DoD Space Planning Criteria

Chapter 530: Pathology and Clinical Laboratory
July 1, 2017

Originating Component: Defense Health Agency Facilities Division

Effective: July 1, 2017

Releasability: No Restrictions

Purpose: This issuance: To provide space planning criteria guidance in support of planning, programming and budgeting for DoD Military Health System (MHS) facilities.

SUMMARY of CHANGE

This revision, dated July 1, 2017 includes the following:

- On page 12, section 4.4. FA4: CORE LABORATORY, corrected room numbering in this section to start with the number “1” and continue sequentially.
- On page 12, section 4.4. FA4: CORE LABORATORY room 2, Laboratory Information Systems Server (CMP02), changed stated net area size to read “130 NSF”.
- On page 16, section 4.9. FA9: ANATOMIC PATHOLOGY WORK AREA room 3, Cytology Lab (LMCY1), changed stated net area size to read “120 NSF”.
- On page 31, changed section 6 title to read “FUNCTIONAL RELATIONSHIPS (Interdepartmental): CLINICAL LABORATORY AND PATHOLOGY”
- On page 32, change section title to read “FUNCTIONAL DIAGRAM (Intradepartmental): CLINICAL LABORATORY AND PATHOLOGY”
- On page 38, under G.1. Definitions, added definition for “Specimen” to read “A biological laboratory sample of a patient's tissue, fluid or other natural material used for laboratory analysis to assist differential diagnosis or staging of a disease process. Common examples include throat swabs, sputum, urine, blood, surgical drain fluids and tissue biopsies. An accession number is assigned to each specimen obtained. Workload is calculated by the number of “specimens (accession numbers) processed." For the purposes of this chapter, one accession number equates to one "specimen." There may be many records (number of times an analysis or test is specified by CPT code) for each specimen. As an example, one hematology specimen may be used to perform several tests/records, a "complete blood count, a liver enzyme panel and a glucose level," which equates to one specimen.”

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SECTION 1: PURPOSE AND SCOPE

1.1. PURPOSE AND SCOPE This chapter outlines space planning criteria for services and programs provided in Clinical and Anatomic Pathology within the Military Health System (MHS). Therapeutic autologous blood donation is included in this chapter due to the clinical laboratories responsibility for maintenance and equipment. Blood donor centers are not included in this chapter due to their operations having a different focus. Cytology is included in this chapter in two different capacities, 'processing and distribution' or 'processing and testing', to distinguish functional area purpose due to certain military cytological testing (gynecological) being transported to several centralized locations in the United States.

Space in this chapter is provided for, but not limited to the following:

A. Specimen Collection: Includes space that may be adjacent to or connected with the clinical testing laboratory, this space would serve and support outpatient services offered by the Clinical Pathology Department. These areas include phlebotomy collections areas, urine specimen collection, and autologous blood collection.

B. Core Laboratory: Includes space for specimen processing and specimen shipping and receiving. This space is the entry and exit point for laboratory specimens and accommodates distribution of multiple specimens to all sub-specialties within the laboratory. Laboratory information systems (LIS) are also included in this functional area for information technology hardware equipment and monitoring equipment of clinical laboratory testing equipment and communications infrastructure.

C. Clinical Core Laboratory (open concept): Includes space for core testing operations, or the 'major' testing area in clinical laboratory. Clinical testing areas to include: hematology (including coagulation and serology), chemistry, and urinalysis. This area would utilize an "open concept" (Refer to definition) of operations integrating space and function to maximize the potential of automated equipment and work flow efficiency in a clinical laboratory.

D. Blood Bank (In House Transfusion Services): Includes space for in house transfusion services that would include testing, distribution, and storage of blood products. This area contains functional areas that could serve a range of limited transfusion services if MTF will receive blood products or transfusion services that test, prepare, and modify blood products for distribution. This area would typically exist adjacent to the core testing area with mandatory access to the exterior of the Laboratory for nursing staff to receive blood products.

E. Microbiology: Includes space for all microbiology related clinical testing, equipment and staff. Microbiology may contain other sub-specialty areas that require specific needs in space and function, such as Mycobacteria (negative pressure room). This sub-specialty space is located within the clinical laboratory space and is typically isolated due to the nature and methods utilized in testing and the byproducts of the actual specimens that are being tested in this area.

F. Molecular Testing Suite: Includes two orientations of functional space that serve for molecular testing. One method serves the 'open' testing method that requires a three room setup

involving separate sterile areas for reagent prep, specimen prep, and one adjoining amplification room used for testing. The second orientation involves a molecular suite to accommodate a 'closed' system of testing that would utilize testing equipment where by it is not necessary to have completely separate sterile rooms. The planner must consult with the laboratory staff to distinguish between which equipment would be utilized for testing by the laboratory in order to define the correct configuration of space.

G. Anatomic Pathology: Included space would depend on the concept of operations, where a medical facility may utilize frozen section services only, or may have the addition of a histology laboratory. Special consideration should be made for the location of frozen and gross section laboratory due to the need for exterior laboratory access to receive surgical specimens and to coordinate testing and results with surgery.

H. Electron Microscopy Suite: Includes rooms and space that would accommodate electron microscopy viewing and research. The primary room would accommodate a workstation to provide space for an electron microscope and computer, with space for supporting equipment. This space also includes supporting space for scope storage, care and supplies.

I. Morgue / Autopsy Area: Included in this functional area are space configurations that would accommodate the need for Morgue/Autopsy services. Projected mortality and autopsy amounts are the numerical driver for allocated space needed in this area. The supporting spaces would then be included in addition to the morgue and autopsy spaces. This area would also Include dedicated support spaces that would assist in morgue/autopsy keeping with self-sustaining operations which are necessary due to the sensitive nature of operations that take place in these areas.

The space planning criteria in this chapter apply to all Military Treatment Facilities (MTFs) and are based on current DoD policies and directives, established and/or anticipated best practices, industry guidelines and standards, and input from DoD Subject Matter Experts (SME) and Defense Health Agency (DHA) Service contacts. As directed by the DHA, these space criteria are primarily workload driven; additional drivers are staffing and mission. Room Codes (RCs) in this document are based on the latest version of DoD UFC 4-510-01, Appendix B.

SECTION 2: OPERATING RATIONALE AND BASIS OF CRITERIA

2.1. OPERATING RATIONALE AND BASIS OF CRITERIA.

A. Laboratory space planning and design are based on criterion that revolves around operations scope, patient encounters and Laboratory testing methodology. Operations scope includes specific departments that a laboratory would include in their testing menu as services offered. These departments are typically strategically configured to work efficiently in a collaborative environment sharing as many resources possible. A Patient encounter involves a single specific encounter by a patient utilizing Laboratory patient collection areas. The number of patient encounters can drive the space necessary for laboratory patient collection areas. Laboratory methodology can range depending on testing volume, testing method and available technology. Laboratory methods can be categorized by automated, semi-automated, and manual testing methods. These methods are the driver of clinical testing laboratory space and workflow. This can also dictate the equipment that a clinical laboratory would utilize.

B. In specimen collection areas, single patient encounters that are forecast annually are used to determine the addition of space to the total NSF needed. Because these areas offer variable times of operation the annual amount is utilized for a ratio that takes into consideration eight hour time increments.

C. In clinical testing areas, testing methodology equates to equipment and workspace usage which correlates to necessary NSF. Automated methodology space is purely driven by the addition of equipment only. Semi-Automated is driven by the combination of technical workspace accompanied by equipment. A manual methodology would be reflective of spaces that utilize workspace only. These three methodologies would allow for a range that would accommodate a variety of sizes of clinical laboratories.

D. Workload projections and planned services / modalities for a specific MHS facility project shall be sought by the planner in order to develop a project based on these Criteria. Healthcare and clinical planners working on military hospitals, medical centers and clinics shall utilize and apply the workload based criteria set forth herein for identified services and modalities to determine space requirements for the project.

E. Space planning criteria have been developed on the basis of an understanding of the activities involved in the functional areas required for Clinical Laboratory and Pathology and its relationship with other services of a medical facility. These criteria are predicated on established and/or anticipated best practice standards, as adapted to provide environments supporting the highest quality health care for Service Members and their dependents.

F. These criteria are subject to modification relative to equipment, medical practice, vendor requirements, and subsequent planning and design. The final selection of the size and type of medical equipment is determined during the design process.

G. Calculation of the number and -in some cases- the area (NSF) of rooms is performed in one of the following methods:

1. Directly Workload (W) -driven

2. Indirectly Workload-driven

3. Mission (M) or Staffing (S) -driven

The directly workload-driven rooms are based on workload projections entered in response to the Workload Input Data Statements (IDSs) in included in Section 3. The directly workload driven rooms in this chapter are the Number of Phlebotomy Stations, The Urine Specimen Collection Toilet, Chemistry, Urinalysis, Hematology Clinical Labs, and the Morgue Refrigerator.

The indirectly workload-driven rooms are derived from the preceding group. They are typically in the Reception and Support Functional Areas. Examples are Waiting, or the number of clean or soiled utility rooms.

The mission / staffing-driven rooms are created based on Boolean 'yes/no' or numeric responses to the Mission and Staffing Input Data Statements (IDSs).

H. The Net Square Feet (NSF) and Room Code (RC) for each room in Section 4: Space Planning Criteria of this chapter was provided by or approved by the Defense Health Agency (DHA) Template Board.

I. Section 3: Input Data Statements and Section 4: Space Planning Criteria have been implemented and tested in the Space and Equipment Planning System (SEPS). To gain access to SEPS planner should contact a Defense Health Agency (DHA) representative; access to SEPS is provided via a 16-hour hands-on training session.

J. Calculation of each of the directly workload-driven room types is implemented in SEPS based on the following formulae:

Formula 1: Annual Room Workload Capacity

$$\frac{(\text{Operating Days per year})(\text{Hours of Operation per Day})}{\text{Average Length of Encounter (ALOE) in Minutes} \div 60 \text{ Minutes}}$$

Where:

a. Operating Days per Year: Range 232 – 277 days
b. SEPS default: 240 days
c. Hours of Operation per Day: Range 6 – 10 hours
d. SEPS default: 8 hours
e. Average Length of Encounter (ALOE): Range 5 – 15 minutes
f. SEPS default: 10 minutes

Formula 2: Project-Based Annual Room Workload Capacity:

$$(\textbf{Annual Room Workload Capcity})(\textbf{Utilization Factor})$$

Where:

1. Utilization Factor: 80% if GME is not authorized; 70 % if GME is authorized SEPS default: 80%

Typically, a workload value 20% above the Project-based Annual Room Workload Capacity generates an additional Room.

Formula 3: Number of directly workload-driven rooms:

$$\frac{(\text{Number of Projected Anual Encounters})}{(\text{Project} - \text{Based Anual Workload Capacity})}$$

Example: Calculation of the number of Phlebotomy Stations is based on the following parameters:

1. Operating Days per Year: 240
2. Hours of Operation per Day: 8
3. Average Length of Encounter: 10 minutes
4. Utilization Factor: 80%
5. Projected workload: 88,450 annual Phlebotomy Station encounters

Step 1: Phlebotomy Station Workload Capacity calculation.

$$\frac{(240)(8)}{\frac{10}{60}} = 11{,}520 \text{ encounters}$$

Step 2: Project-based Phlebotomy Station Workload Capacity calculation.

$$(11{,}520)(0.80) = 9{,}216 \text{ encounters}$$

Step 3: Number of Phlebotomy Stations.

$$\frac{88{,}450}{9{,}216} = 10 \text{ Phlebotomy Stations}$$

TABLE 1: WORKLOAD PARAMETER CALCULATION

CLINICAL LABORATORY AND PATHOLOGY				
BLOOD DRAW ENCOUNTERS	**AVERAGE LENGTH OF ENCOUNTER (minutes)**	**UTILIZATION RATE**	**ANNUAL WORKLOAD PER PHLEBOTOMY STATION**	**MINIMUM ANNUAL WORKLOAD TO GENERATE ONE STATION (20%)**
Phlebotomy Station	10	80%	9,216	1,843
Urine Specimen Collection	10	80%	9,216	1,843

SECTION 3: PROGRAM DATA REQUIRED

3.1. INPUT DATA STATEMENTS. Input Data Statements are based on questions about Workload (W), Mission (M), Staffing (S) and Miscellaneous (Misc) information.

1. How many annual blood draw encounters are projected? (W)
2. How many annual urine specimen collections are projected? (W)
3. How many daily Chemistry Clinical Laboratory specimens are projected to be processed? (W)
4. How many daily Urinalysis Clinical Laboratory specimens are projected to be processed? (W)
5. How many daily Hematology Clinical Laboratory specimens are projected to be processed? (W)
6. Is the Information Management Server Room in the MTF authorized to provide server space for Pathology and Clinical Service? (M)
7. Is a Manual Testing Method in the Clinical Core Lab authorized? (M)
8. Is an Automated Testing Method in the Clinical Core Lab authorized? (M)
9. Is Radioimmunoassay testing in Clinical Laboratory and Pathology authorized? (M)
10. Is a Therapeutic Autologous Donor Station for Clinical Laboratory and Pathology authorized? (M)
11. Is Blood Product Storage / Testing and Issuance for Clinical Laboratory and Pathology authorized? (M)
12. Is Blood Product Preparation / Modification for Clinical Laboratory and Pathology authorized? (M)
13. Is Blood Product Long Term Storage for Clinical Laboratory and Pathology authorized? (M)
14. Are blood bank products authorized to be processed in Clinical Laboratory and Pathology? (M)
15. Is a Microbiology Clinical Laboratory authorized? (M)

    a. How many Microbiology Clinical Laboratory workstations, greater than two, are authorized? (Misc)
16. Is a Mycology Laboratory authorized? (M)
17. Is Media Preparation authorized? (M)
18. Is a Parasitology Laboratory authorized? (M)
19. Is a Mycobacteriology (TB) Laboratory authorized? (M)
20. Is a Fluorescent Microscopy Room authorized? (M)
21. Is a Molecular Testing Suite authorized? (M)
22. Is a Histology Laboratory authorized? (M)
23. Is a Frozen Section Laboratory authorized? (M)
24. Are Cytology Specimens authorized to be analyzed in the Anatomic Pathology Work Area? (M)
25. Is a Tissue Repository Room authorized? (M)
26. Is a Multi-Head Scope / Collaboration Room authorized? (M)
27. Is an Electron Microscopy Area authorized (M)
28. Is a Morgue Refrigerator authorized? (M)
29. How many annual deaths are projected? (W)
30. Is a Morgue / Autopsy Area authorized to serve a Hospital or Medical Center? (M)
    a. Is an Autopsy Room authorized? (M)
    b. Is a Body Prep Room authorized? (M)
    c. Is a Body Viewing Room authorized? (M)
31. Is a Pneumatic Tube Station authorized? (M)
32. Is use of solvent recyclers authorized? (M)
33. Is a Clinical BSL3 Laboratory authorized by Special Study? (M)
34. How many Clinical Laboratory and Pathology FTE positions are authorized? (S)
    a. How many Pathologist FTE positions are authorized? (S)
    b. How many Clinical Laboratory and Pathology FTE positions, other than the Pathologist, are authorized to have a private office? (Misc)
    c. How many Clinical Laboratory and Pathology FTE positions are authorized to have a shared office? (Misc)
    d. How many Clinical Laboratory and Pathology FTE positions are authorized to have a cubicle? (Misc)
35. How many Clinical Laboratory and Pathology Male FTE positions are authorized? (S)
36. How many Clinical Laboratory and Pathology Female FTE positions are authorized? (S)
37. Is a Clinical Laboratory Manager FTE position authorized? (Misc)
38. Is Sub-Waiting in the Staff and Administrative Area authorized? (Misc)
39. How many Clinical Laboratory and Pathology Male FTEs will work on peak shift? (Misc)
40. How many Clinical Laboratory and Pathology Female FTEs will work on peak shift? (Misc)
41. Is a Pathology Graduate Medical Education (GME) program authorized? (M)
    a. How many Resident / Student FTE positions are authorized? (S)

SECTION 4: SPACE PLANNING CRITERIA

For calculation of the number of Vending Machine areas, Public Toilets, Communication Closets, and Janitor Closets for this Chapter, please refer to DoD Space Planning Criteria Chapter 610: Common Areas.

4.1. FA1: CLINICAL LABORATORY AND PATHOLOGY PHLEBOTOMY STATION CALCULATION.

1. **Number of Phlebotomy Stations (CALC1)** **0 NSF**
   Provide one for every increment of 9,216 annual blood draw encounters projected; minimum annual workload to generate a Phlebotomy Station is 1,843. (Refer to Table 1)

4.2. FA2: RECEPTION.

1. **Waiting (WRC01)** **120 NSF**
   Minimum NSF; provide an additional 60 NSF for every increment of four Phlebotomy Station and Urine Specimen Collection Toilet greater than four.

2. **Reception (RECP1)** **120 NSF**
   Provide one for Clinical Laboratory and Pathology.

3. **Kiosk, Patient Check-in (CLSC1)** **30 NSF**
   Provide one for Clinical Laboratory and Pathology.

4.3. FA3: SPECIMEN COLLECTION.

1. **Phlebotomy Multi-Station Room (LBVP2)** **360 NSF**
   Provide one; minimum NSF; provide an additional 90 NSF per each calculated Phlebotomy Station greater than three.

   Minimum NSF accommodates three blood draw stations at 120 NSF each. This area should be adjacent to the reception and waiting area.

2. **Toilet, Specimen Collection (TLTU1)** **60 NSF**
   Minimum one; provide an additional one for every increment of 9,216 projected annual urine specimen collections greater than 9,216; the minimum workload to generate an additional room is 1,843; maximum four.

4.4. FA4: CORE LABORATORY.

1. **Specimen Accessioning,Processing and Distribution (LBSS1) 120 NSF**
   Minimum NSF; provide an additional 30 NSF for every increment of 240 NSF of Chemistry, Urinalysis, Hematology, and Microbiology Clinical Laboratory; Histology and Cytology Laboratory greater than 1,200 NSF.

   Provides space for specimen receiving and requests for the Clinical Laboratory.

2. **Laboratory Information Systems Server (CMP02) 130 NSF**
   Minimum NSF if the Information Management Server Room in the MTF will not provide server space for Pathology and Clinical Service; provide an additional 30 NSF for every increment 1,200 NSF of laboratory floor space, greater than 1,200 NSF.

3. **Specimen Shipping / Receiving (LBSS2) 120 NSF**
   Minimum NSF; provide an additional 30 NSF for every increment of 240 NSF of Chemistry, Urinalysis, Hematology, and Microbiology Clinical Laboratory; Histology and Cytology Laboratory greater than 1,200 NSF.

4. **Storage, Bulk (SRS01) 120 NSF**
   Minimum NSF; provide an additional 60 NSF for every increment of 1,200 NSF of Chemistry, Urinalysis, Hematology, and Microbiology Clinical Laboratory; Histology and Cytology Laboratory greater than 1,200 NSF.

4.5. FA5: CLINICAL CORE LAB (OPEN CONCEPT).

1. **Clinical Lab, Chemistry (LMCH2) 240 NSF**
   Minimum NSF if the projected number of Chemistry Clinical Laboratory daily specimens processed is less than 400 if a Manual Testing Method is authorized; provide an additional 120 NSF for every increment of 400 Chemistry Clinical Laboratory daily specimens processed greater than 400; minimum NSF if the projected number of Chemistry Clinical Laboratory daily specimens processed is less than 1,500 if an Automated Testing Method is authorized; provide an additional 120 NSF for every increment of 1,500 Chemistry Clinical Laboratory daily specimens processed greater than 1,500.

   In this area, staff use automated, semi-automated and manual instrumentation to perform basic chemical analyses on body fluids common to all levels of laboratories.

2. **Clinical Lab, Urinalysis (LMU01) 120 NSF**
   Minimum NSF if the projected number of Urinalysis Clinical Laboratory daily specimens processed is less than 100 if a Manual Testing Method is authorized; provide an additional 60 NSF for every increment of 100 Urinalysis Clinical Laboratory daily specimens processed greater than 100; minimum NSF if the projected number of Urinalysis Clinical Laboratory daily specimens processed is less

than 300 if an Automated Testing Method is authorized; provide an additional 60 NSF for every increment of 300 Urinalysis Clinical Laboratory daily specimens processed greater than 300.

The primary function performed in this area is the biochemical analysis and microscopic examination of urine.

3. **Clinical Lab, Hematology (LMHI2) 300 NSF**
Minimum NSF if the projected number of Hematology Clinical Laboratory daily specimens processed is less than 200 if a Manual Testing Method is authorized; provide an additional 300 NSF for every increment of 200 Hematology Clinical Laboratory daily specimens processed greater than 200; minimum NSF if the projected number of Hematology Clinical Laboratory daily specimens processed is less than 800 if an Automated Testing Method is authorized; provide an additional 300 NSF for every increment of 800 Hematology Clinical Laboratory daily specimens processed greater than 800.

   In this area, staff use automated, semi-automated and manual instrumentation to perform routine Hematology.

4. **Clinical Lab, Radioimmunoassay (RIA) (LBRI1) 240 NSF**
Provide one if Radioimmunoassay testing in Clinical Laboratory and Pathology is authorized.

4.6. FA6: BLOOD BANK.

1. **Donor Station, Therapeutic Autologous (LBBD1) 120 NSF**
Provide one if a Therapeutic Autologous Donor Station is authorized for Clinical Laboratory and Pathology.

2. **Blood Bank, Blood Product Storage / Testing and Issuance (LMBB1) 150 NSF**
Provide one if Blood Product Storage / Testing and Issuance for is authorized Clinical Laboratory and Pathology.

   This area would include type and crossmatch testing as well as other limited services for blood bank testing. Short term storage and distribution would be performed in this space. This space would also serve as the direct access point for hospital staff for the issuance of blood units and blood products.

3. **Blood Bank, Blood Product Preparation / Modification (LMBB1) 150 NSF**
Provide one if Blood Product Preparation / Modification is authorized for Clinical Laboratory and Pathology.

This functional area would be included if the Blood Bank services did not have a contract or sharing agreement to provide blood product preparation for the medical facility. This functional area performs extensive blood product preparation and modification necessary involved in individual blood product processing of components for distribution such as platelets and plasma for distribution.

4. **Blood Bank, Blood Product Long Term Storage (LBUL1) 120 NSF**
Provide one if Blood Product Long Term Storage is authorized for Clinical Laboratory and Pathology.

   Blood bank blood product long term storage would include, but is not limited to: Routine blood storage is 42 days or 6 weeks for stored packed red blood cells (refrigerated). Platelets may only be stored for up to 5 days. Plasma can be stored frozen for one year. Because typically Blood storage products are typically used in a first in, first out process, Blood product long term storage indicates the need for larger capacity storage and extended duration storage that would exceed typical short term storage requirements.

5. **Decontamination, Laboratory Equipment (LBDR1) 120 NSF**
Provide one if blood bank products are authorized to be processed in Clinical Laboratory and Pathology.

6. **Storage, Clean Equipment (SRE01) 120 NSF**
Provide one if blood bank products are authorized to be processed in Clinical Laboratory and Pathology.

4.7. FA7: MICROBIOLOGY.

1. **Microbiology Clinical Lab (LMM01) 240 NSF**
Minimum NSF if a Microbiology Clinical Laboratory is authorized; provide an additional 60 NSF per each Clinical Microbiology Laboratory workstation authorized greater than two.

   Includes an 80 NSF administrative work area for a supervisory medical technologist. The space provided was designed to accommodate automated microbiology systems as well as traditional manual microbiology techniques.

2. **Mycology Lab (LMMY1) 240 NSF**
Provide one if a Mycology Laboratory is authorized.

   This function is usually provided as part of a subsection of microbiology. This area deals exclusively with the identification of fungi, and in some medical centers, susceptibility testing for anti-fungal drugs. This area can be combined into the Microbiology Clinical Lab.

3. **Media Prep Lab (LBSM1)** **150 NSF**
   Provide one if Media Preparation is authorized.

   Allocated NSF provided only if the decision of making media is more cost effective than that provided by purchase of commercial media. This area can be combined into the Microbiology Clinical Lab.

4. **Parasitology Lab (LMMP1)** **240 NSF**
   Provide one if a Parasitology Laboratory is authorized.

   This area is used by staff that would examine feces or body fluids for parasites and is typically part of Clinical microbiology. In a larger Laboratory this could be an independent testing area. This area can be combined into the Microbiology Clinical Lab.

5. **Mycobacteriology (TB) Lab (LMAB1)** **240 NSF**
   Provide one if a Mycobacteriology (TB) Laboratory is authorized.

   Provided only if Mycobacterium Tuberculosis (TB) culture and susceptibility testing is performed in the laboratory. This area deals exclusively with the study of TB and (TB-like) microorganisms.

6. **Fluorescent Microscopy Lab (LBEM2)** **180 NSF**
   Minimum NSF if a Fluorescent Microscopy Room is authorized; provide an additional 30 NSF per each Resident / Student FTE position.

   Allocated NSF to provide a room for fluorescent microscopy studies of laboratory specimens that have been specially processed and prepared on slides for observation and analysis utilizing a fluorescent microscope.

4.8. FA8: MOLECULAR TESTING SUITE.

1. **Molecular Diagnostic, Automated Lab (LMML1)** **240 NSF**
   Provide one if a Molecular Testing Suite is authorized.

   This area could be used on its own, as general Molecular testing area, or within other departments to complement their testing menu. This would be a molecular area that utilizes closed systems that do not require the need for multiple room processing.

2. **Preamplification Room, Reagent Prep (LMML2)** **120 NSF**
   Provide one if a Molecular Testing Suite is authorized.

   This room would be used by staff for preparation and mixing of reagents for molecular testing.

3. **Preamplification Room, Specimen Processing (LMML3)** **360 NSF**
   Provide one if a Molecular Testing Suite is authorized.

   This room would be used by staff for the specimen preparation in the molecular testing process.

4. **Amplification / Instrument Room (LMML4)** **240 NSF**
   Provide one if a Molecular Testing Suite is authorized.

   This room would be used by staff for the actual testing and post analysis involved in molecular testing.

4.9. FA9: ANATOMIC PATHOLOGY WORK AREA.

1. **Histology Lab (LMHS1)** **240 NSF**
   Minimum NSF if a Histology Laboratory is authorized; provide an additional 60 NSF if the number of Pathologist FTE positions authorized is greater than one.

   Minimum allocated NSF includes an administrative work area (80 NSF) for a supervisory medical technologist. In this laboratory, tissue specimens are processed through automated tissue processors, embedded in blocks of paraffin or paraffin-like substances, cut into sections, mounted on microscope slides, and stained for examination by pathologists. This area would contain adequate space for slide, tissue block, autopsy records, etc. storage that is well ventilated and provided with regulated temperature.

2. **Frozen Section Lab (LMHC1)** **150 NSF**
   Minimum NSF if a Frozen Section Laboratory is authorized; provide an additional 60 NSF if the number of Pathologist FTE positions authorized is greater than one.

   This laboratory is necessary to provide space for pathologists to examine tissues from the operating room for rapid (frozen section) diagnostic assistance for surgeons.

3. **Cytology Lab (LMCY1)** **120 NSF**
   Provide one if Cytology Specimens are authorized to be analyzed on site.

   Specimens not analyzed on site will be handled in the Core Laboratory Work Area.

4. **Repository Room, Tissue (LBTS1)** **120 NSF**
   Provide one if a Tissue Repository Room is authorized.

   Includes space for storage of tissue specimens and catalog information. Allocated NSF would also provide for pathological examination materials corresponding to the tissue specimens. This area would have accommodating room temperature storage as well as refrigerated and frozen storage of tissue specimens.

5. **Storage, Lab Slide, Block, Records / Files (SRL01)** **120 NSF**
Provide one if a Histology Laboratory or if Cytology Specimens are authorized to be analyzed in the Anatomic Pathology Work Area.

   Allocate NSF would provide space for staff in utilization and storage of slides, records and have the ability to quickly retrieve previously filed slides and reports for a pathologist reviewing a case. This area would allow for adequate storage for slides, tissue blocks, autopsy records, indexing facilities, etc., for 10 years of slides and reports.

6. **Multi-Head Scope / Collaboration Room (LBMH1)** **240 NSF**
Provide one if a Multi-Head Scope / Collaboration Room is authorized.

4.10. FA10: ELECTRON MICROSCOPY AREA.

1. **Electron Scope Room (LBEM2)** **180 NSF**
Provide one if an Electron Microscopy Area is authorized.

2. **Electron Scope Preparation / Processing Room (LBEM3)** **120 NSF**
Provide one if an Electron Microscopy Area is authorized.

3. **Storage, Electron Scope Equipment (SRSE1)** **90 NSF**
Provide one if an Electron Microscopy Area is authorized.

4.11. FA11: MORGUE / AUTOPSY AREA.

1. **Morgue Refrigerator (LBMR1)** **120 NSF**
Minimum NSF if a Morgue Refrigerator is authorized; provide an additional 60 NSF for every increment of twelve annual deaths projected greater than forty-eight.

   This space serves the multiple functions of organ storage and body preservation in the most convenient way and with best access for cleaning. One space is 30 NSF, an additional 30 NSF is required for opening the drawers in the same stack / column. One refrigerator for four to six cadavers.

2. **Gross Specimen Storage (LBTS1)** **90 NSF**
Minimum NSF; provide an additional 60 NSF if the Morgue Refrigerator is greater than 360 NSF.

   Space can be co-located with the Morgue Refrigerator.

3. **Autopsy Room (LBAR1)** **360 NSF**
Provide one if an Autopsy Room is authorized and if the Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

This area provides the space required to perform post mortem examinations. Allocated NSF is utilized for the performance of autopsies and dissection of organs, tissues, photography of gross specimens and selected diagnostic studies, (e.g., cultures, etc.).

4. **File, Archives and Records (FILE1) 90 NSF**
Provide one if an Autopsy Room is authorized and if the Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

5. **Utility, Medical Waste Holding (UTMW1) 90 NSF**
Provide one if an Autopsy Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

   Allocated NSF accommodates holding / temporary storage space of pathology waste to be processed or disposed of.

6. **Body Prep Room (LBBP1) 120 NSF**
Provide one if an Autopsy Room is not authorized and if a Body Prep Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

7. **Body Viewing Room (LBBV1) 120 NSF**
Provide one if a Body Viewing Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

   Planner shall make sure allocated NSF is not provided in the ED as well.

8. **Locker / Changing, Male Staff (LR002) 120 NSF**
Provide one if an Autopsy Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

9. **Locker / Changing, Female Staff (LR002) 120 NSF**

   Provide one if an Autopsy Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

10. **Toilet / Shower, Staff (TLTS1) 60 NSF**
Provide one if an Autopsy Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

11. **Janitor Closet (JANC1) 60 NSF**
Provide one if an Autopsy Room is authorized and if Morgue / Autopsy Area is authorized to serve a Hospital or Medical Center.

    Dedicated to the Morgue / Autopsy Area.

4.12. FA12: SUPPORT.

1. **Pneumatic Tube Station (NT001)** **30 NSF**
   Provide one if a Pneumatic Tube Station is authorized.

   The Pneumatic Tube Station shall be located within 25 feet of a workstation. Allocated NSF provides space for 3 pneumatic tubes.

2. **Pathology Waste Holding (UTMW1)** **60 NSF**
   Minimum NSF; provide an additional 60 NSF if a Histology, Frozen Section or Cytology Laboratory is authorized.

   Allocated NSF accommodates holding / temporary storage space of pathology waste to be processed or disposed of.

3. **Storage, Refrigerated (SRR02)** **60 NSF**
   Minimum NSF; provide an additional 60 NSF for every increment of 1,200 NSF of Chemistry, Urinalysis, Hematology, and Microbiology Clinical Laboratory; Histology and Cytology Laboratory greater than 1,200 NSF.

4. **Storage, Flammable and Toxic Substance (SRHM1)** **90 NSF**
   Minimum NSF; provide an additional 30 NSF if use of solvent recyclers are authorized

4.13. FA13: BIOSAFETY LEVEL 3 LAB.

1. **Clinical BSL3 Lab (BSL03)** **0 NSF**
   Provide one if a Clinical BSL3 Laboratory is authorized by Special Study.

   This area provides isolation facilities for the handling of biologically hazardous specimens and should be environmental separated (negative pressure) from the main laboratory. Technical staff in this area would utilize biological safety cabinets and other physical containment device for protection. This area would have special design and engineering features that require consideration.

4.14. FA14: STAFF AND ADMINISTRATION.

1. **Office, Department Head / Chief (OFA04)** **120 NSF**
   Provide one for Clinical Laboratory and Pathology.

2. **Office, Clinical Laboratory Manager (OFA04)** **120 NSF**
   Provide one if a Clinical Laboratory Manager FTE position is authorized.

3. **Office, Pathologist (OFP01)** **120 NSF**
   Provide one per each Pathologist FTE position authorized.

This space is outfitted with a microscope.

4. **Sub-Waiting (WRC03)** **60 NSF**
   Provide one if Sub-Waiting in the Staff and Administration is authorized.

5. **Office, NCOIC / LCPO / LPO (OFA04)** **120 NSF**
   Provide one for Clinical Laboratory and Pathology.

6. **Office, Private (OFA04)** **120 NSF**
   Provide one per each Clinical Laboratory and Pathology FTE position, other than the Pathologist, authorized to have a private office.

7. **Office, Shared (OFA05)** **120 NSF**
   Provide one for every increment of two Clinical Laboratory and Pathology FTE positions authorized to have a shared office.

8. **Cubicle (OFA03)** **60 NSF**
   Provide one per each Clinical Laboratory and Pathology FTE position authorized to have a cubicle.

   These cubicles may be collocated in a shared space or dispersed as required.

9. **Conference Room (CRA01)** **240 NSF**
   Provide one for Clinical Laboratory and Pathology.

   Planner must determine adequacy and availability of existing Conference Room space and the ability to optimize resources by sharing Conference Room space with other departments.

10. **Copy / Office Supply (RPR01)** **120 NSF**
    Provide one for Clinical Laboratory and Pathology Staff and Administration.

11. **Storage, Lab Records (FILE1)** **120 NSF**
    Provide one for Clinical Laboratory and Pathology Staff and Administration.

12. **Lounge, Staff (SL001)** **120 NSF**
    Minimum NSF, provide an additional 60 NSF for every increment of five total FTEs working on peak shift greater than ten; maximum 360 NSF.

13. **Toilet, Staff (TLTU1)** **60 NSF**
    Minimum one; provide an additional one for every increment of fifteen total FTEs working on peak shift greater than fifteen.

14. **Locker / Changing, Male Staff (LR002)** **120 NSF**
    Minimum NSF; provide an additional 10 NSF for every increment of two Clinical Laboratory and Pathology Male FTE positions authorized greater than twelve.

15. **Locker / Changing, Female Staff (LR002)** **120 NSF**
    Minimum NSF; provide an additional 10 NSF for every increment of two Clinical Laboratory and Pathology Female FTE positions authorized greater than twelve.

16. **Toilet / Shower, Staff (TLTS1)** **60 NSF**
    Minimum two; provide an additional one for every increment of fifteen Clinical Laboratory and Pathology FTEs working on peak shift greater than thirty.

4.15. FA15: GRADUATE MEDICAL EDUCATION (GME) / TRAINING.

1. **Office, Residency Program Director (OFA04)** **120 NSF**
   Provide one if a Pathology GME program is authorized.

2. **Resident Collaboration Room (WKTM1)** **240 NSF**
   Minimum NSF if a Pathology GME program is authorized; provide an additional 60 NSF per each Resident / Student FTE position authorized greater than two.

   Minimum NSF accommodates two residents, and a collaboration / reference area.

3. **Conference / Classroom (CRA01)** **240 NSF**
   Provide one if the total number of Resident / Student FTE positions is greater than five.

SECTION 5: PLANNING AND DESIGN CONSIDERATIONS

The following design considerations are intended to provide planners and designers with guidance on how to follow world-class and evidence-based design strategies for new and renovation of existing healthcare facilities. For a more comprehensive list, refer to the World Class Checklist (https://facilities.health.mil/home/). Also refer to Section 2.2-4.1 Laboratory Services, Design Considerations and Requirements of the FGI Guidelines for Design and Construction of Hospitals and Outpatient Facilities by the Facility Guidelines Institute (FGI Guidelines).

Because of the dynamic nature of the pathology laboratory and its many components, planning and design considerations are specific to each testing area and also take into consideration the clinical and anatomical laboratories functioning as a whole and in unison.

5.1. NET-TO-DEPARTMENT GROSS FACTOR. The net-to-department gross factor (NTDG) for the Pathology Department is 1.30. This number, when multiplied by the programmed net square foot (NSF) area, determines the departmental gross square feet. This factor accounts for the space occupied by internal department circulation and interior partitions as well as other construction elements not defined by the net square foot area. Refer to UFC 4-510-01, Section 2-3.4.2.2 and DoD Space Planning Criteria Chapter 130: Net to Gross Conversion Factors.

5.2. RECEPTION AREA.

a. Provide reception / check-in desk with greeter and check-in functions located adjacent to the waiting area. Patient is greeted and checked in for outpatient laboratory services to be provided. After verification of laboratory services to be provided, patient is escorted to the specimen collection areas designated for the appropriate collections.

b. The waiting are should be open and easily observed from reception, and should accommodate the clinical program and volume of patients encountered by pathology services.

c. Waiting may be broken into small clusters. This allows more private spaces so that families and loved ones aren't uncomfortably close to one another during what could be a difficult time. Consider zoning with quiet areas and a television area.

d. Consideration should be given to special needs of specific patient groups in a shared / general waiting area. For example, adolescent and geriatric patients may require different seating options and environments. Consider the needs of bariatric patients.

e. Seating should be comfortable with adequate space for patients with wheelchairs and walking aids.

f. Provide views to nature in the way of art, photographs and murals.

5.3. SPECIMEN COLLECTION AREA.

a. Collection areas should be adjacent to the reception and waiting areas and must be physically separated from the main laboratory sections.

b. Collection areas should have strategic placement of alcohol based hand rub dispensers at entrances/exits and bio-hazardous waste and sharps waste containers placement where staff will handle and dispose of needles and hazardous waste.

c. Specimen collection areas may be located outside of the clinical laboratory, but consideration of the distance from the clinical laboratory or distribution area should be made due to transportation of specimens to the laboratory for testing or distribution.

d. Blood collection areas should have appropriate space for seating, typically for specific blood collections chairs, specific to venipuncture.

e. Provision for all age ranges, pediatric to geriatric, should be included in collection areas and equipment in collection areas.

f. In blood collection areas, provide appropriate and sufficient lighting for clear vision and safe collections for staff and patient collections.

g. Views of nature photography and art in blood collection areas will provide positive distraction and may alleviate stress and anxiety.

h. Provide positive distraction in the way of entertainment (TV, music) in the autologous blood collection area to help reduce patient stress and anxiety.

5.4. CORE LABORATORY WORK AREA.

a. Specimen processing should be located at the entrance of the lab, with direct access to the primary receiving pneumatic tube station and/or pass-through window for specimen reception.

b. Specimen processing should have clear access, preferable by line of sight, and a clear walking path to all sub-departments inside the laboratory that it supports.

c. Specimen shipping and receiving should be located as close to the auxiliary exit or courier entrance / exit of the laboratory as possible in order to avoid interruption to the testing areas within the laboratory.

d. The arrangement of workstations and equipment should accentuate efficiency with directional work flow methods originating from specimen processing flow in distribution to the according sub-departments in the clinical laboratory.

5.5. CLINICAL CORE LAB (OPEN CONCEPT).

a. The clinical core laboratory area should be open with no fixed walls as much as possible, promoting an open concept of operations and supporting maximum efficiency of workflow and resources in a core laboratory space. This also provides the advantage of sustainable design practices by keeping workspace open for future changes in equipment and more efficient expansion of the laboratory overall.

b. Design should involve matching sub-departments to each other by related testing (such as automated equipment by other automated equipment in the core lab) and analytic procedures performed (microscope shared use by urinalysis and hematology for example) as well as specimens used. This approach will help provide a more efficient operation.

c. Consideration should be given to flexibility in all design aspects in order to accommodate the changing atmosphere that the clinical laboratory experiences with personnel and equipment.

d. Promote a collaborative environment through open spaces and barrier free workspaces.

e. Clearly identify ‘clean’ and ‘dirty’ sinks. Handwashing stations should be located within twenty five feet of a workstation, and ‘dirty’ sinks for waste disposal should be located in a testing area.

f. Consideration of high volume areas, which are typically the clinical chemistry and hematology areas should be located next to specimen processing.

g. Consideration of intradepartmental relationships, which may differ from lab to lab, would offer maximum function and relationships.

h. Special consideration should be made for Radioimmunoassay testing equipment including safety hoods and waste disposal. Radioimmunoassay would be as isolated as much as possible from the main laboratory due to the radioisotopes used in testing. Meeting appropriate safety standards and standards for inspection agencies for testing and disposal would be crucial for this area in the lab. If hepatitis testing is performed in a radioimmunoassay laboratory, employee safety must be considered in design and location of the laboratory.

i. Emergency power accommodations should be made for all critical core laboratory operations, which would include key equipment (such as the primary analyzers that would inhibit core testing if down) to maintain the Clinical Laboratory and Pathology capabilities.

5.6. BLOOD BANK (TRANSFUSION SERVICES).

a. Blood Bank issuance should have clear access, pass-through window or receiving door, to an exit of the laboratory preferably with an efficient walking path to surgery.

b. Consideration for directional work flow from origin to end of process should be made for equipment arrangement in blood bank (reception of blood sample from processing to unit of blood issued for use).

c. Emergency power accommodations should be made for all critical blood bank operations, which would include key equipment (such as storage refrigerators) to maintain the laboratories capacities.

d. Minimize distractions to blood bank staff to allow attention to detail that blood bank testing work demands. Typically blood bank workstations require a more private, and isolated atmosphere than typically clinical testing areas.

e. All blood bank Refrigerators shall be equipped with an alarm system that is centrally monitored by the laboratory and possibly security as well. Multiple real time monitoring systems are available and should be considered for this space.

5.7. MICROBIOLOGY TESTING AREA.

a. Consideration should be made for microbiology testing and procedures by-products, such as odors and contaminates, as they could affect the rest of the clinical laboratory. This includes being isolated as an area, but still near the central core.

b. Careful consideration shall be given to the TB (tuberculosis) Room which is located in the Microbiology Clinical Lab. The ideal location is on the perimeter of the laboratory. A TB Room would have negative pressure and it will be outfitted with hoods and incubators. This room shall be set up for as minimal maintenance as possible.

c. Much of the microbiology testing area has manual methods. Workstations for manual work, including microscope use and spacious work areas would be important in this section of the lab. These workstations in microbiology are usually in a cluster for efficient use of resources.

d. Consideration of biological safety cabinets and utilization should be made for special processing of microbiology specimens. A biological cabinet may be placed in a processing area of microbiology (usually a bigger department), or centrally located in microbiology for utilization by all of microbiology (usually a smaller department).

e. For equipment access in Microbiology, plenty of shelving and short term storage space should be available.

f. For storage of supplies / media, refrigerators should be placed strategically. Agar medium (which is refrigerated) is a large commodity of microbiology, and needs to be accessible to the entire department for utilization.

g. Emergency power accommodations should be made for all critical microbiology operations, which would include key equipment (such as blood incubators) to maintain the laboratories capacities.

h. CO2 gas cylinder storage should be in close proximity to the microbiology area. CO2 incubators should be close in proximity to storage or a storage room for hazardous materials.

5.8. MOLECULAR TESTING AREA.

a. Special consideration should be given to the concept of 'caution of contamination' in molecular diagnostics areas, as this is the utmost and primary concern for this area. All areas in molecular diagnostics are considered sterile areas, with exception to the amplification room. Careful consideration should be made for the demographic relationship that molecular diagnostics has with the rest of the lab.

b. Each individual area (or room) in the Molecular Testing Area shall have dedicated personal protective equipment (PPE) for staff. The use of storage space dedicated for Laboratory coats, gloves and PPE should be considered.

c. Unidirectional room-to-room work flow patterns are crucial to avoid wasted resources and to promote efficiency. Depending on the molecular diagnostics setup, the planner shall carefully coordinate with the users and discuss the most efficient configuration.

d. Utilization of UV work lights should be anticipated, and work flow efficiency and staff safety should be considered at all times.

e. Three room setup for 'open systems' is suggested for the following rooms: reagent prep, specimen prep, and amplification.

    i. Reagent prep area would have a positive air pressure and sufficient countertop space made of material to withstand rigorous cleaning methods. The use of dedicated supplies and reagent storage would dictate independent storage solutions for this room as well as determine the supporting equipment (e.g., fume hood).

    ii. Specimen prep area would have positive air pressure and sufficient countertop space made of material to withstand rigorous cleaning methods. Controlling molecular contamination is important in this room; methods to support a sterile environment would be especially important. The use of dedicated supplies and pipettes would dictate independent storage solutions for this room as well as its supporting equipment (biological safety cabinet).

    iii. Amplification area will have negative air pressure in order to keep contaminants from moving to other areas within the molecular department. Countertop space should accommodate the variety of testing equipment used as this space is the primary 'testing' area. This room shall have dedicated supplies dictating the need for independent storage solutions in this room, as well as supporting equipment.

f. Special consideration should be given to the dynamic nature of molecular diagnostics, as this area in the laboratory is undergoing rapid changes in the design of equipment and in testing orientation. 'Closed' systems allow the possibility for less physical rooms in testing and may lead to a single room setup.

5.9. ANATOMIC PATHOLOGY

a. The Anatomic Pathology Frozen Section Lab, if not provided in Surgery, shall be located as close as possible to the ORs.

b. Ensure that the gross cutting room has dedicated access to entrance/exit to histology for efficient staff flow, as well as access to safety apparatus such as a 'clean area' eye wash stations and decontamination showers.

c. Consideration should be given to chemical and reagent storage and use, specifically formalin, in the anatomic pathology area. Other especially toxic chemicals used in this area such as xylene and glutaraldehyde require special handling and disposal techniques. Staff safety should be considered in every aspect of design in this area.

d. Work flow and process in Anatomic Pathology may differ from each independent part within Anatomic Pathology. Dedicated staff frequently works in each portion of this area. The overall work flow and process of the department should be considered, from origin of collection, to testing, to final location after testing.

e. Anatomic Pathology uses dedicated supplies, and storage space is a commodity. In some situations (stain / chemical storage) it may be advantageous to use 'open storage' solutions to accommodate quality control of expiration dates on stains and reagents.

f. Open space design to accommodate staff and storage can be challenging in anatomic pathology. Gross cutting requires a negative pressure environment, while the majority testing area could serve as an open space, allowing for better collaboration and resource sharing between histology and other inter-departmental relationships within the lab.

g. The use of fume and/or biological hoods and vented workstations in this area is required due to the variety of specimens, possible disease exposure, and chemical exposure in this area. Vented workstations serve well for the majority of workspaces in this area where open chemicals and reagents area used.

5.10. ELECTRON MICROSCOPY AREA

a. Consideration for digital technology to eliminate the need for a dark room should be made, while keeping the ability for light control may be advantageous. Dimmable lighting abilities can offer a more soothing atmosphere and less eye fatigue.

b. The capacity for sound free and a vibration free atmosphere is necessary for concentration and scope observation.

c. Specimen preparation, from cryofixation to sectioning and staining, should be considered for the specimen preparation room. Countertop space, appropriate ventilation methods and safety measures should be considered important variables for the planner.

d. Special considerations in both design and planning should be made to accommodate the environment needed for electron microscopy use. This area should have the capacity to be a dark room while in use, insulated for sound, and vibration free due to the sensitive nature that an electron microscope requires.

5.11. MORGUE / AUTOPSY SERVICES

a. Morgue / Autopsy services are often operated separately from the clinical and anatomic pathology laboratories but are managed and monitored by pathology services. Morgue and autopsy services shall be located adjacent to each other.

b. Morgue operations are generally housed in a non-public area with access to service vehicles. Direct access to service vehicles and loading docks would be necessary for transportation of cadavers from another facility or to a mortuary. This is the primary logistical concern for placement of the morgue.

c. Consideration for Morgue / Autopsy services should be made to allow proper communications and functions in coordination with the main lab.

d. Movement of supplies, tissue samples, and the deceased should occur through non-public corridors and elevators.

5.12. SUPPORT AREA

a. Optimize staff efficiency and performance by providing decentralized support spaces (e.g. charting, supplies, medications). Keep staff travel distances to a minimum.

b. Emergency safety precautions should be included for decontamination by having a deluge shower in the Pathology proper. For guidelines regarding locations and requirements reference ANSI (American National Standards Institute) and OSHA (Occupational Safety and Health Administration) and also NFPA (National Fire Protection Association) for extensive information.

5.13. STAFF AND ADMINISTRATIVE AREA

a. If possible, place access to the staff lounge appropriately by distance from major testing areas.

5.14. OTHER GENERAL DESIGN CONSIDERATIONS

a. Security of all laboratory areas shall be taken into consideration wherever entrances or exits exist due to the sensitive nature and hazardous potential of the laboratory

environment. Clear way-finding, and signage should be utilized as much as possible around the perimeter as well as service and staff entry / exit points to the lab.

b. Emphasis on workflow and staff flow in both unidirectional and bidirectional workflows should be considered for efficiency and sustainable design practices. Careful consideration to sustainable design, evidence based design, and best practices should be reviewed and analyzed when planning laboratory spaces.

c. Careful consideration to include space and allowance for Laboratory Information systems (LIS) should be made throughout the laboratory. LIS is critical in all laboratory functions and communications, for software, middleware, and hardware support. As often as technology develops in the laboratory, LIS will need to adapt to support the staff and technology in almost every aspect of analysis and testing.

d. Laboratories, by nature, utilize a large amount of utilities, and any efficiency options should be anticipated and encouraged.

e. Careful consideration should be made for dedicated (de-ionized) water systems. Options include point-of-use systems as well as plumbed piping centralized distribution systems. The versatility of a point-of-use system offers sustainable design as well as flexibility for direct feed to analyzers and direct access for staff. Centralized systems may offer application specific benefits.

f. LEAN and Six Sigma efficiency programs, as well as other efficiency programs, have been and will continue to drive overall laboratory operations mission. Review and analysis of these practices is advantageous in planning, even if these methods are not implemented in total as practice. As an objective analysis method, these processes may spotlight areas of improvement or help to drive better planning of space within the laboratory.

g. Automation in the laboratory has become an important aspect of equipment and process and will play an even greater role in the future. All aspects of automation, from supporting equipment, to effects on workflow and staffing, and staff flow should be observed in regards to effects and benefits of automation.

h. Molecular and genetic testing are undergoing major transitions in the laboratory in regards to testing methods, requirements, and overall placement in the lab. Because of the advancements in molecular and genetic testing, it may serve to locate them in different areas within the lab or in a larger laboratory facility. Planner should coordinate placement of this service closely with the laboratory director.

i. Consideration for all laboratory refrigeration should be made to accommodate proper function and security. Alarm monitoring and temperature recording are required functions that the laboratory performs routinely.

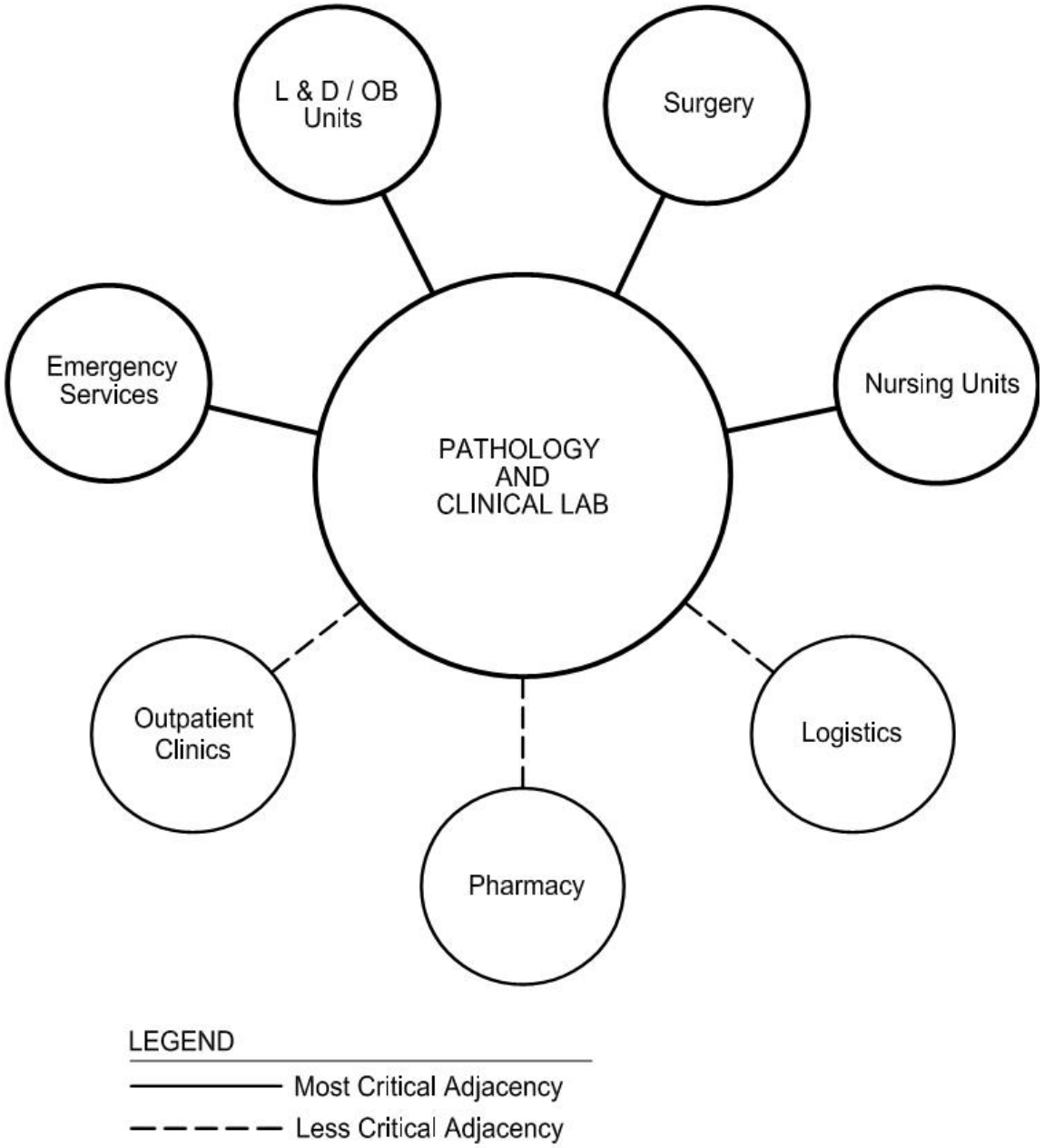
j. The *Standards for Privacy of Individually Identifiable Health Information* ("Privacy Rule") and the Health Insurance Portability and Accountability Act of 1996 ("HIPAA") should be accounted for at all times and in all design considerations as this is crucial to patient privacy and protection. All design considerations should account for private patient information being viewed and discussed in a secure fashion. Special consideration should be made to place computer screens and possible patient information in staff only viewing and access points.

k. Consideration should be made for laboratory safety practices to include eyewash stations and decontamination showers accessible to all laboratory staff.

l. Design considerations should be made for proper cooling and ventilation requirements. Attention and anticipation of heat generated by laboratory analyzers and refrigerators and freezers being in close proximity to each other poses the need to anticipate potential overheating and HVAC design.

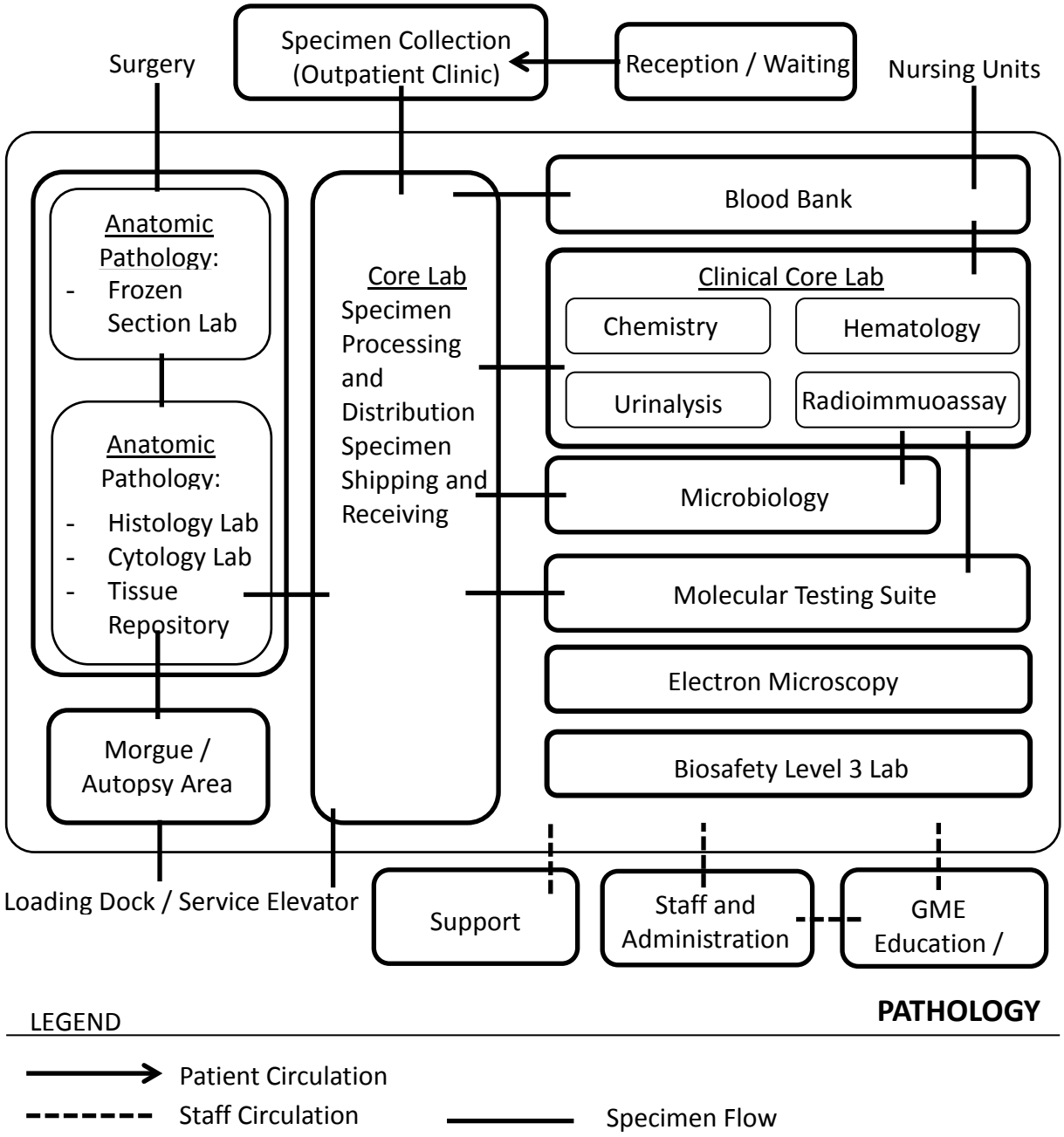
SECTION 6: FUNCTIONAL RELATIONSHIPS (INTERDEPARTMENTAL): CLINICAL LABORATORY AND PATHOLOGY

6.1. FUNCTIONAL RELATIONSHIPS. Clinical Laboratory and Pathology will rely on a number of other services in a Military Treatment Facility (MTF) for patient care and support functions. The diagram below represents desirable relationships based on efficiency and functional considerations.



SECTION 7: FUNCTIONAL DIAGRAM (INTRADEPARTMENTAL): CLINICAL LABORATORY AND PATHOLOGY

7.1. FUNCTIONAL DIAGRAM. The diagram below illustrates intradepartmental relationships among key areas / spaces within the Clinical Laboratory and Pathology. The diagram is necessarily generic. The planner shall use this as a basis for design only and shall consider project-specific requirements for each Military Treatment Facility.



GLOSSARY

G.1. DEFINITIONS.

Anatomic Pathology: This section is one of two branches of Pathology that aids in diagnosis, treatment and prevention based on the following methods: gross analysis, microscopic analysis, chemical analysis, immunologic, and molecular examination of organs, tissues, and cadavers. Surgical specimens are the most typical specimen type originating from surgery and outpatient procedures. Anatomic pathology may include, but is not limited to: histology, cytology, and autopsy/morgue. A frozen section laboratory is a subset of the histology Laboratory and is located in histology or less often in the surgery suite.

Amplification (molecular): As applies to a molecular testing suite, amplification is the primary testing area which involves methods to 'amplify' or the bulk replication of DNA sequences of interest. Because of the importance of having a sterile area due to possible contamination and false results, this area utilizes UV hoods, fume hoods, and/or biological safety cabinets as part of testing protocol.

Automation: Automation in a Laboratory refers to the ability of equipment and more specifically automated analyzers to take manual processes and tests that were very repetitive and mundane and have them done automatically. Essentially an automated analyzer will allow the medical technologist the convenience of loading several specimens into a cartridge, or carriage system, and run tests from beginning to end. Sometimes these systems can auto-verify a test if it is allowed or authorized. The time savings may be achieved by decreasing handling and/or manual processes in testing. Typically this is an initiative to take on higher volume testing without the need for more staff. Automation is considered helpful in quality control, efficiency, and reduction in errors.

Autologous Donor: This is the process of collection and storage of a patient's blood to be procured and stored for transfusion to the same patient at a later time. Examples of use would be a planned surgery.

Autopsy Suite: The section of pathology that specializes in performing autopsies, or postmortem examination. An autopsy would entail the examination of a cadaver to determine or confirm the cause of death. An autopsy suite would contain efficient cold storage for cadaver as well as specimen storage. Room attributes that are necessary would include good natural lighting, exhaust ventilation, good floor drainage and an autopsy table with central drainage.

Authorized: This document uses the term "authorized" to indicate that, during a project's space plan development, a planner shall seek approval from the appropriate official in the chain of command to activate certain spaces or certain groups of spaces. Typical components that may require authorization are certain programs or services that activate Functional Areas (e.g., GME); office spaces (e.g., FTE position); specialized rooms (e.g., Hybrid OR) or other spaces (e.g., On-Call Room). Typically, Mission, Staffing and Miscellaneous Input Data Statements require authorization, while directly and indirectly workload driven rooms / spaces do not.

Blood Bank (In House Transfusion Services): The section of the laboratory that specializes in utilization and testing of blood and blood product constituents. Transfusion services typically refers to an area located in the facility served, organized principally to store, cross match and issue blood for transfusion to patients. An important distinction between a transfusion service and a blood bank is that a transfusion service draws little or no blood. The transfusion service may be the only blood bank function required in the laboratory if the MTF will provide blood product collection, preparation and/or hemotherapeutics.

Blood Bank, Testing and Issuance: The section of the blood bank that performs blood typing, blood antibody identification, and blood transfusion services performed for patient compatibility and issuance of blood for transfusion to patients. Blood and blood product storage is utilized for transfusion to recipient patients.

Blood Bank, Prep / Modification: This functional area would be included if the MTF will provide blood product preparation for the medical facility or other facilities. This functional area performs, but is not limited to the following activities: Blood and blood component irradiation, red cell packing, red cell washing, freezing / rejuvenating, thawing and deglycerolizing, freezing of plasma, thawing of plasma, preparation of cryoprecipitate, thawing of cryoprecipitate, pooling of cryoprecipitate, platelet and granulocyte concentrates from single units, and pooling platelets.

Blood Bank, Long Term Storage: The section of the Blood Bank that provides long term storage for blood products such as cryopreservation of rare red blood cells, plasma and platelets. This area would utilize special techniques and additives to the blood products to allow for extended storage in special sterile containers frozen at extreme cold temperatures.

Blood Donor Center: A center or space that procures whole blood and blood components by apheresis donation for future distribution and utilization for therapeutic receipt by patients. This area would collect blood components such as red blood cells, platelets, plasma, and granulocytes for therapeutic use. Typically the laboratory does not govern the blood donor center in the Military Health System.

Body Viewing Room: This is a private space for family to view the deceased away from any high circulation or testing area.

Body Prep Room: This room is used by staff for preparation of the deceased prior to morgue or mortuary services. In this room cadavers would be cleaned, secured and identified for transport. This room could serve as an alternative if an autopsy room is not utilized and morgue services are to be performed at another location.

Clean Utility Room: This room is used for the storage and holding of clean and sterile supplies. Clean linen may be stored in a designated area in the clean utility room if space is not provided in a separate room or in an alcove.

Clinical BSL3: A Biosafety Level three is a laboratory room (or sometimes an independent Laboratory) where indigenous or exotic bacteria, parasites, and viruses are handled, analyzed, and tested. This Laboratory provides a safe environment for testing and manipulation of lethal

agents. Negative pressure and full personal protective equipment are typically used in this Laboratory.

Clinical Laboratory: A laboratory in which testing and analysis are performed on clinical specimens in order to inform, assess, and aid in the health and well-being of a patient through diagnosis, prognosis and prevention of disorder and disease. A Clinical Laboratory may include, but is not limited to, specimen collection, specimen processing, and testing in the areas of hematology, chemistry, microbiology, virology, urinalysis, molecular diagnostics, serology / immunology, and blood bank (transfusion service).

Clinical Chemistry: The section of the clinical laboratory that performs analytical testing on blood and other body fluids such as urine and CSF (Cerebrospinal Fluid) for composition to diagnose and determine therapeutic levels of treatment. Special sub-specialties include endocrinology, immunology, or toxicology studies.

Clinical Hematology: A section of the clinical laboratory that evaluates and tests whole blood primarily for its cellular components and structural function for disease and disorders. Sub-specialties may include, but are not limited to, specialized hematology which consists of platelet function tests and factor assays. This area of the laboratory is heavily automated, but still has some reliance on manual methods. The automated section of hematology can adjoin other automated sections of the lab, while manual portions can share resources with other manual sections of the core Laboratory for efficiency.

Clinical Pathology: This section is one of two branches of pathology that utilizes laboratory testing and analysis of blood, tissue, and body fluids to aid physicians and medical staff in diagnostics, therapeutics and prevention of associated with diseases.

Coagulation: The section of the clinical laboratory that utilizes testing for blood clotting capabilities and capacities. Coagulation testing may aid in diagnosing bleeding disorders, monitoring anti-coagulation therapy, and the current blood clotting status on a patient before surgery. Typically this area is combined with hematology and/or the automated laboratory.

Cubicle: A cubicle is a partially enclosed workspace, separated from neighboring workspaces by partitions. Managers and other staff with no supervisory responsibilities as well as part-time, seasonal, and job-sharing staff may qualify for a cubicle.

Cytology (or Cytopathology): A section of the laboratory in anatomic pathology that studies the structure and function of specimens at a cellular level. Cytology examines cells microscopically for abnormality and malignancy. Cytology is used for screening and diagnosis of diseases, such as cancer, or precancerous cells.

Electron Microscopy Suite: A section of the laboratory that utilizes a class of electron microscope to produce a magnified image. This suite would include a room and space that would accommodate electron microscopy viewing and research as well as storage and work space.

Encounter: A contact between an eligible beneficiary and a credentialed provider. An encounter may consist of examination, diagnosis, treatment, evaluation, consultation or counseling or a combination of the above. The encounter may take place in a clinic, by telephone, computer, or in other treatment or observation areas. Encounter volume used to generate exam room requirements should not include telephone encounters.

Frozen Section: A sub-section of Anatomic Pathology that performs cryosections (frozen tissue analysis) for rapid microscopic analysis of a specimen and/or gross analysis (specimen dissection analysis). These analyses of specimens by a pathologist are a consultation to aid a surgeon, and are performed during a surgery. Frozen section areas should have access from the Laboratory for coordination with the surgical department. Sometimes frozen section areas may be located in a surgical suite. A frozen section area may act independently or in combination with a histology department.

Fluorescent Microscopy: Typically a sub section of microbiology, this area involves light microscopy in which the specimens are chemically altered to fluoresce for identification and/or presence of microorganisms under a microscope.

Functional Area (FA): The grouping of rooms and spaces based on their function within a service. Typical Functional Areas in clinical services are Reception, Patient Area, Support, Staff and Administration, and Education.

Histology (or Histopathology): A section of anatomic pathology that analyses and tests tissue to distinguish change characteristics of malignancy and disease. Histology uses several different techniques involving tissue dissection and suspension in paraffin blocks, chemical staining of specimens and slides, and visual observation to relay all information and process microscopic slides to distribute to a pathologist for analysis and diagnosis. Blocks and slides must be stored for up to ten years, with at least the most recent two years stored on-site within the laboratory.

Input Data Statement: A set of questions designed to elicit information about the healthcare project in order to create a Program for Design (PFD) (see definition below); based on the space criteria parameters (refer to Section 4) set forth in this document. Input Data Statements are defined as Mission, Workload, Staffing or Miscellaneous.

Immunology: A section of Clinical Pathology that analyzes and tests antigens and antibodies to identify innate or acquired immune system irregularities with structure and function. Typically this section of the Laboratory is involved in the core Laboratory testing area, with a majority being automated testing. Some immunology testing does require manual methods.

Laboratory Information System (LIS): The laboratory's computer systems hardware and software. The LIS logs and records all orders, specimens, quality control, and test results. It is typically interfaced to the hospital information system through middleware. High-volume instrumentation and the majority of the laboratory rely on the LIS services for communication and support through technology.

Lab Information Systems Server: This area accommodates space for the laboratory's information technology needs, which would include LIS monitoring equipment if necessary. This area would have all computer hardware that supports the Laboratory information systems.

Manual (Laboratory): A section of the clinical laboratory that performs manual testing and processing in specimen processing, chemistry, hematology, coagulation, and urinalysis. This area is identified to distinguish from automated methods of processing and testing in the clinical laboratory. Typically manual areas of the laboratory adjoin their respective automated disciplines due to specimen sharing and/or related testing.

Microbiology: A section of the clinical laboratory that analyzes and tests bacterial, fungal, and viral microorganisms at their various cellular levels in a patient for identification and for therapeutic antibiotic effectiveness in treatment of infection. Microbiology typically would consist of virology, mycology, parasitology, and bacteriology.

Microbiology Media Prep: This room is used as an area for preparation of microbiological media which is used in testing to culture and ultimately identify or isolate the bacteria for further testing.

Molecular Pathology (or Molecular Diagnostics): The section of clinical laboratory that uses testing and analyses of DNA, RNA, and proteins to detect specific states of illness and disease.

Morgue: A section of Anatomic Pathology that typically operates on its own as an independent department due to the nature of its operation. A morgue will house and store cadavers and/or human remains for autopsy or mortuary services. Morgue services would also facilitate transportation from a medical center. Autopsy suites, if available, would typically be connected to but not part of a morgue.

Mycobacteria: Mycobacteria are typically associated with tuberculosis, which is highly contagious form of Mycobacteria. The genus includes pathogens known to cause serious diseases in mammals, including tuberculosis and leprosy.

Mycobacteriology (TB) Lab: This lab deals exclusively with the study of Mycobacterium Tuberculosis (TB) and TB-like micro-organisms.

Mycology: A sub-section of microbiology that analyzes and tests fungus and fungal elements for infection, as well as therapeutics for treatment and effectiveness.

Net-to-Department Gross Factor (NTDG): A parameter used to calculate the Department Gross Square Foot (DGSF) area based on the programmed Net Square Foot (NSF) area. Refer to DoD Chapter 130 for the NTDG factors for all Space Planning Criteria chapters.

Open Concept: Laboratory design or layout without walls that is not compartmentalized allowing unilateral workflow for staff providing no physical barriers. Laboratory equipment, bench top space and support staff can be essentially shared for maximum utilization and flexibility in space.

Office, Private: A single occupancy office provided for confidential communication.

Office, Shared: An office that accommodates two workstations.

Parasitology: A sub-section of microbiology that tests, identifies, and analyzes organisms that parasitize humans. These include protozoa, worms and insects whose survival is based on their human host.

Pathologist: A medical doctor who specializes in pathology. A pathologist is a diagnostician who studies disease by examining tissue, biopsies, or body fluids in combination with patient history and tests to determine diagnosis and causation or origination. A pathologist also plays a key role in an intraoperative consultation, whereby the pathologist does not participate directly performing a surgery but still take part in the diagnostic surgical process with prognosis or diagnosis.

Pathology: A specialty in the practice of medicine that studies and diagnoses disease, its origin and cause. This is done though examination of tissues, organs, body fluids, and autopsy (cadaver examination).

Personal Property Lockers: This is a small-sized locker, commonly called purse or cell phone locker, and is generally used to secure purses and smaller valuables. Staff members who do not have an office or cubicle space where they can safely store belongings will be assigned these lockers.

Phlebotomy: A section of the clinical laboratory responsible for collecting and transporting blood specimens for distribution for testing.

Program for Design (PFD): A listing of all of the rooms / spaces generated based on answers to the Input Data Statements (see Section 3) and the space planning criteria outlined in this document (Section 4) in SEPS. The list is organized by Functional Area and includes the Room Quantity, Room Code, Room Name and generated Net Square Feet (NSF), Construction Phase and Construction Type.

Project Room Contents (PRC): A listing of the assigned contents (medical equipment, FF&E, etc.) for each room in a PFD generated by SEPS.

Radioimmunoassay (RIA): A section of the clinical laboratory that utilizes antibodies and antigens combined with radioisotopes to measure the quantities of a substances, such as protein, hormones, or drugs, in a given sample or tissue. In vitro studies utilizing (radioactive) radioisotopes to quantify antibodies by using corresponding antigens in testing, for levels of hormones or drugs for example, are performed in Radioimmunoassay clinical lab.

Reagents: Substance or compound used in a clinical laboratory during chemical analysis testing. Reagents may be in liquid, powder or solid form, and are used in a variety of different methods. Reagents also have specific storage requirements, some can be stored at room temperature, and others refrigerated, and still others frozen at 20 or -70 degrees.

Reference (or Referral) Laboratory: A laboratory that performs testing and analysis, which in turn, returns the results as a reference to an outside entity or other laboratory. Typically a reference laboratory is used when resources for a laboratory are not available or for testing menus that require more specialized equipment. Reference laboratories may be another Department of Defense Laboratory or a civilian lab.

Resident Collaboration Room: This room is provided for the Residents. It will contain one cubicle per Resident, a table with chairs for collaboration space and bookcases.

Specimen: A biological laboratory sample of a patient's tissue, fluid or other natural material used for laboratory analysis to assist differential diagnosis or staging of a disease process. Common examples include throat swabs, sputum, urine, blood, surgical drain fluids and tissue biopsies. An accession number is assigned to each specimen obtained. Workload is calculated by the number of “specimens (accession numbers) processed." For the purposes of this chapter, one accession number equates to one "specimen." There may be many records (number of times an analysis or test is specified by CPT code) for each specimen. As an example, one hematology specimen may be used to perform several tests/records, a "complete blood count, a liver enzyme panel and a glucose level," which equates to one specimen.

Specimen Accessioning: A section of the laboratory that is responsible for the pre-analytical processes and management of specimens for distribution for testing. Activities typically include: receives, logs, verifies, and prepares (centrifuges) specimens for distribution to the various areas within the clinical laboratory. The location of specimen processing is important to facilitate efficient distribution and should have the best overall access to each department within the laboratory that it supports. Direct exterior laboratory access by a service window or door (to receive specimens) or the use of a pneumatic tube station would be crucial as specimen processing is the entry point for specimens to the laboratory.

Space and Equipment Planning System (SEPS): A digital tool developed by the Department of Defense (DoD) and the Department of Veterans Affairs to generate a Program for Design (PFD) and a Project Room Contents list (PRC) for a DoD healthcare project based on approved Space Planning Criteria, the chapter and specific project-related Mission, Workload and Staffing information entered in response to the Program Data Required - Input Data Statements (IDSs).

Soiled Utility Room: This space provides an area for cleanup of medical equipment and instruments, and for disposal of medical waste material. It provides temporary holding for material that will be picked up by Sterile Processing or similar service. It should be accessible to staff.

Serology: A section of the laboratory that analyzes and tests plasma serum as well as other body fluids typically for the diagnostic identification of antibodies. Serology often accentuates another department in the core testing area due to a smaller testing area that can be integrated into other areas. Serology is typically a manual area, but depending on the test menu and the work load it may be semi-automated to an automated process.

Semi-Automated: Semi-automated refers to the combination of manual processes and automated equipment for analysis and testing in a laboratory. Typically semi-automation is utilized when either a laboratory does not have the work load to justify full automation or the testing area or department has not developed analyzers capable of full automation.

Team Collaboration Room: This space provides staff with an environment conducive to collaboration. Room contains touchdown computer workstations for documentation and a table with chairs to hold team meetings.

Test (Assay): A qualitative or quantitative analytic procedure used to assess a specimen for its composition. Typically an assay would take properties of a specimen and express them in relative terms for preventative, therapeutic, and diagnostic use.

Tissue Repository: A section of the laboratory that stores and catalogs patient files and information along with associated paraffin blocks, microscopic slides, and formalin-fixed tissue specimens from pathologic testing and examinations from patients throughout the Military Health System.

Urinalysis: A section of the laboratory that analyzes and tests urine by physical, chemical, and microscopic means. Evaluation of urine is used for toxicology, disease, and dysfunction. Typically the urinalysis section of the laboratory will work in unison with other parts of the laboratory, and therefore is often integrated into the core area of testing. Urinalysis is a section of the laboratory that is highly automated, but does have manual testing utilized in testing.

Urinalysis Lab: The primary function performed in this area is the biochemical analysis and microscopic examination of urine.

Utilization Factor: Also known as capacity utilization rate, this factor provides flexibility in the utilization of a room to account for patient delays, scheduling conflicts and equipment maintenance. A room with an 80% utilization factor provides a buffer to assume that this room would be available 20% of the time beyond the planned operational practices for this room.

Virology: A section of the laboratory that analyzes and tests for viruses, and viral components. This section of the laboratory is often combined with microbiology due to similarities in equipment, personnel, and testing methods.

Workload: Space Planning Criteria per DHA Policy shall be workload driven. Workload projections divided by the throughput determined in this document for each workload driven room determines the quantity of rooms needed to satisfy the projected workload demand.