maintenance. (8.10.22)**
165. Provide condensate neutralization kit for each all boiler/water heaters. Tank shall hold at least ¼ cubic foot of limestone and be rechargeable without disconnecting piping or brackets (8.8.12). Condensate for groups of small boilers (up to 1,200,000 btu/hr input(12.8.16)) may be collected in a header and pass thru a single neutralization tank. (7.15.16)
166. **All mechanical rooms that house a boiler or water heater must have a floor drain. (8.10.22)**
167. Exhaust vents shall be vertical discharge for environmental reasons, even with sidewall penetrations. i.e. no rain caps. (1.2.13)
168. For Fuel Gas fired water and steam boilers provide a gas shutoff valve within 30 feet of the mechanical room exit door and on the same or adjacent wall to the exit door. i.e. valve shall be easily accessible in direct route from door with no more than one 90 degree turn. This valve shall be quick operating type valve such as a ¼ turn ball valve. (1.18.13)
169. **Ensure that carbon monoxide detectors are installed; this is both a NBIC and UFC 3-600-01 Fire Protection Engineering for Facilities requirement. (8.10.22)**
170. **Combustion air louvers need to be sized/installed according to manufacturer's specifications and the National Gas Code and NBIC for the equipment it is serving. Combustion air louvers that open and close will have a switch installed and not allow the boiler or any gas equipment to operate until louvers have reached 100% open. (8.10.22)**
171. Steam Boilers shall have sample points for blowdown, condensate, and make up water. Sample points shall have sample coolers for blowdown and condensate water. Provide intermittent or continuous blowdown conductivity monitors with automated blow down valves. Provide meter with flow totalizer on makeup water. Refer to the following for specifics: UFC 3-240-13FN 25 May 2005, ASME Research Report CRTD-Vol. 81: Consensus on Operating Practices for the Sampling and Monitoring of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers. (7.15.16)

**STEAM:** Camp Lejeune is in the process of closing down the existing central steam distribution systems. New and renovated facilities are to use other sources of heating unless otherwise noted by the project manager (8.8.12).

- ~~172. Meters are required for steam, water(8.30.10) and electrical service to MWR facilities and all other reimbursable customers. (7.1.17)~~
173. Avoid (5.19.8) steam pits within mechanical rooms. Steam lines should be counter flowed from an exterior manhole.
174. Steam condensate receiver pumps should be steam pressure powered. Do not use electric duplex condensate pumps.
175. Minimize use of steampits. Those required must be raised 18 inches (450 mm) above finish grade and equipped with a full grated top. Steampits are required for the connection and valving of building service lines. Drip legs can be direct buried with

steam trap above ground in a “doghouse” if the steam pit is not required for other reasons. Steampits are required at low points and end of mains in order to gravity drain condensate for cold start up of distribution system.

176. Do not use FRP pipe for buried steam condensate lines. Use schedule 80 black steel pipe in condensate systems.
177. Steam tunnels and trenches are preferred by base utilities over direct buried preinsulated steam and condensate systems. Trench tops may double as a sidewalk where appropriate.
178. Direct buried steam and condensate piping shall be drainable, dryable, testable. Do not include thermal performance testing or sensors (i.e. Delete from guide specification). Edit the testing specification as follows: Socket welded pipe does not need to be tested. As an alternative to radiographic testing, the butt welds may be ultrasonically tested. The report shall be similar to that of the radiographic exam, i.e., examiner shall sign and date report, defects and location shall be noted, weld shall be graded acceptable or unacceptable, etc. Welded connections shall not be covered until the government selects 10% of the connections to be tested. (5.26.09)
179. Use externally pressurized bellows expansion joints when inline expansion in steam lines is required and where loops cannot be utilized. Slip tube expansion joints are acceptable but not preferred over externally pressurized bellows joints.
180. Provide check valves and test valves at all steam condensate drip stations.
181. Base operating steam pressures are as follows:

Steam Plant	Steam Pressure
Plant 1700	150 psi (1034 kPa)
Plant AS4151	<del>50 psi (345 kPa)</del> (8.29.14) Decom 2016
Plant G650	<del>50 psi (345 kPa)</del> decommissioned 2015
Plant M625	<del>50 psi (345 kPa)</del> (8.29.14) Decom 2016
Plant RR15	50 psi (345 kPa)
Plant PP2615	50 psi (345 kPa) (decommissioned 8.30.10)
Plant M230	50 psi (345 kPa) (decommissioned)
Plant BB9	100 psi (690 kPa) decommissioned 2016
Plant NH100	100 psi (690 kPa)

182. Specify steam control valve actuators that can withstand heat conducted from steam lines and equipment. Do not specify, or approve, hydraulic powered actuators in steam applications.
183. Install blow down valves on all strainers.
184. It is preferred to distribute hot water throughout building or building complex for heating in lieu of direct steam heat.
185. Specify flange gaskets to be metal spiral wound ASME B16.20.
186. All steam pressure powered pumps (PPP) shall have a direct acting pressure regulator on the motive steam. Provide pressure gages on the motive steam line and the condensate collection system. Regulator to be set for 20 psi higher than the condensate back pressure. Regulator shall be 20' from PPP, or the line between the regulator and the pump shall be oversized. (12.31.07) If the steam distribution

## **CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022**

---

pressure exceeds pump body pressure rating, a safety relief valve must be installed in the steam supply. (8.30.10)

187. Ensure that all steam heated equipment with modulating steam control valves have vacuum breakers, air vents, and gravity drain to a condensate receiver. Show sufficient details to ensure contractor pipes accordingly. The mechanical room plan shall also allow for this. If a pumping trap is required, show it on the drawing. (12.31.07)
188. Valves for 100psi and greater steam shall be steel bodied valves. (1.28.10)
189. Camp Lejeune has introduced flooded vertical heat exchangers that use line pressure steam and a control valve on the condensate discharge in lieu of a steam control valve thereby omitting the need for a steam pressure regulator, steam pressure safety valve, steam control valve and a condensate pump. Contact the Public Works project manager to coordinate the use of the traditional steam system or the flooded vertical heat exchanger on each project. Contact the mechanical branch manager to get the standard detail and about application. (1.28.10)

### **SWIMMING POOLS (5.10.09)**

190. Swimming pool chemistry and filters are monitored by PW Utilities and pools shall be equipped as followings.
191. Pool shall have pool controller that automatically monitors and feeds sodium hypochlorite and sulfuric acid, and backwashes the filter.
  - a) Controller shall read ORP or free chlorine, and PH.
  - b) Controller shall transmit free chlorine, and PH values to the corresponding water plant via radio.
  - c) Pool water temperature shall also be sensed and transmitted on indoor pools.
  - d) Controller shall transmit a master alarm to the corresponding water plant via radio in the event of high or low ORP or PH levels, no sensor water flow, and elapsed chemical feed alarm.
  - e) Chemical feed system shall be interlocked to shut off in the event of no pool circulation water flow.
  - f) The preferred pool controller is Bec System 7.
  - g) Electronics shall have a 60 minute battery backup.
192. Filter backwash shall have manual over-ride such that the filters can be backwashed in the event of controller failure.
193. Normal pool water waste shall be to the sanitary sewer, with a bypass to the storm sewer. This can be used to empty pool after dechlorination. A dechlorinator shall be installed. (7.2.09)
194. A normally energized duplex receptacle needs to be installed near the chemical feed pumps to manually feed chemicals in the event of pool controller failure. If chemical feed is controlled by energizing/de-energizing the receptacle supplying the feed pumps, each pump shall have a separate, independent, and labeled receptacle. (7.2.09)
195. Minimum chemical storage for an indoor Olympic size pool shall be 300 gallons of sodium hypochlorite, and 150 gallons of sulfuric acid. Chemical storage shall be proportional to pool size. Outdoor pools require increased storage capacity. All chemical storage tanks shall have secondary containment. Chemical rooms shall be



## CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

---

- mechanically vented, dedicated to chemical storage and large enough to increase the storage by 50%. Chemical rooms shall be located with easy access by delivery tanker truck. Entrances to chemical room shall be labeled with Hazmat Placard. (7.2.09)
196. Do not use brass saddles at chemical injection points. Use PVC.
197. Do not locate normally serviced equipment such as pumps, backflow preventers, lint traps, etc in pits. Equipment that requires regular operation, service, or maintenance shall not be located in confined spaces. (7.2.09)
198. The contractor shall modify the front end software at the water plant to receive and display the new pool.
- a) Wallace creek recreation center shall transmit to the building 20 water plant.
  - b) The wounded warrior pool shall transmit to the building 670 water plant.
199. Swimming pools shall comply with 15A NCAC 18.A2500, (North Carolina Rules for Public Swimming Pools), with the following exception: Do not provide an integral vacuum system as called for in 15A NCAC 18A.2518(g). The pool chemistry is maintained by the PW Utilities. The cleaning is done by the pool operators. We do not want pool operators to have access to the pump room, which would be necessary if an integral vacuum system were installed.
200. Filter rooms should have a pedestrian door and an 8'x8' roll up door for forklift and pallet access. Provide differential pressure gage across each filter to be easily read while standing in front of filter. (7.2.09)

### ENERGY

201. For partial renovation and/or repair projects, energy modelling may not be practical or in the design scope of work. To comply with the intended goal of 20% better than ASHRAE, specify equipment and individual assembly performance to be 20% better than the ASHRAE prescriptive requirement. Examples: replacing just the air conditioning in a building, or reroofing a building. In these cases the building cannot be made to comply with the 20% goal, but an air conditioner 20% better, or roof insulation 20% better than ASHRAE meets the intent. (8.29.14)
202. Building thermal envelope assemblies shall at a minimum meet the prescriptive requirements of ASHRAE 90.1 with the following exceptions. (2.10.10)
203. Metal and wood studs walls shall be 6" with R19 insulation. (2.10.10)
204. Mass walls shall have a minimum of R10 rigid insulation between wythes of masonry or on the exterior of the massive layer. Insulation in the cells of CMU does not fulfill this requirement. (2.10.10)
205. Windows shall meet ATFP requirements, laminated, meet ASHRAE 90.1 prescriptive requirements. No tilting sashes are permitted. (2.10.10)
206. Water meters are required on all new buildings. Preferred location is in mechanical room and shall report thru the DDC to the EMCS. (8.30.10)
207. Return duct to ERV's shall be insulated when passing thru unconditioned spaces. (8.8.12)
208. Equipment energy efficiencies shall meet the Federal Energy Management Program (FEMP) designated efficiency, DOE Energy Star criteria, and ASHRAE 90.1 2010. Refer to FEMP, Energy Star, ASHRAE documentation for greater detail. Specify efficiencies as necessary to meet the project's goals. Unless otherwise noted, the minimum efficiencies are listed below (7.15.16).

## CAMP LEJEUNE MECHANICAL DESIGN GUIDANCE 10AUG2022

---

- a. Hot water gas fired boilers under 300 MBH: 90% AFUE
- b. Hot water gas fired boilers over 300 MBH: 94% Thermal Efficiency
- c. Gas fired steam boiler, 300 MBH-10,000 MBH: 80% Thermal Efficiency
- d. Domestic hot water gas fired heater with storage,  $\leq 75$  MBH input:  $\leq 55$  gal,  $EF \geq .67$ ;  $\leq 55$  gal,  $EF \geq .77$
- e. Domestic hot water gas fired heater with storage, over 75 MBH input:  $TE \geq .94$ , or  $EF \geq .93$
- f. Domestic hot water gas fired instantaneous,  $>40$  and  $<200$  MBH input:  $TE \geq .9$
- g. Air-source heat pump, 3 phase, packaged unit,  $<65,000$  Btu/hr: 14 SEER; 11 EER; 8.0 HSPF
- h. Air-source heat pump, 3 phase, split system,  $<65,000$  Btu/hr: 14 SEER; 11 EER; 8.2 HSPF
- i. Air-source heat pump, 3 phase,  $\geq 65,000$  Btu/hr -  $<135,000$  Btu/hr: 11.3 EER; 11.4 IEER; 3.35 COP at 47°F
- j. Air-source heat pump, 3 phase,  $\geq 135,000$  Btu/hr -  $<240,000$  Btu/hr: 10.9 EER; 11 IEER; 3.25 COP at 47°F
- k. Air-source air conditioner, 3 phase, packaged unit,  $<65,000$  Btu/hr: 14 SEER; 11 EER
- l. Air-source air conditioner, 3 phase, split system,  $<65,000$  Btu/hr: 14 SEER; 12 EER
- m. Air-source air conditioner, 3 phase, w/electric resistance heating,  $\geq 65,000$  Btu/hr -  $<135,000$  Btu/hr: 11.7 EER; 11.8 IEER
- n. Air-source air conditioner, 3 phase, with other heating,  $\geq 65,000$  Btu/hr -  $<135,000$  Btu/hr: 11.5 EER; 11.6 IEER
- o. Air-source air conditioner, 3 phase, w/electric resistance heating,  $\geq 135,000$  Btu/hr -  $<240,000$  Btu/hr: 11.7 EER; 11.8 IEER
- p. Air-source air conditioner, 3 phase, with other heating,  $\geq 135,000$  Btu/hr -  $<240,000$  Btu/hr: 11.5 EER; 11.6 IEER
- q. Air Source, 1 phase, split system, heat pump and air conditioner,  $<65,000$  Btu/hr: 15 SEER; 12.5 EER; 8.5 HSPF (HSPF for heat pumps only)
- r. Air Source, 1 phase, packaged unit, heat pump and air conditioner,  $<65,000$  Btu/hr: 15 SEER; 12 EER; 8.2 HSPF (HSPF for heat pumps only).
- s. Gas fired furnace,  $\leq 225,000$  Btu/hr: 90% or greater AFUE
- t. Chiller, air cooled,  $\leq 150$  tons; full load optimized  $\geq 10.4$  EER/12.5 IPLV, part load optimized  $\geq 9.56$  EER/15.39 IPLV
- u. Chiller, air cooled,  $\geq 150$  tons; full load optimized  $\geq 10.4$  EER/12.75 IPLV, part load optimized  $\geq 9.56$  EER/15.07 IPLV
- v. Water source heat pump, water to air, closed loop, 17.1 EER, 3.6 COP
- w. Water source heat pump, water to air, open loop, 21.1 EER, 4.1 COP
- x. Water source heat pump, water to water, closed loop, 16.1 EER, 3.1 COP
- y. Water source heat pump, water to water, open loop, 20.1 EER, 3.5 COP



\*\*\*\*\*

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2018

\*\*\*\*\*

### SECTION 28 31 76

#### INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE 10/18

\*\*\*\*\*

NOTE: This specification is not available on the Whole Building Design Group website. It is a draft in progress and has not been released to the public. It has been provided by NAVFAC MIDATLANTIC Fire Protection Engineering and edited to provide a template for multiple MILCONS at Camp Lejeune and Cherry Point related to the rebuilding after Hurricane Florence. The Design-Build Qualified Fire Protection Engineer (defined herein) must edit this section for project specific requirements.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

\*\*\*\*\*

#### PART 1 GENERAL

\*\*\*\*\*

1. On the drawings, show location of control panels, batteries and charger (if remotely mounted), supervising station transmitter, annunciator, primary power supply, remote annunciator, detectors, notification appliances, and each alarm initiating device including fire extinguishing system switches.

2. Show single-line fire alarm/mass notification systems riser diagram. Each device on the riser should be identified by type. Indicate connection of equipment.

3. A fire alarm operating matrix/mass notification system must be placed on the drawings. Show actions of input devices such as detectors, manual stations,

waterflow switches, initiating devices, etc. on one axis and output functions such as door releases, elevator relays, indicating/notification appliances etc. on the other. Entries which require descriptions, explanation of processes, sequences, interfaces, etc. can be flagged by symbols keyed to supplementary notes. Alternately provide a zone-by-zone sequence of operation or a schedule identifying all initiators, outputs, and interfaces.

4. Addressable Fire Alarm Systems generally utilize Signal Line Circuits (SLC) for communication between devices. Normally all devices are addressable or will have an addressable interface device installed integrally with the device. Initiating Device Circuits (IDC) should be provided for connection between non-addressable devices and the SLC.

\*\*\*\*\*

## 1.1 RELATED SECTIONS

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS, applies to this section, with the additions and modifications specified herein. In addition, refer to the following sections for related work and coordination:

[ Section 21 13 13.00 20 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION  
[ Section 21 30 00 FIRE PUMPS]  
[ Section 21 23 00.00 20 WET CHEMICAL FIRE EXTINGUISHING for KITCHEN CABINET]  
[ Section 21 13 16.00 20 DRY PIPE FIRE SPRINKLER SYSTEMS]  
[ Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS]  
[ Section 21 13 20.00 20 FOAM FIRE EXTINGUISHING FOR AIRCRAFT HANGARS]  
[ Section 08 71 00 DOOR HARDWARE for [door release][door unlocking] and additional work related to finish hardware.]  
[ Section[s] [14 21 13 ELECTRIC TRACTION FREIGHT ELEVATORS] [14 21 23 ELECTRIC TRACTION PASSENGER ELEVATORS] [and] [14 24 13 HYDRAULIC FREIGHT ELEVATORS] [14 24 23 HYDRAULIC PASSENGER ELEVATORS] for additional work related to elevators.]  
[ Section 07 84 00 FIRESTOPPING for additional work related to firestopping.]

## 1.2 SUMMARY

### 1.2.1 Scope

- a. This work includes designing and providing a new, complete, fire alarm and mass notification (MNS) system as described herein and on the contract drawings. Include system wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, initiating devices, notification appliances, supervising station fire alarm system, and other accessories and miscellaneous items required for a complete operational system even though each item is not specifically mentioned or described. Provide systems complete and ready for operation.
- b. Provide equipment, materials, installation, workmanship, inspection, and testing in strict accordance with NFPA 72, except as modified

herein. The **system layout** on the drawings show the intent of coverage and suggested locations. Final quantity, system layout, and coordination are the responsibility of the Contractor.

- [c. Each remote fire alarm control unit **must** be powered from a wiring riser specifically for that use or from a local emergency power panel located on the same floor as the remote fire alarm control unit. Where remote fire control units are provided, equipment for notification appliances may be located in the remote fire alarm control units.]
- [d. Where a fire pump is provided, the fire alarm **and mass notification** system **must** monitor and transmit the fire pump controller signals in accordance with the provisions of **NFPA 72**.
- [e. Where an emergency generator provides standby power supply for life safety system circuits, the generator **must** be monitored by the **FMCU** and transmit emergency generator signals in accordance with **NFPA 72**.
- f. The fire alarm **and mass notification** system **must** be independent of the building security, building management, and energy/utility monitoring systems other than for control functions.

#### 1.2.2 **Qualified Fire Protection Engineer (QFPE)**

The scope includes the services of a QFPE. The QFPE must be a registered professional engineer who has passed the Fire Protection Engineering written examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and have relevant experience. The QFPE's services must include:

- a. Reviewing SD-02, SD-03, and SD-05 submittal packages for completeness and compliance with the provisions of this specification.
- b. Providing a **Letter of Confirmation** documenting the SD-02, SD-03, and SD-05 submittal package has been reviewed and noting any outstanding comments.
- c. Performing in-progress construction surveillance prior to installation of ceilings (rough-in inspection).
- d. Witnessing preliminary functional performance testing and performing a final installation review.

#### 1.2.3 **Fire Protection Quality Control Specialist (FPQC)**

The scope includes the services of a FPQC as detailed in Specification Section 01 45 00.05 20 DESIGN AND CONSTRUCTION QUALITY CONTROL. The FPQC must be a registered professional engineer who has passed the Fire Protection Engineering written examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and have relevant experience. The FPQC may be the same person as the QFPE.

\*\*\*\*\*  
**NOTE: ENSURE THE FPQC RESPONSIBILITIES REMAIN IN  
SPEC SECTION 01 45 00.05 20**  
\*\*\*\*\*

### 1.3 REFERENCES

\*\*\*\*\*

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

\*\*\*\*\*

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ACOUSTICAL SOCIETY OF AMERICA (ASA)

ASA S3.2 (2009; R 2014) Method for Measuring the Intelligibility of Speech Over Communication Systems (ASA 85)

#### ASME INTERNATIONAL (ASME)

ASME A17.1/CSA B44 (2016) Safety Code for Elevators and Escalators

#### ASTM INTERNATIONAL (ASTM)

ASTM F402 (2005; R 2012) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

#### FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide  
<http://www.approvalguide.com/>

#### INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41.1 (2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits

IEEE C62.41.2 (2002) Recommended Practice on Characterization of Surges in Low-Voltage

(1000 V and Less) AC Power Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1221	(2016; TIA 17-1; TIA 17-2) Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems
NFPA 4	(2018) Standard for Integrated Fire Protection and Life Safety System Testing
NFPA 170	(2018) Standard for Fire Safety and Emergency Symbols
NFPA 70	(2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14) National Electrical Code
NFPA 72	(2019) National Fire Alarm and Signaling Code
NFPA 720	(2015) Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment
NFPA 90A	(2018) Standard for the Installation of Air Conditioning and Ventilating Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-601-02	(2010) Operations and Maintenance: Inspection, Testing, and Maintenance of Fire Protection Systems
--------------	--

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices
47 CFR 90	Private Land Mobile Radio Services

UNDERWRITERS LABORATORIES (UL)

UL 1283	(2017) UL Standard for Safety Electromagnetic Interference Filters
UL 1449	(2014; Reprint Jul 2017) UL Standard for Safety Surge Protective Devices
UL 1480	(2016; Reprint Sep 2017) UL Standard for Safety Speakers for Fire Alarm and Signaling Systems, Including Accessories
UL 1638	(2016; Reprint Sep 2017) UL Standard for Safety Visible Signaling Devices for Fire Alarm and Signaling Systems, Including

## Accessories

UL 1971	(2002; Reprint Oct 2008) Signaling Devices for the Hearing Impaired
UL 2017	(2008; Reprint Jan 2016) General-Purpose Signaling Devices and Systems
UL 2034	(2017; Reprint Dec 2017) UL Standard for Safety Single and Multiple Station Carbon Monoxide Alarms
UL 2075	(2017) UL Standard for Safety Gas and Vapor Detectors and Sensors
UL 228	(2006; Reprint Nov 2008) Door Closers-Holders, With or Without Integral Smoke Detectors
UL 2572	(2016) Standard for Mass Notification Systems
UL 268	(2016; Reprint Jul 2016) UL Standard for Safety Smoke Detectors for Fire Alarm Systems
UL 464	(2016; Reprint Sep 2017) UL Standard for Safety Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
UL 497A	(2001) Standard for Secondary Protectors for Communications Circuits
UL 497B	(2004; Reprint Dec 2012) Protectors for Data Communication Circuits
UL 864	(2014; Reprint Mar 2018) UL Standard for Safety Control Units and Accessories for Fire Alarm Systems
UL Electrical Constructn	(2012) Electrical Construction Equipment Directory
UL Fire Prot Dir	(2012) Fire Protection Equipment Directory

## 1.4 DEFINITIONS

Wherever mentioned in this specification or on the drawings, the equipment, devices, and functions **must** be defined as follows:

### 1.4.1 Interface Device

An addressable device that interconnects hard wired systems or devices to an analog/addressable system.

#### 1.4.2 Remote Fire Alarm and Mass Notification Control Unit

A control panel, electronically remote from the fire alarm and mass notification control panel, that receives inputs from automatic and manual fire alarm devices; may supply power to detection devices and interface devices; may provide transfer of power to the notification appliances; may provide transfer of condition to relays or devices connected to the control unit; and reports to and receives signals from the fire alarm and mass notification control panel.

#### 1.4.3 Fire Alarm and Mass Notification Control Unit (FMCU)

A master control panel having the features of a fire alarm control unit (FACU) and an autonomous control unit (ACU) where these units are interconnected to function as a combined fire alarm/mass notification system. The FACU and ACU functions may be contained in a single cabinet or in independent, interconnected, and co-located cabinets.

#### 1.4.4 Local Operating Console (LOC)

A unit designed to allow emergency responders and/or building occupants to operate the MNS including delivery of recorded messages and/or live voice announcements, initiate visual, and audible appliance operation and other relayed functions.

#### 1.4.5 Terminal Cabinet

A steel cabinet with locking, hinge-mounted door where terminal strips are securely mounted inside the cabinet.

#### 1.4.6 Control Module and Relay Module

Terms utilized to describe emergency control function interface devices as defined by NFPA 72.

#### 1.4.7 Designated Fire Protection Engineer (DFPE)

The NAVFAC MIDATLANTIC fire protection engineer that oversees that Area of Responsibility for that project. This is sometimes referred to as the "cognizant" fire protection engineer. Interpret reference to "authority having jurisdiction" and/or AHJ in referenced standards to mean the Designated Fire Protection Engineer (DFPE). The DFPE is responsible for review of the contractor submittals having a "G" designation and for witnessing final inspection and testing.

#### 1.4.8 Qualified Fire Protection Engineer (QFPE)

See Part 1.2 Scope for qualifications and services required by the QFPE.

#### 1.4.9 Fire Protection Quality Control Specialist (FPQC)

See Part 1.2 Scope for qualifications and services required by the FPQC.

### 1.5 SUBMITTALS

\*\*\*\*\*

**NOTE: Review submittal description (SD) definitions**



in Section 01 33 00 SUBMITTAL PROCEDURES (or the particular specification section for submittal procedures in this project) and edit the following list to reflect only the submittals required for the project. The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G."

\*\*\*\*\*

Government approval is required for submittals with a "G" designation

Shop drawings (SD-02), product data (SD-03) and calculations (SD-05) must be prepared by the fire alarm designer and combined and submitted as one complete package. The QFPE must review the SD-02/SD-03/SD-05 submittal package for completeness and compliance with the Contract prior to submission to the Government. The QFPE must provide a Letter of Confirmation that they have reviewed the submittal package for compliance with the contract provisions. This letter must include their registered professional engineer stamp and signature. Partial submittals and submittals not reviewed by the QFPE will be returned by the Government disapproved without review.

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

The Contractor must submit the following for review and approval. SD-02, SD-03 and SD-05 submittals received prior to the review and approval of the qualifications of the fire alarm subcontractor and QFPE will be returned disapproved without review. All resultant delays will be the sole responsibility of the Contractor.

Qualified Fire Protection Engineer (QFPE); G

Fire Protection Quality Control Specialist (FPQC); G

Designer; G

Supervisor; G

Installers/Technicians; G

Test Personnel; G

Fire Alarm System Site-Specific Software Acknowledgement; G

#### SD-02 Shop Drawings

Shop drawings must not be smaller than 1/8" = 1' scale. Drawings must comply with the requirements of NFPA 72 and NFPA 170.

Nameplates; G

Nameplate illustrations and data to obtain approval by the Contracting Officer before installation.

## Instructions; G

### Wiring Diagrams; G

Point-to-point wiring diagrams showing the points of connection and terminals used for electrical field connections in the system, including interconnections between the equipment or systems that are supervised or controlled by the system. Diagrams **must** show connections from field devices to the FMCU and remote fire alarm control units, initiating circuits, switches, relays and terminals, including pathway diagrams between the control unit and shared communications equipment within the protected premises. Point-to-point wiring diagrams **must** be job specific and **must** not indicate connections or circuits not being utilized. Provide complete riser diagrams indicating the wiring sequence of all devices and their connections to the control equipment. Include a color-code schedule for the wiring.

### System Layout; G

Plan view drawing showing device locations, terminal cabinet locations, junction boxes, other related equipment, conduit routing, conduit sizes, wire counts, conduit fill calculations, wire color-coding, circuit identification in each conduit, and circuit layouts for all floors. Indicate candela rating of each visual notification appliance. **Indicate the wattage of each speaker. Identify the locations of isolation modules.** Indicate the addresses of all devices, modules, relays, etc. **Show/identify all acoustically similar spaces.**

Provide a complete description of the system operation in matrix format similar to the "Typical Input/Output Matrix" included in the Annex of NFPA 72.

[For air sampling smoke detection systems, provide floor plan layouts indicating location of fire alarm control panel, air sampling piping (lengths of pipe) and sampling ports (sizes and locations). Floor plan must also indicate geographic monitor zone boundaries, location of display control panel, bar level annunciation panels if separate, and all other associated equipment that is required to provide a complete operational system.]

### System Operation; G

**A complete list of device addresses and corresponding messages.**

### Notification Appliances; G

Data on each circuit to indicate that there is at least 25 percent spare capacity for notification appliances. Annotate data for each circuit on the drawings.

### Initiating devices; G

Data on each circuit to indicate that there is at least 25 percent spare capacity for initiating devices. Annotate data for each

circuit on the drawings.

#### Amplifiers; G

Data to indicate that amplifiers have sufficient capacity to simultaneously drive all notification speakers plus 25 percent spare capacity. Annotate data for each circuit on the drawings.

#### Battery Power; G

Provide battery calculations as required in paragraph Battery Power Calculations for alarm, alert, and supervisory power requirements. Calculations including ampere-hour requirements for each system component and each panel component, and the battery recharging period, **must** be included on the drawings.

#### Voltage Drop Calculations; G

Voltage drop calculations indicating that sufficient voltage is available for proper operation of the system and all components, at a minimum rated voltage of the system operating on batteries. Include the calculations on the system layout drawings.

### SD-03 Product Data

Include annotated catalog data as required in the paragraph SUBMITTAL, in table format on the drawings, showing manufacturer's name, model, voltage, and catalog numbers for equipment and components. Product data for all equipment **must** be combined into a single submittal.

#### Fire Alarm and Mass Notification Control Unit (FMCU); G

#### Local Operating Console (LOC); G

#### Amplifiers; G

#### Tone Generators; G

#### Digitalized voice generators; G

#### Remote Annunciator Panel; G

#### Manual Stations; G

#### Smoke Detectors; G

#### Duct Smoke Detectors; G

#### [Air sampling smoke detectors; G]

#### Heat Detectors; G

#### [Flame Detectors; G]

#### Carbon monoxide detectors

Addressable Interface Devices; G

Addressable Control Modules; G

Isolation Modules; G

Notification Appliances; G

Batteries; G

Battery Chargers; G

Supplementary Notification Appliance Circuit Panels; G

Auxiliary Power Supply Panels; G

Surge Protective Devices; G

Alarm Wiring; G

Back Boxes and Conduit; G

Ceiling Bridges for Ceiling-Mounted Appliances; G

Terminal Cabinets; G

Digital Alarm Communicator Transmitter (DACT); G

[ Automatic Fire Alarm Transmitters (including housing); G

Electromagnetic Door Holders; G

Environmental Enclosures or Guards; G

Document Storage Cabinet; G

Spare Parts Cabinet; G

Equipment for Interface to the Base-wide Mass Notification Network; G

#### SD-05 Design Data

[ Air Sampling Smoke Detection System Calculations; G

Submit air sampling detection system design analysis calculations consisting of battery capacity, loading calculations, and fan speed and air flow/transport calculations. Include schematic diagrams showing pipe segments, pipe diameters, lengths of pipe, node numbers, and sample port diameters to verify the requirements are met.]

Preliminary Equipment List; G

Provide a preliminary Equipment List identifying the type, quantity, make, and model number of each piece of equipment to be

provided under this submittal. The Equipment List **must** include the type, quantity, make and model of spare equipment. Types and quantities of equipment submitted **must** coincide with the types and quantities of equipment used in the battery calculations and those shown on the shop drawings.

#### SD-06 Test Reports

Test Procedures; G

Verification of Compliant Installation; G

Request for Government Final Test; G

#### SD-09 Manufacturer's Field Reports

System Operation; G

#### SD-10 Operation and Maintenance Data

Operation and Maintenance (O&M) Instructions; G

Four copies of the Operation and Maintenance Instructions. The O&M Instructions **must** be prepared in a single volume or in multiple volumes, with each volume indexed, and may be submitted as a Technical Data Package. Manuals **must** be approved prior to training. The Interior Fire Alarm And Mass Notification System Operation and Maintenance Instructions **must** include the following:

- a. "Manufacturer Data Package five" as specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA.
- b. Operating manual outlining step-by-step procedures required for system startup, operation, and shutdown. The manual **must** include the manufacturer's name, model number, service manual, parts list, and preliminary equipment list complete with description of equipment and their basic operating features.
- c. Maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manuals **must** include conduit layout, equipment layout and simplified wiring, and control diagrams of the system as installed.
- d. Complete procedures for system revision and expansion, detailing both equipment and software requirements.
- e. Software delivered for this project on each type of CD/DVD media utilized.
- f. Printouts of configuration settings for all devices.
- g. Routine maintenance checklist. The routine maintenance checklist **must** be arranged in a columnar format. The first column **must** list all installed devices, the second column **must** state the maintenance activity or state no maintenance required, the third column **must** state the frequency of the maintenance activity, and the fourth column provided for additional comments or reference.

All data (devices, testing frequencies, etc.) must comply with  
UFC 3-601-02.

h. A final Equipment List must be submitted with the Operating  
and Maintenance (O&M) manual.

Instruction of Government Employees; G

SD-11 Closeout Submittals

As-Built Drawings; G

Spare Parts; G

#### 1.6 SYSTEM OPERATION

\*\*\*\*\*

**NOTE: Circuit wiring shall be Class "B" unless  
Class "A" is required by the RFP. Circuits and  
pathways shall have survivability levels as defined  
by NFPA 72.**

\*\*\*\*\*

The addressable interior fire alarm and mass notification system must be a complete, supervised, noncoded, analog/addressable fire alarm and mass notification system conforming to NFPA 72, UL 864, and UL 2572. Systems meeting UL 2017 only are not acceptable. Fire alarm system/mass notification system components requiring power, except for the control panel(s) power supply, must operate on 24 Volts dc.

##### 1.6.1 Alarm Initiating Devices and Notification Appliances (Visual, Voice)

- a. Connect alarm initiating devices to [Class "A"] [Class "B"] signaling line circuits (SLC).
- b. Connect notification appliances to [Class "A"] [Class "B"] notification appliance circuits (NAC).
- c. The system must be activated into the alarm mode by actuation of any alarm initiating device. The system must remain in the alarm mode until the initiating device is reset and the control panel is reset and restored to normal. The system may be placed in the alarm mode by local microphones, LOC, FMCU, or remotely from authorized locations/users.

##### 1.6.2 Functions and Operating Features

The system must provide the following functions and operating features:

- a. Power, annunciation, supervision, and control for the system. Addressable systems must be microcomputer (microprocessor or microcontroller) based with a minimum word size of eight bits with sufficient memory to perform as specified.
- b. Visual alarm notification appliances must have the flash rates synchronized as required by NFPA 72.
- c. Electrical supervision of the primary power (AC) supply, presence of

the battery, battery voltage, and placement of system modules within the control panel.

- d. An audible and visual trouble signal to activate upon a single break or open condition, or ground fault. The trouble signal **must** also operate upon loss of primary power (AC) supply, absence of a battery supply, low battery voltage, or removal of alarm or supervisory panel modules. After the system returns to normal operating conditions, the trouble signal **must** again sound until the trouble is acknowledged. A smoke detector in the process of being verified for the actual presence of smoke **must** not initiate a trouble condition.
- e. A trouble signal silence feature that **must** silence the audible trouble signal, without affecting the visual indicator.
- f. Program capability via switches in a locked portion of the FMCU to bypass the automatic notification appliance circuits and the following when applicable: fire reporting system, air handler shutdown, elevator recall, door release, door unlocking features. Operation of this programmed action **must** indicate on the FMCU display as a supervisory or trouble condition.
- h. Alarm functions **must** override trouble or supervisory functions. Supervisory functions **must** override trouble functions.
- h. The system **must** be capable of being programmed from the panel keyboard. Programmed information **must** be stored in non-volatile memory.
- i. The system **must** be capable of operating, supervising, and/or monitoring non-addressable alarm and supervisory devices.
- j. There **must** be no limit, other than maximum system capacity, as to the number of addressable devices that may be in alarm simultaneously.
- k. Where the fire alarm/mass notification system is responsible for initiating an action in another emergency control device or system, such as HVAC, elevator recall, releasing service, the addressable fire alarm relay **must** be located in the vicinity of the emergency control device.
- 1. An alarm signal **must** automatically initiate the following functions:
  - (1) Transmission of an alarm signal to the dispatch center. Transmission **must** be point specific via contact ID format with the address, location, and description of the condition as it appears on the FMCP.
  - (2) Visual indication of the device operated on the FMCU and on the remote annunciator.
  - (3) Continuous actuation of all alarm notification appliances.
  - (4) Recording of the event via electronically in the history log of the FMCU.
  - [ (5) Release of doors held open by electromagnetic devices.]



- [ ( 6) Release of power to electric locks (delayed egress locks) on doors that are part of the means of egress.]
- [ (7) Operation of a smoke detector in an elevator lobby or other location associated with the automatic recall of elevators.]
- [ (8) Operation of a sprinkler waterflow switch serving an elevator machinery room or elevator shaft **must** operate shunt trip circuit breaker(s) to shut down power to the elevators in accordance with **ASME A17.1/CSA B44.**]
- m. A supervisory signal **must** automatically initiate the following functions:
  - (1) Visual indication of the device operated on the **FMCU** and on the remote annunciator.
  - (2) Transmission of a supervisory signal to the dispatch center. Transmission must be point specific via contact ID format with the address, location, and description of the condition as it appears on the **FMCP**.
  - (3) Operation of a duct smoke detector **must** shut down the appropriate air handler in accordance with **NFPA 90A** in addition to other requirements of this paragraph and as allowed by **NFPA 72**.
  - (4) Recording of the event electronically in the history log of the **FMCU**.
- n. A trouble condition **must** automatically initiate the following functions:
  - (1) Visual indication of the device operated on the **FMCU** and on the remote annunciator.
  - (2) Transmission of a trouble signal to the dispatch center. Transmission must be point specific via contact ID format with the address, location, and description of the condition as it appears on the **FMCP**.
  - (3) Recording of the event electronically in the history log of the **FMCU**.
- o. A carbon monoxide signal **must** automatically initiate the following functions:
  - (1) Visual indication of the device operated on the **FMCU** and on the remote annunciator
  - (2) Transmission of a carbon monoxide alarm signal to the dispatch center. Transmission must be point specific via contact ID format with the address, location, and description of the condition as it appears on the **FMCP**.
  - (3) Continuous actuation of all strobes and the audible carbon monoxide message throughout the building.
  - (4) Recording of the event electronically in the history log of the

FMCU.

- p. System control equipment **must** be programmed to provide a 60-minute to 180-minute delay in transmission of trouble signals resulting from primary power failure.
- q. Activation of a LOC pushbutton **must** activate the audible and visual alarms in the facility. The audible message **must** be the one associated with the pushbutton activated.
- r. A lockout code **must** not be installed in the hardware, firmware, or software of the fire alarm system. Installer and operator codes shall remain as the factory default setting.

#### 1.6.3 Elevator Recall

\*\*\*\*\*  
**NOTE: Delete this paragraph if no elevator work is included in the project.**  
\*\*\*\*\*

Provide elevator recall in accordance with **ASME A17.1/CSA B44**, Section [ **14 21 13** ELECTRIC TRACTION FREIGHT ELEVATORS][**14 21 23** ELECTRIC TRACTION PASSENGER ELEVATORS][**14 24 13** HYDRAULIC FREIGHT ELEVATORS][**14 24 23** HYDRAULIC PASSENGER ELEVATORS], and as specified herein. Activation of any smoke detector in an elevator shaft, machine room, or lobby (except at designated recall level) **must** cause all elevators associated with that shaft, machine room, or lobby to return nonstop to the designated level. Activation of a smoke detector in the lobby or machine room at the designated level **must** cause all elevators associated with that lobby to return nonstop to the assigned alternate level. Activation of a detector in an elevator shaft, machine room, or lobby **must** also cause illumination of elevator cab warning signal (fire hat) and complete operation of fire alarm system as specified in paragraph titled "Functions and Operating Features".]

#### 1.7 TECHNICAL DATA AND SITE-SPECIFIC SOFTWARE

Technical data and site-specific software (meaning technical data that relates to computer software) that are specifically identified in this project, and may be required in other specifications, **must** be delivered, strictly in accordance with the CONTRACT CLAUSES. The fire alarm system manufacturer must submit written confirmation of this contract provision as "**Fire Alarm System Site-Specific Software Acknowledgement**". Identify data delivered by reference to the specification paragraph against which it is furnished. Data to be submitted **must** include complete system, equipment, and software descriptions. Descriptions **must** show how the equipment will operate as a system to meet the performance requirements of this contract. A lockout code **must** not be installed in the hardware, firmware, or software of the fire alarm system. Installer and operator codes **must** remain as the factory default setting. The site-specific software data package **must** also include the following:

- a. Items identified in NFPA 72, titled "Site-Specific Software".
- b. Identification of programmable portions of the system equipment and capabilities.

- c. Description of system revision and expansion capabilities and methods of implementation detailing both equipment and software requirements.
- d. Provision of operational software data on all modes of programmable portions for fire alarm and mass notification.
- e. Description of Fire Alarm and Mass Notification Control Unit equipment operation.
- f. Description of auxiliary and remote equipment operations.
- g. Library of application software.
- h. Operation and maintenance manuals.

## 1.8 QUALITY ASSURANCE

### 1.8.1 Qualifications

#### 1.8.1.1 Fire Protection Quality Control Specialist (FPQC)

See Part 1.2 Scope for qualifications and services required by the QFPE.

#### 1.8.1.2 Fire Protection Quality Control Specialist (FPQC)

See Part 1.2 Scope for qualifications and services required by the FPQC.

#### 1.8.1.3 Designer

The **designer** must be certified as a Level IV Technician by National Institute for Certification in Engineering Technologies (NICET) in the Fire Alarm Systems Layout subfield of Fire Protection Engineering Technology.

#### 1.8.1.4 Supervisor

The **supervisor** must be certified as a NICET Level III or IV fire alarm technician with a minimum of eight years experience[, and must be thoroughly experienced in the installation of air sampling detection systems]. The fire alarm technicians supervising the installation of equipment must be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

#### 1.8.1.5 Installers/Technicians

Electricians may be allowed to install wire, cable, conduit and backboxes for the fire alarm system/mass notification system. Fire alarm technicians must be utilized to assist with the installation of fire alarm/mass notification devices, cabinets and panels. Fire alarm technicians must have a minimum of four years experience and must be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings[, and must be thoroughly experienced in the installation of air sampling detection systems].

#### 1.8.1.6 Test Personnel

Test Personnel must include a NICET Level IV fire alarm technician with a

minimum of eight years experience in testing and certifying the installation of the fire alarm/mass notification devices, cabinets and panels. Test Personnel must be factory trained in the installation, adjustment, testing, and operation of the equipment installed as part of this project.

#### 1.8.1.7 Manufacturer

Components must be of current design and must be in regular and recurrent production at the time of installation. Provide design, materials, and devices for a protected premises fire alarm system, complete, conforming to NFPA 72, except as specified herein.

#### 1.8.2 Regulatory Requirements

Equipment and material must be listed or approved. Listed or approved, as used in this Section, must mean listed, labeled or approved by a Nationally Recognized Testing Laboratory (NRTL) such as UL Fire Prot Dir or FM APP GUIDE. The omission of these terms under the description of any item of equipment described must not be construed as waiving this requirement. All listings or approval by testing laboratories must be from an existing ANSI or UL published standard. The recommended practices stated in the manufacturer's literature or documentation must be considered as mandatory requirements.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

Protect equipment delivered and placed in storage from the weather, humidity, and temperature variation, dirt and dust, and other contaminants.

#### 1.10 MAINTENANCE

##### 1.10.1 Spare Parts

Furnish the following spare parts in the Spare Parts Cabinet detailed in Part 2:

- a. Five complete sets of system keys.
- b. Four spare fuses for each fused circuit.
- c. Two manual stations.
- d. Two of each type of detector installed.
- e. Two of each type of detector base and head installed.
- [ f. Two electromagnetic door holders.]
- [g. Two air sampling smoke detection system filter assemblies.]
- h. Two of each type of audible and visual alarm device installed.
- i. [Two][\_\_\_\_] low voltage, [one][\_\_\_\_] [telephone][internet][ethernet], and [one][\_\_\_\_] 120 VAC surge protective device.

### 1.10.2 Special Tools

Software, connecting cables and proprietary equipment, necessary for the maintenance, testing, and reprogramming of the equipment **must** be furnished to the Contracting Officer, prior to the instruction of Government employees.

## PART 2 PRODUCTS

### 2.1 GENERAL PRODUCT REQUIREMENT

All fire alarm and mass notification equipment **must** be listed for use under the applicable reference standards. Interfacing of **UL 864** or similar approved industry listing with Mass Notification equipment listed to **UL 2572** **must** be done in a laboratory listed configuration, if the software programming features cannot provide a listed interface control.

### 2.2 MATERIALS AND EQUIPMENT

#### 2.2.1 Standard Products

Provide materials, equipment, and devices that have been tested by a nationally recognized testing laboratory and listed for fire protection service when so required by **NFPA 72** or this specification. Select material from one manufacturer, where possible, and not a combination of manufacturers, for any particular classification of materials. Material and equipment **must** be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 2 years prior to bid opening.

#### 2.2.2 Nameplates

Major components of equipment **must** have the manufacturer's name, address, type or style, model or serial number, catalog number, date of installation, installing Contractor's name and address, and the contract number provided on a new name plate permanently affixed to the item or equipment. Major components include, but are not limited to, the following:

a. **FMCU**

Lettering on the nameplate must say "Fire Alarm and Mass Notification Control Panel" and must not be less than 1-inch high.

b. **Terminal Cabinet**

c. **Automatic Transmitters**

[ d. **Air Sampling Detectors**]

#### 2.2.3 Keys

Keys and locks for equipment, panels and devices **must** be identical.

### 2.3 FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT

\*\*\*\*\*

**NOTE: The control unit shall be located in an air**

conditioned space where the ambient temperature is  
maintained between 60 and 80 degrees F.

\*\*\*\*\*

Provide a complete fire alarm and mass notification control unit (FMCU) fully enclosed in a lockable steel cabinet as specified herein. System must be Simplex, Notifier, or Firelite. Operations required for testing or for normal care, maintenance, and use of the system must be performed from the front of the enclosure. If more than a single unit is required at a location to form a complete control panel, the unit cabinets must match exactly. If more than a single unit is required, and is located in the lobby/entrance, notify the Contracting Officer's Designated Representative (COR), prior to installing the equipment.

- a. Each control unit must provide power, supervision, control, and logic for the entire system, utilizing solid state, modular components, internally mounted and arranged for easy access. Each control unit must be suitable for operation on a 120 volt, 60 hertz, normal building power supply. Provide each panel with supervisory functions for power failure, internal component placement, and operation.
- b. Visual indication of alarm, supervisory, or trouble initiation on the FMCU must be by liquid crystal display or similar means with a minimum of 80 characters. The mass notification control unit must have the capability of temporarily deactivate the fire alarm audible notification appliances while delivering voice messages.
- c. Provide secure operator console for initiating recorded messages, strobes and displays; and for delivering live voice messages. Provide capacity for at least eight prerecorded messages. Provide the ability to automatically repeat prerecorded messages. Provide a secure microphone for delivering live messages. Provide adequate discrete outputs to temporarily deactivate fire alarm audible notification, initiate/synchronize strobes and initiate textual visual notification appliances. Provide a complete set of self-diagnostics for controller and appliance network. Provide local diagnostic information display and local diagnostic information and system event log file.

#### 2.3.1 FMCU Cabinet

Install control panel components in cabinets large enough to accommodate all components and also to allow ample gutter space for interconnection of panels as well as field wiring. The enclosure must be identified by an engraved phenolic resin nameplate. Lettering on the nameplate must say "Fire Alarm and Mass Notification Control Panel" and must not be less than 1-inch high. Provide prominent rigid plastic or metal identification plates for lamps, circuits, meters, fuses, and switches. The cabinet must be provided in a sturdy steel housing, complete with back box, hinged steel door with cylinder lock, and semi-recessed mounting provisions.

#### 2.3.2 Silencing Switches

##### 2.3.2.1 Alarm Silencing Switch

Provide an alarm silencing switch at the FMCU that must silence the audible and visual notification appliances. This switch must be overridden upon activation of a subsequent alarm.

#### 2.3.2.2 Supervisory/Trouble Silencing Switch

Provide supervisory and trouble silencing switch(es) that **must** silence the audible trouble and supervisory signal(s), but not extinguish the visual indicator. This switch **must** be overridden upon activation of a subsequent alarm, supervision, or trouble condition. Audible trouble indication must resound automatically every 24 hours after the silencing feature has been operated if the trouble condition still exists.

#### 2.3.3 Non-Interfering

Power and supervise each circuit such that a signal from one device does not prevent the receipt of signals from any other device. Initiating devices **must** be manually reset by switch from the FMCU after the initiating device or devices have been restored to normal.

#### 2.3.4 Audible Notification System

The Audible Notification System **must** comply with the requirements of NFPA 72 for Emergency Voice/Alarm Communications System requirements, except as specified herein. The system **must** be a one-way multi-channel voice notification system incorporating user selectability of a minimum eight distinct sounds for tone signaling, and the incorporation of a voice module for delivery of recorded messages. Audible appliances **must** produce a three-pulse temporal pattern for three cycles followed by a voice message that is repeated until the control panel is reset or silenced. For carbon monoxide detector activation, audible appliances **must** produce a four-pulse temporal pattern for three cycles followed by a voice message that is repeated until the control unit is reset or silenced. Automatic messages **must** be broadcast through speakers throughout the building/facility but not in stairs or elevator cabs. A live voice message **must** override the automatic audible output through use of a microphone input at the control panel or the LOC.

- a. When using the microphone, live messages **must** broadcast through all speakers at the same time.
- b. The microprocessor **must** actively interrogate circuitry, field wiring, and digital coding necessary for the immediate and accurate rebroadcasting of the stored voice data into the appropriate amplifier input. Loss of operating power, supervisory power, or any other malfunction that could render the digitalized voice module inoperative **must** automatically cause the three-pulse temporal pattern to take over all functions assigned to the failed unit in the event an alarm is activated.

##### 2.3.4.1 Outputs and Operational Modules

All outputs and operational modules **must** be fully supervised with on-board diagnostics and trouble reporting circuits. Provide form "C" contacts for system alarm and trouble conditions. Provide circuits for operation of auxiliary appliance during trouble conditions. During a Mass Notification event the panel **must** not generate nor cause any trouble alarms to be generated with the Fire Alarm system.

##### 2.3.4.2 Mass Notification



- a. The system **must** have the capability of utilizing an LOC with redundant controls of the FMCU. Notification Appliance Circuits (NAC) **must** be provided for the activation of strobe appliances. Audio output **must** be selectable for line level. A hand held microphone **must** be provided and, upon activation, **must** take priority over any tone signal, recorded message or PA microphone operation in progress, while maintaining the strobe NAC circuit activation.
- b. The Mass Notification functions **must** override the manual or automatic fire alarm notification, and public address (PA) functions. Other fire alarm functions including transmission of a signal(s) to the fire department **must** remain operational. When a mass notification announcement is disengaged and a fire alarm condition still exists, the audible and visual notification appliances **must** resume activation for alarm conditions.

\*\*\*\*\*  
**NOTE: Include ALL installation specific messages in this section.**  
 \*\*\*\*\*

- c. Messages **must** be recorded professionally utilizing standard industry methods, in a professional female voice. Message and tone volumes **must** both be at the same decibel level. Messages recorded from the system microphone **will not** be accepted. A 1000 Hz tone (as required by NFPA 72) **must** precede messages and be similar to the following:
  - (1) Fire: "May I have your attention please. May I have your attention please. A fire emergency has been reported in the building. Please leave the building by the nearest exit.[ Do not use the elevators.]" Provide a 2 second pause. Repeat the tones and message on a continuous loop.
  - (2) Carbon Monoxide: "May I have your attention please. May I have your attention please. Carbon monoxide has been detected in the building. Please walk to the nearest exit and leave the building." Provide a 2 second pause. Repeat the tones and message on a continuous loop.
  - (3) Test: "May I have your attention please. May I have your attention please. This is a test of the building mass notification system. Please continue your normal duties. This is only a test."
  - (4) All Clear: "May I have your attention please. May I have your attention please. An all clear has been issued, resume normal activities."
- d. Auxiliary Input Module **must** be designed to be an outboard expansion module to either expand the number of optional LOCs, or allow a telephone interface.

#### 2.3.4.3 Installation-Wide Control

The autonomous control unit **must** communicate with the central control unit of the installation-wide mass notification system. The autonomous control unit **must** receive commands/messages from the central control unit and provide status information.

#### 2.3.5 Memory

Provide each control unit with non-volatile memory and logic for all functions. The use of long life batteries, capacitors, or other age-dependent devices **must** not be considered as equal to non-volatile processors, PROMS, or EPROMS.

#### 2.3.6 Field Programmability

Provide control units and control panels that are fully field programmable for control, initiation, notification, supervisory, and trouble functions of both input and output. The system program configuration **must** be menu driven. System changes **must** be password protected. Any proprietary equipment and proprietary software needed by qualified technicians to implement future changes to the fire alarm system **must** be provided as part of this contract.

#### 2.3.7 Input/Output Modifications

The FMCU **must** contain features that allow the bypassing of input devices from the system or the modification of system outputs. These control features **must** consist of a panel mounted keypad[ and a keyboard]. Any bypass or modification to the system **must** indicate a trouble condition on the FMCU.

#### 2.3.8 Resetting

Provide the necessary controls to prevent the resetting of any alarm, supervisory, or trouble signal while the alarm, supervisory or trouble condition on the system still exists.

#### 2.3.9 Instructions

Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the instructions on the interior of the FMCU. The card **must** show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory, and trouble. The instructions **must** also include procedures for operating live voice microphones. The instructions and their mounting location **must** be approved by the Contracting Officer before being posted.

#### 2.3.10 Walk Test

The FCMU **must** have a walk test feature. When using this feature, operation of initiating devices **must** result in limited system outputs, so that the notification appliances operate for only a few seconds and the event is indicated in the history log, but no other outputs occur.

#### 2.3.11 History Logging

The control panel **must** have the ability to store a minimum of 400 events in a log. These events **must** be stored in a battery-protected memory and **must** remain in the memory until the memory is downloaded or cleared manually. Resetting of the control panel **must** not clear the memory.

### 2.4 LOCAL OPERATING CONSOLES (LOC)

#### 2.4.1 General

The LOC **must** consist of a remote microphone station incorporating a push-to-talk (PTT) hand-held microphone and system status indicators. The LOC **must** have the capability of being utilized to activate prerecorded messages. The unit **must** incorporate microphone override of any tone generation or recorded messages. The unit **must** be fully supervised from the FMCU. The housing for the LOC **must** not be lockable.

#### 2.4.2 Multiple LOC

When an installation has more than one LOC, the LOCs **must** be programmed to allow only one LOC to be available for paging or messaging at a time. Once one LOC becomes active, all other LOCs will have an indication that the system is busy (Amber Busy Light) and cannot be used at that time. This is to avoid two messages being given at the same time. It must be possible to override or lockout the LOCs from the FMCU.

### 2.5 AMPLIFIERS, PREAMPLIFIERS, TONE GENERATORS

Any amplifiers, preamplifiers, tone generators, **digitalized voice generators**, and other hardware necessary for a complete, operational, textual audible circuit conforming to **NFPA 72** **must** be housed in a remote FMCU, terminal cabinet, or in the FMCU. Individual amplifiers **must** be 100 watts maximum.

#### 2.5.1 Operation

The system **must** automatically operate and control all building speakers.

#### 2.5.2 Construction

Amplifiers **must** utilize computer grade solid state components and **must** be provided with output protection devices sufficient to protect the amplifier against any transient up to 10 times the highest rated voltage in the system.

#### 2.5.3 Inputs

Equip each system with separate inputs for the tone generator, digitalized voice driver and panel mounted microphone. Microphone inputs **must** be of the low impedance, balanced line type. Both microphone and tone generator input **must** be operational on any amplifier.

#### 2.5.4 Tone Generator

The tone generator **must** produce a three-pulse temporal pattern and **must** be constantly repeated until interrupted by either the digitalized voice message, the microphone input, or the alarm silence mode as specified. The tone generator **must** be single channel with an automatic backup generator per channel such that failure of the primary tone generator causes the backup generator to automatically take over the functions of the failed unit and also causes transfer of the common trouble relay. The tone generator **must** be provided with securely attached labels to identify the component as a tone generator and to identify the specific tone it produces.

#### 2.5.5 Protection Circuits

Each amplifier must be constantly supervised for any condition that could render the amplifier inoperable at its maximum output. Failure of any component must cause illumination of a visual "amplifier trouble" indicator on the control panel, appropriate logging of the condition in the history log, and other actions for trouble conditions as specified.

## 2.6 REMOTE ANNUNCIATOR

### 2.6.1 LCD Annunciator Panel

Provide a flush mounted annunciator that includes an LCD display. The display must indicate the device in trouble/alarm or any supervisory device. Display the device name, address, and actual building location. The remote annunciator must duplicate functions of the FMCU for message display, fire alarm, supervisory alarm, and trouble conditions, visual and audible notification, and system reset functions. Remote annunciator must require the use of a key for accessing the reset, control and other functions.

Provide a laminated building floor plan (22" by 34") mounted at the main entrance of the building, adjacent to the annunciator. The drawing must indicate the FMCU, LOC, remote power supply panels, and all initiating devices. The drawing must include room numbers.

## 2.7 MANUAL STATIONS

Provide metal or plastic, semi-flush mounted, double-action, addressable manual stations, that are not subject to operation by jarring or vibration. Stations must be equipped with screw terminals for each conductor. Stations that require the replacement of any portion of the device after activation are not permitted. Stations must be finished in fire-engine red with molded raised lettering operating instructions of contrasting color. The use of a key must be required to reset the station.

## 2.8 SMOKE DETECTORS

\*\*\*\*\*  
NOTE: Provide smoke detectors only in spaces where  
they are specifically required by UFC 3-600-01,  
DESIGN: FIRE PROTECTION ENGINEERING FOR FACILITIES.

Smoke detectors provided in elevator machinery rooms  
are to be provided per requirements of UFC  
3-600-01. Coordinate with Section 14 21 13 ELECTRIC  
TRACTION FREIGHT ELEVATORS, Section 14 21 23  
ELECTRIC TRACTION PASSENGER ELEVATORS and/or Section  
14 24 13 HYDRAULIC FREIGHT ELEVATORS, Section  
14 24 23 HYDRAULIC PASSENGER ELEVATORS.

\*\*\*\*\*

### 2.8.1 Photoelectric Smoke Detectors

Provide addressable photoelectric smoke detectors as follows:

- a. Provide analog/addressable photoelectric smoke detectors utilizing the photoelectric light scattering principle for operation in accordance with UL 268. Smoke detectors must be listed for use with the FMCU.

- b. Provide self-restoring type detectors that do not require any readjustment after actuation at the FMCU to restore them to normal operation. Detectors **must** be listed as smoke-automatic fire detectors.
- c. Components **must** be rust and corrosion resistant. Vibration **must** have no effect on the detector's operation. Protect the detection chamber with a fine mesh metallic screen that prevents the entrance of insects or airborne materials. The screen **must** not inhibit the movement of smoke particles into the chamber.
- d. Provide twist lock bases [with sounder that produces a minimum of 90 dBA at 10 feet] for the detectors. The detectors **must** maintain contact with their bases without the use of springs. Provide companion mounting base with screw terminals for each conductor. Terminate field wiring on the screw terminals. The detector **must** have a visual indicator to show actuation.
- e. The detector address **must** identify the particular unit, its location within the system, and its sensitivity setting. Detectors **must** be of the low voltage type rated for use on a 24 VDC system.
- f. An operator at the control panel, having a proper access level, **must** have the capability to manually access the following information for each initiating device.
  - (1) Primary status
  - (2) Device type
  - (3) Present average value
  - (4) Present sensitivity selected
  - (5) Detector range (normal, dirty, etc.)

#### 2.8.2 Duct Smoke Detectors

\*\*\*\*\*  
**NOTE: Coordinate the requirements for Duct Detectors with the HVAC requirements and Sections 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC. All required duct detectors **must** be shown on the contract drawings.**  
 \*\*\*\*\*

Provide duct-mounted addressable photoelectric smoke detectors **must** be furnished and installed where indicated and in accordance with NFPA 90A. Units **must** consist of a smoke detector, as specified in paragraph Photoelectric Detectors, mounted in a special housing fitted with duct sampling tubes. Detector circuitry **must** be mounted in a metallic or plastic enclosure exterior to the duct.[ It is not permitted to cut the duct insulation to install the duct detector directly on the duct.] Detectors **must** have a manual reset. Detectors **must** be rated for air velocities that include air flows between [500 and 4000] [[\_\_\_\_\_] and [\_\_\_\_\_] fpm. Detectors **must** be powered from the FMCU.

- a. Sampling tubes **must** run the full width of the duct. The duct detector

package **must** conform to the requirements of **NFPA 90A**, **UL 268A**, and **must** be listed for use in air-handling systems. The control functions, operation, reset, and bypass **must** be controlled from the **FMCU**.

- b. Lights to indicate the operation and alarm condition; and the test and reset buttons **must** be visible and accessible with the unit installed and the cover in place. Remote indicators **must** be provided where required by **NFPA 72** and these **must** be provided with test and reset switches.
- c. Remote lamps and switches as well as the affected fan units **must** be properly identified in etched plastic placards. Detectors **must** provide for control of auxiliary contacts that provide control, interlock, and shutdown functions specified in Section **23 09 00** to INSTRUMENTATION AND CONTROL FOR HVAC. Auxiliary contacts provide for this function **must** be located within **3 feet** of the controlled circuit or appliance. The detectors **must** be supplied by the fire alarm system manufacturer to ensure complete system compatibility.

### 2.8.3 Air Sampling Smoke Detectors

The addressable air sampling smoke system **must** consist of a detector assembly housing an integral aspiration fan, filter, laser-based detection chamber and control, output and supervision circuitry. The system **must** consist of a piping or tubing distribution network that runs from the detector assembly(s) to the protected area(s) and is supported by **air sampling smoke detection system calculations** from a computer-based design modeling tool. The system **must** include configurable alarm and trouble relay outputs for interface to other systems where required.

- a. System **must** be complete in all ways. It **must** include all engineering, and electrical installation, all detection and control equipment, auxiliary devices and controls, alarm interface, functional checkout and testing, training and all other operations necessary for a functional system.
- c. Program alarm thresholds to the following values unless the results of the system acceptance tests indicate a clear need to change them. In the event that such a need is indicated, notify the Contracting Officer and provide complete documentation concerning the need to deviate from these values. Include within the deviation documentation request, information that complies with the paragraph entitled "Sensitivity Verification Test". Ensure initial threshold levels are approved prior to the final acceptance test.
  - (1) Alarm Level 1: set ALERT at [\_\_\_\_][0.0250] percent obscuration/foot
  - (2) Alarm Level 2: set PRE-ALARM at [\_\_\_\_][0.0500] percent obscuration/foot
  - (3) Alarm Level 3: set FIRE 1 at [\_\_\_\_][0.1000] percent obscuration/foot
  - (4) Alarm Level 4: set FIRE 2 at [\_\_\_\_][0.2000] percent obscuration/foot
- d. All air sampling smoke detection devices and associated components **must** be new, standard products or the manufacturer's latest design and suitable to perform the functions intended.

- e. The laser detection chamber **must** be of the mass light scattering type and capable of detecting a wide range of smoke particle types of varying size. A particle counting method **must** be employed for the purposes of:
  - 1. Preventing large particles from affecting the true smoke reading.
  - 2. Monitoring contamination of the filter (dust and dirt, etc.) to automatically notify when maintenance is required. The particle counting method **must** not be used for the purpose of smoke density measurement.
- f. Detector(s) **must** be self-monitoring for filter contamination and provide indication through system fault when replacement is necessary. Detectors which allow automatic reset of filter status upon removal and re-insertion are not permitted.
- g. Detector(s) **must** contain relays for alarm and fault conditions. The relays **must** be software programmable to the required functions.
- h. Detector(s) **must** permit configuration by programmers that are either integral to the system, portable or PC based.
- i. Detector(s) **must** allow programming of:
  - 1. Smoke threshold alarm levels; ALERT, PRE-ALARM, FIRE 1 and FIRE 2.
  - 2. Time delays. Ensure the display control panel contains individual adjustable alarm time delay features for each of the alarm threshold levels. Provide an adjustment range between 0 and 60 seconds. Program the alarm threshold time delays to 30 seconds for alarm levels 1 and 2, and 15 seconds for alarm levels 3 and 4.
  - 3. Faults, including airflow, detector, power, filter and network, as well as an indication of the urgency of the fault.
  - 4. Configuration of relay outputs for remote indication of alarm and fault conditions.
  - 5. General purpose input functionality.

## 2.9 HEAT DETECTORS

```

*****
NOTE: Heat detectors provided in elevator machinery
rooms are strictly for the warning sign in the
elevator cab and shall not alarm the FACU.
Coordinate with Section 14 21 13 ELECTRIC TRACTION
FREIGHT ELEVATORS, Section 14 21 23 ELECTRIC
TRACTION PASSENGER ELEVATORS and/or Section 14 24 13
HYDRAULIC FREIGHT ELEVATORS, Section 14 24 23
HYDRAULIC PASSENGER ELEVATORS..
*****

```

### 2.9.1 Heat Detectors

Heat detectors shall be **analog/addressable and** designed for detection of



fire by combination fixed temperature and rate-of-rise principle. The alarm condition shall be determined by comparing detector value with the stored values. Heat detector spacing shall be rated in accordance with UL 521. Detectors located in areas subject to moisture, exterior atmospheric conditions, or hazardous locations as defined by NFPA 70 and as indicated, shall be types approved for such locations.

#### 2.9.1.1 Combination Fixed-Temperature and Rate-of-Rise Detectors

Detectors shall be designed for [surface][semi-flush] outlet box mounting and supported independently of wiring connections. Contacts shall be self-resetting after response to rate-of-rise principle. Under fixed temperature actuation, the detector shall have a permanent external indication that is readily visible. Detector units located in boiler rooms, showers, or other areas subject to abnormal temperature changes shall operate on fixed temperature principle only. The UL 521 test rating for the fixed temperature portion shall be [ 135] [ ] degrees F][as shown]. The UL 521 test rating for the Rate-of-Rise detectors shall be rated for 50 by 50 feet.]]

#### 2.9.2 Self-Test Routines

Automatic self-test routines shall be performed on each detector that will functionally check detector sensitivity electronics and ensure the accuracy of the value being transmitted. Any detector that fails this test shall indicate a trouble condition with the detector location at the control panel.

#### 2.10 FLAME DETECTORS

\*\*\*\*\*  
**For the Hangar projects, insert Flame Detector requirements from UFC 4-211-01**  
\*\*\*\*\*

#### 2.11 CARBON MONOXIDE DETECTORS

Carbon monoxide (CO) detectors must be listed to UL 2075 for gas and vapor detectors and sensors. Carbon monoxide detectors must be listed for use with fire alarm control units. Do not provide CO detectors with local alarms. Detector must be provided with an LED status indicator.

- a. Provide analog/addressable carbon monoxide detectors listed for use with the FMCU. For FMCU with no listed compatible addressable CO detectors, provide listed 4-wire carbon monoxide detectors.
- b. Where 4-wire CO detectors are necessary, each 4-wire CO detector must be individually monitored via addressable interface modules for alarm and off normal/trouble conditions (including loss of power to the individual detector).
- c. Wiring connections must be made by means of screw terminals and detectors must be equipped with trouble relays. Detectors must be able to mount a single-gang electrical box.
- d. A trouble condition at an individual CO detector must not affect any other CO detectors. CO detectors must be powered by the FMCU.

- e. Battery powered and 120 VAC powered detectors are prohibited. Power circuits for 4-wire CO detectors **must** be dedicated to powering the CO detectors only.
- f. Detectors **must** be provided with a means to test CO gas entry into the CO sensing cell.

#### 2.12 ADDRESSABLE INTERFACE DEVICES

The initiating device being monitored **must** be configured as [Class "A"] [Class "B"] initiating device circuits. The system **must** be capable of defining any module as an alarm module and report alarm trouble, loss of polling, or as a supervisory module, and reporting supervisory short, supervisory open or loss of polling such as waterflow switches, valve supervisory switches, fire pump monitoring, independent smoke detection systems, relays for output function actuation, etc. The module **must** be listed as compatible with the control panel. The monitor module **must** provide address setting means compatible with the control panel's SLC supervision and store an internal identifying code. Monitor module **must** contain an integral LED that flashes each time the monitor module is polled and is visible through the device cover plate. Pull stations with a monitor module in a common backbox are not required to have an LED.

#### 2.13 ADDRESSABLE CONTROL MODULES

The control module **must** be capable of operating as a relay (dry contact form C) for interfacing the control panel with other systems, and to control door holders or initiate elevator fire service. The module **must** be listed as compatible with the control panel. The indicating device or the external load being controlled **must** be configured as a Class "B" notification appliance circuits. The system **must** be capable of supervising, audible, visual and dry contact circuits. The control module **must** have both an input and output address. The supervision **must** detect a short on the supervised circuit and **must** prevent power from being applied to the circuit. The control model **must** provide address setting means compatible with the control panel's SLC supervision and store an internal identifying code. The control module **must** contain an integral LED that flashes each time the control module is polled and is visible through the device cover plate. Control Modules **must** be located in environmental areas that reflect the conditions to which they were listed.

#### 2.14 ISOLATION MODULES

- a. Provide isolation modules to as required by NFPA 72 or as indicated on the contract drawings.
- b. Isolation modules shall provide short circuit isolation for signaling line circuit wiring.
- c. Power and communications shall be supplied by the SLC and shall report faults to the FMCU.
- d. After the wiring fault is repaired, the fault isolation modules shall test the lines and automatically restore the connection.

#### 2.15 NOTIFICATION APPLIANCES

### 2.15.1 Speakers

\*\*\*\*\*  
NOTE: The designer must layout speakers to achieve both the required dBA levels requires by NFPA 72 and also the required intelligibility required. See Part 3 for testing for intelligibility requirements that must be incorporated into the design.  
\*\*\*\*\*

Audible appliances must conform to the applicable requirements of UL 464. Appliances must be connected into notification appliance circuits. Surface mounted audible appliances must be painted [red][white]. Recessed audible appliances must be installed with a grill that is painted [red][white].

- a. Speakers must conform to the applicable requirements of UL 1480. Speakers must have six different sound output levels and operate with audio line input levels of 70.7 VRMs and 25 VRMs, by means of selectable tap settings. Interior speaker tap settings must include taps of 1/8, 1/4, 1/2, 1, and 2 watt. Exterior speakers must also be multi-tapped with no more than 15 watt maximum setting. Speakers must incorporate a high efficiency speaker for maximum output at minimum power across a frequency range of 400 Hz to 4,000 Hz, and must have a sealed back construction. Speakers must be capable of installation on standard 4-inch square electrical boxes. Where speakers and strobes are provided in the same location, they may be combined into a single [wall mounted] unit. All inputs must be polarized for compatibility with standard reverse polarity supervision of circuit wiring via the FMCU.
- b. Provide speaker mounting plates constructed of cold rolled steel having a minimum thickness of 16 gauge or molded high impact plastic and equipped with mounting holes and other openings as needed for a complete installation. Fabrication marks and holes must be ground and finished to provide a smooth and neat appearance for each plate. Each plate must be primed and painted.
- c. Speakers must utilize screw terminals for termination of all field wiring.
- d. Exterior weatherproof notification speakers must be "bull horn" style. All conduit penetrations for exterior equipment must enter the junction box or equipment from the bottom to minimize water intrusion. Provide duct seal inside all conduits that penetrate exterior walls per NFPA 70, Section 300.7.

### 2.15.2 Visual Notification Appliances

\*\*\*\*\*  
NOTE: ABA requires that Visual Notification Appliances be provided in buildings and facilities in each of the following areas: restrooms, and any general usage area (e.g., meeting rooms), hallways, lobbies, and any other area for common use and other areas stated at [www.access-board.gov](http://www.access-board.gov). The Visual Notification Appliance must be mounted as required by ABA that directs compliance with NFPA 72 except

that the maximum allowable sound level of audible notification appliances shall have a sound level no more than 110 dB at the minimum hearing distance from the audible appliance. In addition, alarms in guest rooms required to provide communication features shall comply with sections 18.5.4.6 of NFPA 72. Shop drawings **must** indicate location, dimensions, content, details, and other required information to indicate extent of complying with ABA requirements.

\*\*\*\*\*

Visual notification appliances **must** conform to the applicable requirements of **UL 1971** and conform to the Architectural Barriers Act (ABA). Visual notification appliances are required in all public use areas, common use areas, and employee work areas to include office suites and areas intended to have more than four desks/occupants. Offices that are designed for a single office worker (even though it may be able to hold a meeting with 3 or 4 people) do not require a strobe unless that employee is someone who has a hearing impairment. Visual Notification Appliances **must** have clear high intensity optic lens, xenon flash tubes, and be marked "Alert" in red letters. The light pattern **must** be disbursed so that it is visible above and below the strobe and from a 90 degree angle on both sides of the strobe. Strobe flash rate **must** be 1 flash per second and a minimum of 15 candela (actual output after derating for tinted lens) based on the **UL 1971** test. Where more than two appliances are located in the same room or corridor or field of view, provide synchronized operation. Devices **must** use screw terminals for all field wiring.

## 2.16 ELECTRIC POWER

### 2.16.1 Primary Power

Power **must** be 120 VAC service for the **FMCU** from the AC service to the building in accordance with **NFPA 72**.

## 2.17 SECONDARY POWER SUPPLY

Provide for system operation in the event of primary power source failure. Transfer from normal to auxiliary (secondary) power or restoration from auxiliary to normal power **must** be automatic and **must** not cause transmission of a false alarm.

### 2.17.1 Batteries

Provide sealed, maintenance-free, sealed lead acid batteries as the source for emergency power to the **FMCU**. Batteries **must** contain suspended electrolyte. The battery system **must** be maintained in a fully charged condition by means of a solid state battery charger. Provide an automatic transfer switch to transfer the load to the batteries in the event of the failure of primary power.

#### 2.17.1.1 Capacity

Battery size **must** be the **greater of the following two capacities**. This capacity applies to every panel associated with this system, including **supplemental notification appliance circuit panels, auxiliary power supply panels, fire alarm transmitters, and Base-wide mass notification**

transceivers. When determining the required capacity under alarm condition, visual notification appliances **must** include both textual and non-textual type appliances.

- a. Sufficient capacity to operate the fire alarm system under supervisory and trouble conditions, including audible trouble signal devices for 48 hours and audible and visual signal devices under alarm conditions for an additional 15 minutes.
- b. Sufficient capacity to operate the mass notification for 60 minutes after loss of AC power.

#### 2.17.1.2 Battery Power Calculations

- a. Verify that battery capacity exceeds supervisory and alarm power requirements.
  - (1) Substantiate the battery calculations for alarm and supervisory power requirements. Include ampere-hour requirements for each system component and each panel component, and compliance with **UL 864**.
  - (2) Provide complete battery calculations for both the alarm and supervisory power requirements. Submit ampere-hour requirements for each system component with the calculations.
  - (3) Provide **voltage drop calculations** to indicate that sufficient voltage is available for proper operation of the system and all components, at the minimum rated voltage of the system operating on batteries.
- b. For battery calculations assume a starting voltage of 24 VDC for starting the calculations to size the batteries. Calculate the required Amp-Hours for the specified standby time, and then calculate the required Amp-Hours for the specified alarm time. Using 20.4 VDC as starting voltage, perform a voltage drop calculation for circuits containing device and/or appliances remote from the power sources.

#### 2.17.2 Battery Chargers

Provide a solid state, fully automatic, variable charging rate battery charger. The charger **must** be capable of providing 120 percent of the connected system load and **must** maintain the batteries at full charge. In the event the batteries are fully discharged (20.4 Volts dc), the charger **must** recharge the batteries back to 95 percent of full charge within 48 hours after a single discharge cycle as described in paragraph CAPACITY above. Provide pilot light to indicate when batteries are manually placed on a high rate of charge as part of the unit assembly if a high rate switch is provided.

#### 2.18 SURGE PROTECTIVE DEVICES

**Surge protective devices** **must** be provided to suppress all voltage transients which might damage fire alarm panel components. Systems having circuits located outdoors, communications equipment **must** be protected against surges induced on any signaling line circuit. Cables and conductors, that serve as communications links, **must** have surge protection

circuits installed at each end. The surge protective device **must** wire in series to the power supply of the protected equipment with screw terminations. Line voltage surge arrester **must** be installed directly adjacent to the power panel where the **FMCU** breaker is located.

- a. Surge protective devices for nominal 120 VAC **must** be **UL 1449** listed with a maximum 500 volt suppression level and have a maximum response time of 5 nanoseconds. The surge protective device **must** also meet **IEEE C62.41.1** and **IEEE C62.41.2** category B tests for surge capacity. The surge protective device **must** feature multi-stage construction and be provided with a long-life indicator lamp (either light emitting diode or neon) which extinguishes upon failure of protected components. Any unit fusing **must** be externally accessible.
- b. Surge protective devices for nominal 24 VAC, fire alarm telephone dialer, or ethernet connection **must** be **UL 497B** listed and have a maximum response time of 1-nanosecond. The surge protective device **must** feature multi-stage construction and be self-resetting. The surge protective device **must** be a base and plug style. The base assembly **must** have screw terminals for fire alarm wiring. The base assembly **must** accept "plug-in" surge protective module.
- c. All surge protective devices (SPD) **must** be the standard product of a single manufacturer and be equal or better than the following:
  1. For 120 VAC nominal line voltage: **UL 1449** and **UL 1283** listed, series connected 120 VAC, 20A rated, surge protective device in a NEMA 4x enclosure. Minimum 50,000 amp surge current rating with EMI/RFI filtering and a dry contact circuit for remote monitoring of surge protection status.
  2. For 24-volt nominal line voltage: **UL 497B** listed, series connected low voltage, 24-volt, 5A rated, loop circuit protector, base and replaceable module.
  3. For alarm telephone dialers: **UL 497A** listed, series connected, 130-volt, 150 mA rated with self-resetting fuse, dialer circuit protector with modular plug and play.
  4. For IP-DACTS: **UL 497B** listed, series connected, 6.4-volt, 1.5A rated with 20 kA/pair surge current, data network protector with modular plug and play.

## 2.19 WIRING

Provide wiring materials under this section as specified in Section **26 20 00** INTERIOR DISTRIBUTION SYSTEM with the additions and modifications specified herein.

### 2.19.1 Alarm Wiring

Signaling Line Circuits (SLC) wiring **must** be solid copper or stranded as permitted by **NFPA 70**. Copper SLCs and Initiating Device Circuit (IDC) field wiring **must** be No. 18 AWG size conductors at a minimum. Visual notification appliance circuit conductors, that contain audible alarm appliances, **must** be No. 16 AWG size conductors at a minimum. Speaker circuits **must** be copper No. [16][\_\_\_\_\_] AWG size twisted and shielded

conductors at a minimum. Wire size must be sufficient to prevent voltage drop problems. Circuits operating at 24 VDC must not operate at less than the listed voltages for the detectors and/or appliances. Power wiring, operating at 120 VAC minimum, must be a minimum No. 12 AWG solid copper having similar insulation. Acceptable power-limited cables are FPL, FPLR or FPLP as appropriate with red colored covering. Nonpower-limited cables must comply with NFPA 70.

## 2.20 INTERFACE TO THE BASE-WIDE MASS NOTIFICATION NETWORK

a. The Government will furnish and install the Cooper Industries TRX-401 mass notification system transceiver.

b. Provide space and all other components required for the connection to the basewide mass notification system. See contract drawings for detailed equipment, including but not limited to, NEMA 4X enclosure, mounting board, antenna, cables, and conduit.

c. Provide the following equipment to the PMO-Base Physical Security Office: three uninterruptible power supplies (Eaton Model UPS-8001), two dual UPS Charging Cables (Eaton Model M50-0459), and one Universal Waves Interface (Eaton Model UWI-1302).

## 2.21 AUTOMATIC FIRE ALARM TRANSMITTERS

### 2.21.1 Digital Alarm Communicator Transmitter (DACT)

Provide DACT that is compatible with the existing supervising station fire alarm system. Transmitter must have a means to transmit alarm, supervisory, and trouble conditions via a single transmitter. Transmitter must have a source of power for operation that conforms to NFPA 72. Transmitter must be capable of initiating a test signal daily at any selected time. Transmitter must be arranged to seize telephone circuits in accordance with NFPA 72.

[For Camp Lejeune and New River, use the following: Provide a point reporting digital alarm communicator transmitter that is compatible with the Sur-Gard System III Multi-platform Digital Telephone Receiver. Provide two CAT 6 UTP cables inside one-inch conduit from the FMCP to the telephone equipment room. Make connections to telephone equipment per the base's telephone requirements.]

[For Cherry Point, use the following: Basewide Fire Alarm Reporting System (FARS) is a network that utilizes fiber as the primary connection and digital telephone lines as the secondary connection. Provide the Bosch B465 Conettix Universal Dual Path Communicator (UPDC) & a 10/100/1000BaseT/TX to 1000BaseLX Media Converter, SC/SM. Provide the UPDC in a dedicated panel (not within the FMCP), and key the panel the same as the FMCP. Power the UPDC from the building FMCP, and monitor its power by the FMCP. The Bosch equipment must communicate with the existing Bosch 6600 receiver (with Microkey automation software) at the MCAS Cherry Point Fire Dispatch station. Facility Systems Service Office (FSSO) government personnel will program all individual points at the head end equipment. Coordinate connection to the FARS and programming with the FARS Administrator. Contact FSSO at email CHPT.FACSS.OMB@USMC.MIL.]

### 2.21.2 Signals to Be Transmitted to the Base Receiving Station



All fire alarms, supervisory alarms and trouble conditions indicated at the FMCU shall be transmitted to the fire alarm receiving station. Transmission shall be point specific via contact ID format with the address, location, and description of the condition as it appears on the FMCU.

## 2.22 SYSTEM MONITORING

### 2.22.1 Valves

Each valve affecting the proper operation of a fire protection system, including automatic sprinkler control valves, sprinkler service entrance valve, [ valves at fire pumps, ] isolating valves for pressure type waterflow or supervision switches, and valves at backflow preventers, whether supplied under this contract or existing, **must** be electrically monitored to ensure its proper position. Provide each tamper switch with a separate address.

### 2.22.2 High/Low Nitrogen Supervisory Switches

Provide monitoring of high and low supervisory nitrogen for dry pipe systems. Each supervisory switch **must** have a separate address. Switches **must** be listed extinguishing system attachments. The device **must** contain double pole, double throw contacts. Operation of the switch **must** cause a supervisory signal to be transmitted to the FMCU when nitrogen pressure in the system monitored sprinkler system increases more than 5 psi above the normal system pressure or drops halfway from the normal pressure to the tripping point.]

### 2.22.3 Room Low Temperature Supervisory Switch

Provide monitoring of the listed supervisory air temperature switch for the [fire pump][sprinkler riser] room[s]. Switch **must** cause a supervisory signal to be transmitted to the FMCU whenever the temperature in the room drops to below 40 degrees F. Device **must** reset when temperature rises above 40 degrees F.]

### 2.22.4 Electromagnetic Door Holders

Electromagnetic holding devices **must** operate on [120 VAC][24 VDC], and require not more than [3][\_\_\_\_] watts of power to develop 25 psi of holding force. Under normal conditions, the magnets **must** attract and hold the doors open. Operation **must** be fail safe with no moving parts. Electromagnetic door hold-open devices **must** not be required to be held open during building power failure. The device **must** be listed based on UL 228 tests.]

## 2.23 DOCUMENT CABINET

Provide a steel cabinet with a hinge-mounted door and lock with lock cylinder keyed the same as the FMCU. Mount the Document Cabinet on the wall adjacent to the FMCU. Prominently label the exterior of the cabinet "SYSTEM RECORD DOCUMENTS". Cabinet must include paper copies and a CD of Fire Alarm As-Built drawings, List of Contact ID descriptions for the fire alarm addressable devices, Sprinkler As-Built drawings, NFPA 72 & NFPA 13 Records of Completion. CD must also include site-specific software and O&M manuals stored in a CD jewel case.

## 2.24 SPARE PARTS CABINET

Provide a steel cabinet with a hinge-mounted door and lock with lock cylinder keyed the same as the FMCU. Mount the cabinet on the wall adjacent to the FMCU. Prominently label the exterior of the cabinet "SPARE PARTS".

## 2.25 ENVIRONMENTAL ENCLOSURES OR GUARDS

Environmental enclosures **must** be provided to permit fire alarm/mass notification components to be used in areas that exceed the environmental limits of the listing. The enclosure **must** be listed for the device or appliance as either a manufactured part number or as a listed compatible accessory for the component is currently listed. Guards required to deter mechanical damage **must** be either a listed manufactured part or a listed accessory for the category of the initiating device or notification appliance.

## PART 3 EXECUTION

### 3.1 INSTALLATION OF FIRE ALARM INITIATING DEVICES AND NOTIFICATION APPLIANCES

#### 3.1.1 Fire Alarm and Mass Notification Control Unit (FMCU)

Locate the FMCU where indicated on the drawings. [Recess] [Semi-recess] [Surface mount] the enclosure with the top of the cabinet 6 feet above the finished floor or center the cabinet at 5 feet, whichever is lower. Conductor terminations **must** be labeled and a drawing containing conductors, their labels, their circuits, and their interconnection **must** be permanently mounted in the FMCU. Locate the document storage cabinet and spare parts cabinet adjacent to the FMCU unless the Contracting Officer directs otherwise.

#### 3.1.2 Battery Cabinets

When batteries will not fit in the FMCU, locate battery cabinets below or adjacent to the FMCU. Battery cabinets **must** be installed at an accessible location when standing at floor level. Battery cabinets **must** not be installed lower than 12 inches above finished floor, measured to the bottom of the cabinet, nor higher than 36 inches above the floor, measured to the top of the cabinet. Installing batteries above drop ceilings or in inaccessible locations is prohibited. Battery cabinets **must** be large enough to accommodate batteries and also to allow ample gutter space for interconnection of panels as well as field wiring. The cabinet **must** be provided in a sturdy steel housing, complete with back box, hinged steel door with cylinder lock, and surface mounting provisions. The cabinet **must** be identified by an engraved phenolic resin nameplate. Lettering on the nameplate **must** indicate the panel(s) the batteries power and **must** not be less than 1-inch high.

#### 3.1.3 Manual Stations

Locate manual stations as required by NFPA 72 and as indicated on the drawings. Mount stations so they are located no farther than 5 feet from the exit door they serve, measured horizontally. Manual stations **must** be mounted at 44 inches measured to the operating handle.

#### 3.1.4 Notification Appliances

Locate notification appliances as required by NFPA 72 and as indicated on the drawings. Provide additional appliances as needed to satisfy intelligibility requirements. Audible and visual notification appliances mounted on the exterior of the building, within unconditioned spaces, or in the vicinity of showers must be listed weatherproof appliances installed on weatherproof backboxes.

#### 3.1.5 Smoke and Heat Detectors

Locate detectors as required by NFPA 72 and as indicated on the drawings. Mount detectors on a 4 inch mounting box. Install heat detectors not less than 4 inches from a side wall to the near edge. Heat detectors located on the wall must have the top of the detector at least 4 inches below the ceiling, but not more than 12 inches below the ceiling. Smoke detectors are permitted to be on the wall no lower than 12 inches from the ceiling with no minimum distance from the ceiling. Install smoke detectors no closer than 3 feet from air handling supply diffusers.

#### 3.1.6 Carbon Monoxide Detectors

Locate detectors as required by NFPA 72 and as indicated on the drawings. Mount detectors on a 4-inch mounting box.

#### 3.1.7 Air Sampling Smoke Detectors

Locate air sampling smoke detectors in accordance with the manufacturer's instructions. Air sampling smoke detectors must be installed as follows:

a. Air Sampling Smoke Detector Assembly:

1. Detector assembly must be mounted to a wall at a height between 48 to 60 inches to top of detector measured above the finished floor.
2. Mounting must be in a fully accessible and visible location.
3. Mounting or attachment to site equipment, cable trays, movable walls, other equipment or equipment supports is not permitted.
4. Piping network insertion into the detector inlet must not be glued.
5. Air sampling smoke detector assembly must be installed in accordance with this specification section and the manufacturer's installation and instruction manuals.
6. Flexible tubing for termination of the sampling pipe network into detector inlet is not permitted unless allowed by its listing.
7. Provide red background with white lettering labels that are plastic or phenolic type with a minimum of 0.25-inch block lettering to indicate detector and zone. For example: "AIR SAMPLING SOME DETECTOR No. 1-1 No. 5".
8. Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the

ASD panel. The card **must** show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory, and trouble. The instructions **must** be approved by the Contracting Officer before being posted.

b. Pipe and Sampling Tube Mounting:

1. The pipe and sampling tubing detection network **must** be mounted as per the design and manufacturer's specification. The hardware used for mounting will depend upon the design and site requirements.
2. To minimize flexing, pipes **must** be secured every 5 feet.
3. Pipes **must** be suspended between 1 and 4 inches below the ceiling. In areas with a suspended ceiling, the pipe network **must** be installed above the ceiling utilizing the manufacturer's capillary sample port supported by the ceiling.
4. The sampling tubes **must** be of the same length or use the manufacturer's guidelines to run tubes of the required lengths.
5. When installing a pipe network in areas subject to high temperature fluctuations allow for the contraction and expansion of pipes.
6. Where expansion or contraction of pipes is likely either after installation or on a continuous basis, do not place pipe clips adjacent to couplings and socket unions as these may interfere with the movement of the pipe.
7. No bends are permitted within the first 18 inches from the detector inlet.
8. The routing of the piping and sample tube network **must** be coordinated with potential obstructions, including cable trays, grounding bars, and HVAC ductwork.
9. All changes in direction **must** be made with standard elbows or tees.
10. All joints **must** be air-tight and made by using solvent cement, except at the entry to the detector assembly. Refer to **ASTM F402**.
11. All pipes **must** be supported by mechanical hangers attached to the structure of the building. Not more than 1-foot of pipe **must** extend beyond the last hanger of each sampling pipe. The final installation **must** result in no noticeable deflection in the piping network.
12. Attachment of air sampling pipes to cable trays, "gray iron", and telecommunications equipment is prohibited.
13. Clearly label pipe network to distinguish the pipe from other facility pipe work or protective cabling enclosures. For example: "SMOKE DETECTION SAMPLING TUBE - DO NOT DISTURB". In open rooms and exposed areas, provide labels at no greater than 20-foot intervals. Provide labels every 10 feet where piping is installed above suspended ceilings and every 2 feet, centered in the floor panels, where piping is installed within the raised floor cavity.

14. Placement of the sampling tube **must** take into consideration appropriate sampling point locations and spacing.

c. Air Sampling Points:

1. Open area ceiling sampling points **must** be oriented downward and **must** be within 1 to 4 inches below the underside of the ceiling above where the ceiling is smooth.

2. Label all air sampling points with a round red label, each with a center hole to match the diameter of the drilled sampling point. For example: "AIR SAMPLING POINT DIA 0.125 INCHES". Indicate fractional dimensions in decimal format with a minimum of three decimal places.]

3.1.8 LCD REMOTE Annunciator

Locate the LCD annunciator as shown on the drawings. Mount the panel, with the top of the panel 6 feet above the finished floor or center the panel at 5 feet, whichever is lower.

3.1.9 Local Operating Console (LOC)

Locate the LOC(s) as required by NFPA 72 and as indicated on the drawings. Mount the console so that the top message button is no higher than 4 feet above the floor.

3.1.10 Ceiling Bridges

Provide ceiling bridges for ceiling-mounted appliances. Ceiling bridges **must** be as recommended/required by the manufacturer of the ceiling-mounted notification appliance.

3.2 SYSTEM FIELD WIRING

3.2.1 Wiring within Cabinets, Enclosures, and Boxes

Provide wiring installed in a neat and workmanlike manner and installed parallel with or at right angles to the sides and back of any box, enclosure, or cabinet. Conductors that are terminated, spliced, or otherwise interrupted in any enclosure, cabinet, mounting, or junction box **must** be connected to screw-type terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. The use of wire nuts or similar devices is prohibited. Conform wiring to NFPA 70.

Indicate the following in the wiring diagrams.

- a. Point-to-point wiring diagrams showing the points of connection and terminals used for electrical field connections in the system, including interconnections between the equipment or systems that are supervised or controlled by the system. Diagrams **must** show connections from field devices to the FCMU and remote fire alarm/mass notification control units, initiating circuits, switches, relays and terminals.
- b. Complete riser diagrams indicating the wiring sequence of devices and their connections to the control equipment. Include a color code schedule for the wiring. Include floor plans showing the locations of devices and equipment.

### 3.2.2 Terminal Cabinets

\*\*\*\*\*  
**NOTE: Provide terminal cabinets on each floor where  
the fire alarm system supply riser is located and  
where the fire alarm return riser is located.**  
\*\*\*\*\*

Provide a terminal cabinet at the base of any circuit riser, on each floor at each riser, and where indicated on the drawings. Terminal size **must** be appropriate for the size of the wiring to be connected. Conductor terminations **must** be labeled and a drawing containing conductors, their labels, their circuits, and their interconnection **must** be permanently mounted in the terminal cabinet. Minimum size is **8 inches by 8 inches**. Only screw-type terminals are permitted. Provide an identification label, that displays "FIRE ALARM TERMINAL CABINET" with **2-inch** lettering, on the front of the terminal cabinet.

### 3.2.3 Alarm Wiring

- a. Voltages **must** not be mixed in any junction box, housing or device, except those containing power supplies and control relays.
- b. Utilize shielded wiring where recommended by the manufacturer. For shielded wiring, ground the shield at only one point, in or adjacent to the **FMCU**.
- c. **All devices must have screw terminals. Where devices are only provided with pigtails from the manufacturer, pigtails must be landed on terminal strips mounted within the junction box. All terminations must be at a terminal strip or the device screw terminals. Terminal strips are only permitted where direct connection to a device is not possible.**
- d. Color coding is required for circuits and **must** be maintained throughout the circuit. Conductors used for the same functions **must** be similarly color coded. Conform wiring to **NFPA 70**.
- e. Pull all conductors splice free. The use of wire nuts, crimped connectors, or twisting of conductors is prohibited.
- f. **Provide labels for all addressable devices, panels, and controls. For any device located above a ceiling, provide legible, typed label on the ceiling to identify its purpose and location. Provide clearance for access, inspection, maintenance, repair, and removal.**

### 3.2.4 Back Boxes and Conduit

In addition to the requirements of Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, provide all wiring in rigid metal conduit or intermediate metal conduit unless specifically indicated otherwise. Minimum conduit size **must** be **3/4-inch** in diameter except for **1/2-inch** drops to individual devices. Do not use electrical non-metallic tubing (ENT) or flexible non-metallic tubing and associated fittings.

- a. Galvanized rigid steel (GRS) conduit **must** be utilized where exposed to weather, where subject to physical damage, and where exposed on exterior of buildings. Intermediate metal conduit (IMC) may be used in

lieu of GRS as allowed by NFPA 70.

- b. Electrical metallic tubing (EMT) is permitted above suspended ceilings or exposed where not subject to physical damage. Do not use EMT underground, encased in concrete, mortar, or grout, in hazardous locations, where exposed to physical damage, outdoors or in fire pump rooms. Use die-cast compression connectors.
- c. For rigid metallic conduit (RMC), only threaded type fitting are permitted for wet or damp locations.
- d. Flexible metal conduit is permitted for initiating device circuits 6 feet in length or less. Flexible metal conduit is prohibited for notification appliance circuits and signaling line circuits. Use liquid tight flexible metal conduit in damp and wet locations.
- e. Schedule 40 (minimum) polyvinyl chloride (PVC) is permitted where conduit is routed underground or underground below floor slabs. Convert non-metallic conduit, other than PVC Schedule 40 or 80, to plastic-coated rigid, or IMC, steel conduit before turning up through floor slab.
- f. Exterior wall penetrations must be weathertight. Conduit must be sealed to prevent the infiltration of moisture.
- [g. For Class "A" circuits with conductor lengths of 10 feet or less, the conductors may be permitted to be installed in the same raceway in accordance with NFPA 72.]

### 3.2.5 Conductor Terminations

Labeling of conductors at terminal blocks in terminal cabinets, FMCU and the LOC must be provided at each conductor connection. Each conductor or cable must have a shrink-wrap label to provide a unique and specific designation. Each terminal cabinet, FMCU, and remote FMCU must contain a laminated drawing that indicates each conductor, its label, circuit, and terminal. The laminated drawing must be neat, using 12 point lettering minimum size, and mounted within each cabinet, panel, or unit so that it does not interfere with the wiring or terminals. Maintain existing color code scheme where connecting to existing equipment.

### 3.3 DISCONNECTION AND REMOVAL OF EXISTING SYSTEM

- a. Prior to system removal, contact base fire alarm technicians and allow time for their retrieval of fire alarm and/or mass notification panels, devices, appliances, etc. [For Camp Lejeune and New River, contact David Jones (910) 376-0437.] [For Cherry Point, contact David Conner (252) 466-3202.] If unsuccessful, contact the fire inspector or construction manager who will coordinate with the Public Works Department.
- b. If the base fire alarm technicians do not remove any equipment in advance, minimally remove the fire alarm control panel, fire alarm transmitter, and mass notification transceiver (if present) and turn over to the construction manager.

### 3.4 CONNECTION OF NEW SYSTEM



The following new system connections **must** be made during the last phase of construction, at the beginning of the preliminary tests. New system connections **must** include:

- a. Connection of new relays to existing magnetic door hold-open devices.
- b. Connection of new elevator recall relays to existing wiring and conduit.
- c. Connection of new system **fire alarm** transmitter to existing installation fire reporting system.
- d. Connection of the new transceiver to the existing Installation mass notification system (to be performed by the Government).

Once these connections are made, system **must** be left energized. Report immediately to the Contracting Officer, coordination and field problems resulting from the connection of the above components.

### 3.5 FIRESTOPPING

Provide firestopping for holes at conduit penetrations through floor slabs, fire rated walls, partitions with fire rated doors, corridor walls, and vertical service shafts in accordance with Section **07 84 00** FIRESTOPPING.

### 3.6 PAINTING

- a. In unfinished areas (including areas above drop ceilings), paint all exposed electrical conduit (serving fire alarm equipment), fire alarm conduit, surface metal raceway, junction boxes and covers red. In lieu of painting conduit, the contractor may utilize red conduit with a factory applied finish.
- b. In finished areas, paint exposed electrical conduit (serving fire alarm equipment), fire alarm conduit, surface metal raceways, junction boxes, and electrical boxes to match adjacent finishes. The inside cover of the junction box must be identified as "Fire Alarm" and the conduit must have painted red bands **3/4-inch** wide at **10-foot** centers and at each side of a floor, wall, or ceiling penetration.
- c. Painting **must** comply with Section **09 90 00** PAINTS AND COATINGS.

### 3.7 FIELD QUALITY CONTROL

#### 3.7.1 Test Procedures

Submit detailed test procedures, prepared and signed by the NICET Level IV Fire Alarm Technician, and the representative of the installing company, and reviewed by the QFPE **30** days prior to performing system tests. Detailed test procedures **must** list all components of the installed system such as initiating devices and circuits, notification appliances and circuits, **signaling line devices and circuits**, control devices/equipment, batteries, transmitting and receiving equipment, power sources/supply, annunciators, special hazard equipment, emergency communication equipment, interface equipment, and transient (surge) suppressors. Test procedures **must** include sequence of testing, time estimate for each test, and sample test data forms. The test data forms **must** be in a check-off format (pass/fail with space to add applicable test data; similar to the forma in

NFPA 72 and NFPA 4.) The test procedures and accompanying test data forms must be used for the preliminary testing and the acceptance testing. The test data forms must record the test results and must:

- a. Identify the NFPA Class of all Initiating Device Circuits (IDC), and Notification Appliance Circuits (NAC), Voice Notification System Circuits (NAC Audio), and Signaling Line Circuits (SLC).
- b. Identify each test required by NFPA 72 Test Methods and required test herein to be performed on each component, and describe how these tests must be performed.
- c. Identify each component and circuit as to type, location within the facility, and unique identity within the installed system. Provide necessary floor plan sheets showing each component location, test location, and alphanumeric identity.
- d. Identify all test equipment and personnel required to perform each test (including equipment necessary for smoke detector testing. The use of magnets is not permitted.
- e. Provide space to identify the date and time of each test. Provide space to identify the names and signatures of the individuals conducting and witnessing each test.

### 3.7.2 Pre-Government Testing

#### 3.7.2.1 Verification of Compliant Installation

Conduct inspections and tests to ensure that devices and circuits are functioning properly. Tests must meet the requirements of paragraph entitled "Minimum System Tests" and "Verification of Compliant Installation" as required by NFPA 72. The contractor and an authorized representative from each supplier of equipment must be in attendance at the pre-Government testing to make necessary adjustments. After inspection and testing is complete, provide a signed Verification of Compliant Installation letter by the QFPE that the installation is complete, compliant with the specification and fully operable. The letter must include the names and titles of the witnesses to the pre-Government tests. Provide all completion documentation as required by NFPA 72 including all referenced annex sections and the test reports noted below.

- a. NFPA 72 Record of Completion
- b. NFPA 72 Record of Inspection and Testing
- c. Fire Alarm and Emergency Communication System Inspection and Testing Form
- d. Audibility test results with marked-up test floor plans.
- e. Intelligibility test results with marked-up floor plans.
- f. Documentation that all tests identified in the paragraph "Minimum System Tests" are complete.

#### 3.7.2.2 Request for Government Final Test

When the verification of compliant installation has been completed, submit a formal request for Government final test to the NAVFAC MIDLANTIC Designated Fire Protection Engineer (DFPE) or Contracting Offices Designated Representative (COR). Government final testing will not be scheduled until the DFPE has received copies of the request for Government final testing and Verification of Compliant Installation letter with all required reports. Government final testing will not be performed until after the connections to the installation-wide fire reporting system and the installation-wide mass notification system have been completed and tested to confirm communications are fully functional. Submit request for test at least 15 calendar days prior to the requested test date.

### 3.7.3 Government Final Tests

The tests must be performed in accordance with the approved test procedures in the presence of the NAVFAC MIDLANTIC DFPE. Furnish instruments and personnel required for the tests. The following must be provided at the job site for Government Final Testing:

- a. The systems manufacturer's technical representative
- c. Marked-up red line drawings of the system as actually installed
- d. Loop resistance test results
- e. Complete program printout including input/output addresses
- f. Copy of Preliminary Test Certificate, test procedures and completed test data forms.
- g. Audibility test results with marked-up floor plans.
- h. Intelligibility test results with marked-up floor plans.

Government Final Tests will be witnessed by the NAVFAC MIDLANTIC Designated Fire Protection Engineer. At this time, any and all required tests noted in the paragraph "Minimum System Tests" must be repeated at their discretion.

### 3.7.4 Minimum System Tests

Test the system in accordance with the procedures outlined in NFPA 72. The required tests are as follows:

- a. Loop Resistance Tests: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests must be witnessed by the Contracting Officer and test results recorded for use at the final acceptance test.
- b. Verify the absence of unwanted voltages between circuit conductors and ground. The tests must be accomplished at the preliminary test with results available at the final system test.
- c. Verify that the control unit is in the normal condition as detailed in the manufacturer's O&M manual.

- d. Test each initiating device and notification appliance and circuit for proper operation and response at the control unit. Smoke detectors **must** be tested in accordance with manufacturer's recommended calibrated test method. Use of magnets is prohibited. Testing of duct smoke detectors **must** comply with the requirements of **NFPA 72** except disconnect at least 20 percent of devices. If there is a failure at these devices, then supervision **must** be tested at each device.
- e. **Carbon Monoxide Detector Tests:** Carbon monoxide detectors **must** be tested in accordance with **NFPA 720** and the manufacturer's recommended calibrated test method.
- f. Test the system for specified functions in accordance with the contract drawings and specifications and the manufacturer's O&M manual.
- g. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the time period and in the manner specified.
- h. Determine that the system is operable under trouble conditions as specified.
- i. Visually inspect wiring.
- j. Test the battery charger and batteries.
- k. Verify that software control and data files have been entered or programmed into the FCMU. Hard copy records of the software **must** be provided to the Contracting Officer.
- l. Verify that red-line drawings are accurate.
- m. Measure the current in circuits to ensure there is the calculated spare capacity for the circuits.
- n. Measure voltage readings for circuits to ensure that voltage drop is not excessive.
- o. Disconnect the verification feature for smoke detectors during tests to minimize the amount of smoke needed to activate the sensor. Testing of smoke detectors **must** be conducted using real smoke or the use of canned smoke which is permitted.
- p. Measure the voltage drop at the most remote appliance (based on wire length) on each notification appliance circuit.
- q. Verify the documentation cabinet is installed and contains all as-built shop drawings, product data sheets, design calculations, site-specific software data package, and all documentation required by paragraph titled "Test Reports".

#### 3.7.4.1 Audibility Tests

Sound pressure levels from audible notification appliances **must** not exceed 110 dBA in any occupiable area. The provisions for audible notification (audibility and intelligibility) must be met with doors, fire shutters, movable partitions, and similar devices closed.

#### 3.7.4.2 Intelligibility Tests

Intelligibility testing of the System **must** be accomplished in accordance with **NFPA 72** for Voice Evacuation Systems, and **ASA S3.2**. Following are the specific requirements for intelligibility tests:

- a. Intelligibility Requirements: Verify intelligibility by measurement after installation.
- b. Ensure that a CIS value greater than the required minimum value is provided in each area where building occupants typically could be found. The minimum required value for CIS is [.7] [.8]. Rounding of values is permitted.
- c. Areas of the building provided with hard wall and ceiling surfaces (such as metal or concrete) that are found to cause excessive sound reflections may be permitted to have a CIS score less than the minimum required value if approved by the DFPE, and if building occupants in these areas can determine that a voice signal is being broadcast and they must walk no more than **33 feet** to find a location with at least the minimum required CIS value within the same area.
- d. Areas of the building where occupants are not expected to be normally present are permitted to have a CIS score less than the minimum required value if personnel can determine that a voice signal is being broadcast and they must walk no more than **50 feet** to a location with at least the minimum required CIS value within the same area.
- e. Take measurements near the head level applicable for most personnel in the space under normal conditions (e.g., standing, sitting, sleeping, as appropriate).
- f. The distance the occupant must walk to the location meeting the minimum required CIS value **must** be measured on the floor or other walking surface as follows:
  - (1) Along the centerline of the natural path of travel, starting from any point subject to occupancy with less than the minimum required CIS value.
  - (2) Curving around any corners or obstructions, with a **12 inches** clearance there from.
  - (3) Terminating directly below the location where the minimum required CIS value has been obtained.

Use commercially available test instrumentation to measure intelligibility as specified by **NFPA 72** as applicable. Use the mean value of at least three readings to compute the intelligibility score at each test location.

#### 3.8 System Acceptance

Following acceptance of the system, **as-built drawings** and O&M manuals **must** be delivered to the Contracting Officer for review and acceptance. Submit six sets of detailed as-built drawings. The drawings **must** show the system as installed, including deviations from both the project drawings and the approved shop drawings. These drawings **must** be submitted within two weeks

after the final acceptance test of the system. At least one set of as-built (marked-up) drawings **must** be provided at the time of, or prior to the final acceptance test.

- a. Furnish one set of CDs or DVDs containing software back-up and CAD based drawings in latest version of AutoCAD, DXF and portable document formats of as-built drawings and schematics.
- b. Include complete wiring diagrams showing connections between devices and equipment, both factory and field wired.
- c. Include a riser diagram and drawings showing the as-built location of devices and equipment.
- d. Provide **operation and maintenance (O&M) instructions**.

### 3.9 **INSTRUCTION OF GOVERNMENT EMPLOYEES**

#### 3.9.1 Instructor

Provide the services of an instructor, who has received specific training from the manufacturer for the training of other persons regarding the operation, inspection, testing, and maintenance of the system provided. The instructor **must** train the Government employees designated by the Contracting Officer, in the care, adjustment, maintenance, and operation of the fire alarm system. The instructor **must** be thoroughly familiar with all parts of this installation. The instructor **must** be trained in operating theory as well as in practical O&M work. Submit the instructors information and qualifications including the training history.

#### 3.9.2 Required Instruction Time

**Provide training for the active systems consisting of a minimum of two (2) eight (8)-hour sessions to accommodate all shifts of the base fire department and allow for rescheduling for unforeseen fire department responses.** The instruction **must** be given during regular working hours on such dates and times selected by the Contracting Officer.

##### 3.9.2.1 Technical Training

**Provide a factory-trained instructor to teach a five-day technical training classroom instruction for at least five Government personnel at [Camp Lejeune] [Cherry Point]. The technical training shall include classroom instruction as well as hands-on programming, troubleshooting and diagnostics exercises. Provide three laptops for the government's retention. Laptops shall be Windows 10 based and include system software, special connecting cable(s), proprietary equipment necessary for the maintenance, testing and reprogramming of the fire alarm equipment and system. Factory training shall occur within six months of system acceptance.**

#### 3.9.3 Technical Training Manual

Provide, in manual format, lesson plans, operating instructions, maintenance procedures, and training data for the training courses. The operations training **must** familiarize designated government personnel with proper operation of the installed system. The maintenance training course **must** provide the designated government personnel adequate knowledge

required to diagnose, repair, maintain, and expand functions inherent to the system.

### 3.10 EXTRA MATERIALS

#### 3.10.1 Repair Service/Replacement Parts

Repair services and replacement parts for the system **must** be available for a period of 10 years after the date of final acceptance of this work by the Contracting Officer. During the warranty period, the service technician **must** be on-site within 24 hours after notification. All repairs **must** be completed within 24 hours of arrival on-site.

During the warranty period, the installing fire alarm contractor is responsible for conducting all required testing and maintenance in accordance with the requirements and recommended practices of **NFPA 72** and the system manufacturer[s]. Installing fire alarm contractor is NOT responsible for any damage resulting from abuse, misuse, or neglect of equipment by the end user.

-- End of Section --



This page intentionally left blank.