Real Estate Development + Facilities
Design Guidelines

NYU Langone
MEDICAL CENTER
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LETTER FROM THE VICE DEAN AND SENIOR VICE PRESIDENT

This is an especially exciting time for NYU Langone Medical Center, as we set out to fulfill an ambitious new vision as a world-class, patient-centered, integrated academic medical center.

The transformation of our campus is key to achieving this vision. Building upon a legacy of excellence, we are creating a uniquely seamless environment in which patient care, research, and education blend synergistically across all areas of our institution. Our researchers will have state-of-the-art laboratories built to encourage collaboration, which in turn will speed the translation of scientific discoveries to the patient bedside; and, our students and faculty will work together in modern educational facilities equipped with the latest technological tools. This integration culminates in our paramount focus—to set new standards of excellence in providing for the health and comfort of patients and their families.

In line with these goals is adherence to a set of comprehensive design standards, shaped by a set of guiding principles for the built environment:

- Design Quality
- Construction Quality
- Cost Effectiveness
- Schedule Compliance
- Design Flexibility
- Efficiency, Functionality and Practicality
- Intuitive Wayfinding
- Durable Materials
- Attention to Detail
- Collaborative Process

The mission of the Real Estate Development and Facilities (RED+F) department at NYU Langone is to plan, develop, operate and maintain the campus of the Medical Center and, in doing so, to provide the foundation for its growth and success in the 21st century. The design guidelines put forth here will enable RED+F to work efficiently and successfully with its partners in the design community to play a vital role in translating our vision into the physical reality.

Vicki Match Suna, AIA
Vice Dean and Senior Vice President
Real Estate Development and Facilities
INTRODUCTION

Purpose

With over 5 million square feet in its various New York City locations, NYU Langone Medical Center leases, owns and operates an enormous variety of buildings. These design guidelines have been created to assist architects, interior designers, engineers and project managers by providing direction regarding the Medical Center’s requirements and design goals, as we continue to upgrade existing facilities and build new ones. The Design Guidelines are not intended to repeat or replace any code mandated requirements. Compliance with relevant codes is the sole responsibility of the A/E Team.

Goals

- **Efficiency**
  A principal goal is to improve the efficiency of the design process by clarifying requirements and improving operations and maintenance by creating a commonality of systems and products across the Medical Center’s expanding portfolio. Where appropriate, approved materials and products are indicated in the guidelines. The aim is not to limit design expression but to guide the architects and engineers toward solutions that are in conformance with Medical Center construction and maintenance practices. Improving efficiency in design, construction and operations will be of substantial financial benefit to the Medical Center.

- **Design Excellence and Quality Construction**
  NYU Langone Medical Center is committed to design excellence, and stands by the premise that intelligent planning, inspired design, meticulous documentation, and quality construction are all indispensable to this effort, and will bring added value to the Medical Center. These guidelines have been created in support of this goal.

Access and Exceptions

Access to the most current version of the Design Guidelines will be made available by the RED+F Project Manager and posted on the website of Real Estate Development and Facilities. The date of a signed contract determines the version of the Design Guidelines that will govern a particular project. These guidelines will be updated periodically. If designers suggest alternatives or additions to the Guidelines they must take these suggestions to the RED+F Project Manager. Proposals for significant changes to the Guidelines should be made in writing to the RED+F Project Manager who will forward such requests and proposals to the RED+F Design Studio for review. The Architect may seek minor deviation(s) from compliance with the Guidelines on an individual project by written request to the Project Manager. The Project Manager will advise the Architect in writing whether or not an exception to the Guidelines will be permitted.
UPDATES AND REVISIONS

These guidelines will be updated periodically. Below is a Legend and Summary of how and what changes have been incorporated into the 2016 release of the NYU Langone Design Guidelines:

Legend

- *(CAPITALIZED BOLD ITALIC)* text following section titles listed in the Table of Contents shall be used to identify New and Updated sections.

Summary

The following sections in the 2016 NYU Langone Design Guidelines have been UPDATED:

**Section 1: Architectural Guidelines**
- Introduction
- Finishes
- Paint Colors
- Information Technology
- Dos and Don’ts
- Close-Out Package

**Section 2: Engineering Guidelines**
- General
- Mechanical
- Electrical
- Plumbing
- Fire Protection
- Fire Alarm

The following sections in the 2016 NYU Langone Design Guidelines are NEW:

**Section 1: Architectural Guidelines**
- Updates and Revisions
- Building Accessories
- Plumbing Fixtures
- Toilet Accessories
- Emergency Plumbing Fixtures
- Environmental Sustainability and Green Buildings
- Miscellaneous
- Photography
- Post-Occupancy Evaluations

**Section 2: Engineering Guidelines**
- Building Management System
MASTER PLAN GUIDING PRINCIPLES

NYU Langone Medical Center has developed master plan guiding principles to help direct our collective efforts in the transformation of our campus. All projects undertaken at NYU Langone shall be planned in accordance with these master plan guiding principles.

1. All future facility improvement and development should redefine and reposition NYU Langone in the New York metropolitan region.

2. NYU Langone will be a leader in patient-centered care.

3. The physical environment should support efficient, LEAN-based operations in all enterprises of the campus.

4. All programs and facilities should foster clinical and translational research that:
   ▪ is integrated into programs and facilities
   ▪ promotes collaboration in care delivery and research
   ▪ can support NYU Langone to broaden sources of funding for research

5. The physical environment should encourage flexibility and an adaptive environment.

6. NYU Langone will be a premier “service” organization that is:
   ▪ safe
   ▪ supportive of faculty, clinicians, students, patients and visitors
   ▪ disease-focused
   ▪ innovative
   ▪ responsive to market forces and dynamics

7. The faculty response to clinical needs must be fiscally responsible and provide clear direction for expansion over time, as funds become available.

8. Consistent with the NYU Langone mission and as they support strategic areas, innovative methods and technologies will be anticipated and incorporated into clinical programs and practices.

9. All facilities should provide space in support of the educational and training mission of the Medical School and the University.

10. The care that we provide at NYU Langone results from a team effort working on behalf of the patient and family.

11. All facilities should embrace sustainable and evidence-based parameters in design, materials, equipment and technology.
DESIGN PRINCIPLES

NYU Langone Medical Center is committed to design excellence and demands the highest quality built environment. We stand by the premise that intelligent planning, inspired design, meticulous documentation and quality construction are all indispensable to this effort. As part of our mission of becoming a world-class medical center, we have developed the following design principles:

1. **Design Quality**
   - Design solutions must be timeless with a clearly organized concept, developed and reinforced with appropriate materials and details.
   - Provide innovative solutions that create safe, secure and supportive environments and improve work-flow.
   - Develop design solutions that strengthen the NYU Langone brand.

2. **Construction Quality**
   - The built environment must have the highest possible quality of construction appropriate to the project scope, budget and schedule.

3. **Cost Effectiveness**
   - Design solutions must be cost effective and fiscally responsible.

4. **Schedule Compliance**
   - Design and construction schedules must be maintained.

5. **Design Flexibility**
   - The physical environment should encourage flexibility and adaptability and provide clear direction for expansion over time.

6. **Efficient, Functional and Practical**
   - Designs should look to improve work-flow, support efficient, LEAN-based operations, and create environments that are easily maintained.

7. **Intuitive Wayfinding**
   - The circulation pattern from point of entry to final destination must be clearly visible and easily understood.

8. **Durable Materials**
   - Materials and finishes must last over time and be easily maintainable.

9. **Attention to Detail**
   - It is critical that details are thoughtfully designed, thoroughly documented and carefully constructed.

10. **Collaborative Process**
    - NYU Langone promotes an integrated team approach in the development and construction of projects. It is essential that all stakeholders have input in the process.
GENERAL PROJECT REQUIREMENTS

1. Architects Agreement

Architects are required to execute NYU Langone Medical Center’s Standard Master Owner - Architect Agreement (the “Standard Agreement”); no exception may be taken to the terms and conditions of the Standard Agreement. In the event of any inconsistency between these Design Guidelines and the provisions of the Standard Agreement, the provisions of the Standard Agreement shall govern.

2. Communication and Approach

NYU Langone Medical Center promotes a team approach in the development and construction of projects. We believe it is essential that all stakeholders have input into the process. This includes the User, Real Estate Development + Facilities (RED+F), Medical Center Information Technology (MCIT), Environmental Health & Safety (EHS), Security, Building Services, etc. The NYU Langone project manager (PM) will act as the main contact on the project to ensure all elements are coordinated.

The Architectural/Engineering team (A/E team) is encouraged to initiate and sustain open communications throughout the project. All communication with the A/E team will be handled through their primary contact, the PM. Other contacts listed in this document should only be contacted at the direction of the PM.

3. Roles and Responsibilities

The following is a list of key project participants with whom the A/E team will likely have regular contact during the planning, design and construction process:

- **Real Estate Development + Facilities (RED+F)** - RED+F is the client. They provide architectural design review and planning information for projects. This includes information on related or concurrent projects, NYU Langone practices, policies and space standards. RED+F has a staff of in-house architects, engineers and interior designers that oversee the design of all NYU Langone capital projects. In order to provide the Medical Center with a consistent vision for the built environment, RED+F is responsible for approving the final finish selections.

- **Sponsor** - The Sponsor for a capital project is the department or group that is funding the project.

- **User** - The User is the department or group that will occupy the project after it is constructed. They have an important responsibility to provide feedback on their functional and programmatic needs, work-flow requirements and to sign-off on the plan. The plan sign-off is a critical schedule milestone that determines when Construction Documents begin and when the Users will be able to move in. The Users will be shown the proposed materials and finishes for the project and be allowed to provide input on functional issues. The aesthetic approval of the finishes will be the sole responsibility of RED+F.
- **RED+F Project Manager (PM)** - The PM is the primary contact for all aspects of the project. They act as the central point of contact for collecting and disseminating information, project schedule, project budget and all communication. PMs utilize resources within the NYU Langone community as needed to support the project objectives.

- **Medical Center Information Technology Project Manager (MCIT PM)** - The MCIT PM will assist the PM with coordinating the IT, telecommunication, audio-visual and associated cabling requirements for capital construction projects. Refer to the Information Technology section in these Design Guidelines for further detailed information.

- **Environmental Health and Safety Project Manager (EHS PM)** - The EHS PM will assist the PM with various aspects of health and safety including asbestos abatement, hazardous waste removal and OSHA safety requirements. Refer to the Environmental Health & Safety section in these Design Guidelines for further detailed information.

- **Clinical Engineering** - Clinical Engineering coordinates the ordering and installation of medical equipment.

4. **Adherence to Budget and Schedule**

Cost and schedule control are of paramount concern to NYU Langone. As per the Architects Agreement, the Architect is responsible to meet the project’s budget and schedule goals. Evaluations of the Architect’s work and consideration for future projects will be made based on meeting these budget and schedule goals, adherence to the Design Principles, and overall RED+F and User satisfaction.
NYULMC Design Guidelines

PROJECT DELIVERY PROCESS

RED+F’s project delivery process falls into three major categories: formulation and planning; project development; and project implementation.

Typically, projects are formulated for approval and are then guided through Design and Construction by an assigned project manager (PM). Each PM formulates and implements construction projects based on time and cost to meet the goals and needs of all stakeholders. The project implementation follows a defined process that ensures projects are completed within the specified scope, schedule and budget.

1. Formulation & Planning

- **Formulation** - To ensure that the Medical Center’s resources are utilized in the most effective manner, most projects are initiated through Senior Administration. Individual departments can also initiate small department-funded projects by contacting RED+F directly. These requests are then reviewed by Senior Administration and, if approved, authorized to proceed. Requests are evaluated based on their importance in supporting the Medical Center’s vision and strategic goals, space requirements, staffing requirements, potential impact on other programs, and funding sources. If the administration believes the project merits further investigation, RED+F will begin a planning study which will specifically identify the project objectives, scope, budget, and schedule requirements.

- **Planning** - When Senior Administration determines that an individual project request merits further investigation, RED+F begins an iterative planning process, which attempts to balance project requirements with available resources. Throughout this process, RED+F provides professional assistance to define the primary objective of the project, the specific needs of the user department and the potential solutions. Working with Senior Administration, RED+F then analyzes the options in a campus-wide context and establishes target budgets. The best options are then re-examined and re-analyzed until a viable solution can be found. By identifying key relationships, such as adjacencies to public spaces, utility connections, and potential future uses of the site, broad facility issues can be addressed one project at a time.

For mid- to large-size projects, RED+F will often contract outside consulting firms to work with the client group through a process of defining the project goals, developing the space program, identifying and analyzing options, and budgeting. Throughout this process, RED+F will review the progress with Senior Administration. At the conclusion of the planning study, a formal report is prepared to document the project scope, budget, and schedule for approval by Senior Administration.

For smaller projects, the planning process is similar to that of major projects, except the process is not as complex and may not involve an outside consultant.

During the Formulation Process, RED+F develops a clear statement of project objectives. This statement is incorporated into a final report along with the space program, schedule,
and project budget for approval by Senior Administration and to serve as a guide throughout the design process.

- **Approvals** - All projects move through an approval process to ensure that the Medical Center's resources are managed effectively. The parties involved in the approval process and the number of approvals required varies depending on the project category, the size of the budget, and other considerations.

As projects are planned, they are incorporated into a comprehensive capital plan, either as a specific line item or as a broad allowance (pools). The capital plan is developed within the framework of a long-term financial plan. Both the capital plan and the financial plan are updated regularly to ensure that the future costs of any planned capital investments are accounted for in the long-term financial plan.

As projects become more defined, capital and operating budget implications are considered and the capital and financial plans are updated, reviewed and prioritized by NYU Langone senior leadership and approved by the Medical Center’s Finance Committee. The planning studies prepared in the previous phase not only identify each project's objective, scope, budget, and schedule, but they also include a Project Authorization Form with signature lines for each of the parties responsible for approval. When all signatures are received the project account is established and the design process begins.

2. **Project Development and Design**

A project manager (PM) is assigned to the project and a project user-group is established. The PM will coordinate a series of meetings between the Users and the Design Team for information gathering. This group is responsible for guiding the project through the planning and design process and is comprised of representatives from the user-group, Facilities Management, Senior Administration, the architect and engineering consultants, and the construction manager, if applicable. Facilities Management and other Medical Center departments are brought into the Planning and Design meetings as required for the specific project. These meetings provide a forum for coordination of the various aspects of the project during the design process.

- **Schematic Design (SD)** - In this first phase of the design process the Design Team generates schemes based on information gathered from Users and its own field investigation. Schemes are reviewed by all stakeholders and refined accordingly. This phase of the project defines the design parameters and the overall layout including:
  - Scope, Schedule and Budget
  - Equipment requirements
  - Furnishings
  - IT and phone requirements
An estimate will be prepared at the end of the SD phase to verify that the project remains within budget. The budget must be reconciled with scope prior to proceeding with the next phase of design.

A/E Deliverables:
- Meeting Minutes
- Program Analysis
- Scope Narrative
- Floor plans (w/ FFE, material notes, etc.)
- Elevations
- CAD Renderings of major spaces
- Sample materials

**Design Development (DD)** - In this phase, the agreed upon layout in Schematic Design is developed in greater detail with all major design components of the project defined and developed. There is often heavy User involvement to be sure that the design meets all needs. The PM brings in other Medical Center departments (Facilities O&M, IT, Infection Control, EH&S, Security, etc.) to provide input and inform the design. All key design decisions are made and agreed upon by the end of this phase.

The PM will work with the Design Team during the Design Development phase to keep scope in line with the initial approval, as well as with any additional changes incorporated during Schematic Design. Any changes to the agreed upon and authorized scope of the project must be approved by the PM. Since changes in the scope and schedule of a project have an impact on the project budget, an estimate is prepared at the end of the Design Development phase to verify that the project remains within budget. The budget must be reconciled with scope prior to proceeding with the next phase of design. Also, the User must sign-off on the floor plan(s) in a timely manner in order for the Design Team to proceed into the Construction Document phase and maintain the overall project schedule.

A/E Deliverables:
- Meeting Minutes
- Program Analysis
- Outline Specification
- Floor plans (w/ FFE, dimensions, partition tags, RED+F room numbers, etc.)
- Enlarged floor plans (of typical and major spaces)
- Reflected Ceiling Plan
- Elevations
- Typical Room Finish and Door Schedules
- Typical and Major Details
- CAD Renderings of major spaces
- **Construction Documents (CD)** - This phase takes the design as developed and finalized during Design Development, and documents it for construction. Details are further refined as construction issues are addressed. The main emphasis of this phase of work is to verify that all the information is on the drawings and in the specifications so that the project can be bid for construction. Typically, fewer meetings in the Construction Documents phase require the involvement of the Users because the focus in this phase is the documentation of the design decisions already made during Design Development.

The agreed upon and authorized scope, schedule and budget during Construction Documents must be adhered to. The Project Manager will work with the Design Team during the Construction Documents phase to keep scope in line with the initial approval, with the addition of any changes incorporated during previous phases. At the end of this phase the Construction Project Manager will put the project out to bid.

A/E Deliverables:
- Meeting Minutes
- Full Specifications
- Floor plans (fully developed and coordinated with furniture and equipment)
- Enlarged floor plans (of typical and major spaces)
- Reflected Ceiling Plan (fully developed)
- Final Elevations
- Final Room Finish and Door Schedules
- Details (all details fully developed)
CAD DOCUMENTATION STANDARDS

The Space Planning and Management group of RED+F is responsible for space reporting, assessment and planning for NYU Langone Medical Center. In order to fulfill its responsibilities, the group maintains an inventory of all owned and leased properties. Keeping all floor plans and space information current is important to the operations of the medical center. Staff and consultants involved in capital projects that impact the space inventory are expected to provide appropriate documentation to the Space Planning and Management group in a timely manner.

Drawings are to be delivered to NYU Langone Medical Center on the completion of each of the following phases: design, construction documentation, and construction. Drawings shall be delivered in DWG format. All X-ref drawings must be bound and inserted into the drawings. All 3D and BIM drawings must be converted to 2D-compatible DWG files.

Drawing List Standards

A-000 General Information
A-100 Floor Plans
A-200 Elevations
A-300 Exterior Details
A-400 Interior Details
A-500 Vertical Transportation
A-600 Reflected Ceiling Plans
A-700 Finish Plans
A-800 Schedules

Note: Consultant drawings should follow the same format (i.e. M-000 General Information, M-100 Floor Plans, etc.)
## CAD Layer Standards

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<td>6-magenta</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Interior</td>
<td>I-Furn</td>
<td>Furniture</td>
<td>6-magenta</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Interior</td>
<td>I-Millwork</td>
<td>Cabinetry / Casement</td>
<td>6-magenta</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Landscaping</td>
<td>L-Site</td>
<td>Site improvements</td>
<td>4-cyan</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Mechanical</td>
<td>M-Hvac-Eqpm</td>
<td>Mechanical equip. (chiller, boiler etc.)</td>
<td>6-magenta</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Plumbing</td>
<td>P-Fixt</td>
<td>Plumbing fixtures, toilets, sinks</td>
<td>6-magenta</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Plumbing</td>
<td>P-Safety-Shwsh</td>
<td>Emergency shower and eye wash</td>
<td>6-magenta</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Structural</td>
<td>S-Cols</td>
<td>Columns</td>
<td>2-yellow</td>
<td>Default</td>
<td>Continuous</td>
</tr>
<tr>
<td>Structural</td>
<td>S-Grid</td>
<td>Column grid</td>
<td>2-yellow</td>
<td>Default</td>
<td>Center</td>
</tr>
<tr>
<td>Telecom</td>
<td>T-Jack</td>
<td>Data/telephone jacks</td>
<td>3-green</td>
<td>Default</td>
<td>Continuous</td>
</tr>
</tbody>
</table>
PRESENTATION MATERIALS

In communicating the design to NYU Langone Medical Center, the Design Team shall provide presentation materials that are clear and easy to understand. Plans, Reflected Ceiling Plan (RCP), Material/Finish Diagrams, Perspective Renderings, Material samples and Furniture cut sheets are to be presented during the design phases, with any additional or supplemental information as may be necessary to clearly communicate the quality of the space. Below are some examples of acceptable presentation materials:

1. Plans and RCP

Plans and RCP’s shall be presented to NYU Langone during the design phases. Rooms shall be labeled, furniture drawn, and the drawings shall be to a scale. They shall be rendered when materials and finishes are being reviewed. Below are acceptable examples:
2. **Perspective Renderings**

CAD Perspective renderings shall be presented to NYU Langone during the design phases. The quality level shall be sufficient for NYU Langone to understand the scale, material, color and lighting of the space. Single line or freehand perspectives are to be used sparingly and only as additional or supplemental information. Below are acceptable examples of such renderings:

![Perspective Rendering Example 1](image1.jpg)

![Perspective Rendering Example 2](image2.jpg)

![Perspective Rendering Example 3](image3.jpg)
3. **Material/Finish Diagrams**

A Finish Diagram shall be presented to NYU Langone during the design phases. The purpose is to clearly identify the locations of the various materials and finishes in the project. The drawing can be a plan or axonometric. The diagram should be color coded and have a legend identifying the different materials and finishes. The actual material samples shall be presented simultaneously. Below are acceptable examples:

---

Ennead Architects
4. **Material/Finish Samples**

Actual samples of Materials/Finishes shall be presented to NYU Langone during the design phase. The Architect shall provide sizes that are appropriate to both the scale and scope of the material in the project. For example, a large sample of the base color must be presented if it is being used in the majority of spaces. Samples such as wood and terrazzo shall be large enough to show the pattern, grain, color variation, etc. The materials should be keyed into the Finish Diagrams and/or Renderings. Below is an acceptable example:
FINISHES

In accordance with both our Mission Statement of creating a world-class medical center and our Design Principles of providing timeless designs that are cost effective, efficient, functional and practical, RED+F has developed a palette of typical materials and finishes that we have found to be successful for various spaces at NYU Langone Medical Center.

Our goals in listing these materials and finishes are to:

- Streamline the design process
- Assist the Architect and Interior Designer with specifying materials
- Create spaces that are timeless, durable, easily maintainable and cost-effective
- Create a consistent NYU Langone brand

The Architect and Interior Designer should use this as a guide for specifying the finishes on NYU Langone capital projects. This information does not relieve the Architect or Interior Designer of specifying materials that are appropriate and code compliant for specific spaces. Also, the Architect and Interior Designer may suggest other materials and finishes if they believe those proposed materials and finishes will support our Mission Statement, Design Principles, as well as the design intent of the project.

We have provided this information for both clinical and non-clinical areas in the following sub-sections:

A. Room Finishes for Clinical Spaces
B. Room Finishes for Non-Clinical Spaces
C. Material Legend
A. ROOM FINISHES for CLINICAL SPACES

The following finishes are recommended for Clinical Spaces.

**PATIENT ROOMS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, tile</td>
</tr>
<tr>
<td></td>
<td>Wood plank</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, cove, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Wall Protection</td>
<td>Rubstrip, C-S</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>Hollow Metal (HM), paint, semi-gloss finish</td>
</tr>
<tr>
<td></td>
<td>Acrovyn</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td>Millwork</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td></td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td></td>
<td>Engineered Stone</td>
</tr>
<tr>
<td>Window Sills/Convector</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Treatments</td>
<td>Shade Cloth, 3% opening and Shade Cloth, blackout</td>
</tr>
<tr>
<td></td>
<td>Use double roller</td>
</tr>
</tbody>
</table>

**PATIENT TOILETS/SHOWERS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Porcelain, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Porcelain, cove</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Porcelain, tile</td>
</tr>
<tr>
<td></td>
<td>Ceramic, tile</td>
</tr>
<tr>
<td></td>
<td>Wall Covering (non-wet walls)</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>GWB, paint, flat finish</td>
</tr>
<tr>
<td></td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td></td>
<td>Engineered Stone</td>
</tr>
<tr>
<td>Window Sills/Convector</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Treatments</td>
<td>Shade Cloth, 1% opening</td>
</tr>
<tr>
<td>Shower Curtains</td>
<td>100% trevira, no mesh</td>
</tr>
</tbody>
</table>
### PATIENT FLOOR CORRIDORS

<table>
<thead>
<tr>
<th>Component</th>
<th>Material/Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, cove, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Wall Protection</td>
<td>Handrail, C-S</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
</tbody>
</table>

### FAMILY LOUNGES

<table>
<thead>
<tr>
<th>Component</th>
<th>Material/Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Resilient</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, cove with recess, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish (allow 1 accent wall)</td>
</tr>
<tr>
<td>Wall Covering</td>
<td></td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td>Millwork</td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Sills/Convector</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Treatments</td>
<td>Shade Cloth, 3% openness</td>
</tr>
<tr>
<td></td>
<td>Trevira Sheers</td>
</tr>
</tbody>
</table>

### NURSE STATIONS

<table>
<thead>
<tr>
<th>Component</th>
<th>Material/Finish</th>
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<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, cove, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td>Millwork</td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td></td>
<td>Engineered Stone</td>
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</tbody>
</table>
**CLEAN UTILITY**

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, sheet, chemically welded</td>
</tr>
<tr>
<td></td>
<td>Rubber, tile, chemically welded</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, Integral, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Integral Sanitary cove base, 6”</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>*Ceiling Material</td>
<td>Lay-in, ACT Clean Room VL</td>
</tr>
<tr>
<td></td>
<td>GWB, paint, epoxy</td>
</tr>
<tr>
<td>Millwork</td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td></td>
<td>Corian</td>
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</tbody>
</table>

* Note: Refer to the Miscellaneous Section of these Design Guidelines for further information.

**SOILED UTILITY**

<table>
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<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, sheet, chemically welded</td>
</tr>
<tr>
<td></td>
<td>Rubber, tile, chemically welded</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, Integral, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, Epoxy</td>
</tr>
<tr>
<td>Wall Protection</td>
<td>Corian</td>
</tr>
<tr>
<td></td>
<td>Rubber</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>*Ceiling Material</td>
<td>Lay-in, ACT Clean Room VL</td>
</tr>
<tr>
<td></td>
<td>GWB, paint, epoxy</td>
</tr>
<tr>
<td>Millwork</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Countertops</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

* Note: Refer to the Miscellaneous Section of these Design Guidelines for further information.
### STORAGE ROOMS

<table>
<thead>
<tr>
<th>Component</th>
<th>Material/Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, cove, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td>Millwork</td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
</tbody>
</table>

**EXAM ROOMS**

<table>
<thead>
<tr>
<th>Component</th>
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</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Resilient</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>Acrovyn</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td>Millwork</td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Countertops</td>
<td>Engineered Stone</td>
</tr>
</tbody>
</table>

**PROCEDURE ROOMS**

<table>
<thead>
<tr>
<th>Component</th>
<th>Material/Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Rubber, sheet, chemically welded</td>
</tr>
<tr>
<td></td>
<td>Rubber, tile, chemically welded</td>
</tr>
<tr>
<td></td>
<td>In OR Sterile zone use Norament Grano ED</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, integral, 6”</td>
</tr>
<tr>
<td></td>
<td>Integral Sanitary cove base, 6”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, Epoxy</td>
</tr>
<tr>
<td>Wall Protection</td>
<td>Varia Ecoresin</td>
</tr>
<tr>
<td></td>
<td>Corian</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>Acrovyn</td>
</tr>
<tr>
<td>Door Protection</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>*Ceiling Material</td>
<td>GWB, paint, Epoxy</td>
</tr>
<tr>
<td></td>
<td>Lay-in, ACT Clean Room VL</td>
</tr>
<tr>
<td>Millwork</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Countertops</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

* Note: Refer to the Miscellaneous Section of these Design Guidelines for further information.
**PSYCHIATRIC CLINICAL ROOMS**

- **Flooring**
  - Rubber, sheet, chemically welded
  - Rubber, tile, chemically welded
  - Resilient

- **Base**
  - Rubber, integral, 6”

- **Wall Finish**
  - GWB, paint, Epoxy

- **Door type/finish**
  - HM, paint, semi-gloss finish
  - Acrovyn

- **Door Frame type/finish**
  - HM, paint, semi-gloss finish

- **Door Protection**
  - Stainless Steel

- **Ceiling Material**
  - GWB, paint, Epoxy

- **Millwork**
  - Stainless Steel

- **Countertops**
  - Solid Surface
  - Corian

**SERVICE CORRIDORS**

- **Flooring**
  - Rubber, tile
  - Resilient; Upo, Zero / Johnsonite, Cortina Grande
  - Rubber, cove, 6”

- **Base**
  - GWB, paint, eggshell finish with Varia Ecoresin on lower wall and rub strip at IV pole height

- **Wall Finish**
  - Double Stainless Steel crash rail

- **Wall Protection**
  - HM, paint, semi-gloss finish
  - Acrovyn

- **Door type/finish**
  - HM, paint, semi-gloss finish

- **Door Protection**
  - Stainless Steel

- **Ceiling Material**
  - GWB, paint, Epoxy
  - Lay-in, ACT Ultima
B. **ROOM FINISHES for NON-CLINICAL SPACES**

The following finishes are recommended for *Non-Clinical Spaces*.

### CONFERENCE ROOMS

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Carpet, broadloom</td>
</tr>
<tr>
<td></td>
<td>Carpet, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, straight with recess, 4”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td></td>
<td>Wall Covering</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td></td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>GWB, paint, flat finish</td>
</tr>
<tr>
<td></td>
<td>Lay-in, ACT</td>
</tr>
<tr>
<td></td>
<td>Lay-in, Wood</td>
</tr>
<tr>
<td>Millwork</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td></td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td></td>
<td>Engineered Stone</td>
</tr>
<tr>
<td>Window Sills/Convectors</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Wall Panels</td>
<td>Wood</td>
</tr>
<tr>
<td></td>
<td>Specialty Material</td>
</tr>
<tr>
<td>Window Treatments</td>
<td>Shade Cloth, 3% openness</td>
</tr>
<tr>
<td></td>
<td>Trevira Sheers</td>
</tr>
<tr>
<td>Storefront</td>
<td>Demountable Partitions</td>
</tr>
</tbody>
</table>

### AUDITORIUMS

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Carpet, broadloom (in circulation areas only)</td>
</tr>
<tr>
<td></td>
<td>Resilient sheet- Acoustifloor (under chairs)</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, straight with recess, 4”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td></td>
<td>Wall Covering</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>Acoustic panels over paint</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td></td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td></td>
<td>GWB, paint, flat finish</td>
</tr>
<tr>
<td></td>
<td>Lay-in, ACT</td>
</tr>
<tr>
<td></td>
<td>Lay-in, Wood</td>
</tr>
<tr>
<td>Millwork</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td></td>
<td>Specialty, Acoustic</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td></td>
<td>Engineered Stone</td>
</tr>
<tr>
<td>Window Sills/Convectors</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Wall Panels</td>
<td>Wood / Specialty Material</td>
</tr>
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</table>
### TRAINING ROOMS

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Carpet, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, straight</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT</td>
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### CORRIDORS

<table>
<thead>
<tr>
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<tbody>
<tr>
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</tr>
<tr>
<td>Base</td>
<td>Resilient flooring</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Rubber, cove with recess, 4”</td>
</tr>
<tr>
<td>Specialty Finish</td>
<td>GWB, paint, eggshell finish</td>
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<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
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<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT</td>
</tr>
<tr>
<td>Speciality Material</td>
<td>Lay-in, ACT, Ultima</td>
</tr>
<tr>
<td>Millwork</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Engineered Stone</td>
<td>Wood</td>
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<tr>
<td>Wall Panels</td>
<td>Plastic Laminate</td>
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<tr>
<td>Window Sills/Convector</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Treatments</td>
<td>Shade Cloth, 3% opening; Trevira Sheers</td>
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</table>
**PUBLIC LOBBIES**

<table>
<thead>
<tr>
<th>Category</th>
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<tbody>
<tr>
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<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
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<tr>
<td>Ceiling Material</td>
<td>GWB, paint, flat finish</td>
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<td>Lay-in, ACT, Ultima</td>
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<td>Wood</td>
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<td>Wall Panels</td>
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**PUBLIC ELEVATOR LOBBIES**

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<td>Wall Finish</td>
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<td>Door Frame type/finish</td>
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<td>Millwork</td>
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## NYULMC Design Guidelines

<table>
<thead>
<tr>
<th>Countertops</th>
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<td>Wall Panels</td>
<td>Wood</td>
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<tr>
<td>Window Treatments</td>
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<tr>
<td></td>
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### PUBLIC TOILETS

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<td>Ceramic, tile</td>
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<td>Wall Covering (non-wet walls)</td>
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<tr>
<td>Ceiling Material</td>
<td>GWB, paint, flat finish</td>
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<tr>
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<td>Lay-in, ACT Hzone</td>
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<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Sills/Convector</td>
<td>Engineered Stone</td>
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<tr>
<td>Window Treatments</td>
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### CAFETERIAS (PUBLIC AREAS)

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<tr>
<td>Base</td>
<td>Integral, 4”</td>
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<td>Integral Sanitary cove base</td>
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<td>GWB, paint, eggshell finish</td>
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<tr>
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<td>Aluminum</td>
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<td>Stainless Steel</td>
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<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
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<td>Aluminum</td>
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<td>Stainless Steel</td>
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<tr>
<td>Door Protection</td>
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<tr>
<td>Ceiling Material</td>
<td>GWB, paint, flat finish</td>
</tr>
<tr>
<td></td>
<td>Lay-in, ACT</td>
</tr>
<tr>
<td></td>
<td>Wood</td>
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<td>Specialty</td>
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### NYULMC Design Guidelines

#### Window Sills/Convector
- Solid Surface

#### Window Treatments
- Shade Cloth, 3% opening

#### LABORATORIES

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
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<tbody>
<tr>
<td>Flooring</td>
<td>Resilient, tile</td>
</tr>
<tr>
<td>Base</td>
<td>Rubber, cove, 4”</td>
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<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
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<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
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<tr>
<td>Door Frame/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td></td>
<td>GWB, paint, flat finish</td>
</tr>
<tr>
<td>Lab Casework</td>
<td>Countertops: Epoxy</td>
</tr>
<tr>
<td></td>
<td>Cabinets: Wood/Metal</td>
</tr>
<tr>
<td></td>
<td>Tack panel: Carnegie, Xorel</td>
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#### VIVARIUM

<table>
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<tr>
<th>Material</th>
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<tbody>
<tr>
<td>Flooring</td>
<td>Poured Epoxy (typical rooms), Stonhard</td>
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<tr>
<td></td>
<td>Integral cove base</td>
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<tr>
<td>Wall Finish</td>
<td>Glass-fiber reinforced plastic panel</td>
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<td>GWB, paint, Epoxy</td>
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<tr>
<td>Door type/finish</td>
<td>Stainless Steel, Aluminum plate</td>
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<tr>
<td>Door Frame/finish</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Glass-fiber reinforced plastic tile</td>
</tr>
<tr>
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<td>GWB, paint, Epoxy</td>
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#### ADMINISTRATIVE OFFICES

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
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<tbody>
<tr>
<td>Flooring</td>
<td>Carpet, broadloom</td>
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<tr>
<td>Base</td>
<td>Rubber, straight with recess, 4”</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td>Door type/finish</td>
<td>Wood, clear finish (8’-0” door ht. typ)</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Lay-in, ACT Ultima</td>
</tr>
<tr>
<td>Millwork</td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td>Countertops</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Sills/Convector</td>
<td>Solid Surface</td>
</tr>
<tr>
<td>Window Treatments</td>
<td>Shade Cloth, 3% opening</td>
</tr>
<tr>
<td>Storefront</td>
<td>Demountable Partitions</td>
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NYULMC Design Guidelines
## STAFF OFFICES

<table>
<thead>
<tr>
<th>Category</th>
<th>Staff Office Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Flooring</strong></td>
<td>Carpet, broadloom</td>
</tr>
<tr>
<td><strong>Base</strong></td>
<td>Resilient flooring</td>
</tr>
<tr>
<td><strong>Wall Finish</strong></td>
<td>Rubber, straight or cove, 4”</td>
</tr>
<tr>
<td><strong>Door type/finish</strong></td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td><strong>Door Frame type/finish</strong></td>
<td>Wood, clear finish (8'-0” door ht. typ)</td>
</tr>
<tr>
<td><strong>Ceiling Material</strong></td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td><strong>Millwork</strong></td>
<td>Lay-in, ACT, Ultima</td>
</tr>
<tr>
<td><strong>Countertops</strong></td>
<td>Plastic Laminate</td>
</tr>
<tr>
<td><strong>Window Sills/Convector</strong></td>
<td>Solid Surface</td>
</tr>
<tr>
<td><strong>Window Treatments</strong></td>
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## STAFF LOUNGES

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<tr>
<th>Category</th>
<th>Staff Lounge Details</th>
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<tr>
<td><strong>Flooring</strong></td>
<td>Resilient, wood</td>
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<tr>
<td><strong>Base</strong></td>
<td>Rubber flooring</td>
</tr>
<tr>
<td><strong>Wall Finish</strong></td>
<td>Rubber, cove, 4”</td>
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<tr>
<td><strong>Door type/finish</strong></td>
<td>GWB, paint, eggshell finish</td>
</tr>
<tr>
<td><strong>Door Frame type/finish</strong></td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td><strong>Door Protection</strong></td>
<td>Wood, clear finish</td>
</tr>
<tr>
<td><strong>Ceiling Material</strong></td>
<td>Aluminum</td>
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<tr>
<td><strong>Millwork</strong></td>
<td>Stainless Steel</td>
</tr>
<tr>
<td><strong>Countertops</strong></td>
<td>Stainless Steel</td>
</tr>
<tr>
<td><strong>Window Sills/Convector</strong></td>
<td>Lay-in, ACT, Ultima</td>
</tr>
<tr>
<td><strong>Window Treatments</strong></td>
<td>Plastic Laminate</td>
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<td><strong>Window Treatments</strong></td>
<td>Solid Surface</td>
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## LOCKER ROOMS

<table>
<thead>
<tr>
<th>Category</th>
<th>Locker Room Details</th>
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<tbody>
<tr>
<td><strong>Flooring</strong></td>
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</tr>
<tr>
<td><strong>Base</strong></td>
<td>Rubber, cove, 4”</td>
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<tr>
<td><strong>Wall Finish</strong></td>
<td>GWB, paint, eggshell finish</td>
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<tr>
<td><strong>Door type/finish</strong></td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td><strong>Door Frame type/finish</strong></td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td><strong>Door Protection</strong></td>
<td>Stainless Steel</td>
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<tr>
<td><strong>Ceiling Material</strong></td>
<td>Lay-in, ACT Hzone</td>
</tr>
<tr>
<td><strong>Millwork</strong></td>
<td>Plastic Laminate</td>
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<tr>
<td><strong>Countertops</strong></td>
<td>Solid Surface</td>
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<tr>
<td><strong>Window Sills/Convector</strong></td>
<td>Solid Surface</td>
</tr>
<tr>
<td><strong>Window Treatments</strong></td>
<td>Shade Cloth, 3% opening</td>
</tr>
</tbody>
</table>
# MECHANICAL ROOMS

- **Flooring**:Concrete, waterproofing (grey color)
- **Concrete Pads**:Waterproofing to match floor (pad color to be provided by Facilities Operations)
- **Base**:Waterproofing turned up 8”
- **Wall Finish**:CMU preferred, paint, eggshell finish
- **Door type/finish**:HM (solid core) paint, semi-gloss finish
- **Door Frame type/finish**:HM (welded frame), paint, semi-gloss finish
- **Ceiling Material**:Exposed to underside of slab, paint, flat finish

# ELECTRICAL ROOMS

- **Flooring**:Epoxy coating, Tnemec (red color)
- **Concrete pads**:Epoxy coating, Tnemec (yellow color)
- **Base**:Rubber, cove, 6”
- **Wall Finish**:GWB, paint, eggshell finish
- **Door type/finish**:HM (solid core) paint, semi-gloss finish
- **Door Frame type/finish**:HM (welded frame), paint, semi-gloss finish
- **Ceiling Material**:Exposed to underside of slab, painted, flat finish

# SHOPS

- **Flooring**:Resilient, tile, Johnsonite, Cortina Grande
- **Base**:Rubber, cove, 4”
- **Wall Finish**:GWB, paint, eggshell finish
- **Door type/finish**:HM, paint, semi-gloss finish
- **Door Frame type/finish**:HM, paint, semi-gloss finish
- **Door Protection**:Stainless Steel
- **Ceiling Material**:Lay-in, ACT, Ultima

# FOOD PREPARATION

- **Flooring**:Quarry tile
- **Base**:Specialty Sheet, Oscada Plastics
- **Wall finish**:Quarry tile, coved, 6”
- **Door type/finish**:GWB, paint, Epoxy
- **Door frame type/finish**:Integral, 6”
- **Door Protection**:Integral Sanitary cove base
- **Ceiling Material**:GWB, paint, Epoxy
- **Millwork**:Stainless Steel
- **Countertops**:Lay-in, ACT Hzone

# MILLWORK

- **Millwork**:Stainless Steel
- **Countertops**:Solid Surface
- **Stainless Steel**
### Service Elevator Lobby/Service Corridors

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
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<tbody>
<tr>
<td>Flooring</td>
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<td>Terrazzo tile, Floorazzo</td>
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<td>Base</td>
<td>Rubber, cove, 6”</td>
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<td>Wall Finish</td>
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<tr>
<td>Wall Protection</td>
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<td>Door type/finish</td>
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<tr>
<td>Door Frame type/finish</td>
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<tr>
<td>Door Protection</td>
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### Building Services

<table>
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<tr>
<td>Flooring</td>
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<td>Base</td>
<td>Rubber, cove, 4”</td>
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<tr>
<td>Wall Finish</td>
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<td>Door type/finish</td>
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### BDF/IDF Rooms & Data Centers

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<tr>
<td>Door type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Door Frame type/finish</td>
<td>HM, paint, semi-gloss finish</td>
</tr>
<tr>
<td>Ceiling Material</td>
<td>Exposed, underside of slab painted flat finish Lay-in, ACT Ultima</td>
</tr>
</tbody>
</table>
C. MATERIAL LEGEND

The following is a list of recommended manufacturers and products for specific applications.

Use of materials in Clinical versus Non-Clinical spaces is denoted with an * located in both or one of the two columns to the right of the page.

Flooring

<table>
<thead>
<tr>
<th>RESILIENT FLOORING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manuf.</strong></td>
</tr>
<tr>
<td>Patcraft</td>
</tr>
<tr>
<td>Johnsonite</td>
</tr>
<tr>
<td>Johnsonite</td>
</tr>
<tr>
<td>Amtico</td>
</tr>
<tr>
<td>Armstrong</td>
</tr>
<tr>
<td>Mohawk</td>
</tr>
<tr>
<td>Johnsonite</td>
</tr>
<tr>
<td>Johnsonite</td>
</tr>
<tr>
<td>Mannington</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Wood Plank</strong>*</th>
<th><strong>Manuf.</strong></th>
<th><strong>Model / Series</strong></th>
<th><strong>Color / Finish</strong></th>
<th><strong>Remarks</strong></th>
<th><strong>Clinical</strong></th>
<th><strong>Non-Clinical</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amtico</td>
<td>Wood</td>
<td>Varies (See manuf. info)</td>
<td>2.5mm. x 3.5” x 36”</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Centiva</td>
<td>Event or Contour</td>
<td>Varies (See manuf. info)</td>
<td>3mm. x 4” x 36”</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Fre-Plank</td>
<td>Varies (See manuf. info)</td>
<td>3.2mm., sizes vary</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Patcraft</td>
<td>Highland Forest</td>
<td>Varies (See manuf. info)</td>
<td>2.5mm. x 4” x 36”</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Note: All wood planks are to be non-beveled.

<table>
<thead>
<tr>
<th><strong>Floating Floor</strong></th>
<th><strong>Manuf.</strong></th>
<th><strong>Model / Series</strong></th>
<th><strong>Color / Finish</strong></th>
<th><strong>Remarks</strong></th>
<th><strong>Clinical</strong></th>
<th><strong>Non-Clinical</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaw</td>
<td>Grain and Pigment</td>
<td>Varies (See manuf. info)</td>
<td>4mm. x 7” x 48”</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Mannington</td>
<td>Locksolid</td>
<td>Varies (See manuf. info)</td>
<td>4mm. x 4” x 36”</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Patcraft</td>
<td>Click Refresh</td>
<td>Varies (See manuf. info)</td>
<td>5mm. x 7” x 48”</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Manuf.</td>
<td>Model / Series</td>
<td>Color / Finish</td>
<td>Remarks</td>
<td>Clinical</td>
<td>Non-Clinical</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------</td>
<td>----------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>IQ Optima / Acoustifloor</td>
<td>Varies (See manuf. info)</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Acczent</td>
<td>Varies (See manuf. info)</td>
<td>2mm. x 6’-6”</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Armstrong</td>
<td>Medley</td>
<td>Varies (See manuf. info)</td>
<td>2mm. x 6’</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Upo</td>
<td>Zero</td>
<td>Varies (See manuf. info)</td>
<td>2mm. x 4’-9”</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

**Sheet**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mannington</td>
<td>Boardwalk</td>
<td>Varies (See manuf. info)</td>
<td>.080” x 6ft., 9ft., or 12ft.</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Debolon</td>
<td>Comfort</td>
<td>Varies (See manuf. info)</td>
<td>3.3mm. x 6’-7” x 65’-7”</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Mannington</td>
<td>Nature’s Path</td>
<td>Varies (See manuf. info)</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Acczent Wood</td>
<td>Varies (See manuf. info)</td>
<td>.080”T, 6’-6”W</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Polyflor</td>
<td>Forest FX</td>
<td>Varies (See manuf. info)</td>
<td>2mm. x 6’-6”</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Polyflor</td>
<td>Forest RX</td>
<td>Varies (See manuf. info)</td>
<td>7mm. x 6’-6”</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

**Wood Sheet**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscada Plastics**</td>
<td>Protect All</td>
<td>Varies (See manuf. info)</td>
<td>Watertight, 5’ x 5’ or 5’ x 8’ x ¼”T</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

**Note:** For Food Prep Areas: Provide Protect All as a system using Protect All flooring adhesives, fusion base, welding rods, aluminum/stainless steel cove base caps, drain rings and transition strips, steel fasteners, anchors and all other materials required and provided by Oscada for a complete installation.

**Specialty Sheet**

**RUBBER FLOORING**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nora</td>
<td>Environcare</td>
<td>Varies (See manuf. info)</td>
<td>2mm. or 3mm. x 24” x 24” tile</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Nora</td>
<td>Norament Grano</td>
<td>Varies (See manuf. info)</td>
<td>3mm. x 24” x 24”</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Nora</td>
<td>Norament Grano ED</td>
<td>Varies (See manuf. info)</td>
<td>3.5mm. x 24” x 24” (for Sterile Zone in OR)</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Nora</td>
<td>Noraplan Degree</td>
<td>Varies (See manuf. info)</td>
<td>3mm. x 24” x 24”</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Mannington</td>
<td>Colorfields</td>
<td>Varies (See manuf. info)</td>
<td>3mm. x 24” x 24”</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Mesto</td>
<td>Varies (See manuf. info)</td>
<td>2mm. x 12” x 24”</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
### Sheet

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nora</td>
<td>Environcare</td>
<td>Varies</td>
<td>2mm. or 3mm. x 49.2 ft. x 48”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nora</td>
<td>Noraplan Degree</td>
<td>Varies</td>
<td>3mm. x 40”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mannington</td>
<td>Colorfields</td>
<td>Varies</td>
<td>3mm. x 4 ft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mannington</td>
<td>Enlighten</td>
<td>Varies</td>
<td>2mm. x 6’-6”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Arcade</td>
<td>Varies</td>
<td>2mm. or 3mm. x 6 ft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### STATIC DISSIPATIVE TILE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armstrong**</td>
<td>Static Dissipative Tile (SDT)</td>
<td>Varies</td>
<td>12” x 12”</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

**Note:** For BDF / IDF Rooms and Data Centers use Static Dissipative Tile (SDT) installed as a system per manufacturer’s complete specification. Refer to the Information Technology section of these Design Guidelines for additional information.

### CARPET

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadloom Carpet</td>
<td>Tandus</td>
<td>Varies (See manuf. info)</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Shaw</td>
<td>Varies (See manuf. info)</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altas</td>
<td>Varies (See manuf. info)</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Carpet Tile

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tandus</td>
<td>Varies (See manuf. info)</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaw</td>
<td>Varies (See manuf. info)</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### WALK-OFF MAT

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tandus</td>
<td>Abrasive Action II</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mats Inc.</td>
<td>Nomad Matting 5000</td>
<td>Varies (See manuf. info)</td>
<td>Inset mat</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Mats Inc.</td>
<td>Berkshire</td>
<td>Charcoal</td>
<td>Runners</td>
<td>*</td>
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</tr>
</tbody>
</table>

### PORCELAIN TILE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dal-Tile</td>
<td>Veranda Tones</td>
<td>Varies (See manuf. info)</td>
<td>3/8” x 20” x 20”, 13” x 20”</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Dal-Tile</td>
<td>Fabrique</td>
<td>Varies (See manuf. info)</td>
<td>3/8” x 12” x 12”, 12” x 24”</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Dal-Tile</td>
<td>Keystones Color Body Porcelain</td>
<td>Varies (See manuf. info)</td>
<td>Janitor’s Closets</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Dal-Tile</td>
<td>San Michele</td>
<td>Varies (See manuf. info)</td>
<td>3/8”T, sizes vary</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>ASI</td>
<td>Riviera Wood Grain</td>
<td>Varies (See manuf. info)</td>
<td>3/8” x 8” x 48”, 6” x 24”</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Stone Source</td>
<td>Flor Gres Architech</td>
<td>Varies (See manuf. info)</td>
<td>3/8”T, sizes vary</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Stone Source</td>
<td>Provenza Q-Stone</td>
<td>Varies (See manuf. info)</td>
<td>10.5mm. x 12” x 24”, sizes vary</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Stone Source</td>
<td>Atlas Style</td>
<td>Varies (See manuf. info)</td>
<td>3/8”T, sizes vary</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Stone Source</td>
<td>Refin Ceramiche Chromie</td>
<td>Varies (See manuf. info)</td>
<td>3/8”T, sizes vary</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Stone Source</td>
<td>Flor Gres Geotech</td>
<td>Varies (See manuf. info)</td>
<td>3/8”T, sizes vary</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

**QUARRY TILE**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dal-Tile</td>
<td>Quarry Tile</td>
<td>Varies (See manuf. info)</td>
<td>½” x 6” x 6”</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

**STONE TILE**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Varies (See manuf. info)</td>
<td>*</td>
<td>*</td>
<td></td>
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</table>

**TERRAZZO**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom Mix</td>
<td>Varies</td>
<td>Thin set epoxy with zinc dividers, 1/4”, 3/8”, 1/2” thick</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Port Morris Tile and Marble (or approved equal)</td>
<td>Varies</td>
<td>Thin set epoxy with zinc dividers, 3/8” T</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

**CONCRETE COATINGS**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tnemec</td>
<td>Epoxy Coating</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Stonhard</td>
<td>Stontec ERF</td>
<td>2mm. T</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Stonhard</td>
<td>Stonclad UT</td>
<td>6mm. T</td>
<td></td>
<td>*</td>
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</tr>
</tbody>
</table>
## NYULMC Design Guidelines

### Waterproofing

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kemper Systems</td>
<td>Kemperol 2K-PUR</td>
<td></td>
<td>At Mech Rooms – Provide 20-year warranty</td>
<td></td>
<td></td>
</tr>
</tbody>
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### Base

#### RUBBER BASE**

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnsonite</td>
<td>Baseworks cove base</td>
<td></td>
<td>⅜” x 4-3/8” or 6-3/8”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Baseworks base</td>
<td></td>
<td>⅜” x 4-1/4” or 6-1/4”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Perceptions Recess RWDC Toe</td>
<td>Varies (See manufact. info)</td>
<td>1/8” x 4.25”H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Perceptions Recess Toeless</td>
<td>Varies (See manufact. info)</td>
<td>1/8” x 4.25”H</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Note: Comparable Roppe products are acceptable.

#### TRANSITIONS

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tandus</td>
<td>Metal Edge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schluter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### STAINLESS STEEL BASE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom</td>
<td>Custom</td>
<td>Non-directional Stainless Steel</td>
<td>18 Ga, height varies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ALUMINUM WALL BASE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluma Floor</td>
<td>Alloy 5052</td>
<td>Clear anodized with matte finish</td>
<td>0.040” thick, 6” high</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

## PORCELAIN BASE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Varies (See manuf. info)</td>
<td>Cove, to match floor or wall tile</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

## QUARRY BASE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Varies (See manuf. info)</td>
<td>Cove, to match floor tile</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

## INTEGRAL BASE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Varies (See manuf. info)</td>
<td>Cove, seamless, 6” to match floor; backer to prevent puncture</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Nora</td>
<td>Sanitary Cove Base</td>
<td>Varies (See manuf. info)</td>
<td>6” H, coordinate thickness with adjacent floor finish</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

### Wall Finish

#### GWB / PAINT

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benjamin Moore</td>
<td>EcoSpec Silver WB</td>
<td>Finish as scheduled</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

#### WALL COVERING

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie</td>
<td>Xorel</td>
<td>Varies (See manuf. info)</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Carnegie</td>
<td>Vinyl</td>
<td>Varies (See manuf. info)</td>
<td>Breathable back</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Knoll</td>
<td>Vinyl</td>
<td></td>
<td>Breathable back</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Knoll</td>
<td>Olefin</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Design Tex</td>
<td>Vinyl</td>
<td></td>
<td>Breathable back</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Innovations</td>
<td></td>
<td></td>
<td>Breathable back</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Trikes</td>
<td>Vinyl</td>
<td></td>
<td>Microperforated</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
### CERAMIC TILE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dal-Tile</td>
<td>Modern Dimensions</td>
<td>Varies (See manuf. info)</td>
<td>4-1/4” x 8-1/2” Field Tile (or size approved by owner)</td>
<td>•</td>
<td>*</td>
</tr>
</tbody>
</table>

### GLASS TILE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dal-Tile</td>
<td>Color Wave</td>
<td>Varies (See manuf. info)</td>
<td>Accent Tile, sizes vary</td>
<td>•</td>
<td>*</td>
</tr>
<tr>
<td>Stone Source</td>
<td>Glacier</td>
<td>Varies (See manuf. info)</td>
<td>Accent Tile, sizes vary</td>
<td>•</td>
<td>*</td>
</tr>
</tbody>
</table>

### PORCELAIN TILE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stone Source</td>
<td>I Colori</td>
<td>Varies (See manuf. info)</td>
<td>sizes vary</td>
<td>•</td>
<td>*</td>
</tr>
</tbody>
</table>

### PORCELAIN SEALANT

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siltanium</td>
<td></td>
<td></td>
<td>Color bond and applied sealant for restoring existing tile</td>
<td>•</td>
<td>*</td>
</tr>
</tbody>
</table>

### SPECIALTY FINISHES

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFB</td>
<td>Vitruv or Visari</td>
<td></td>
<td>Seamless concrete applied finish</td>
<td>•</td>
<td>*</td>
</tr>
<tr>
<td>Scuffmaster</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

### ACOUSTIC PANELS

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFB</td>
<td>Panel Tex</td>
<td>Varies (See manuf. info)</td>
<td>¾”T Fabric / Carnegie, Xorel or Owner-approved fabric</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Ceilings Plus</td>
<td>Wall Forms</td>
<td>Species vary</td>
<td>Arboreal wood, perforated panels</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

### GLASS/FIBER REINFORCED PANELS

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcoplast</td>
<td>Varies</td>
<td>Varies (See manuf. info)</td>
<td></td>
<td>•</td>
<td></td>
</tr>
</tbody>
</table>
# WALL PROTECTION

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-S Group</td>
<td>Rub Strip, Acrovyn 4000 Series RS-60N</td>
<td>metal, brushed nickel</td>
<td>.060” 9” H finish</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>C-S Group</td>
<td>Crash Rail, ECR 32A/32S/60A</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-S Group</td>
<td>Crash Rail, SCR 1655V</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-S Group</td>
<td>Model P-RWS</td>
<td>Stainless Steel / wood</td>
<td>Stainless Steel crash rail w/ wooden handrail</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3-Form</td>
<td>Varia Ecoresin</td>
<td>Hush Natural + White Out x 2; Grid both sides</td>
<td>3/16” gauge with eased top edge; pattern parallel to 48” side</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3-Form</td>
<td>Varia Ecoresin</td>
<td>Titanium + White Out; Grid both sides</td>
<td>3/16” gauge with eased top edge; material is solid color and non-directional</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>C-S Group</td>
<td>Model CO-8</td>
<td>Stainless Steel</td>
<td>Full Height</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Johnsonite</td>
<td>Millwork Rampart</td>
<td></td>
<td>4”H x 3/8”</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Grainger</td>
<td>Diamond Plate</td>
<td>Alum.</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

## DEMOUNTABLE PARTITIONS

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirtt</td>
<td>Varies</td>
<td>Varies</td>
<td>(See manuf. info)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Clipper Wall</td>
<td>Varies</td>
<td>Varies</td>
<td>(See manuf. info)</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
### Doors

<table>
<thead>
<tr>
<th>HM DOOR</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benjamin Moore</td>
<td>EcoSpec Silver WB</td>
<td>Semi-gloss finish</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WOOD DOOR</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dodge Veneers</td>
<td>Clear Finish</td>
<td>Specifies incl: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bacon Veneer Company</td>
<td>Clear Finish</td>
<td>Specifies incl: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACROVYN DOOR</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C-S Group</td>
<td>Faux wood / metal finish, Color TBD</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALUMINUM DOOR</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Varies</td>
<td>Varies</td>
<td>Brushed Aluminum</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STAINLESS STEEL DOOR</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Varies</td>
<td>Varies</td>
<td>#4 finish</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Varies</td>
<td>Varies</td>
<td>Non-directional</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DOOR PROTECTION</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless Steel</td>
<td>C-S Group</td>
<td>Model KP-SS</td>
<td>#304 16ga. stainless steel</td>
<td>Stainless Steel Kick plate</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

### Door Frames

<table>
<thead>
<tr>
<th>HM DOOR FRAME</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benjamin Moore</td>
<td>EcoSpec Silver WB</td>
<td>Color varies, Semi-gloss finish</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
### ALUMINUM DOOR FRAME

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Brushed Aluminum</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

### STAINLESS STEEL DOOR FRAME

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>#4 finish</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Non-directional</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

### Ceilings

#### LAY-IN CEILING

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armstrong</td>
<td>Ultima Health Zone #1936</td>
<td>9/16” beveled tegular, ¾” x 24” x 24”</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Armstrong</td>
<td>Ultima #1912</td>
<td>9/16” beveled tegular, ¾” x 24” x 24”</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Armstrong</td>
<td>Clean Room VL #868</td>
<td>Unperforated, square lay-in, 5/8” x 24” x 24” w/ 15/16” Co-Extruded Clean Room Grid</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armstrong</td>
<td>Interlude XL HRC</td>
<td>White</td>
<td>9/16”</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armstrong</td>
<td>Woodworks, Linear, Grille or Vector</td>
<td>Beech veneer, clear lacquer finish, fully grooved</td>
<td>Wood ceiling panel, custom sizes as per plans Suspension System: Decoustics Celencio suspension system</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lindner USA</td>
<td>LMD-E Hook on System</td>
<td>Finish: custom makore; direct printed metal faux wood veneer</td>
<td>Custom upturned panel lengths thru-out; 24 ga steel panel micro-perforated with RG 0, 7-4 with mineral wool lined 0.5” alum. honeycomb core; typ panel size 2’ x 3’; 1/8” black neoprene gasket joint on all sides</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
### GWB

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benjamin Moore</td>
<td>EcoSpec Silver WB</td>
<td>Flat finish</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

### Glass / Fiber Reinforced Tile

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcoplast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

### Millwork

#### Plastic Laminate

<table>
<thead>
<tr>
<th>Wood Grain and Solid</th>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilsonart</td>
<td>Varies</td>
<td>Varies</td>
<td>(See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formica</td>
<td>Varies</td>
<td>Varies</td>
<td>(See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pionite</td>
<td>Varies</td>
<td>Varies</td>
<td>(See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nevamar</td>
<td>Varies</td>
<td>Varies</td>
<td>(See manuf. info)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Specialty Material

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Form</td>
<td>Acrylic Resin, Varia Ecoresin</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3-Form</td>
<td>Acrylic Resin, Chroma</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3-Form</td>
<td>Acrylic Resin, Stone</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Lightblocks</td>
<td>Acrylic Panels</td>
<td>Varies (See manuf. info)</td>
<td>Gauge varies, 1/16” – 2” panel thickness available; standard panel size 48” x 96”</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

#### Stainless Steel

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>#4 finish</td>
<td></td>
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</table>

### Wood

<table>
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<tr>
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<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dooge Veneers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Specifies incl: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Bacon Veneer Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Specifies incl: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple</td>
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## Glass Panels

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Bendheim</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Skyline Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Forms and Surfaces</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
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</table>

## Countertops

### SOLID SURFACE

<table>
<thead>
<tr>
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<th>Remarks</th>
<th>Clinical</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Corian</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
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</table>

### ENGINEERED STONE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
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<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caesarstone</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Pionite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
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</table>

## Window Sills

### SOLID SURFACE

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corian</td>
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<td></td>
<td>*</td>
<td>*</td>
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</table>

### PAINTED METAL

<table>
<thead>
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<th>Color / Finish</th>
<th>Remarks</th>
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<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>Varies</td>
<td>Varies (See manuf. info)</td>
<td>Electrostatic Painted Aluminum. Gauge to withstand a person standing on it.</td>
<td>*</td>
<td>*</td>
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</table>

## Wall Panels

### WOOD

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robin Reigi</td>
<td>Plyboo Strand</td>
<td></td>
<td>Species: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Plyboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dooge Veneers</td>
<td></td>
<td></td>
<td>Species: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
### Bacon Veneer Company

Species: Cherry, Anigre, Walnut, Sycamore, Bamboo, Macore, Maple

### SPECIALTY MATERIAL

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Form</td>
<td>Acrylic Resin, Varia Ecoresin</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3-Form</td>
<td>Acrylic Resin, Chroma</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3-Form</td>
<td>Acrylic Resin, Stone</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Lightblocks</td>
<td>Acrylic Panels</td>
<td>Varies (See manuf. info)</td>
<td>Gauge varies, 1/16” – 2” panel thickness available; standard panel size 48” x 96”</td>
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### GLASS PANELS

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<thead>
<tr>
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<th>Color / Finish</th>
<th>Remarks</th>
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<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bendheim</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Skyline Design</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Forms and Surfaces</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
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### Window Treatments

### SHADECLOTH

<table>
<thead>
<tr>
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<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phifer</td>
<td>Sheerweave, Style 2500</td>
<td>1% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Phifer</td>
<td>Sheerweave, Style 2410</td>
<td>3% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Phifer</td>
<td>Sheerweave, Style 2390</td>
<td>5% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Phifer</td>
<td>Sheerweave, Style 4800</td>
<td>Sun Control, 1% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Phifer</td>
<td>Sheerweave, Draper Sunbloc</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Mechoshade</td>
<td>Ecoviel, 0950 Series</td>
<td>1% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Mechoshade</td>
<td>Ecoviel, 1550 Series</td>
<td>3% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Mechoshade</td>
<td>Ecoviel, 1350 Series</td>
<td>5% openness</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Mechoshade</td>
<td>Equinox, 0100 Series</td>
<td>Black out</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
### SHEERS

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knoll</td>
<td>trevira</td>
<td></td>
<td></td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Carnegie</td>
<td></td>
<td></td>
<td></td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Maharam</td>
<td></td>
<td></td>
<td></td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

### Cubicle Track

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-S Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

1. Cubicle Tracks: C/S Cubicle Curtains #6062 surface-mounted tracks of heavy extruded aluminum alloy 6063-T5, 1-⅜” x ¾”, slotted to receive roller carriers, complete with accessories and components required for complete and secure installations including splicers, end caps and corner bends.  
- Corner Bends: Shall have a 12” radius fabricated in one continuous “L” shape.  
- Finish: Clear anodized aluminum.  

2. Qwik Switch Safety Loading Unit: Tracks are to be provided with a Qwik Switch safety loading unit, hinged unit of track, to allow for safe removal of curtains from the track without the use of a ladder or step stool. Hinge unit of track, when lowered, is to bring the track end and curtains down to four feet above the finished floor so curtain can be removed from the carriers.  
- Provide one Qwik Switch unit for each run of track.  
- Qwik Switch unit to include: Hinge, Locking unit, and Latch.  
- Provide one Qwik Switch Release Wand for every 20 units of track.  

3. Carriers: C-S Cubicle Curtains 1062N, virgin nylon axle with nylon wheels complete with nickel-plated brass bead-chain and hook assembly.  
- Provide one carrier for each 6” of cubicle curtain width  

*
### Cubicle Curtains (provide 100% attic stock)

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arc Com</td>
<td>Nami</td>
<td>AC-33101</td>
<td>Tisch Hospital and HJD Patient Rooms</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Color: Surf #2</td>
<td>Tisch Hospital 12 West</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Carnegie</td>
<td>Canopy</td>
<td>4238</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Maharam</td>
<td>Progression</td>
<td>Color: 009</td>
<td>Pediatric Areas</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Arc Com</td>
<td>Woodland</td>
<td>AC-32762</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Color: Spring #3</td>
<td>ED Adult Treatment Areas</td>
<td></td>
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<tr>
<td>Arc Com</td>
<td>Papillion-X</td>
<td>AC-33190</td>
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<tr>
<td></td>
<td></td>
<td>Color: Spring</td>
<td>ED Pediatric Treatment Areas</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

**Fabrication:** Top hem to be 1-½” wide triple thick & reinforced with permanent, washable type buckram. Side and bottom hems to be ½” wide double thick. Nickel plated brass grommets to be machined 6” on center. Vertical seams to be double needle lock stitched. Where mesh is specified, mesh to finish 20” high. All curtain widths are expressed in feet, height in inches. In addition, all curtain widths are cut size. Finished width after side hems and vertical seams will be smaller. Length specified is finished length including mesh, if any. Fabric joined to mesh with double hem stitch construction. Matching fabric ½” band where mesh and curtain are joined in back. Sides of curtains to have matching fabric on edges. Curtains are supplied with weights in the bottom. Curtains are to come tagged with size and location for ease of maintenance when removing for cleaning. Curtain length shall be 10” – 12” off the floor.

### Shower Curtains (provide 100% attic stock)

<table>
<thead>
<tr>
<th>Manuf.</th>
<th>Model / Series</th>
<th>Color / Finish</th>
<th>Remarks</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varies</td>
<td>100% trevira</td>
<td>Varies</td>
<td>No mesh, weighted bottom, 10” off floor</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

(See manuf. info)
PAINT COLORS

In order to create and maintain a consistent brand and allow appropriate maintenance at NYU Langone spaces, there are specific paint colors we utilize. The list below will give the Design Team a sense of the preferred color palettes at NYU Langone and also help inform the interior finish selections. The typical wall colors and ceiling colors must be from the list below (i.e. “Off-Whites” and “Ceiling White”). Accent colors other that those listed will be considered if it is deemed necessary by the RED+F Design Studio. Only Benjamin Moore, no VOC products shall be used (e.g. Natura, Eco Spec, etc.)

Note: The color swatches shown in the tables below are for reference only. Design Team shall obtain actual BM color swatches for design use, material presentation and approval.

Typical Logo and Pathway Colors

<table>
<thead>
<tr>
<th>NYU Purple</th>
<th>Green Pathway</th>
<th>Yellow Pathway</th>
<th>Blue Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Mystical Grape BM #: 2071-30 Pantone #: 2597C</td>
<td>Name: Cat’s Eye BM #: 2036-10</td>
<td>Name: Jack o’Lantern BM #: 2156-30</td>
<td>Name: Santa Monica Blue BM #: 776</td>
</tr>
</tbody>
</table>

Typical Paint Colors

<table>
<thead>
<tr>
<th>Ceiling White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Decorator’s White BM #: PM-3</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Off Whites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Seapearl BM #: 961</td>
</tr>
<tr>
<td>Name: White Sand BM #: 964</td>
</tr>
<tr>
<td>Name: White Down BM #: 970</td>
</tr>
<tr>
<td>Name: Putnam Ivory BM #: HC-39</td>
</tr>
<tr>
<td>Off Whites (Cont’d)</td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Name:</strong> Revere Pewter</td>
</tr>
<tr>
<td><strong>BM #:</strong> HC-172</td>
</tr>
<tr>
<td>Color</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>Purples</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Yellows</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Earth Tones</td>
</tr>
<tr>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Grays</td>
</tr>
<tr>
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</tbody>
</table>
ARTS PROGRAM

NYU Langone Medical Center has embarked on a comprehensive visual arts program of the highest quality consistent with our vision of being a world-class academic medical center. The NYU Langone Medical Center Art Program and Collection is integrated into the daily life of the Medical Center providing a life-affirming, healing and supportive environment for patients, families, caregivers, students, faculty and staff. This is achieved through acquisitions, exhibitions, donations of art and other related visual arts programming. Acquisitions meet overall quality standards with the aim that the art collection appreciates in value over time.

1. Importance of Art in a Healthcare Environment

- Over the past decade, art has become an integral component in healthcare environments. As indicated in the State of the Field Report: Arts in Healthcare/2009 survey, nearly half of all healthcare institutions reported having arts in healthcare programs with the majority of these in hospital settings. Studies have shown that these programs improve patients’ overall health outcomes, treatment compliance and quality of life, and foster a positive environment for caregivers that reduces stress and improves workplace satisfaction and employee retention.

2. Means of Selecting Art

- Art is identified and acquired through gallery visits, studio visits, recommendations as provided by museum curators, art critics and contemporary art historians and Calls to Artists as posted on visual art websites (New York Foundation for the Arts, Public Arts Network, etc.)
3. Capital Construction Projects

Many capital construction projects provide excellent opportunities to integrate art into the design of these new facilities.

- Emphasis will focus on public spaces with higher visibility resulting in greater impact.
- For patient areas, the inclusion and placement of artwork will be a calming distraction.
- Placement of artwork will also support wayfinding efforts.
- Goal is to create a singular vision and identity throughout an individual project through selection and placement of artwork.
- Selection of site-specific artwork will involve input from user-groups occupying the space.
- Art will be selected from a range of artists, from emerging to established.

4. Architect’s Responsibilities

The Design Team has certain responsibilities pertaining to the location and placement of art in a project including but not limited to the following:

- At the conclusion of Design Development, the architect will work with the Arts Manager, Project Manager and users to identify potential locations for art.
- The Design Team shall provide drawings sufficient to identify proposed art locations including plans, elevations and perspectives.
- The Design Team will be responsible for keeping any walls that have been identified for the artwork integration, free and clear of any and all electrical devices, room and directional signage, or other potentially distracting items. This includes electrical outlets, telephone/data outlets, light switches, thermostats, fire strobes, furniture, equipment, etc.
- The Design Team shall ensure the art has proper lighting.

Art by Tom Christopher, Photo by Rene Perez
ROOM NUMBERING, SIGNAGE & WAYFINDING

The architect is required to use RED+F’s assigned room numbers and provide full design services related to signage and wayfinding. The NYU Langone Wayfinding and Communications Standards Manual is available to the Design Team. The manual specifies each signage type approved for use at NYU Langone facilities located at the main campus. For off-campus projects, the Design Team shall follow these guidelines in conjunction with any building landlord requirements.

1. **Architect’s Responsibilities**

   - The architect shall submit the signed-off floor plans to the Space Planning and Management group at RED+F who shall assign the room numbers. The architect shall insert these room numbers on the drawings. RED+F will not accept any other room numbers shown on the documents.
   - Present signage design options to the Signage and Wayfinding group at RED+F.
   - Produce signage documents that include sign types and message schedules for review and approval by the Signage and Wayfinding group at RED+F.
   - Review and approve shop drawings. Shop drawings are also to be forwarded to the RED+F Signage and Wayfinding group for their review and approval.
   - Punchlist signage.
   - Final acceptance of the signage in conjunction with the Signage and Wayfinding group at RED+F.

The signage design package can be created by the Architect, a pre-approved signage consultant or one of the NYU Langone approved signage vendors.
2. **Sign Planning and Programming Process**

There are five groups of signs comprising the NYU Langone system: identification, directional, informational, regulatory, and pageantry. Before programming a facility’s signs, the complete sign typology (contained within the NYU Langone Wayfinding and Communications Standards Manual) should be understood by the Signage programmer. The following outlines a step-by-step approach for sign planning and programming.

- **Analysis** - The programmer should keep in mind two distinct points of view when planning and programming signs: the literal activities of the end-users, and the perspective of first-time visitors. It is essential that a programmer not only know the architectural layout, but imagine day-to-day operations and activities within the space. It is highly recommended that the sign programmer(s) meet with end-users to review and learn how the facility will function. The programmer should explore and examine various visitor scenarios, and locate wayfinding decision points (both clear and obscure) along arrival and departure routes. Consider the route distances and turns from start to end point. Typical questions to ask: Where are the restricted-access areas, and for what reasons? Who are the visitors, and for what purposes? What kind of sign types are needed, and where? Typical deliverables should include: A list of assumptions and observations; Preliminary location diagram, sorted by sign type.

- **Visualization of the Space** - The programmer should imagine a “visitor-eye-view” through the department. The programmer should build comprehension of the architectural character of the visitor experience, of walking the hallways, facing inhibited sightlines or seeking visual landmarks. High and low-ceiling space should be noted, along with wall position and angle, both on first entry and closer approach. The programmer should visualize the look and feel of the spaces, and identify optimum sign locations for decision points, avoiding obstacles. If possible, the programmer should suggest the architect revisit particular design details to accommodate sign locations. Typical questions to ask: Are doors or walls opaque or transparent? What color is the wall finish behind reception, and how tall? Typical deliverables should include: Preliminary message schedule; Sign location diagram; Mock elevation renderings (for high-profile sign types located in lobbies).

- **Programming Documentation & Clarification** - The programmer should issue documents for sign vendors to produce message layouts and shop drawings. Draft documents should be submitted to both the end-user representative, and the Signage and Wayfinding group at RED+F for approval and comments. A unique sign number shall designate: floor/location ID (if applicable) - designation ID - sign type ID. Typical questions to ask: What is the proper name of the facility? Are there any donor recognition signs? Typical deliverables should include: Message schedule; Signage location plan; Signage quantity list; Site specific custom signage detail elevations (if requested).
PLUMBING FIXTURES

In order to create and maintain a consistent brand and allow appropriate maintenance at NYU Langone spaces, specific plumbing fixtures are used. The list below will give the Design Team a sense of the typical fixtures used at NYU Langone facilities. It is the Architect’s responsibility to select items that are code compliant and appropriate for the capital project based on the type of space and end-user needs. Architects shall coordinate with the RED+F Project Manager, Facilities Operations and the Design Studio to finalize fixture selections. Please note the following items are preferred over others:

- Automatic faucets are preferred over manual faucets in public restrooms.
- Undercounter lavatories are preferred over wall-hung lavatories in public restrooms.
- Touchless flushometers are preferred over manual flush valves.
- Floor mounted toilets are preferred over wall mounted toilets.

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1a</td>
<td>Toilet</td>
<td>Sanwalton</td>
<td>3484 / White Vitreous China</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

**Location:** Restrooms

**Remarks:** Floor mounted toilet w/ back outlet, back spud, and elongated bowl; 14-1/2” high

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<tr>
<th>Image</th>
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<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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</thead>
<tbody>
<tr>
<td>P1b</td>
<td>Toilet (ADA Compliant)</td>
<td>American Standard</td>
<td>Huron 3312.001 / White Vitreous China</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

**Location:** Restrooms

**Remarks:** Floor mounted toilet w/ back outlet, top spud, and elongated bowl w/ Everclean surface; 17-1/8” high; ADA-compliant

<table>
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<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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</thead>
<tbody>
<tr>
<td>P1c</td>
<td>Toilet (Bariatric &amp; ADA-Compliant)</td>
<td>American Standard</td>
<td>Huron 3342.001 / White Vitreous China</td>
<td>*</td>
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</tbody>
</table>

**Location:** Restrooms

**Remarks:** Floor mounted toilet w/ back outlet, back spud, and elongated bowl w/ integral seat and Everclean surface; 17-1/8” high; recommended for bariatric use; ADA-compliant
<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2a</td>
<td>Urinal</td>
<td>Zurn</td>
<td>Z5799 / White Vitreous China</td>
<td>*</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Location: <em>Varies</em></td>
<td>Remarks: Wall mounted urinal w/ ¾” back spud</td>
</tr>
<tr>
<td>P2b</td>
<td>Urinal</td>
<td>Zurn</td>
<td>Z5759 Retrofit Pint / White Vitreous China</td>
<td>*</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Location: <em>Varies</em></td>
<td>Remarks: Wall mounted retrofit urinal w/ ¾” back spud</td>
</tr>
<tr>
<td>P3a</td>
<td>Automatic Flush Valve (Top &amp; Back Spud Toilets)</td>
<td>Toto</td>
<td>Ecopower TET2GN Series/Stainless Steel</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Preferred</strong></td>
<td></td>
<td></td>
<td>Location: <em>Public Restrooms (ADA-compliant)</em></td>
<td>Remarks: Concealed electronic flushometer for toilets w/ 14” x 12” cover plate, hydropower self-generating system, 1” angle stop and 1-1/2” vacuum breaker set, 24-hr automatic flush for trap seal protection; 1.6 gpf or less; available in back spud floor (TET2GN33#SS) and top spud (TET2GN32#SS); manual override to be mounted at ADA height</td>
</tr>
<tr>
<td>P3b</td>
<td>Automatic Flush Valve (Urinal)</td>
<td>Toto</td>
<td>Ecopower TEU2UN11 / Satin Stainless Steel</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Preferred</strong></td>
<td></td>
<td></td>
<td>Location: <em>Public Restrooms (ADA-compliant)</em></td>
<td>Remarks: Concealed electronic flush valve for urinals w/ ¾” back spud, vacuum breaker, hydropower self-generating system; manual override to be mounted at ADA height</td>
</tr>
<tr>
<td>P3c</td>
<td>Automatic Flush Valve (Top Spud Toilets Only)</td>
<td>American Standard</td>
<td>Selectronic 6065.323.007 / 6065.363.007</td>
<td>*</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Location: <em>Public Restrooms (ADA-compliant)</em></td>
<td>Remarks: Concealed automatic flushometer for toilets w/ top spud, battery operated, manual override mounted at ADA height # 6065.323.007 – 1.28 gpf # 6065.363.007 – 1.6 gpf</td>
</tr>
<tr>
<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
<td>Clinical</td>
<td>Non-Clinical</td>
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<tr>
<td>P3d</td>
<td>Automatic Flush Valve (Urinal)</td>
<td>American Standard</td>
<td>Selectronic 6063.501.007</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
|       | **Location:** *Public Restrooms (ADA-compliant)*  
Remarks: Concealed automatic flush valve for urinals w/ ¾” back spud, mounted at ADA height |
| P3e   | Automatic Flush Valve (Back Spud Toilets Only) | American Standard | Selectronic 6065.262.007     | *        | *            |
|       | **Location:** *Back Spud Toilets w/ Bedpan Washers*  
Remarks: Concealed, sensor operated Selectronic flush valve for toilets (w/ rear access) w/ 1-1/2” concealed back spud bowls; battery operated; manual override to be mounted at ADA height |
| P3f   | Automatic Flush Valve (Top Spud Toilets Only) | American Standard | Selectronic / 6066.121.002 / 6066.161.002 | *        | *            |
|       | **Location:** *Restrooms*  
Remarks: Exposed, sensor-operated flush valve for toilets w/ 1-1/2” top spud bowls; w/ extended battery life  
#6066.121.002 – 1.28 gpf  
#6066.161.002 – 1.6 gpf |
| P3g   | Manual Flush Valve (Top Spud Toilets Only) | American Standard | Flowise 6047.121.002         | *        | *            |
|       | **Location:** *Restrooms*  
Remarks: Exposed, manual operation flush valve for toilets w/ top spud, 1.28 gpf |
| P4a   | Bedpan Washer                        | Meiko           | Topline 30WC DT NDV RH ADA   | *        | *            |
|       | **Location:** *Patient Rooms (mounted above toilet)*  
Remarks: 480V model, flush mount, mounted above toilet; shall meet NYC Plumbing Code requirements and UL Listings; #4 Stainless Steel finish;  
provide cutout for flushometer P3e sensor  
Note: Coordination with and shop drawings provided by Meiko are required |
<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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<tbody>
<tr>
<td>P4b</td>
<td>Bedpan Washer</td>
<td>Meiko</td>
<td>Topline 30 DT NDV RH</td>
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<td></td>
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<td></td>
<td>Location: <em>Periop and NIBS Internal Toilets to all Patient Rooms, Soiled Workrooms</em> Remarks: 480V model, flush mount; shall meet all NYC Plumbing Code requirements and UL Listings; #4 Stainless Steel finish</td>
<td></td>
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</tr>
<tr>
<td>P4c</td>
<td>Bedpan Washer w/ Flushing Rim Sink</td>
<td>American Standard</td>
<td>Clinic Service Sink 9512.999.020</td>
<td>*</td>
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<tr>
<td></td>
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<td>Location: <em>Soiled Utility and Environmental Services</em> Remarks: Wall hung clinic service sink w/ blow-out flushing rim and 1-1/2&quot; top inlet; Provide stainless steel guard American Std #7832512.075; Provide bedpan cleanser; use faucet P4d and flush valve P4e shown below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P4d</td>
<td>Faucet</td>
<td>American Standard</td>
<td>8355.101</td>
<td>*</td>
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<tr>
<td></td>
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<td>Location: <em>Soiled Utility and Environmental Services</em> Remarks: Exposed yoke, wall-mounted utility faucet w/ bottom fork brace; provide vandal resistant wrist blade handles; use with bedpan washer P4c</td>
<td></td>
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<tr>
<td>P4e</td>
<td>Flush Valve (Bedpan Washer)</td>
<td>Sloan</td>
<td>Royal 117H</td>
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<td></td>
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<td>Location: <em>Soiled Utility and Environmental Services</em> Remarks: Exposed, diaphragm type, chrome plated, service sink flushometer; use with bedpan washer P4c</td>
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<tr>
<td>P5a</td>
<td>Sink</td>
<td>American Standard</td>
<td>Ovalyn 9482.000 / White Vitreous China</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Location: <em>Restrooms</em> Remarks: Undercounter mount sink w/ overflow, ADA-compliant</td>
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<tr>
<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
<td>Clinical</td>
<td>Non-Clinical</td>
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<tr>
<td>P5b</td>
<td>Sink</td>
<td>Kohler</td>
<td>Caxton K-2210 / White Vitreous China</td>
<td>*</td>
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<td></td>
<td><strong>Location:</strong> Restrooms <strong>Remarks:</strong> Undercounter mount sink w/ overflow, ADA-compliant</td>
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<tr>
<td>P5c</td>
<td>Sink</td>
<td>Kohler</td>
<td>Ladena K2214/ White Vitreous China</td>
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<td><strong>Location:</strong> Restrooms <strong>Remarks:</strong> Undercounter mount sink w/ overflow, ADA-compliant</td>
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<tr>
<td>P5d</td>
<td>Sink</td>
<td>Kohler</td>
<td>Verticyl K-2881-0 (Oval)</td>
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<td>*</td>
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<td><strong>Location:</strong> Restrooms <strong>Remarks:</strong> Undercounter mount sink w/ overflow, ADA-compliant</td>
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<td></td>
<td></td>
<td></td>
<td>Verticyl K-2882-0 (Rectangular)</td>
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<td></td>
<td></td>
<td>Verticyl K-2883-0 (Round)</td>
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<tr>
<td>P5e</td>
<td>Sink</td>
<td>Willis</td>
<td>8252 / 8254 Corian</td>
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<td><strong>Location:</strong> Restrooms <strong>Remarks:</strong> Integral Corian solid surface undercounter mount sink, coordinates w/ Corian solid surface vanity tops for seamless, easy-to-clean surface; sink w/ overflow, ADA-compliant</td>
<td></td>
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</tr>
<tr>
<td>P5f</td>
<td>Sink</td>
<td>Lavanto</td>
<td>Ventura C76100 / Corian</td>
<td>*</td>
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<td><strong>Location:</strong> Exam Room <strong>Remarks:</strong> Integral Corian solid surface sink, seam-mount installation to countertop, coordinates w/ Corian solid surface vanity tops; sink w/ overflow, ADA-compliant</td>
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<tr>
<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
<td>Clinical</td>
<td>Non-Clinical</td>
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<tr>
<td>P5g</td>
<td>Sink</td>
<td>Custom Integral</td>
<td>Solid Surface / Corian</td>
<td>*</td>
<td>*</td>
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<td></td>
<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<td></td>
<td>Remarks: Integral Corian sink w/ overflow; coordinates w/ Corian vanities of various shapes (i.e. corner); w/ and w/o backsplash</td>
<td></td>
</tr>
<tr>
<td>P5h</td>
<td>Sink (Double Bowl)</td>
<td>Custom Integral</td>
<td>Stainless Steel</td>
<td>*</td>
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<td></td>
<td>Location: <strong>Soiled Rooms, Procedure Rooms, Decontamination</strong></td>
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<td></td>
<td></td>
<td>Remarks: Integral stainless steel double bowl sink w/ 8” centerset</td>
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<tr>
<td>P5i</td>
<td>Sink</td>
<td>Kohler</td>
<td>Soho K2084</td>
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<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<td></td>
<td>Remarks: Wall hung sink w/ overflow less soap dispenser hole; drilled for concealed arm carrier; single center hole; ADA-compliant</td>
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<tr>
<td>P5j</td>
<td>Sink</td>
<td>Kohler</td>
<td>K-2053 / White Vitreous China</td>
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<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<td></td>
<td></td>
<td>Remarks: Wall hung sink w/ overflow less soap dispenser hole; drilled for concealed arm carrier; 8” centers; ADA-compliant</td>
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<tr>
<td>P5k</td>
<td>Sink</td>
<td>American Standard</td>
<td>Lucerne 0355 / 0356 White Vitreous China</td>
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<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<td></td>
<td></td>
<td>Remarks: Wall hung sink w/ overflow; faucet hole configurations vary (see manufacturer spec)</td>
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<tr>
<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
<td>Clinical</td>
<td>Non-Clinical</td>
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<tr>
<td>PSI</td>
<td>Sink</td>
<td>American Standard</td>
<td>ICS Sink 9118.150 / White Vitreous China</td>
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</tbody>
</table>
|       |             |                   | **Location:** *Entryway of Inpatient Rooms*  
Remarks: Wall hung sink w/ permanent Everclean surface; includes offset grid drain and P-trap w/ Saniguard coating; use faucet P7d |          |              |
|       |             |                   | **Location:** *Restrooms*  
Remarks: Wall hung sink w/ overflow, Everclean surface; faucet hole configurations vary (see manufacturer spec); ADA-compliant |          |              |
| P5m   | Sink        | American Standard | Murro / White Vitreous China | *        |              |
|       |             |                   | **Location:** *Restrooms*  
Remarks: Wall hung sink w/ overflow, Everclean surface; faucet hole configurations vary (see manufacturer spec); ADA-compliant |          |              |
| P5n   | Sink        | Duravit           | Stark 3 #030055 / White | *        |              |
|       |             |                   | **Location:** *Restrooms*  
Remarks: Wall hung sink w/ overflow; faucet hole configurations vary (see manufacturer spec); not ADA-compliant when combined w/ coordinating pedestal, siphon cover or metal console |          |              |
| P5o   | Sink        | Lacava            | Block 4500 / White Porcelain | *        |              |
|       |             |                   | **Location:** *Restrooms*  
Remarks: Wall hung sink w/o overflow; available w/o faucet hole or single faucet hole only; -compliant |          |              |
| P5p   | Sink        | Elkay             | ELVWO2219 / Satin Stainless Steel | *        |              |
|       |             |                   | **Location:** *Laboratories*  
Remarks: Wall hung sink w/ overflow; faucet hole configurations vary (see manufacturer spec); ADA-compliant |          |              |
<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
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<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5q</td>
<td>Sink (Handwash)</td>
<td>Elkay</td>
<td>LRAD / Satin Stainless Steel</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
|       | **Location:** Nourishment / Treatment Rooms / Staff Lounges / Playrooms / Pantry  
**Remarks:** Self-rimming drop in sink w/ grid drain; faucet and drain hole configurations vary (see manufacturer spec); ADA-compliant |
| P5r   | Sink (Large/Deep) | Elkay  | DLR191910 / Satin Stainless Steel | *        |              |
|       | **Location:** MEDS / Treatment / POCT / Inpatient Dietary / Pantry  
**Remarks:** Drop in sink w/o overflow; faucet hole configurations vary (see manufacturer spec) |
| P5s   | Utility Sink  | Elkay  | PLA8136 / Satin Stainless Steel | *        |              |
|       | **Location:** Aquarium Equipment Room  
**Remarks:** Freestanding laundry/utility sink; use faucet P7o |
| P5t   | Mop Sink     | Just Mfg. | C2523 / Satin Stainless Steel | *        |              |
|       | **Location:** Building Services (Patient Floors)  
**Remarks:** Floor mounted mop sink; use faucet P7n |
| P5u   | Mop Sink     | Just Mfg. | A47699 / Satin Stainless Steel | *        |              |
|       | **Location:** Building Services (Procedure Floors)  
**Remarks:** Floor mounted mop sink; use faucet P7n |
<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5v</td>
<td>Mop Sink</td>
<td>Eagle Group</td>
<td>F1916 / Stainless Steel</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
|       | **Location:** Building Services
|       | **Remarks:** Floor mounted mop sink |
| P6a   | ADA Undersink P-Trap Covers  | Plumbing Supply.com | ProeXtreme Series                | *        | *            |
|       | **Location:** Typical Throughout
|       | **Remarks:** ADA-compliant undersink P-Trap cover w/ snap lock fasteners; model and accessories TBD based on sink selection |
| P7a   | Faucet                       | Sloan            | EAF 250-ISM CP / Polished Chrome  | *        | *            |
|       | **Location:** Restrooms       |
|       | **Remarks:** Battery powered, sensor activated, electronic hand washing faucet for pre-tempered or hot and cold water operation; ADA-compliant |
| P7b   | Faucet                       | American Standard| 6053.105 w/ mixing valve          | *        | *            |
|       | **Location:** Restrooms       |
|       | **Remarks:** NYC DOH Article 28 compliant
Self-closing, thermal mixing faucet, w/ laminar flow and 12-hour auto purge; long-life battery powered; ADA-compliant |
| P7c   | Faucet                       | American Standard| 7053.205 / 7053.215               | *        | *            |
|       | **Location:** Restrooms       |
|       | **Remarks:** Self-closing, thermal mixing faucet w/ 12-hour auto purge, laminar flow and side mixer; long-life battery powered; ADA-compliant
#7053.205 – 0.5 gpm
#7053.215 – 1.5 gpm |
<table>
<thead>
<tr>
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<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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</thead>
<tbody>
<tr>
<td>P7d</td>
<td>Faucet</td>
<td>American Standard</td>
<td>Selectronic IC Faucet 6053.193 w/ mixing valve 605XTMV</td>
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<td>*</td>
</tr>
<tr>
<td><strong>Location:</strong> Entryway of Inpatient Rooms</td>
<td><strong>Remarks:</strong> Self-closing, thermal mixing faucet; 12-hour auto purge, laminar flow; w/ long-life battery power; for use w/ ICS Sinks</td>
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<tr>
<td>P7e</td>
<td>Faucet</td>
<td>Kohler</td>
<td>K-7516 / Stl Stl or Polished Chrome</td>
<td>*</td>
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</tr>
<tr>
<td><strong>Location:</strong> Restrooms</td>
<td><strong>Remarks:</strong> Single hole mounting electronic faucet w/ vandal-resistant aerator, available w/ and w/o mixer, less drain, 0.5 gpm; ADA-compliant</td>
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<tr>
<td>P7f</td>
<td>Manual Faucet (Metering)</td>
<td>Chicago Faucets</td>
<td>3500-E2805ABCP / Polished Chrome</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Location:</strong> Restrooms</td>
<td><strong>Remarks:</strong> Single hole, self-closing, manual, metering faucet w/ vandal proof non-aerating spray; 0.5 GPM; ADA-compliant</td>
<td></td>
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</tr>
<tr>
<td>P7g</td>
<td>Faucet</td>
<td>Blanco</td>
<td>Alta 157-067 / Stl Stl or Polished Chrome</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Location:</strong> Pantry</td>
<td><strong>Remarks:</strong> Single hole, manual kitchen faucet; 2.2 gpm</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>P7h</td>
<td>Faucet</td>
<td>Elkay</td>
<td>LK3000 / Polished Chrome</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Location:</strong> Pantry</td>
<td><strong>Remarks:</strong> Manual kitchen faucet w/ remote lever handle; 1.5 – 2.2 gpm flow regulators included; ADA-compliant</td>
<td></td>
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<tr>
<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
<td>Clinical</td>
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</tr>
<tr>
<td>P7i</td>
<td>Faucet</td>
<td>American Standard</td>
<td>Heritage 7400.172H-L10</td>
<td>*</td>
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<td></td>
<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
<td></td>
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<tr>
<td></td>
<td>Remarks: NYC DOH Article 28 compliant</td>
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<tr>
<td></td>
<td>Two-handle, centerset, gooseneck spout lavatory faucet w/ wrist blades, laminar flow, 1.5 gpm; ADA-compliant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P7j</td>
<td>Faucet</td>
<td>American Standard</td>
<td>Monterey 7545.170 w/ A15LV outlet</td>
<td>*</td>
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<tr>
<td></td>
<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<tr>
<td></td>
<td>Remarks: Two-handle, centerset, gooseneck spout lavatory faucet, 1.5 gpm w/ pressure compensating vandal proof aerator; ADA-compliant</td>
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<tr>
<td>P7k</td>
<td>Faucet</td>
<td>American Standard</td>
<td>Monterey 6545.170 w/ A15LV outlet</td>
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<td></td>
<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<td></td>
<td>Remarks: NYC DOH Article 28 compliant</td>
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<tr>
<td></td>
<td>Two-handle, 8&quot; widespread lavatory faucet w/ vandal proof wrist blades and gooseneck spout, 1.5 gpm w/ pressure compensating vandal proof aerator; ADA-compliant</td>
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<tr>
<td>P7l</td>
<td>Faucet</td>
<td>Chicago</td>
<td>786-GN2FCCP</td>
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<tr>
<td></td>
<td>Location: <strong>Handwash Areas / Restrooms</strong></td>
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<tr>
<td></td>
<td>Remarks: Deck mounted sink faucet w/ 8&quot; fixed centers, concealed hot and cold water, 4&quot; vandal proof wrist blades, 1.5 gpm laminar flow; ADA-compliant</td>
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<tr>
<td>P7m</td>
<td>Faucet</td>
<td>T &amp; S Brassworks</td>
<td>B-1152</td>
<td>*</td>
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<tr>
<td></td>
<td>Location: <strong>Procedure Floor / Decontamination</strong></td>
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<tr>
<td></td>
<td>Remarks: Deck mounted w/ rigid swing nozzle aerator, wrist blades and 4-ft stainless steel hose w/ spray valve</td>
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<td>Image</td>
<td>Description</td>
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<td>Model/Finish</td>
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<tr>
<td>P7n</td>
<td>Faucet</td>
<td>Chicago</td>
<td>897-RCF w/ 317-PRJKCP Wrist blades / Stainless Steel</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Building Services (Patient and Procedure Floors)</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Wall mounted manual faucet w/ 8” body, adjustable arms, vandal proof lever handles, vacuum breaker spout w/ pail hook and wall brace; ADA-compliant</td>
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<tr>
<td>P7o</td>
<td>Faucet</td>
<td>Fiat</td>
<td>830-AA</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Aquarium Equipment Room</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Chrome plated service faucet w/ vacuum breaker, integral stops, adjustable wall brace, pail hook and ¼” hose thread on spout, body inlets 8” center to center, four arm handles</td>
<td></td>
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<tr>
<td>P8a</td>
<td>Shower</td>
<td>Moen</td>
<td>52236GBM15 w/ Moen 8370 mixing valve / Chrome Plated</td>
<td>*</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Patient Rooms and Staff Showers (ADA)</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Single function, handheld shower w/ stainless steel slide grab bar, mounted at ADA height, w/ non-positive cut off button and plastic hose; ADA-compliant</td>
<td></td>
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<td></td>
<td>* order w/ extra clips</td>
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</tr>
<tr>
<td>P8b</td>
<td>Shower</td>
<td>Moen</td>
<td>52716EP15 w/ Moen 8370 mixing valve</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Non-ADA Staff Showers</td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Fixed mount, vandal resistant showerhead</td>
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<tr>
<td>P9a</td>
<td>Supply Box</td>
<td>Acorn</td>
<td>M 8196-E501-LL</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Patient Rooms</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Side opening door w/ hinge on right, brass piping and valve, brass ball valve, door shall be <em>less logo</em>; provide quick connect parts 1295-006-000 and 1295-007-000; cold water only; provide gasket b/w door and box; provide vacuum breaker on water supply</td>
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<tr>
<td>Image</td>
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<tr>
<td>P9b</td>
<td>Supply Box</td>
<td>Acorn</td>
<td>PVC 8196-LLG</td>
<td>*</td>
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</tr>
<tr>
<td></td>
<td><strong>Location:</strong> <em>Instrument Washers</em></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Side opening door w/ hinge on right; PVC piping and valve; PVC ball valve; RO water only</td>
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<thead>
<tr>
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<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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</thead>
<tbody>
<tr>
<td>P10a</td>
<td>Drinking Fountain (Hi/Low Combo)</td>
<td>Filtrine</td>
<td>107-16-HL-TM-BF-VP / Satin Stainless Steel</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Location:</strong> <em>Varies</em></td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Vandal proof drinking fountain w/o chiller, w/ bottle filler, integral water filter and bubbler; ADA-compliant</td>
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<thead>
<tr>
<th>Image</th>
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<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10b</td>
<td>Drinking Water Cooler</td>
<td>Halsey Taylor</td>
<td>SCWT-14A-VR-Q / Stainless Steel</td>
<td>*</td>
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<tr>
<td></td>
<td><strong>Location:</strong> <em>Loading Dock</em></td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Self-contained, electric refrigerated, free-standing water dispenser w/ integral water filter</td>
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<thead>
<tr>
<th>Image</th>
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<tbody>
<tr>
<td>P10c</td>
<td>Water Dispenser</td>
<td>Quench</td>
<td>740</td>
<td>*</td>
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<tr>
<td></td>
<td><strong>Location:</strong> <em>Pantry</em></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Free-standing high capacity bottleless water cooler w/ hot, cold and room-temperature water; ultraviolet sanitization; 5-stage activated carbon filter; high-capacity stainless steel tank (Overall dimensions: 13”w x 13”d x 44”h)</td>
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<tr>
<th>Image</th>
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<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10d</td>
<td>Water Dispenser</td>
<td>Nestle</td>
<td>0-68274-39102-6 (Silver)</td>
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<td></td>
<td><strong>Location:</strong> <em>Pantry</em></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Free-standing water hot and cold water bottled dispenser w/ child resistant hot spigot, stainless steel hot tank, polypropylene cold tank, adjustable cold temperature and on/off switch for hot tank</td>
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<td></td>
<td><strong>Note:</strong> Coordination required w/ Facilities Operations regarding bottled water delivery.</td>
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**EMERGENCY PLUMBING FIXTURES**

In order to create and maintain a consistent brand and allow appropriate maintenance at NYU Langone spaces, specific emergency fixtures are used. The list below will give the Design Team a sense of the typical fixtures used at NYU Langone facilities. It is the Architect’s responsibility to select items that are code compliant and appropriate for the capital project based on the type of space and end-user needs. Architects shall coordinate with the RED+F Project Manager, Facilities Operations and the Design Studio to finalize fixture selections.

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<th>Image</th>
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<th>Model/Finish</th>
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<tbody>
<tr>
<td>E1a</td>
<td>Eyewash/Drench Hose</td>
<td>Guardian</td>
<td>G5026-FSH-VB</td>
</tr>
<tr>
<td></td>
<td>Remarks: Wall mounted combination eyewash and drench hose w/ stainless steel hose and in-line vacuum breaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1b</td>
<td>Eyewash/Drench Hose</td>
<td>Guardian</td>
<td>G5022-FSH-VB</td>
</tr>
<tr>
<td></td>
<td>Remarks: Deck mounted combination eyewash and drench hose w/ stainless steel hose and in-line vacuum breaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1c</td>
<td>Eyewash/Drench Hose</td>
<td>Water Saver</td>
<td>EW1022-BP/Stainless Steel and PVC</td>
</tr>
<tr>
<td></td>
<td>Remarks: Deck mounted combination eyewash and drench hose w/ PVC hose, stainless steel lever handler and backflow preventer</td>
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<tr>
<td>E2a</td>
<td>Eyewash/Shower</td>
<td>Water Saver</td>
<td>SSBF2152 / Brushed Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>Remarks: Recessed barrier-free eye/face wash and shower safety station w/ ceiling mounted exposed shower head and drain pan; ADA-compliant</td>
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<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
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</tr>
<tr>
<td>E2b</td>
<td>Eyewash/Shower</td>
<td>Guardian</td>
<td>GBF2452 / Brushed Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>Remarks: Recessed barrier-free eye/face wash and shower safety station for use in clean rooms (ideal for use in semiconductor, electronics and pharmaceutical applications); unit comes w/ ceiling mounted exposed shower head and drain pan; ADA-compliant</td>
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</tr>
<tr>
<td>E2c</td>
<td>Emergency Shower</td>
<td>Guardian</td>
<td>G1629 SE-575-SD-238-FLW-SSH</td>
</tr>
<tr>
<td></td>
<td>Remarks: Emergency shower for recess mounting in finished ceiling or soffit, w/ stay-open ball valve; shower activated by rigid pull rod</td>
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<tr>
<td>E3a</td>
<td>Supply Box</td>
<td>Acorn</td>
<td>M8195-E501-LL</td>
</tr>
<tr>
<td></td>
<td>Location: Emergency Preparedness</td>
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<tr>
<td></td>
<td>Remarks: Side opening door w/ hinge on right, brass piping and valve, brass ball valve; door shall be <em>less logo</em>; provide quick connect parts 1295-006-000 and 1295-007-000; cold and hot water; provide gasket b/w door and box; provide vacuum breaker on water supply</td>
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</table>
**TOILET ACCESSORIES**

In order to create and maintain a consistent brand and allow appropriate maintenance at NYU Langone spaces, specific toilet accessories are used. The list below will give the Design Team a sense of the typical items used at NYU Langone facilities. It is the Architect’s responsibility to select items that are code compliant and appropriate for the capital project based on the type of space and end-user needs. Architects shall coordinate with the RED+F Project Manager, Facilities Operations and the Design Studio to finalize product selections. Please note the following items are preferred over others:

- Electric hand dryers are preferred over manual paper towel dispensers.
- Recessed accessories are preferred over surface mounted / semi-recessed accessories.

**Abbreviations**

- OFCI: Owner-Furnished, Contractor-Installed
- CFCI: Contractor-Furnished, Contractor-Installed

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<tr>
<th>Image</th>
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<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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<tbody>
<tr>
<td>T1a</td>
<td>Toilet Compartments</td>
<td>Bradley</td>
<td>Series 700 / #4 Satin Brushed Stl Stl</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
|       | **Location:** Restrooms  
       | **Remarks:** Floor-to-ceiling mount w/ heavy duty stainless steel hardware and locking mechanisms (CFCI) |
| T2a   | Urinal Screens | Bradley | Model #5 / #4 Satin Brushed Stl Stl |  |
|       | **Location:** Restrooms  
       | **Remarks:** Wall hung w/ continuous bracket (CFCI) |
| T3a   | Toilet Paper Dispenser (Single) | Bobrick |  B-6697 / Satin Stainless Steel | * |  |
|       | **Location:** Restrooms  
<pre><code>   | **Remarks:** Recessed, single roll, toilet paper dispenser w/ hood for stud walls and countertop aprons (CFCI) |
</code></pre>
<table>
<thead>
<tr>
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<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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<tbody>
<tr>
<td>T3b</td>
<td>Toilet Paper Dispenser (Double)</td>
<td>Georgia Pacific</td>
<td>56798 / Stainless Steel</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
| **Location:** Restrooms  
**Remarks:** Surface mounted compact side-by-side double roll toilet paper dispenser (OFCI) |
| T3c   | Toilet Paper Dispenser (Double) | Georgia Pacific | 56782 / Stainless Steel | * |
| **Location:** Restrooms  
**Remarks:** Surface mounted compact vertical double roll toilet paper dispenser (OFCI) |
| T3d   | Toilet Paper Dispenser (Double) | Bobrick | B-4288 / Satin Stainless Steel | * |
| **Location:** Restrooms  
**Remarks:** Surface mounted, vertical double roll toilet paper dispenser (CFCI) |
| T3e   | Toilet Paper Dispenser (Double) | Bobrick | B-386 / Satin Stainless Steel | * |
| **Location:** Restrooms  
**Remarks:** Partition mounted, dual-sided, multi-roll toilet paper dispenser; serves 2 toilet compartments (CFCI) |
| T3f   | Toilet Paper Disp. / Sanitary Disposal | Bobrick | B-3094 / Satin Stainless Steel | * |
| **Location:** Restrooms  
**Remarks:** Recessed, double roll toilet paper dispenser and sanitary napkin disposal unit (CFCI) |
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<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
</table>
| T4a   | Sanitary Napkin Disposal | Bobrick | B-4353 / B-4354  
Satin Stainless Steel | * | * |
| **Location:** Restrooms  
**Remarks:**  
B-4353 – Recessed sanitary napkin disposal w/ self-closing door (CFCI)  
B-4354 – Partition-mounted sanitary napkin disposal w/ self-closing door; mounted back-to-back to serve 2 compartments (CFCI) |
| T4b   | Sanitary Napkin Disposal | Bobrick | B-354 / B-35303  
Satin Stainless Steel | * | * |
| **Location:** Restrooms  
**Remarks:**  
B-35303 – Recessed sanitary napkin disposal (CFCI)  
B-354 – Partition-mounted sanitary napkin disposal; mounted back-to-back to serve 2 compartments (CFCI) |
| T4c   | Sanitary Napkin Disposal | Bobrick | B-270 /  
Satin Stainless Steel | * | * |
| **Location:** Restrooms  
**Remarks:** Surface mounted sanitary napkin disposal (CFCI) |
| T5a   | Toilet Seat Cover Dispenser | Bobrick | B-221 / B-3013  
Satin Stainless Steel | * | * |
| **Location:** Restrooms  
**Remarks:**  
B-221 – Surface mounted toilet seat cover dispenser (CFCI)  
B-3013 – Recessed toilet seat cover dispenser (CFCI) |
| T6a   | Grab Bars | Bobrick | B-6806 /  
Satin Stainless Steel | * | * |
| **Location:** Restrooms / Tubs / Showers  
**Remarks:** Stainless steel grab bars w/ concealed mounting flanges and snap flange covers; shapes and sizes vary (CFCI)  
B-68137 /  
Satin Stainless Steel  
B-6861 /  
Satin Stainless Steel  
B-68616 /  
Satin Stainless Steel | * | * |
<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T7a</strong></td>
<td>Coat Hook (Single)</td>
<td>Bradley</td>
<td>9114 / Satin Stainless Steel</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
| Location: Restrooms  
Remarks: Surface mounted single hook; locate (2) on back of toilet stall doors; (1) at 48” AFF; (1) at 64” AFF; provide vandal resistant escutcheons (CFCI) |
| **T7b** | Coat Hooks (Multiple) | Peter Pepper | 2141 / 2141XL Natural Anodized Alum. | * | * |
| Location: Varies  
Remarks: 2141 – (3) hooks on flush plate; surface mounted (CFCI)  
2141XL – (5) hooks on flush plate; surface mounted (CFCI) |
| **T8a** | Hand Dryer | Palmer | Blustorm 2 HD 0955-09 / Stainless Steel | * | * |
| Location: Restrooms  
Remarks: Automatic, touchless, recessed, ADA-compliant hand dryer made of stainless steel (CFCI)  
Note: All hand dryers to be mounted no further than 24” away from edge of sink. |
| **Preferred** |
| **T8b** | Hand Dryer | Dyson | Airblade V / Sprayed Nickel | * | * |
| Location: Restrooms  
Remarks: Automatic, touchless, surface mounted, ADA-compliant hand dryer made of molded plastic; 4” projection (CFCI)  
Note: All hand dryers to be mounted no further than 24” away from edge of sink. |
| **T8c** | Hand Dryer | Bobrick | B-7128 / No.4 Satin Stl Stl w/ black trim | * | * |
| Location: Restrooms  
Remarks: Automatic, touchless, surface mounted, ADA-compliant hand dryer w/ satin stainless steel cover and black trim; 4” projection (CFCI)  
Note: All hand dryers to be mounted no further than 24” away from edge of sink. |
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<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
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</thead>
<tbody>
<tr>
<td>T9a</td>
<td>Soap Dispenser (Hands Free)</td>
<td>Gojo</td>
<td>TFX Series</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
|       | **Location:** Restrooms / Handwash Areas  
Remarks: Surface mounted, touchfree, ADA-compliant soap dispenser; provide plastic drip guard if mounted above floor (OFCI @ Tisch Hospital / Kimmel; CFCI all other locations)  
Model # TFX-2789-12 / Nickel Finish  
Model # TFX-2799-12-EEU00 / Brushed Metallic Finish  
Note: Soap dispenser to be mounted over sink / vanity directly adjacent to sink for diminished dripping. |           |                       |          |              |
| T9b   | Soap Dispenser               | ASI        | 5002 / Stainless Steel Type 304 | *        | *            |
|       | **Location:** Restrooms  
Remarks: Recessed, ADA-compliant, cartridge soap dispenser (CFCI)  
Note: Soap dispenser to be mounted over sink / vanity directly adjacent to sink for diminished dripping. |           |                       |          |              |
| T10a  | Baby Changing Station        | Bobrick    | KB110-SSWM / Satin Stainless Steel | *        | *            |
|       | **Location:** Restrooms  
Remarks: Horizontal, wall mounted, stainless steel baby changing station (CFCI) |           |                       |          |              |
| T11a  | Door Tissue                  | Georgia Pacific | Safe-T-Gard Dispenser S9503 / Stainless Steel | *        | *            |
|       | **Location:** Restrooms  
Remarks: Surface mounted toilet door tissue dispenser; mount near toilet room exit door; provide Rubbermaid stainless steel waste receptacle below (OFCI) |           |                       |          |              |
| T12a  | Mirror                       | Electric Mirror | Fusion Lighted Mirror FUS – size varies (w/ glass shelf) | *        |              |
|       | **Location:** Restrooms  
Remarks: Surface mounted lighted mirror; size varies; electrical power should be controlled by light switch (CFCI) |           |                       |          |              |
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<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>T12b</td>
<td>Frameless Mirror</td>
<td>Contractor Furnished</td>
<td>Custom</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
| **Location**: Restrooms  
**Remarks**: Frameless mirror, sizes and configurations vary, frameless glass to be flush w/ tile and installed prior to tile (CFCI) |
| T12c  | Mirror | Bradley | 781 / Bright Annealed Stainless Steel | * | * |
| **Location**: Restrooms  
**Remarks**: Surface mounted mirror w/ roll-formed channel frame and theft-resistant mounting; sizes vary (CFCI)  
**Note**: To be used only when frameless mirror is not feasible. |
| T13a  | Shelf | Bradley | 7510 / Satin Stainless Steel | * | * |
| **Location**: Restrooms  
**Remarks**: Surface mounted, 10” deep shelf, lengths vary (CFCI) |
| T14a  | Folding Shower Seat | Bradley | 9562 / 9569 White Phenolic Seat, Stl Stl Frame | * |  |
| **Location**: Showers (ADA)  
**Remarks**: 9562 – Folding shower seat, ADA-compliant (CFCI)  
9569 – Reversible folding shower seat, ADA-compliant (CFCI) |
| T15a  | Mop and Broom Holder | Bradley | 9953 / 9954 / 9955 Satin Stainless Steel | * | * |
| **Location**: Building Services  
**Remarks**: 9953 – Surface mtd mop and broom holder w/ (3) holders, 24” long (CFCI)  
9954 – Surface mtd mop and broom holder w/ (4) holders, 36” long (CFCI)  
9955 – Surface mtd mop and broom holder w/ (5) holders, 48” long (CFCI) |
BUILDING ACCESSORIES

In order to create and maintain a consistent brand and allow appropriate maintenance at NYU Langone spaces, specific building accessories are used. The list below will give the Design Team a sense of the typical items used throughout NYU Langone facilities. It is the Architect’s responsibility to select items that are code compliant and appropriate for the capital project based on the type of space and end-user needs. Architects shall coordinate with the RED+F Project Manager, Facilities Operations and the Design Studio to finalize product selections. Please note the following items are preferred over others:

- Recessed accessories are preferable where possible.

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
<th>Manuf.</th>
<th>Model/Finish</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1a</td>
<td>Trash Receptacle (Half-Round)</td>
<td>Rubbermaid</td>
<td>FG SH12SS PL-12 Gallon / Stainless Steel</td>
<td>*</td>
<td>*</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Public Areas and Restrooms</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Freestanding, open top, half round trash receptacle w/ plastic liner; no plastic bag option available, made from heavy-gauge, fire-safe steel; fits against walls to conserve space</td>
<td></td>
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<tr>
<td>B1b</td>
<td>Trash Receptacle (Rectangular)</td>
<td>Rubbermaid</td>
<td>FG SR14RB-25 Gallon / Stainless Steel</td>
<td>*</td>
<td>*</td>
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<tr>
<td></td>
<td>* FG SR14PL-13 Gallon / Stainless Steel</td>
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<td></td>
<td><strong>Location:</strong> Public Areas and Restrooms</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Freestanding, open top, trash receptacle w/ plastic liner, made from heavy-gauge, fire-safe steel</td>
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<td></td>
<td>* For Toilet Rooms at NYU Langone use 13 Gallon</td>
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<tr>
<td>B1c</td>
<td>Trash Receptacle (Square)</td>
<td>Rubbermaid</td>
<td>FG SC14RB-24 Gallon / Stainless Steel</td>
<td>*</td>
<td>*</td>
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<td></td>
<td>FG SC14PL-16 Gallon / Stainless Steel</td>
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<td></td>
<td><strong>Location:</strong> Public Areas and Restrooms</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Freestanding, open top, trash receptacle w/ plastic liner, made from heavy-gauge, fire-safe steel</td>
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<td></td>
<td>FG SC18RB-29 Gallon / Stainless Steel</td>
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<td></td>
<td>FG SC18PL-20 Gallon / Stainless Steel</td>
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<td></td>
<td>FG SC22RB-50 Gallon / Stainless Steel</td>
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<tr>
<td></td>
<td>FG SC22PL-40 Gallon / Stainless Steel</td>
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<td>Image</td>
<td>Description</td>
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<tr>
<td>B1d</td>
<td>Space Saver Trash/Recycling Receptacle</td>
<td>Magnuson Group</td>
<td>Sotare - SO1809 Left / Right – 14 Gallon / Anodized Silver</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Location:</strong> Public Areas</td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Order appropriate labels for “Trash” / “Recycling” separately</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B1e</td>
<td>Trash Receptacle (Round)</td>
<td>Cleanline</td>
<td>CLEANLINE.39.TL – 39 Gal. / #304 Stl Stl</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>CLEANLINE.20.TL – 20 Gal. / #304 Stl Stl</td>
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<td></td>
<td><strong>Location:</strong> Public Areas</td>
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<td></td>
<td><strong>Remarks:</strong> Order appropriate labels for “Recycling” separately</td>
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</tr>
<tr>
<td>B1f</td>
<td>Recyling Receptacle (Round)</td>
<td>Cleanline</td>
<td>CLEANLINE.39.ES-39 Gallon / #304 Stainless Steel</td>
<td>*</td>
<td>*</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Public Areas</td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Order appropriate labels for “Recycling” separately</td>
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<tr>
<td>B1g</td>
<td>Open Trash Can</td>
<td>Global Industrial</td>
<td>Rubbermaid RCP WB30R8-7.5 Gallon / Black ABS Plastic</td>
<td></td>
<td>*</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Office / Workstation / Laboratory</td>
<td></td>
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<td></td>
<td><strong>Remarks:</strong> Rectangular 4.2 Gallon capacity = 7.5 x 10.75 x 12.25 in.</td>
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<td></td>
<td>Rectangular 7.5 Gallon capacity = 8.5 x 15 x 13.75 in.</td>
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<td></td>
<td>Round 5 Gallon capacity = 15 x 15 x 10 in.</td>
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<tr>
<td>B2a</td>
<td>Purell Dispenser</td>
<td>Gojo</td>
<td>GOJ 2780-12 / Nickel w/ Shield Protector 2762-06</td>
<td>*</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>GOJ 2790-12 / Metallic w/ Shield Protector 2760-06</td>
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<tr>
<td></td>
<td><strong>Location:</strong> Clinical Public Areas</td>
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<td></td>
<td><strong>Remarks:</strong> Surface or stand mounted; capacity 1200 ml.</td>
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<td>Image</td>
<td>Description</td>
<td>Manuf.</td>
<td>Model/Finish</td>
<td>Clinical</td>
<td>Non-Clinical</td>
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<tr>
<td>B2b</td>
<td>Purell Floor Stands</td>
<td>Gojo</td>
<td>2423-DS / Matte Silver</td>
<td></td>
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<tr>
<td></td>
<td><strong>Location:</strong> <em>Clinical Public Areas</em></td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Stand for antibacterial dispenser; use with B2a dispensers</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B3a</td>
<td>Trash / Laundry Grommet (Round)</td>
<td>Doug Mockett</td>
<td>TM2C / Stl Grommet w/ TM2C / Satin Stl Stl Liner</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Location:</strong> <em>Built-in Trash / Laundry Receptacles</em></td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> 8” dia. X 3” deep trash grommet w/ TM2C grommet liner / Satin Stainless Steel finish</td>
<td></td>
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</tr>
<tr>
<td>B3b</td>
<td>Trash / Laundry Chute (Square)</td>
<td>Doug Mockett</td>
<td>TM2A/SQ Stl Trash Mgr w/ TM2/SQ Stl Stl Grommet Liner</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Location:</strong> <em>Built-in Trash / Laundry Receptacles</em></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> 8” square x 6” deep</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>B4a</td>
<td>Umbrella Stand</td>
<td>Medium in Motion</td>
<td>Bono / Satin Stainless Steel</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Location:</strong> <em>Near exterior entry doors</em></td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Dual umbrella wrapper stand</td>
<td></td>
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</tr>
<tr>
<td>B5a</td>
<td>Fire Extinguisher Cabinet</td>
<td>JL Industries</td>
<td>Embassy Series / #4 Stainless Steel</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Embassy Series / Painted*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td><strong>Location:</strong> <em>Locate as required by code</em></td>
<td></td>
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<tr>
<td></td>
<td><strong>Remarks:</strong> Trimless decorative recessed cabinet (std. paint grade white interior finish) w/ door thickness projecting 7/8” beyond face of adjacent wall surface, ADA compliant, w/ vertical duo panel, zinc pull, (provide w/ lock in all psychiatric and pediatric areas; no lock all others) stainless steel door finish typical</td>
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<td></td>
<td><strong>Note:</strong> Acceptable under certain design conditions only, subject to RED+F approval. painted door finish to match adjacent wall color.</td>
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</table>
DOOR HARDWARE

Instructions to Architects for preparing a hardware specification.

A. It shall be the Architect’s responsibility to follow these NYU Langone door hardware guidelines with no exceptions on all projects located on the main campus. For projects that are located off-campus, the architect shall follow these guidelines in conjunction with the building landlord’s requirements (if any).

B. It shall be the Architect’s responsibility to coordinate all work with NYU Langone Security, Fire Alarm, and Infant Abduction System (if applicable) Vendors and associated NYU Langone personnel. Where power and control is required to electrical hardware that is not being furnished by the Security Vendor, the Architect and/or the Electrical Engineer shall provide wiring diagrams for all hardware specified in the Finish Hardware Section of the Specification. It shall also be the Architect’s responsibility to provide a sequence of operations for all automatic doors for all scenarios (i.e.: daytime, nighttime, upon activation of fire alarm, etc.).

C. Where automatic operators are specified, it shall be the Architect’s responsibility to coordinate all power and control to the automatic operators and accessories (proximity readers, paddles, intercom systems, etc.), including logic for tie-in to fire alarm and infant abduction systems. The Architect and/or the Electrical Engineer shall provide wiring diagrams that show all wiring and power requirements to the automatic operator and accessories. The Architect shall include in the specifications that the automatic operator shall be furnished and installed by an authorized Stanley distributor. The same automatic operator provider & installer shall also furnish and install all electronic locking hardware, as may be required, for all automatic operated doors.

D. The Architect shall include in the specification a paragraph stating that the GC is responsible for setting up a pre-installation meeting between the hardware installer, the automatic door vendor and the security vendor to coordinate installation of all trades.

E. The standard specifications listed below are a guideline only. It shall be the Architect’s responsibility to conform to all appropriate building code requirements.
Contents

1.1 Hanging Devices
   A. Full Mortise Hinges
   B. Swing Clear Hinges
   C. Lead Lined Pivots
   D. Center Pivots
   E. Continuous Hinges
   F. Full Mortise Hinges

1.2 Locking and Latching Devices
   A. Mortise Locks and Latches
   B. Cylinders & Keying
   C. Cylindrical Locks at Existing Doors
   D. Combination Locks
   E. Hospital Push Pull Latches
   F. Exit Devices
   G. Electric Locks

1.3 Door Closing Devices
   A. Surface Mounted Door Closers
   B. Floor Closers
   C. Coordinating Door Closers

1.4 Door Stops
   A. Wall and Floor Stops
   B. Overhead Stops

1.5 Protection Plates
   A. Kick Plates
   B. Mop Plates
   C. Armour Plates

1.6 Flush Bolts
   A. Manual Flush Bolts
   B. Automatic Flush Bolts

1.7 Automatic Operators

1.8 Card Access Doors
   A. Mortise Locks and Latches
   B. Cylinders & Keying
   C. Cylindrical Locks at Existing Doors

2.1 Typical Hardware Sets

2.2 Typical Electrical Hardware Sets
1.1 Hanging Devices

A. Full Mortise Hinges:

1. Unless otherwise noted, all doors shall be hung on full mortise five knuckle ball bearing type, template hinges, with non-rising loose pins. All out-swing doors shall be furnished with non-removable pins (NRP).

   a. All hinges for 1-3/4" thick doors shall be 4-1/2" wide in the open position. For other thickness doors, hinges shall be of a width to permit unobstructed swing of the doors.

   b. Size and weight of hinges shall conform to the following:

      Up to 36" --------------- 4-1/2" heavy weight
      Over 36" to 46" ------ 5" heavy weight
      Over 46" ------------ Zero Continuous Hinges 910DBAA

   c. Quantity of hinges shall be provided to conform to the following:

      Doors up to 60" in height ------------ 2 hinges
      Doors 60" to 90" in height ----------- 3 hinges
      Doors 90" and over ---------------- 1 hinge every 30" in height

   d. Approved Manufacturers: No other manufacturer’s products are approved.

      PBB: Standard Duty BB81/51 series and Heavy Duty 4B81/51 series.


B. Swing Clear Hinges:

1. Unless otherwise noted, all patient room doors and doors that will receive heavy cart traffic shall be furnished with heavy weight full mortise five knuckle ball bearing type, template swing clear hinges.

   a. Size and weight of hinges shall conform to the following:

      All Doors --------- 5" heavy weight
b. Quantity of hinges shall be provided to conform to the following:

- Doors up to 60” in height ----------- 2 hinges
- Doors 60” to 90” in height ----------- 3 hinges
- Doors 90” and over ---------------- 1 hinge every 30” in height

c. Approved Manufacturers: No other manufacturer’s products are approved.

- PBB: Heavy Duty SC4B81-5”
- Stanley: Heavy Duty FBB268-5”
- McKinney: Heavy Duty T4B3795-5”

C. Lead Lined Pivots:

1. Unless otherwise noted, all lead lined doors shall be furnished with lead lined top and bottom pivots including lead lined intermediate pivots.

   a. Quantity of intermediate pivots shall be provided to conform to the following:

   - Doors up to 84” in height ----- 1 intermediate pivot
   - Doors 84” and over ----------- 1 intermediate pivot every 30” in height

b. Approved Manufacturers: NO SUBSTITUTIONS.

   Rixson: ML 19-26D.

D. Center Hung Pivots:

1. Unless otherwise noted, all patient toilet doors that swing into the toilet and require emergency hardware shall be furnished with a top and bottom center pivot. The bottom pivot leg shall be mortised into the frame. Where marble saddles are being installed, the bottom pivot shall be installed on top of the marble saddle.

   a. Approved Manufacturers: NO SUBSTITUTIONS.

      Rixson: 127 ¾ x US26D.
E. Continuous Hinges:

1. Unless otherwise noted, all continuous hinges shall be heavy gauge aluminum alloy with self-lubricating bearings.
   
a. Approved Manufacturers: NO SUBSTITUTIONS.
      
      Roton: 780 series

1.2 Latching and Locking Devices

A. Mortise Locks and Latches:

1. Unless otherwise noted, all latchsets and locksets shall be heavy duty mortise type conforming to ANSI A156.13 Grade 1. Furnish a wrought steel box strike and a curved lip strike with each unit. All locksets are to be ordered less cylinder.
   
a. Approved Manufacturers: NO SUBSTITUTIONS.
      
      Sargent: 8200 series x LL lever and rose x US26D.

b. Lock Functions are as follows:
   
   Office Function: Sargent 8205 x LL x US26D.
   
   Passage Function: Sargent 8215 x LL x US26D.
   
   Privacy Function: Sargent 49-8265 x LL x US26D.
   (Specify at all single gang public toilets, staff toilets and all patient toilets)
   
   Privacy Function: Sargent 8265 x LL x US26D.
   (Specify at all single gang patient toilets within patient bedrooms)
   
   Classroom Function: Sargent 8237 x LL x US26D.
   
   Storeroom Lock: Sargent 8204 x LL x US26D.

B. Cylinders and Keying:

1. Unless otherwise noted, all cylinders shall be keyed to the existing ASSA large format interchangeable core keying system. The hardware supplier shall furnish all cylinders and temporary brass construction cores. The NYU Langone Lock Shop will furnish and install all permanent cores. The hardware supplier shall furnish 5 control keys and 5 construction keys to be used during construction. It shall be the GC/Hardware supplier’s responsibility to return the temporary cores to the manufacturer.
***Contractor shall provide and install temporary cores as work requires; NYU Langone locksmith shall provide all permanent ASSA cylinders upon completion of the work. ***

a. Approved Manufacturers: NO SUBSTITUTIONS.

ASSA: Keyed to the existing NYU Langone key system.

C. Cylindrical Locks at Existing Doors:

1. Unless otherwise noted, where new locksets/passage sets are to be installed in existing doors that have a cylindrical lock preparation, furnish a Yale AU5400 series x US26D. Lock function is to match existing lock function.

a. Approved Manufacturers: NO SUBSTITUTIONS.

Yale: AU5400 x 1210-less core series x US26D.

D. Combination Locks:

1. Unless otherwise noted, furnish combination locks at all soiled and clean utility rooms, staff locker and staff work rooms, on-call rooms and other spaces as requested by the user of the space. Key as directed by the NYU Langone Lock Shop.

a. Approved Manufacturers: NO SUBSTITUTIONS.

ALARM LOCK: DL2700-T2 x Schlage C Keyway x US26D.

E. Hospital Push Pull Latches:

1. Unless otherwise noted, furnish hospital push pull latch at all patient bedroom doors and other spaces as requested by the user of the space. Mount both paddles down (except for OR’s). Backset to be 2 ¾”.

a. Approved Manufacturers: NO SUBSTITUTIONS.

Glynn Johnson: HL6 x US26D.
F. Exit Devices:

1. Unless otherwise noted, all exit devices to be Von Duprin 98 series, rim, mortise or surface vertical rod. Concealed vertical rod devices will not be permitted.

2. Where electrified exit devices are required for interface with security or automatic operators, furnish Von Duprin EL (electric latch retraction), Quiet Electrified Latch (QEL) and RX (request to exit) features. The use of a Von Duprin EPT10 (power transfer) and a PS873 series (power supply) is required.
   a. Approved Manufacturers: NO SUBSTITUTIONS.
      Von Duprin: 98 series x US26D.

G. Electrical Locks:

1. Unless otherwise noted, electric locks shall be specified at all card access doors. Electric strikes may be permitted in certain applications. Electric locks shall be mortise type complying with 1.2A as listed above. Electric locks shall be specified to have a built-in request to exit switch.

2. The Architect shall include in their documents all wiring, power and control required to the electric lock and interface to other electrical equipment.

3. The Architect shall specify a fail secure lock typically (with a manual key over-ride). When a door is required to unlock in a fire condition or loss of power, specify a fail-safe electric lock.
   a. Approved Manufacturers: NO SUBSTITUTIONS.
      Sargent: 8270RX (Fail Safe) x LL x 24VDC x US26D.
      Sargent: 8271RX (Fail Secure) x LL x 24VDC x US26D.

1.3 Door Closing Devices

A. Surface Mounted Door Closers:

1. Unless otherwise noted, all surface mounted door closers shall meet ANSI A156.4 Grade 1 requirements. All closers shall be barrier free with a delayed action feature. Furnish all required brackets, filler plates and any others items required to ensure proper installation and operation.
2. All surface mounted door closers shall be installed so that closer bodies are positioned on room-side of doors to and from corridors, (i.e. in-swing doors shall be regular arm). Out-swing doors shall have a parallel arm. Regular arm shall be used in connecting doors between rooms.

a. Approved Manufacturers: NO SUBSTITUTIONS.

LCN: 4040XP-RW PA-689

LCN: 4040XP-HW PA 689 HOLD OPEN

LIFE SAFETY CLOSER SHALL BE LCN: 4040SE-24V

b. Surface Mounted Door Closers shall be specified as follows:

Regular Arm Mount: used on doors that swing into a space. The door closer will mount on the pull side of the door, 4040XCP.

Parallel Arm Mount: used on doors that swing out of a space. The door closer will mount on the push side of the door, 4040XP.

Regular Arm Mount with built-in stop: used on doors that swing into a space, where an auxiliary stop cannot be used. The door closer will mount on the pull side of the door, 4040XP.

Parallel Arm Mount with built-in stop: used on doors that swing out of a space, where an auxiliary stop cannot be used. The door closer will mount on the push side of the door, 4040 XP.

B. Floor Closers:

1. Floor closers shall only be used where it is virtually impossible for a surface mounted closer to be used. Approval from NYU Langone must be received before specifying floor closers. Floor closers may be used without approval on all glass doors.

a. Approved Manufacturers: NO SUBSTITUTIONS.

RIXSON: 28 AHO/NHO 26D
C. **Coordinating Door Closers:**

1. Furnish coordinating door closers at all doors where a standard coordinator would be used with automatic flush bolts or constant latching flush bolts. Standard coordinators will not be permitted.

   a. Approved Manufacturers: NO SUBSTITUTIONS.

   GLYNN JOHNSON: FB 31P-26D

1.4 **Door Stops**

A. **Wall and Floor Stops:**

1. Unless otherwise noted, all door stops shall be wall mounted type, Trimco 1270WV series. Furnish appropriate concealed fasteners as required. Where wall stops cannot be installed, furnish Trimco W1211 floor stops.

   a. Approved Manufacturers: No other manufacturer’s products are approved.

   Trimco, Rockwood and Ives.

B. **Overhead Stops:**

1. Unless otherwise noted, furnish overhead stops at doors where wall or floor stops will not work. Furnish a Rixson 2 series x US32D for all hollow metal doors and Rixson 1 series for all heavy duty doors.

   a. Approved Manufacturers: No other manufacturer’s products are approved.

   Rixson and Glynn Johnson.

1.5 **Protection Plates**

A. **Kick Plates:**

1. Unless otherwise noted, furnish kick plates on all doors, with the exception of closet doors within rooms. Kick plates shall be 16” high x 2” less than door width x .050 thick x beveled three sides.

   a. Approved Manufacturers: No other manufacturer’s products are approved.

   Trimco, Rockwood and Ives.
B. Mop Plates:

1. Unless otherwise noted, furnish mop plates on all doors, with the exception of closet doors within rooms. Mop plates shall be 6” high x 2” less than door width x .050 thick x beveled three sides.

   a. Approved Manufacturers: No other manufacturer’s products are approved.
      Trimco, Rockwood and Ives.

C. Armour Plates:

1. Unless otherwise noted, furnish armour plates on all doors that are subject to heavy abuse. Armour plates shall be 34” high x 2” less than door width x .050 thick x beveled three sides. Armour plates furnished on fire-rated doors must have a UL listing.

   a. Approved Manufacturers: No other manufacturer’s products are approved.
      Trimco, Rockwood and Ives.

1.6 Flush Bolts

A. Manual Flush Bolts:

1. Unless otherwise noted, furnish manual flush bolts to secure the inactive leaf on pairs of doors leading to spaces that are considered non-occupied spaces (Mechanical Rooms, Electrical Rooms, Closets, and Boiler Rooms, etc.). Furnish Trimco W3917 for all metal doors. Top bolts shall be furnished with proper extensions to allow for easy operation. Furnish Trimco W3913 for all wood doors. A dustproof strike by IVES must be used.

   a. Approved Manufacturers: No other manufacturer’s products are approved.
      Trimco, Rockwood and Ives.

B. Automatic Flush Bolts:

1. Automatic Flush Bolts shall be installed on all other pairs of doors where manual flush bolts cannot be installed per appropriate building codes. Furnish Trimco 3810 x 3810 for all metal doors and IVES for all wood or composite doors. A dustproof strike by IVES must be used.

   a. Approved Manufacturers: No other manufacturer’s products are approved.
      Trimco, Rockwood and Ives.
1.7 Automatic Operators

1. Unless otherwise noted, all Automatic Operators shall be Stanley Magic Force surface mounted. Specify all associated products required to meet ANSI A156.10.

2. The Architect shall specify that all automatic operators be furnished and installed by a Stanley authorized installer. The same automatic operator provider and installer shall also furnish and install all electronic locking hardware, as may be required, for all automatic operated doors.

3. The Architect shall include in their documents all wiring, power and control required to the automatic operator and accessories.

   a. Approved Manufacturers: NO SUBSTITUTIONS.

       STANLEY: Magic Force x Alum.

1.8 Card Access Doors

1. The Architect shall coordinate all security and electrical requirements with the security consultant and the electrical engineer. Where card readers are furnished, an electric lock with built-in request to exit switch shall be installed (see 1.2.H above). The Architect shall indicate which doors are required to have door and frame preparation for door contacts.
2.1 Typical Hardware Sets

A. The following is a general listing of hardware requirements and is not intended for use as a final hardware specification. It shall be the responsibility of the Architect to specify any items of hardware required by established standards or practices, or to meet state and local codes or proper door operation. Coordinate final door hardware requirements with user-groups.

This hardware set is used for doors to suite offices that are non fire rated.
Each to have:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinges</td>
<td>(see description) x US26D</td>
</tr>
<tr>
<td>Office Lock</td>
<td>Sargent 8205 x LL x LC x US26D</td>
</tr>
<tr>
<td>Cylinder</td>
<td>Assa (see description) x US26D</td>
</tr>
<tr>
<td>Temporary Core</td>
<td>Assa (see description) x US26D</td>
</tr>
<tr>
<td>Permanent Core</td>
<td>(by NYU Langone Lock Shop)</td>
</tr>
<tr>
<td>Stop</td>
<td>(see description) x US32D</td>
</tr>
<tr>
<td>Silencers</td>
<td>Trimco 1229A</td>
</tr>
</tbody>
</table>

This hardware set is used for doors to offices that are fire rated.
Each to have:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinges</td>
<td>(see description) x US26D</td>
</tr>
<tr>
<td>Office Lock</td>
<td>Sargent 8205 x LL x LC x US26D</td>
</tr>
<tr>
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</tr>
<tr>
<td>Permanent Core</td>
<td>(by NYU Langone Lock Shop)</td>
</tr>
<tr>
<td>Closer</td>
<td>LCN</td>
</tr>
<tr>
<td>Stop</td>
<td>(see description) x US32D</td>
</tr>
<tr>
<td>Kick Plate</td>
<td>(see description) x US32D</td>
</tr>
<tr>
<td>Silencers</td>
<td>Trimco 1229A</td>
</tr>
</tbody>
</table>

This hardware set is used for doors to public or staff toilets that are non fire rated and fire rated.
Each to have:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinges</td>
<td>(see description) x US26D</td>
</tr>
<tr>
<td>Privacy Set</td>
<td>Sargent 49-8265 x LL x US26D</td>
</tr>
<tr>
<td>Closer</td>
<td>LCN</td>
</tr>
<tr>
<td>Stop</td>
<td>(see description) x US32D</td>
</tr>
<tr>
<td>Kick Plate</td>
<td>(see description) x US32D</td>
</tr>
<tr>
<td>Silencers</td>
<td>Trimco 1229A</td>
</tr>
</tbody>
</table>
This hardware set is used for doors to patient toilets within a patient room that swing out of the toilet.
Each to have:

- Hinges (see description) x US26D
- 1 Spring Hinge (to match) x US26D
- 1 Privacy Set Sargent 8265 x LL x US26D
- 1 Stop (see description) x US32D
- 1 Kick Plate (see description) x US32D
- 1 Mop Plate (see description) x US32D
- 3 Silencers Trimco 1229A

This hardware set is used for doors to patient toilets within a patient room that swing into the toilet.
Each to have:

- 1 set Pivots Rixson 127 ¾ x US26D
- 1 Privacy Set Sargent 8265 x LL x US26D
- 1 Emergency Release Stanley ES-1 x US26D
- 1 Double Lip Strike Stanley DLS series x US26D
- 1 Stop (see description) x US32D
- 2 Kick Plates (see description) x US32D
- 2 set Sight Seals Zero 335A @ wood doors
- 2 set Sight Seals Zero 137P @ metal doors

Note:
- Sight seals to be installed at pivot side and lock side of door only.
- Where marble saddles are used, mount pivot set on top of the marble saddle.

This hardware set is used for doors to conference rooms, consulting rooms, and lounges that are non fire rated.
Each to have:

- Hinges (see description) x US26D
- 1 Classroom Lock Sargent 8237 x LL x LC x US26D
- 1 Cylinder Assa (see description) x US26D
- 1 Temporary Core Assa (see description) x US26D
- 1 Permanent Core (by NYU Langone Lock Shop)
- 1 Stop (see description) x US32D
- 3 Silencers Trimco 1229A
This hardware set is used for **conference rooms, consulting rooms, and lounges** that are fire rated.
Each to have:

- **Hinges** (see description) x US26D
- 1 Classroom Lock Sargent 8237 x LL x LC x US26D
- 1 Cylinder Assa (see description) x US26D
- 1 Temporary Core Assa (see description) x US26D
- 1 Permanent Core (by NYU Langone Lock Shop)
- 1 Closer LCN
- 1 Stop (see description) x US32D
- 3 Silencers Trimco 1229A

This hardware set is used for **doors to utility type rooms** that are non fire rated and fire rated and do not require access control.
Each to have:

- **Hinges** (see description) x US26D
- 1 Storeroom Lock Sargent 8204 x LL x LC x US26D
- 1 Cylinder Assa (see description) x US26D
- 1 Temporary Core Assa (see description) x US26D
- 1 Permanent Core (by NYU Langone Lock Shop)
- 1 Closer LCN
- 1 Stop (see description) x US32D
- 1 Kick Plate (see description) x US32D
- 3 Silencers Trimco 1229A

This hardware set is used for **double doors to utility type rooms** that are non fire rated and fire rated and do not require access control.
Each to have:

- **Hinges** (see description) x US26D
- 2 Flush Bolts (see description) x US26D
- 1 Storeroom Lock Sargent 8204 x LL x LC x US26D
- 1 Cylinder Assa (see description) x US26D
- 1 Temporary Core Assa (see description) x US26D
- 1 Permanent Core (by NYU Langone Lock Shop)
- 1 Closer LCN
- 1 Stop (see description) x US32D
- 2 Kick Plate (see description) x US32D
- 2 Silencers Trimco 1229A
This hardware set is used for doors to **closets** within rooms that are non fire rated.

Each to have:

- **Hinges** (see description) x US26D
  - 1 Storeroom Lock Sargent 8204 x LL x LC x US26D
  - 1 Cylinder Assa (see description) x US26D
  - 1 Temporary Core Assa (see description) x US26D
  - 1 Permanent Core (by NYU Langone Lock Shop)
  - 1 Stop (see description) x US32D
  - 3 Silencers Trimco 1229A

This hardware set is used for doors to **patient rooms**.

Each to have:

- **Swing Clear Hinges** (see description) x US26D
  - 1 Hospital Push Pull Latch GJ (see description) x US26D
  - 1 Friction OH Stop Rixson 1 or 9 series x US32D
  - 1 Armour Plate (see description) x US32D
  - 1 Mop Plate (see description) x US32D
  - 3 Silencers Trimco 1229A

This hardware set is used for doors to **patient isolation rooms**.

Each to have:

- **Swing Clear Hinges** (see description) x US26D
  - 1 Hospital Push Pull Latch GJ (see description) x US26D
  - 1 Closer LCN
  - 1 Stop (see description) x US32D
  - 1 Armour Plate (see description) x US32D
  - 1 Mop Plate (see description) x US32D
  - 3 Silencers Trimco 1229A

This hardware set is used for all **staff lounges, medication rooms, on-call rooms, soiled and clean linen rooms, break rooms and any other space that is user required**.

Each to have:

- **Hinges** (see description) x US26D
  - 1 Combination Lock (see description) x US26D
  - 1 Cylinder Schlage (see description) x US26D
  - 1 Closer LCN
  - 1 Stop (see description) x US32D
  - 1 Kick Plate (see description) x US32D
  - 3 Silencers Trimco 1229A
This hardware set is used for all lead lined doors.
Each to have:

| 1 | set Pivots | Top Pivot Rixson  L-180 /  
|   |            | Center Pivot if needed ML-19 /  
|   |            | Top and Bottom Rixson Pivot set L-1471  
| 1 | Classroom Lock | Sargent 8237 x LL x LC x US26D  
| 1 | Cylinder | Assa (see description) x US26D  
| 1 | Temporary Core | Assa (see description) x US26D  
| 1 | Permanent Core | (by NYU Langone Lock Shop)  
| 1 | Closer | RIXON  
| 1 | Stop | (see description) x US32D  
| 1 | Kick Plate | (see description) x US32D  
| 3 | Silencers | Trimco 1229A  

Note:  
- If doors are non fire rated, furnish hold open closers.
2.2 Typical Electrical Hardware Sets

A. The following is a general listing of electrical hardware sets. Coordinate with electrical engineer, security vendor and fire alarm vendor.

This hardware set is used for all single doors with automatic operators no latching (see wiring diagram E1)

Each to have:

1. Continuous Hinge Zero 910DBAA x CE4 (CE4 is for Presence Sensor)
2. set Push Pulls Trimco 1894-4B x US32D
3. Automatic Operator Stanley Magic Force x Alum
4. Presence Sensors BEA Super Scan
5. Wall Actuators WIKK x 4 x 4-2 x US32D
6. Door Stop Trimco (as required) x US26D
7. Armour Plate Rockwood (see description) x US32D
8. Mop Plate Trimco (as required) x US32D
9. Silencers Trimco 1229A

Operation:
Wall actuator on either side signals automatic operator to open door. Free egress at all times.
This hardware set is used for all **double doors with automatic operators** no latching (see wiring diagram E2)

Each to have:

- 2 Continuous Hinge Zero 910DBAA x CE4
- (CE4 is for Presence Sensor)
- 2 sets Push Pulls Trimco 1894-4B x US32D
- 1 Automatic Operator Stanley Magic Force x Alum
- 2 Presence Sensors BEA Super Scan
- 2 Wall Actuators WIKK x 4 x 4-2 x US32D
- 2 Door Stop Trimco (see description) x US26D
- 2 Armour Plate Trimco (see description) x US32D
- 2 Mop Plate Trimco (as required) x US32D
- 2 Silencers Trimco 1229A

Operation: Wall actuator on either side signals automatic operator to open door. Free egress at all times.

![Wiring Diagram](image)

**Operation:** Push Plate on either side of the door signals automatic operator to open door. Safety sensors prevent door from opening when someone is standing in front of door.

<table>
<thead>
<tr>
<th>PROJECT: NYULMC</th>
<th>DRWG#</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Door No Latching (Pair)</td>
<td>E2</td>
<td>8-20-10</td>
</tr>
</tbody>
</table>
This hardware set is used for all single doors with card access (see wiring diagram E3)

Each to have:

- Hinges
- PBB (as required) x US26D
- 1 Electric Hinge
- PBB 4 wire (to match) x US26D
- 1 Electric Lock
- Sargent RX8271 x LL x US32D
- 1 Door Closer
- LCN
- 1 Door Stop
- Trimco (see description) x US26D
- 1 Kick Plate
- Trimco (see description) x US32D
- 3 Silencers
- Trimco 1229A
- 1 Door Contact
- (by security vendor)
- 1 Card Reader
- (by security vendor)

Operation:
Non Secure Side: Card reader unlocks electric lock.
Secure Side: Free egress. RX switch in electric lock shunts alarm.

Emergency Operation:
Non Secure Side: Door remains locked.
Secure Side: Free egress.

OPERATION: Card reader outside unlocks electric lock. Free egress inside, request to exit switch in lockset shunts alarm
This hardware set is used for all double doors with card access (see wiring diagram E4)

Each to have:

- Hinges: PBB (as required) x US26D
- 1 Electric Hinge: PBB 4 wire (to match) x US26D
- 1 Electric Lock: Sargent RX8271 x LL x US32D
- 2 Automatic Flush Bolts: Trimco (see description) x US26D
- 2 Coordinating Door Closer: Dorma TS93GSR series x Alum
- 1 Door Stop: Trimco (see description) x US26D
- 2 Kick Plate: Trimco (see description) x US32D
- 2 Silencers: Trimco 1229A
- 2 Door Contact: (by security vendor)
- 1 Card Reader: (by security vendor)

Operation:
Non Secure Side: Card reader unlocks electric lock.
Secure Side: Free egress. AE switch in electric lock shunts alarm.

Emergency Operation:
Non Secure Side: Door remains locked.
Secure Side: Free egress.
This hardware set is used for all double egress doors with card access (see wiring diagram E5)

Each to have:

- **2** Continuous Hinge Zero 910DBAA x CE4 x EPT
  - Note: CE4 is for the Presence Sensor and the EPT cutout is for the Electric Power Transfer
- **2** Electric Exit Devices Von Duprin ELRX 9827EO-F x LBR x US26D
- **2** Automatic Operators Stanley Magic Force x Alum
- **1** Wall Actuator (Inside) WIKK x 4 x 4-2 x US32D
- **4** Kick Plates Trimco (see description) x US32D
- **2** Silencers Trimco 1229A
- **2** Magnetic Locks Deltrex 810-DS x Alum
- **1** Power Supply Von Duprin PS873-2
- **1** Relay Module Deltrex 530-2ARCM2
- **2** Door Contacts (by security vendor)
- **1** Motion Sensor (by security vendor)
- **1** Card Reader (by security vendor)

**Operation:**
During normal operation, electric exit devices are electrically dogged to allow for automatic operators to open doors freely. Magnetic locks secure doors. When signaled from the fire alarm system, or loss of power, electric exit devices latch, automatic operators are shut off and magnetic locks unlock.

- Non Secure Side: Card reader unlocks magnetic lock and signals automatic operator to open both doors.
- Secure Side: Free egress. Wall actuator unlocks magnetic lock and signals automatic operator to open both doors.

**Emergency Operation:**
- Non Secure Side: Door remains locked.
- Secure Side: Free egress.
This diagram indicates all components of the system. See drawing E5-1 and E5-2 for specific wiring information.

### PROJECT: NYULMC

<table>
<thead>
<tr>
<th>DRWG #</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Corridor Automatic Doors with Card Readers and Magnetic Locks</td>
<td>E5</td>
</tr>
</tbody>
</table>

The wiring shown on this diagram is only for the electric exit device system.

### PROJECT: NYULMC

<table>
<thead>
<tr>
<th>DRWG #</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Corridor Automatic Doors with Card Readers and Magnetic Locks</td>
<td>E5-1</td>
</tr>
</tbody>
</table>
The wiring shown on this diagram is only for the automatic operator and card access interface.
This hardware set is used for all single locked stair doors (see wiring diagram E6)
Each to have:

- Hinges: PBB (as required) x US26D
- 1 Electric Hinge: PBB 4 wire (to match) x US26D
- 1 Electric Lock: Sargent RX8270 x LL x US32D
- 1 Close: LCN
- 1 Door Stop: (see description) x US32D
- 1 Kick Plate: Trimco (see description) x US32D
- 1 Power Supply: Deltrex 551CCM-ERI
- 3 Silencers: Trimco 1229A

Operation:
Stair Side: During normal operation, doors are locked electrically from the stair side. When signaled from the fire alarm system, or loss of power, electric lock unlocks automatically.
Egress Side: Free Egress at all times.

OPERATION: During normal operation stair doors are locked on the stair side. When signaled from the fire alarm system or loss of power, electric lock unlocks to allow re-entry.
ENVIRONMENTAL HEALTH AND SAFETY

NYU Langone Medical Center’s Environmental Health and Safety (EH&S) division develops and manages programs that (1) protect personnel in all departments and on all levels from health and safety hazards, (2) ensure waste is discarded in an environmentally sound manner and (3) facilitate compliance with regulatory requirements for environmental and occupational health and safety. EH&S’s programs cover a broad spectrum of health and safety issues, including but not limited to: asbestos, biosafety, bulk storage tanks, chemical safety, ergonomics, fire safety, formaldehyde, hazard communication, hearing conservation, indoor air quality, laboratory and animal safety, mold prevention and remediation, and waste management.

1. Architect’s Responsibilities

The A/E design team, to the best of their ability, shall incorporate Best Management Practices for environmental and occupational health and safety into the design of the space. The responsibilities include:

▪ Anticipating, identifying and eliminating potential health and safety hazards (i.e. ergonomics, hazardous materials, noise, etc.) associated with the proposed use of the space, to the extent reasonably practical.

Note: Eliminating hazards is not intended to limit creativity, but to ensure the designer minimizes foreseeable risks to the health and safety of those who:

- Carry out construction work, including demolition.
- May be affected by the project, including customers and the general public.
- Occupy the space post-construction.
- Clean and maintain the space.

▪ Specifying the least toxic and flammable/combustible products available for construction and renovation.

▪ Where health and safety hazards cannot be eliminated, proposing alternate engineering controls to minimize or eliminate the risk.

▪ The A/E design team shall use and comply with the design and safety regulations, guidelines and references listed in References below, as well as other health and safety guidelines received from NYU Langone’s Project Manager or division of EH&S. The A/E team shall utilize the latest editions of the references available at the time of the design contract award.

▪ If the design does not incorporate Best Management Practices for environmental and occupational health and safety, and comply with the References listed below, the A/E design firm shall obtain approval from NYU Langone’s division of EH&S.
The A/E design team shall not specify any of the following without approval from NYU Langone’s division of EH&S:

- Chemicals that are known (IARC group 1) or probable (IARC group 2a) human carcinogens.
- Hazardous substances listed in OSHA 1910 subpart Z.
- Products containing volatile organic compounds (VOCs) in excess of 50 grams/liter.
- Products whose Safety Data Sheet (SDS) rates health, fire and/or reactivity as exceeding “1” on a scale of 0 to 4.
- Products emitting strong odors.

In order to minimize potential delays associated with asbestos abatement, the A/E design team shall submit a set of Design Development Drawings that identify the scope of work. The Design Development drawings shall include 100% complete Demolition Drawings. The Demolition Drawings shall provide sufficient information to initiate an asbestos investigation and pull a demolition permit. The Demolition Drawings submitted shall be the same drawings that are filed with the DOB.

2. References

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ENVIRONMENTAL SUSTAINABILITY AND GREEN BUILDINGS

NYU Langone Medical Center believes that healthy people and a healthy environment are inextricably linked. As a healthcare organization, it is imperative that we act as good environmental stewards and as a community leader. Creating a vital and healing environment is central to our mission of providing world-class care and is integral to the comfort and lifelong wellness of our staff, students and patients. This sustainability commitment extends across every facet of NYU Langone, including how we design, construct and operate our facilities. Furthermore, the Medical Center recognizes the risks associated with climate change and has committed to a 50% carbon reduction goal by 2025 and intends to build facilities that are both sustainable and resilient.

The goal of NYU Langone’s sustainability program is to fulfill a quadruple bottom line approach where decision-making is based on balancing the potential impacts on people, the planet, business economics and, most importantly, patient care. The goal is not only to design green buildings and use environmentally-preferable materials, but to augment our benefit to the community and reduce the negative environmental and wellness impacts of operations once occupied.

More can be read about the scope and progress of NYU Langone’s sustainability program, called GreenFirst, at http://nyulangone.org/our-story/sustainability.

1. Sustainable Building Design Guidelines

For all new construction and major renovation, NYU Langone has instituted a goal of achieving Gold or higher certification under the LEED v4 BD+C or LEED v4 for Healthcare ratings system. Projects must complete a NYSERDA or whole building energy model simulation as part of meeting its LEED goals. Designers are to discuss the LEED and energy performance requirements with RED+F Project Managers from the outset and to follow an integrative design process. Where achievement of these goals presents significant hurdles, the requirements should be discussed with the RED+F Project Manager, RED+F Leadership, and the Sustainability Program Manager early during the design process. Good communication of goals, requirements and challenges will help all projects achieve the highest levels of performance and innovation. Use of older LEED ratings systems should also be discussed with NYU Langone Leadership and the Project Team before the design process begins.

For fit-outs, interior-only and smaller projects, the LEED and energy goals should be discussed with the RED+F Project Manager, RED+F Leadership, and the Sustainability Program Manager at the outset of the design process to establish requirements and goals on a case by case basis.

Other guidelines or certification standards that NYU Langone encourages project developers to take into consideration include the WELL Building Standard, the NYC Active Design Guidelines: Promoting Physical Activity and Health in Design and resources from the International Institute for Sustainable Laboratories (www.i2SL.org).
NYU Langone believes that LEED and green buildings aim to protect, restore and work in harmony with the local environment, existing transit infrastructure and underlying natural systems. In general, green buildings are energy efficient, water conserving, durable and nontoxic, with high-quality spaces that incorporate nature. NYU Langone seeks to integrate the following features of well-designed green buildings where possible and applicable:

- Demonstrate resiliency and adaptability in response to a changing climate and extreme weather events
- Incorporate recycled, local and renewably sourced materials that are highly recyclable at end of life
- Provide well-incorporated waste and recycling segregation and bins using the built environment to inspire proper recycling behavior in occupants
- Maximize use of passive solar and natural lighting
- Maximize use of cogeneration/CHP and renewable energy sources
- Facilitate social connections
- Provide views to the outside
- Employ good sound and noise management
- Provide for improved indoor air quality and minimize the use of chemicals of concern to increase the productivity of staff and reduce recovery time for patients
- Minimize building stormwater runoff by incorporating rooftop gardens, permeable pavers and other green infrastructure (GI) or low-impact development (LID) techniques
- Use native and adaptive plants that minimize landscaping and irrigation needs
- Make use of open space, incorporate green spaces and provide access to the outdoors for patients and staff
- Incorporate facilities and design that encourage the use of alternative transportation methods, particularly biking and public mass transit
- Minimize the use of mercury-containing materials where safe, effective alternatives exist in compliance with NYULMC Safety Policy 170
An integrative design approach and a life cycle assessment approach are both essential to meet these guidelines and marry green building with sustainable operations and resiliency for the life of the facility. Finding synergies between the built environment and eventual operations is an important concept. For example, incorporation of a green roof feature can provide insulation and lower energy usage, help manage stormwater runoff on the campus and reduce the heat island effect in the NYC community. Or designing with the understanding that the flooring material used not only has an embedded energy, carbon and natural resource footprint, but that the type of material used impacts how the facility needs to be cleaned post-occupancy and can either facilitate or hinder a reduction in chemical and water usage as part of green cleaning practices. Or designing into the built environment smart waste sorting stations that cater to the type of activity (research, clinical or office) taking place in each space can ultimately drive employees to practice good recycling behaviors. By using an integrative project approach that brings in multiple stakeholders from the outset, project teams can more readily discover synergies and areas for true innovation.

2. **Sustainable Furniture Guidelines**

NYU Langone has committed to the Practice Greenhealth Healthier Hospitals Initiative: Safer Chemicals Challenge, which impacts furniture purchasing and design decisions. This goal means that at least 30% of all purchases of freestanding furniture and medical furnishings for any individual project are to be specified without the intentional use of the following chemicals of concern: halogenated and brominated flame retardants, formaldehyde, perfluorinated compounds, PVC (also known as vinyl) and antimicrobials. Project teams should discuss with the RED+F Project Manager, RED+F Leadership, the RED+F Design Studio, and the Sustainability Program Manager throughout the process to meet these guidelines and evaluate feasibility.

For all projects, regardless of the level of certification or LEED ratings system being pursued, NYU Langone also encourages the use of locally-sourced furniture and textiles, furniture that contains pre or post-consumer recycled content and the use of wood that is FSC-certified.

Other standards or certifications to refer to include the ANSI/BIFMA e3 Furniture Sustainability Standard, SCS certified and Cradle to Cradle.

3. **Related Components or Policies**

- NYULMC Engineering Design Guidelines
- NYULMC Safety Policy 170: Mercury Elimination Program
- NYULMC Safety Policy 108: Chemical Waste Minimization and Disposal Program
- NYULMC Safety Policy 108a: Hazardous Waste from Contractors (Construction & Building Maintenance)
- NYULMC Safety Policy 108c: Universal Waste Management Program
INFORMATION TECHNOLOGY

NYU Langone’s MCIT (Medical Center Information Technology) division is responsible for the planning, design, construction, implementation, and operational aspects of all information technology systems, inclusive of both clinical and non-clinical systems. Our mission is to ensure technology systems are deployed in a manner to improve patient outcomes, increase patient safety, and provide state-of-the-art platforms to conduct world-class medical research initiatives. MCIT is responsible for all aspects of IT spaces, including data center, BDF/IDF, and TER’s as well as the following IT systems: networking, cabling, telephony, audio/visual, electronic medical record, nurse call, telemetry, end-user devices, and real-time location services (RTLS).

The standards listed below are for IDF Rooms and other miscellaneous items that are typically found in capital improvement projects. The information is a subset of a much larger technology design standards document (*NYULMC Technology Design Standards*) and should be used in conjunction with the latest version. This document can be provided by MCIT upon request.

The purpose of the *NYULMC Technology Design Standards* is to provide specific criteria in the design and planning of technology spaces. It is intended to be used by internal and external project management administrators, project architects and engineers, as well as facility managers. This document is to be referenced for specific guidelines, standards and specifications for the design, construction, and commissioning of technology spaces and/or facilities.

1. *Standards Conformance and Variance*

   For each project, a review of the criteria must be performed by the Design Team to verify conformance with this document. The IT design professional must submit to NYU Langone MCIT, a checklist which denotes either conformance with, or variance from, the *NYULMC Technology Design Standards*.

   The checklist is a tool for tracking design conformance and variances in design criteria as established in this document. This document lists the minimum design requirement for each technology space classification. It is understood by NYU Langone MCIT that each site will have unique circumstances which may necessitate a variance from the criteria listed in this document. Due to the possibility of such variances, the checklist provides a means of documenting and substantiating each variance.

   An “exception” is a formal sign-off by the project team and by NYU Langone MCIT to utilize a criteria that is less than the standards set forth in this document, for each class of facility.

   It is recognized by NYU Langone MCIT that there may be projects where the existing base of technology infrastructure will be assumed by NYU Langone, if a total re-build is not to occur. These types of projects will require deviation from these standards, and accordingly, a waiver should be sought through MCIT for record purposes.
2. **IDF’s - Planning Requirements**

An IDF is a technology space on a floor in a NYU Langone building from which all horizontal services to users are served. On a floor, (1) one or more IDF Rooms will be provided, depending on the size of the floor, location of the IDF and size of the IDF. An IDF can serve approximately 20,000 sq.ft. of floor space if it is properly sized and centrally located in the area being served. IDF Rooms will converge IT, AV, Security, BMS, RF, Nurse Call, Telemetry, Public Address, etc., into one room, with the majority of these systems migrating to Ethernet.

- **Location of IDF’s** - IDF’s (and BDF Rooms providing IDF functionality) should be positioned to be within 250 feet of horizontal distance from the farthest outlet point (using right angle measurements) on non-clinical floors. Final locations of all IDF’s, including the intended primary path(s) of horizontal cabling and the associated 250 foot rule must be presented to and approved by MCIT prior to the architectural layout being approved by NYU Langone project management.

IDF Rooms should stack to maintain a vertical adjacency, as a minimum between major MER or building occupancy transitions.

- **Room Size and Layout** - Since the IDF size varies for each facility and the area that it will serve, one of three options included in the attached sketches at the end of this section will provide a guideline for room size and layout.

The room size is to be ultimately confirmed by the final determination of racks and cabinets, which must be identified for use by the Designer and approved by NYU Langone MCIT prior to coordination with the Architect.

- **Equipment Orientation and Clearances within the Room** - The attached sketches of IDF Rooms at the end of this section provide example layouts.

- **Unacceptable Occupancies or Uses above IDF’s** - All use types that involve water supply and removal, such as kitchens, locker room showers, toilets, pantries, etc. shall not be permitted to be located above a technology room.

- **Horizontal Pathways** - Space must be established by the IT Designer to account for horizontal cabling distribution, regardless of whether ladder rack is provided or not, as a means of cabling support. Sufficient clearance must also be included to facilitate future cabling changes. This path shall be presented to MCIT when the IDF locations are being submitted for preliminary approval.

- **Raceways Penetrating Walls and Floors** - Where cabling is required to traverse rated walls and/or floors and is not to be routed in conduit, fire-rated EZ-Path must be employed. Non-rated penetrations shall use the Smoke and Acoustical EZ-Path. EZ-Path shall not be filled in excess of 60% fill. 40% spare capacity shall be provided for future use via unused EZ-Path modules.
3. **IDF’s - Electrical Requirements**

- **UPS Power** - Preference is for centralized building UPS to support all technology spaces. If no centralized building UPS is provided, the electrical branch circuit design should include branch circuit wiring from two different automatic transfer switches within the building to serve an IDF closet for clinical spaces. A single source of EM power is sufficient for non-clinical IT loads.

  For planning purposes, assume 4 kW per rack. One (1) 10kW Liebert UPS at minimum is required per IDF. Liebert GXT3 (10kVA per Network Switch). Battery run time shall be calculated to ensure 15 minutes of UPS run-time (applies only to rack mounted UPS).

- **PDU and Distribution Level Capacity** - PDU’s may or may not be used. If they are used, capacity shall be 80% of rating. Capacity shall assume total load on a PDU in the event one-half of a circuit in a 2N pair has failed.

- **Branch Circuit Capacity** - Capacity shall be 80% of rating. Capacity shall assume total load on a circuit in the event one-half of a circuit in a 2N pair has failed.

- **Branch Circuit Receptacles or EPDU** - Determined by project and technology.

- **Branch Circuit Monitoring** - Recommended.

- **Power Grounding** - Normal equipment grounding – no isolated grounds.

- **Clearance** – Clearances for the front of electrical panels shall follow the latest electrical code.

- **EPS - Emergency Power System (Generator) Power** - Lighting and HVAC for the entire technology space.

- **EPS Redundancy** - Refer to NYU Langone Electrical Guidelines.

- **EPS System Fuel Oil Storage Time** - Refer to NYU Langone Electrical Guidelines.

- **EPS Feeders to CRAC’s (Computer Room Air Conditioning)** - CRAC units need only be provided with a single power feed.

- **Convenience (non-UPS Power) in ceiling** - Not required.

- **Convenience (non-UPS Power) on walls** - Provide a normal “non-EPS and non-UPS” outlet on the perimeter of the room, to be located between every CRAC unit or large MEP equipment. See the layout of typical IDF Rooms at the end of this section. These outlets shall follow color coding as specified in the NYU Langone MEP Guidelines.

- **Lighting** - 45 to 55 fc (450 to 550 lux)
- **Emergency Lighting** - Refer to NYU Langone Electrical Guidelines.

- **Telecommunication Grounding** - Telecommunications grounding bar mounted at 7'-6” connected to building steel – specifications by IT. Put this on Electrical plans for electrician to install. The IT contractor shall take care of grounding all equipment in the room to this grounding bar.

4. **IDF’s – Mechanical Requirements** – Refer to NYU Langone Mechanical Guidelines.

5. **IDF’s – Architectural Requirements**

- **Ceiling Construction** - No hung ceiling – encapsulating fireproofing. All areas above 8’-0” to be painted black. No penetrations or sky lights over IT areas.

- **Floor Treatment** - Provide Armstrong Static Dissipative Floor Tile (SDT) installed as a system using SDT tile, S-202 SDT Adhesive, copper grounding strips packaged with the adhesive, and S-392 SDT Polish.

  All floors above technology spaces shall be treated in the area of the technology room to provide a waterproof layer in order to prevent the migration of water to the technology room below.

- **Fire Rating** - As required by Code. (Perimeter Wall -2 hour minimum. Interior Walls – 1 hour minimum.)

- **Windows** - Fenestration (i.e. windows) at exterior walls is not permissible for all critical spaces.

- **Finishes** - Acrylic latex paint over vapor barrier primer/sealer.

- **Materials** - Insulated stud wall with gypsum board finish. Provide fire-retardant plywood painted with two (2) coats of fire-retardant paint (white in color) on the major wall space.

- **Pipes, Duct, Ladder Rack, Cable Tray & Conduit Penetrations** - Fire-sealed at penetrations through rated walls.

- **Doors** - 36 inches. Doors are to swing out and not have a threshold. Minimum 3'-0” width x 7'-0” height. Provide Salto card access with electrified mortise lock with transfer hinge.
6. **IDF’s – Miscellaneous Requirements**

Connectivity to Central Campus BMS system is required. CRAC units within the IDF shall be provided with local water leakage containment and detection. Common alarm points include CRAC units, UPS system, Lead/Lag Control for all pumping equipment, leak detection grid.

IDF’s shall be pre-action or wet sprinkler. If pre-action is used, heat detection shall activate the fire protection system.

SALTO card reader required on door. Off Campus locations require remote access through Salto System.

Provide a wall phone inside the room, adjacent to the door.

7. **Miscellaneous IT Design Requirements**

Cable trays are to be provided by the electrical contractor. They are to be designed by IT Designer and shown on the Electrical drawings. It is critical the cable tray path is coordinated with the MEP systems to assure access to conduit and other MEP systems.

Coordinate pathway for conduits to building main IT room (BDF). Architects should include some allowance for demolition, temporary protection, patching, firestopping, etc. for conduit runs in the architectural plans.

Camera locations need to be coordinated with Security and IT PM.

Card readers are to be automatically deactivated when the Fire Alarm is activated.

Provide electric locks for single doors and overhead electric strikes for glass doors. No mag-locks are allowed.
8. **SKETCHES**

- **IDF – 3 Rack Room**  
  See Sketch: *SKT-IDF3R-3.25.10*

A 3-rack IDF shall be utilized when smaller, non-clinical areas need to be served and convergence of voice and data occurs only with limited Security and no AV needs within the occupied space.

The following systems are represented as the limits of the typical 3-rack IDF:

**Voice Networks**
- Fixed and portable telephones
- Fax machines

**Data Networks**
- Desktop and portable computers (WOWS)
- Printers, copiers, and other peripherals

**Security Networks**
- Surveillance, access control, intrusion detection
- Public announcement system (PA)
- Electronic signage
- Fire detection / alarm / emergency lighting
IDF – 4 Rack Room:  

See Sketch: SKT-IDF4R-3.25.10

A 4-rack IDF shall be utilized when smaller clinical floors, or mid-size, non-clinical areas need to be served and convergence of voice and data occurs with limited AV, security and other specialty low-voltage system needs in the occupied space.

The following systems are represented as the limits of the typical 4-rack IDF:

Voice Networks
- Fixed and portable telephones
- Fax machines

Data Networks
- Desktop and portable computers (WOWS)
- Printers, copiers, and other peripherals

Security Networks
- Surveillance, access control, intrusion detection
- Public announcement system (PA)
- Electronic signage
- Fire detection / alarm / emergency lighting

Limited AV

Special Purpose Networks
IDF – 5 Rack Room

A 5-rack IDF shall be utilized when clinical areas need to be served and convergence of voice, data, AV, Security, RF, BMS, and other specialty low-voltage systems.

The following systems are represented as the limits of the typical 5-rack IDF:

Voice Networks
- Fixed and portable telephones
- Fax machines

Data Networks
- Desktop and portable computers (COWS)
- Printers, copiers, and other peripherals

Security Networks
- Surveillance, access control, intrusion detection
- Public announcement system (PA)
- Electronic signage
- Fire detection / alarm / emergency lighting

Audio Visual
- Background music
- Satellite or cable television
- Patient entertainment
- Remote classroom

Special Purpose Networks
- Radiology/Imaging
- Real Time Locator System (RTLS)
- Nurse Call
- Patient Monitoring

BMS

RF Antenna Systems
9. **Telecommunications Grounding Bus (TGB)**

A telecommunications grounding bus bar (TGB) should be provided in all telecommunications spaces. The TGB is the grounding connection point for telecommunications systems and equipment. The TGB should be a pre-drilled copper bus bar provided with holes for use with standard-sized lugs. It should have minimum dimensions of 0.25 inch thick by 2 inches wide, and can be any appropriate length. The TGB may be connected to building structural steel or an already established telecommunications ground.

10. **Bonding Conductors**

Bonding conductors connect the telecommunications system components to the TGB.

Conductors should consist of #6 green insulated stranded copper grounding cables.

Each end should be fitted with 2-hole lugs with irreversible compression-type connections.

Nuts and bolts of appropriate size should be used to connect the conductor to the TGB and the equipment. Sheet metal screws are not acceptable. Each bolt must be secured with a star washer behind each nut. Each 2-hole lug must be secured with 2 bolts.

Before attaching a lug to equipment, paint should be removed with an appropriate tool behind where the lug will press against the equipment.

Connect lugs where they are clearly visible for purposes of inspection.

Run a separate conductor for each cabinet; daisy-chaining is not acceptable.

Run a separate conductor for overhead ladder rack; individual pieces of ladder rack can be daisy-chained.

Lugs should not overlap (i.e. share bolts/holes); create separate connections for each 2-hole lug.
SECURITY

Given its location in the heart of New York City, NYU Langone pays special attention to security in its facilities and operations. Since the security needs vary from building to building, and since the range of existing conditions and occupancy types is similarly large, the principal means to achieving acceptable security design is the direct and timely involvement of NYU Langone Security Department representatives at key points during the design and construction process. The following are required milestones for meetings with NYU Langone to determine security needs, develop scope and coordinate final recommendations:

1. **Schematic Design**

   During Schematic Design a meeting with the Design Team, Security Department, RED+F’s PM, User-Group leadership and any additional stakeholder(s) of the new space shall be held. The purpose of the meeting is to review security needs as it pertains to the proposed layout. The RED+F PM will coordinate comments from the Design Team and schedule follow-up meetings as necessary with the Security Department and its approved Security vendor.

2. **Design Development**

   During the Design Development Phase, the Architect shall provide (through the RED+F PM) Floor plans, Furniture plans, Reflected Ceiling plans and Door Hardware information to the Security PM and Security vendor. The Security PM and Security vendor will review and propose a security system design that incorporates User-Group requests, Stakeholder requests, NYU Langone security standards and industry security standards.

3. **Construction Documents**

   During the Construction Document Phase a meeting with the Design Team, Security Department and RED+F’s PM will be held in order to review the proposed security solutions. The Security vendor will provide the Design Team with equipment cut sheets, cabling and rough-in requirements. The Design Team will incorporate this information into the Construction Documents. A final meeting will be held with the Design Team, Security Department, RED+F’s PM, User-Group leadership and any additional stakeholder(s) of the new space to present the final coordinated security design. The decision for systems cabling responsibility will also be determined at this time.

4. **“As-Built” Documentation**

   The Architect shall provide the Security vendor with copies of the finalized “As-Built” in electronic form acceptable for import into the NYU Langone Security software. The Security vendor and/or the Systems Technology Manager will provide information in acceptable formats that are compatible with the Security software being used at that point.
5. **General Notes About Security Design**

- Any code issues, such as fire and life safety, that affect security operations must be addressed by the Architect.

- Security access control and alarm systems on the superblock must be compatible and integrated with the existing system at the NYU Langone Security Operations Center. Systems off the superblock will be evaluated on a case-by-case basis as to their need to be tied into the existing system or if they can be stand-alone and tied into a central station for monitoring and subsequent response.

- Cameras are required at all lobbies, laundry rooms, elevators, stairs and entrance and egress doors, as well as any other areas as recommended by NYU Langone Medical Center.

- All window screens should be lockable.

- Design Team should alert NYU Langone Medical Center to security conditions that are not immediately apparent but would have operational impact, such as emergency egress doors that are on hold-opens.

- Areas of high security risk generally include where cash, narcotics, or retail operations are planned, as well as areas housing behavioral health (i.e. Psychiatry), Infants/Pediatric areas, Emergency Department, TBI (Traumatic Brain Injury) or ICU patients. These areas require greater access control, panic alarms and camera coverage. In some cases, specialized systems, such as Infant/Patient tracking & monitoring systems need to be incorporated into the design.

- IDF closets require SALTO security systems. Access will be controlled by the MCIT Department.

6. **Some General Security Design Guidelines**

NYPD has published security guidelines entitled *Engineering Security, Protective Design for High Risk Buildings*. Where applicable these guidelines are to be referenced & utilized as necessary.

- Exterior
  - Lighting design must carefully consider appropriate light levels without compromising security.
  - Employ “passive” security design strategies such as avoiding dead-end spaces and blind corners, and areas that are isolated from foot traffic or out of sight.
  - Consider relationship of ground floor spaces to the exterior for sightlines and access to open windows and doors.
  - Where security officer posts are required, consider issues of congestion, sightlines, ADA compliance and the physical comfort (furniture and HVAC) of the personnel.
NYULMC Design Guidelines

- Interior
  - Common spaces should not be isolated from entrances or stairs.
  - Consider location of permanent staff in multiple locations within spaces to limit possibility of unoccupied spaces that cannot be monitored.
  - Consider use of interior glazing and other strategies to improve visibility and accessibility.
  - If a security officer post is included in the design, consider sightlines from the seated position.
MISCELLANEOUS

This section is a running list of miscellaneous items that the A/E Team should consider during the Design and Construction process.

1. Firestopping
   - Only Hilti products installed as UL-approved systems are permitted (unless otherwise allowed in the Design Guidelines).
   - All firestopping must be performed by certified tradespersons qualified to use Hilti products.
   - The A/E Team and RED+F Project Manager shall require the GC / CM to retain a certified independent firestopping firm to perform all firestopping work. Making individual trades responsible for firestopping their own penetrations is NOT acceptable.
   - Please note firestopping requires a Special Inspection required by the NYC DOB and NYU Langone Facility Operations.

2. New Fire Extinguishers, Cabinets and Signs
   - New fire extinguishers, wall cabinets, and signs shall be purchased and installed as part of the capital project.
   - The NYU Langone standard is a 10 lb. ABC fire extinguisher (except OR’s, MRI’s, and specific MER’s). Fire extinguisher cabinets shall be able to house a 10 lb. ABC fire extinguisher without modification.
   - The cabinet must NOT have break-glass or any kind of key locking mechanism to access the extinguisher.
   - When closed, the cabinet door shall latch shut without the use of any key.
   - The cabinet door shall be opened by simply pulling on the handle.
   - The NYU Langone standard for OR and MRI areas is the AC Water Mist fire extinguisher (magnetic safe).
   - Fire extinguishers in cabinets must be identified by 3D signs. Coordinate with RED+F Signage and Wayfinding Project Manager.

3. Temporary Interior Construction Partitions
   - All NYU Langone interior construction projects, which are not confined to an enclosed room or space (i.e. corridor, etc.) and do not require a rated barrier, shall use the Edge Guard partition system.
   - The A/E Team and RED+F Project Manager shall require the GC / CM to order this product in advance of start of construction as it may take several days for delivery.
4. **Ceiling Type Selection**

At the Medical Center, existing infrastructure in some cases may prevent proper pressurization of specialized rooms. Selection of the appropriate ceiling type can mitigate these issues.

- For spaces requiring positive or negative pressure at the Medical Center, the Architect shall meet with the RED+F Project Manager and Facilities Operations to determine the type of ceiling construction to be provided (i.e. acoustical ceiling tile or gypsum board ceiling with access panels).

5. **Refrigerator and Freezer Monitoring**

- All clinical refrigerators and freezers shall be equipped with the ELPRO Central Monitoring System (CMS).

- All research -80°C through -140°C as well as liquid nitrogen dewar tanks and freezers shall be equipped with the ELPRO Central Monitoring System (CMS).
DOS and DON’TS

As part of our approach to continually improve the Design and Construction process, we at RED+F maintain a running list of Dos and Don’ts. This is a detailed list of items that we have found to work well (or not work well) for NYU Langone capital construction projects. We have listed these items in the following order:

Architectural
Engineering
Interior Design
Medical & Lab Equipment
AV/IT & Design Team Coordination

Architectural

1. Make sure patient room saddles have no lip (not even code allowable 1/4”). Patients cannot negotiate with IV pole.

2. Make sure there are bed stops.

3. Place soap dispensers above countertops instead of above floors, so any drippings go on the counter. Also, use wall mounted dispensers provided by Building Services; do not specify counter mounted soap dispensers in toilets. Building Services does not stock liquid soap for the countertop soap dispensers.

4. For Article 28 facilities do not specify storage cabinets under sinks; use ADA-compliant panels instead. The area under sinks should be clear. It will fail DOH survey if storage is located underneath.

5. Provide the construction budget to the A/E Team before start of design. The A/E Team needs to design within budget. They can’t do that without a budget.

6. Obtain user equipment lists and determine infrastructure requirements (i.e. power requirements) ASAP so that test fit can be performed.

7. Floating ceilings might require sprinkler coverage ON TOP of them. Check it.

8. Be sure that room numbering adheres to NYU Langone standards. Device schedules need to match (for FA Programming).

9. Do not specify direct-ducted bio-safety cabinets. Canopy connected A-2’s with 70/30 Air Circulation are preferred. There are exceptions. Please review with EH&S before specifying.

10. The Tisch Ancillary building is a balloon frame construction. There is no fire-stopping between the slab and curtain wall. Design dwgs to address this. Millhauser is similar.

11. Do not ‘float’ HIPPA divider panels between desks. Sandwich the panels tight to the desks with no gaps for added stability and to prevent pens, papers, etc. from falling through.

12. Add card readers to all clean supply rooms.

13. Make sure mounting height of ADA mirrors is specified for the reflective edge to be 40” AFF, not the mirror frame.
NYULMC Design Guidelines

14. Camera locations need to be coordinated with the Security PM, Security vendor and the MCIT PM.
15. The Architect should do a file/storage survey during planning to make sure adequate file and storage space is factored into the design.
16. Provide electric locks for single doors and overhead electric strikes for glass doors. No maglocks are allowed.
17. All interior finish drawings and specifications are to be forwarded to our Design Studio upon closeout.
18. MER doors to have Trilogy keypad locksets with T2 keyway. Must coordinate with NYU Langone locksmith.
19. All firestopping must be performed by a certified tradespersons in firestopping, contracted under either the GC/CM. Making individual trades responsible for firestopping their own penetrations is not acceptable. They must use only Hilti products (unless otherwise allowed in the Design Guidelines), and must use UL-approved systems. A Special Inspection is required by NYC DOB and NYU Langone Facility Operations.
20. Cable trays are not to penetrate smoke or fire barriers. Cable trays are to stop at wall with cables traversing through EZ-Path devices, then resume with cable trays past penetration. Coordinate with MCIT PM.
21. Consideration must be given to additional data drop conduits and back boxes (with drag lines) to all rooms. Furniture layouts change, often times during construction, and the only drops in the room are behind furniture. This is especially the case with wall mounted computer work stations. Similarly, additional wall grounds are to be provided on a second wall in the event this location changes as well to avoid tearing open newly created walls.
22. Avoid ceiling tile slivers less than 6” wide. Spec larger tile for that wall location where this may occur and cut the tile. For example, if 2’x2’ ACT is specified and it will end up with some spaces with slivers of less than 6” cut tile, they should consider specifying larger 2’x4’ ACT for that wall location and cutting the larger tile down. Therefore, instead of a 2’-0” x 0’-6” sliver, we end up with 2’-0” x 2’-6” ACT. This will look more consistent.

Engineering

1. Do not substitute Terminal Reheat Units for Induction Units and vice versa without a Facilities Operations engineering review.
2. Provide power for Lighting Circuits from lighting panels/receptacles and convenience outlets from utility panels and receptacle panels.
3. Give the construction budget to the Design Team before start of design.
4. NYU Langone’s main campus does not provide natural gas to lab benches. Do not design for this service, and include removal of same on the demolition plans.
5. Define that power tie in's to furniture are to be performed by the electrical contractor. Engineer to include on the "E" drawings. PM to confirm with the GC/CM.
6. Do not locate IT room HVAC equipment in ceilings of the rooms. This brings water in. Locate outside the rooms and duct in. Or use a split system and hang the evaporator on the wall and drain outside the room. Reference the Information Technology section in these Design Guidelines.

7. Use only concealed sprinkler heads, not recessed.

8. Specify tamperproof receptacles in all waiting rooms, regardless of the clinical function of the practice.

9. For laboratory equipment rooms, provide exhaust registers directly above heat generating equipment.

10. Existing HVAC systems to be investigated prior to completing design to ensure base systems can meet design requirements.

11. Be sure to spec duct arrival at the site be cleaned and wrapped. Too many times we install dusty duct.

12. Include UL-approved pass-thru sleeves for future use in all smoke/fire partitions to prevent non-firestopped penetrations resulting from future cable pulls. Refer to the Information Technology section in these Design Guidelines for EZ-Path sleeves.

13. Thought must be given to redundancy for critical MEP systems. If a system loss will result in compromised patient safety or revenue loss to the institution, redundant systems need to be included in the design (i.e. emergency power, UPS, etc.)

14. DO NOT USE USG Sheetrock Acoustical Sealant at medical gas copper pipe penetrations. It corrodes the pipes. Use an alternate.

15. Include Hands-on Training for maintenance staff for all MEP equipment.

**Interior Design**

1. Coordinate power/data drops with under-counter pedestal files, etc.

2. Make best efforts to marry up to a column / wall to reduce core drilling for power and data.

3. Specify wardrobe closets in workstations whenever possible.

4. No visible whips are allowed when connecting to workstations.

5. Coordinate cable management with furniture (V30 training room - cables hanging from desktops and visible).

6. Purchase construction cores on wall / door systems, not pre-keyed cores. The main campus locksmith will provide final cores. For off-campus facilities, engage a locksmith.

7. Get signage requirements early to have permanent signage at opening. PM to provide the Signage PM the project schedule.

8. Specify and install door hooks on both offices and systems furniture.

9. Make best efforts to not specify products that require overseas delivery.
**Medical / Lab Equipment**

1. Do not provide UV lights as an option when ordering new Bio-Safety Cabinets for a lab or other type of project.

2. Do not specify direct-ducted bio-safety cabinets. Canopy connected A-2’s with 70/30 air circulation are preferred. There are exceptions. Please review with EH&S before specifying.

**AV / IT & Design Team Coordination**

1. A/E Team shall fully coordinate with the IT consultant engaged directly with NYU Langone. Refer to the Information Technology Section for further information.

2. IT Engineer infrastructure specification needs to be placed on the "E" drawings so that the electrical contractor can buy and install.

3. No MEP Services should pass through the IDF rooms that are not servicing the room.

4. Cable trays to be shown on all A/E drawings and coordinated appropriately with MCIT and the contractors. "Coordinate in field" is not acceptable.

5. Define who will buy the server UPS, Electrical or Low Voltage contractor PRE-BID.

6. Determine the power requirement at the rack early in the project.

7. Define AV equipment credenza ventilation requirements.

8. Coordinate light fixture locations to avoid racks / ladder racks. Wall mounted lights are acceptable.

9. Multiple outlets mounted above rack. Specifications should come from IT designer. Place the information on the Electrical plans for electrician to install.

10. Provide UPS to the rack. IT designer to specify the UPS. Electrical drawings shall show the UPS to be bought.

11. Each IDF room gets its own electrical panel. Power panels are to have surge suppressors.

12. Security panels typically go in IDF rooms. They require power and data connection. Coordinate requirements with the MCIT PM.

13. Cable Trays are to be designed by the IT designer, shown on the Electrical drawings and bought by the electrical contractor. It is critical that the cable tray path is coordinated with the MEP systems.

14. Coordinate pathway for conduits to building main IT rooms (BMS). Architects should include some allowance for demolition, temporary protection, patching, firestopping, etc. in the architectural plans.
## CLOSE-OUT PACKAGE

At the end of a project, a close-out package is to be completed and submitted to RED+F per the Final Payment Checklist. Below is a list of many of the required items. The goal is to have all projects closed 120 days after the first user has moved in. The Design Team shall request the latest version of this checklist from the RED+F PM at time of close-out.

<table>
<thead>
<tr>
<th>Item</th>
<th>Resp. Party</th>
<th>Date Rec’d</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTRACTOR ITEMS REQUIRED FOR FINAL PAYMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td></td>
<td>Completed close-out matrix by trade.</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td></td>
<td>NYC Department of Buildings and FDNY inspections completed and all permits closed out.</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td></td>
<td>MEP As-built drawings (2 CD or flash drive copies of pdf files).</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td></td>
<td>Equipment Use Permits.</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td></td>
<td>Contractor’s Warranty and Approval for Final Payment letter.</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td></td>
<td>Material, equip &amp; systems warranties/guarantees received for wk completed/installed, incl. service contracts.</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
<td></td>
<td>Medical Gas Certifications.</td>
</tr>
<tr>
<td>8</td>
<td>C</td>
<td></td>
<td>Copies of all test data for work completed, received.</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
<td></td>
<td>Electrical Panel Schedules and Keys (3 copies of each).</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td></td>
<td>Final Lien Waivers.</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td></td>
<td>Final progress photos.</td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td></td>
<td>Keys and valve tag charts.</td>
</tr>
<tr>
<td>13</td>
<td>C</td>
<td></td>
<td>All operation and maintenance manuals.</td>
</tr>
<tr>
<td>14</td>
<td>C</td>
<td></td>
<td>Coordinate orientation with in-house staff for training and ongoing maintenance/engineering operations.</td>
</tr>
<tr>
<td>15</td>
<td>C</td>
<td></td>
<td>Signed off commissioning log.</td>
</tr>
<tr>
<td>16</td>
<td>C</td>
<td></td>
<td>Equipment list for all major MEP/FP/FA equipment removed and installed.</td>
</tr>
<tr>
<td>17</td>
<td>C, A/E, RED+F</td>
<td></td>
<td>All finish samples and spec books (relevant wood finish samples, ceiling tile and grid specifications, glazing, paint colors and finishes, flooring colors/specs, specialty items model number and manufacturers).</td>
</tr>
<tr>
<td>18</td>
<td>C, A/E, RED+F</td>
<td></td>
<td>NYU Langone team and consultants walk-thru site inspection sign-off. Punch list sign off by A/E consultants and RED+F.</td>
</tr>
<tr>
<td><strong>CONSULTANT AND RED+F ITEMS REQUIRED FOR PROJECT CLOSEOUT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>A/E</td>
<td></td>
<td>Letter(s) of substantial completion for all permits (Mech, Plumb, Struct, Fire Protection, General Construction).</td>
</tr>
<tr>
<td>20</td>
<td>A/E</td>
<td></td>
<td>CD’s in DWG format &amp; PDF format documents received and forwarded to SPM to update Planon and Alchemy.</td>
</tr>
<tr>
<td>21</td>
<td>RED+F</td>
<td></td>
<td>DOB Signed and Sealed drawings.</td>
</tr>
<tr>
<td>22</td>
<td>RED+F</td>
<td></td>
<td>Closed out ILSM forms, signed-off by EH&amp;S.</td>
</tr>
<tr>
<td>23</td>
<td>RED+F</td>
<td></td>
<td>Closed out Penetration form, signed-off by Facilities Operations.</td>
</tr>
<tr>
<td>24</td>
<td>RED+F</td>
<td></td>
<td>Coordinate inspections conducted by the NY State Department of Health. Complete DOH binder and submit.</td>
</tr>
<tr>
<td>25</td>
<td>RED+F</td>
<td></td>
<td>Communicate project go-live to NYU Langone: MRM update / Signage(elevators, etc.) / Occ. date for Real Estate.</td>
</tr>
<tr>
<td>26</td>
<td>RED+F</td>
<td></td>
<td>Provide all closeout documentation on a memory stick or disk (all files in PDF). Folder structure to be the same as this document.</td>
</tr>
<tr>
<td><strong>ARTICLE 28 (CON) PROJECT ITEMS REQUIRED FOR PROJECT CLOSEOUT – SUBMIT TO RED+F FINANCE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>C</td>
<td></td>
<td>Affidavit of Release of Liens (AIA G706A).</td>
</tr>
<tr>
<td>28</td>
<td>C</td>
<td></td>
<td>Affidavit of Payment of Debts and Claims (AIA G706).</td>
</tr>
<tr>
<td>29</td>
<td>C</td>
<td></td>
<td>Final (Requisition) Certificate of Payment (AIA G702).</td>
</tr>
<tr>
<td>30</td>
<td>A/E</td>
<td></td>
<td>Certificate of Substantial Completion (AIA G704).</td>
</tr>
<tr>
<td>31</td>
<td>RED+F</td>
<td></td>
<td>Permanent Certificate of Occupancy.</td>
</tr>
<tr>
<td>32</td>
<td>RED+F</td>
<td></td>
<td>Temporary Certificate of Occupancy (N/A if in receipt of PCO).</td>
</tr>
<tr>
<td>33</td>
<td>RED+F</td>
<td></td>
<td>Copy of DOH Pre-Occupancy Survey used at inspection.</td>
</tr>
<tr>
<td>34</td>
<td>RED+F</td>
<td></td>
<td>Facility Project Letter of Acceptance and Completion issued by the NY State Department of Health.</td>
</tr>
</tbody>
</table>
FINISH BOOKLET

As part of the project closeout, the Architect shall submit to the RED+F Design Studio, a Finish Booklet in both pdf format and hard copy. The booklet shall have an 11”x17” floor plan and RCP, as well as all material information used on the project. The Finish Booklet shall include information on the final installed materials including product name and number, color, finish, size, manufacturer, contact information, room/location, and any other pertinent information. The booklet shall follow the format described below:

1. Finish Booklet Items

   - **Floors:**
     - Resilient Flooring (Resilient Tile, Wood Plank, Sheet Flooring, Wood Sheet)
     - Rubber Flooring (Rubber Tile, Rubber Sheet)
     - Carpet (Carpet, Carpet Tile)
     - Tile (Ceramic, Porcelain Tile, Quarry Tile)
     - Stone
     - Terrazzo
     - Walk-off Mat
     - Concrete Coatings

   - **Base:**
     - Rubber Base (Cove, Straight)
     - Stainless Steel Base
     - Porcelain Base
     - Integral Cove Base

   - **Walls:**
     - Paint
     - Wall Covering
     - Tile (Ceramic, Porcelain Tile, Quarry Tile)
     - Stone
     - Wall Protection (Crash Rails, Handrails, Sheet, Corner Guards)

   - **Doors:**
     - Wood (Specialty Doors)
     - Hollow Metal

   - **Ceilings:**
     - Paint
     - Lay-in Ceiling (Acoustic Ceiling Tile, Wood Lay-In)
     - Grid System

   - **Others:**
     - Millwork (Wood, Plastic Laminate, Decorative Metal)
     - Countertops (Solid Surface, Engineered Stone)
     - Glass Panels
     - Window Sills (Solid Surface, Ptd. Alum.)
     - Window Treatments (Shade Cloth, Sheers)
2. *Format for the Finish Booklet*

Below is the format to be used for the Finish Booklet. The first pages of the Finish Booklet shall contain 11”x17” floor plans and RCP of the project. This should be followed by the Material and Finish data on 8½” x 11” as formatted below. A template will be provided by the RED+F Design Studio.

**Floors**

<table>
<thead>
<tr>
<th>TERRAZZO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TER-1</strong></td>
</tr>
<tr>
<td><strong>Description:</strong> Thin-set epoxy custom mix with zinc dividers, KLLC1211E</td>
</tr>
<tr>
<td><strong>Thickness:</strong> 3/8”</td>
</tr>
<tr>
<td><strong>Contact:</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESILIENT FLOORING: RESILIENT TILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RT-2</strong></td>
</tr>
<tr>
<td><strong>Product Style:</strong> Nora Environcare</td>
</tr>
<tr>
<td><strong>Product Color:</strong> Lace Vine 2945</td>
</tr>
<tr>
<td><strong>Size:</strong> 24” x 24”</td>
</tr>
<tr>
<td><strong>Thickness:</strong> 2 mm thick</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOOR TILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TILE-1</strong></td>
</tr>
<tr>
<td><strong>Product Style:</strong> Classic Terrazzo Collection</td>
</tr>
<tr>
<td><strong>Product Color:</strong> CS21515, Dusk</td>
</tr>
<tr>
<td><strong>Size:</strong> 12” x 12”, 3/16” thick</td>
</tr>
</tbody>
</table>
# Walls

<table>
<thead>
<tr>
<th>WALL TILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TILE-2</strong></td>
</tr>
<tr>
<td>Manufacturer:</td>
</tr>
<tr>
<td>Product Style:</td>
</tr>
<tr>
<td>Product Color:</td>
</tr>
<tr>
<td>Grout:</td>
</tr>
<tr>
<td>Size:</td>
</tr>
<tr>
<td>Contact:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WALL COVERING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WC-01</strong></td>
</tr>
<tr>
<td>Manufacturer:</td>
</tr>
<tr>
<td>Product Style:</td>
</tr>
<tr>
<td>Product Color:</td>
</tr>
<tr>
<td>Size:</td>
</tr>
<tr>
<td>Contact:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WALL AND CORNER PROTECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CG-4</strong></td>
</tr>
<tr>
<td>Manufacturer:</td>
</tr>
<tr>
<td>Product No.:</td>
</tr>
<tr>
<td>Finish:</td>
</tr>
<tr>
<td>Legs:</td>
</tr>
<tr>
<td>Height:</td>
</tr>
<tr>
<td>Corner:</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| **HR-1** |  |
| Manufacturer: | Construction Specialties, or approved |
| Product No.: | P-RWS |
| Finish: | Stainless Steel, Wood Handrail, stain to match WD-1 |
### Base

**WALL BASE**

<table>
<thead>
<tr>
<th>RB-1</th>
<th>Manufacturer:</th>
<th>Johnsonite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Product Style:</td>
<td>Tightlock Cove Base, Resilient Floors</td>
</tr>
<tr>
<td></td>
<td>Product Color:</td>
<td>Pewter, 38</td>
</tr>
</tbody>
</table>

### Doors

**WOOD**

<table>
<thead>
<tr>
<th>WD-1</th>
<th>Manufacturer:</th>
<th>Dooge Veneers Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Product Color:</td>
<td>Anigre, Qtd Figured</td>
</tr>
<tr>
<td></td>
<td>Log No.:</td>
<td>#77/30 FSC, stained to match architect’s sample</td>
</tr>
</tbody>
</table>

### Ceilings

**ACOUSTICAL LAY-IN CEILINGS**

<table>
<thead>
<tr>
<th>ACT-1</th>
<th>Manufacturer:</th>
<th>Armstrong</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Product Style:</td>
<td>Healthzone Ultima</td>
</tr>
<tr>
<td></td>
<td>Product Color:</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Size:</td>
<td>As Noted</td>
</tr>
</tbody>
</table>
PHOTOGRAPHY

A professional photographer will be engaged by the Architect to photograph the project after construction is complete. The Architect shall request pre-approval from NYU Langone of the photographer they wish to use.

The RED+F PM and GC/CM shall allocate sufficient time in the schedule to professionally photograph the project. The time shall be clearly shown on the project schedule. The length of time needed will be based on the size and scope of the project. At a minimum two days will be allocated for spaces up to 50,000 GSF. One more day shall be allocated for each additional 50,000 GSF. Final photography must be scheduled as follows:

- After construction is complete and no contractors are on the premises
- After final cleaning has occurred
- Before any move-in preparation has begun

All the major public spaces and architecturally important components shall be photographed sufficiently to show the scope of the project. Final high resolution files shall be provided to the Design Studio at RED+F via the PM without charge to NYU Langone Medical Center. Below are a few examples:
POST-OCCUPANCY EVALUATIONS

RED+F is continually seeking to improve the Design and Construction process of the built environment and has established a Built Environment Improvement Cycle. The cycle, which consists of Design-Construction-Occupancy-Evaluation and back to Design, allows for continual improvement of the built environment by establishing a Post-Occupancy Evaluation phase.

The Post-Occupancy Evaluation phase occurs after the users have moved in and utilized the space for a certain period of time, typically about a year. The intent of the Post-Occupancy Evaluation is to provide feedback on the design and general performance of materials over a period of time.

The RED+F Design Studio performs the Post-Occupancy Evaluation. It is important the same group perform the evaluation in order to maintain a consistent basis of analysis between projects. Results of Post-Occupancy Evaluations are then used to inform Project Teams and update the Design Guidelines. For example, materials that are not holding up well are removed from the Design Guidelines. Materials that are not part of the Design Guidelines but were approved for a particular project and have been holding up well are considered for inclusion in the Design Guidelines. This process reduces maintenance costs and streamlines the Design process.

*Built Environment Improvement Cycle*
POST-OCCUPANCY EVALUATION FORM

The intent of the Design Post Occupancy Evaluation Form is to provide feedback on the overall design and general performance of materials over a period of time. The information will be used to continually update the Design Guidelines.

<table>
<thead>
<tr>
<th>EVALUATION ITEMS</th>
<th>RATINGS (1-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Floor Finishes</td>
<td>#</td>
</tr>
<tr>
<td>2. Wall/Base Finishes</td>
<td>#</td>
</tr>
<tr>
<td>3. Doors/Hardware</td>
<td>#</td>
</tr>
<tr>
<td>4. Millwork/Casework</td>
<td>#</td>
</tr>
<tr>
<td>5. Ceilings</td>
<td>#</td>
</tr>
<tr>
<td>6. Lighting</td>
<td>#</td>
</tr>
<tr>
<td>7. Furniture</td>
<td>#</td>
</tr>
<tr>
<td>8. Signage/Wayfinding</td>
<td>#</td>
</tr>
<tr>
<td>9. Specialty (Reception Desk, Nurse Station, etc.)</td>
<td>#</td>
</tr>
<tr>
<td>10. Other (Acoustics, Artwork, etc.)</td>
<td>#</td>
</tr>
</tbody>
</table>

| Total                                                  | #              |

* Ratings: 1 = Needs Work, 3 = Fair, 5 = Average, 7 = Above Average, 9 = Very Good, 10 = Exceptional
Instructions to Engineer for preparing a design and specification:

I. It shall be the Engineer’s responsibility to follow these NYULMC guidelines on all projects located on the main campus. For projects that are located off-campus, the Engineer shall follow these guidelines in conjunction with the building landlord’s requirements.

II. The information listed below is a guideline only. It shall be the Engineer’s responsibility to conform to all appropriate building code requirements.

III. All projects shall be designed in accordance with the applicable New York City Building Code, Mechanical Code, Fuel Gas Code, Fire Code, Energy Conservation Code, and the applicable standards referenced by these codes.

IV. These Guidelines will be updated periodically and suggestions for updates may be made to the NYULMC Project Manager. Requests and proposals for changes to the guidelines should be made in writing to a NYULMC Project Manager assigned to the project who will forward such requests to RED+F Facilities Operations, as appropriate for review. RED+F Facilities Operations will advise the PM and Engineer in writing whether an exception to the Guidelines will be permitted or not.
BIM Model of Energy Building – Ennead Architects
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1. **GENERAL**

   A. **End of Project Requirements**
      As part of a break-out cost, the design engineer shall review the as-built documentation provided by the subcontractors and edit the project design documents to reflect the “as-built” condition. The engineer shall confirm the collaborated as-buils are correct and complete. To create these collaborated as-buils the design engineers shall use the contractor as-buils as a reference, which shall be provided to the engineer in PDF form and native (AutoCAD or Revit).

      I. **Single Line Diagrams**
         - Steam Distribution
         - CHW Distribution
         - CW Distribution
         - Domestic Water Distribution
         - Sanitary and Storm Drainage Distribution
         - Medical Gas Distribution
         - Medical Vacuum Distribution
         - Electrical Distribution (Normal and Emergency)
         - Controls System

      II. **Floor plans**

      III. **Life Safety Drawings** which include the following but not limited to:
         - Sprinklers
         - Fire Standpipe
         - Strobes
         - Pull stations
         - Smoke doors
         - Magnets for doors
         - Smoke compartments
         - Egress paths
         - Flow tamper switches
         - Exit Signs
         - Fire/smoke and smoke dampers

      IV. **Floor Plans** indicating room pressure relationships

      V. **Campus Wide Equipment Schedules**
         a. All major MEP/FP/FA equipment removed and installed (in excel format).
B. Training
Training for new equipment or controls shall be written into design specifications. There shall be two training sessions, one in the morning and one in the afternoon to pick up all worker shifts. Training syllabus shall be provided to design engineer as well as NYULMC RED+F Facilities Operations for review prior to training sessions for review and comment. Training must be done by qualified personnel with intricate knowledge of equipment and system and not by salesman.

C. Mercury Elimination Program Compliance
In an effort to protect patients, staff, researchers and the environment, it is the policy of NYU Langone Medical Center to prohibit the use of mercury-containing equipment, materials and instrumentation where safe, effective alternatives exist. This program is outlined in more detail in NYULMC Safety Policy No. 170. Typical mercury-containing materials could include—thermostats, switches, float controls and lamps. Approved suppliers with known mercury-free alternatives are identified herein, but this list should not be assumed to be complete. If a designer or engineer believes the use of mercury-containing materials (besides UV, florescent and LED light bulbs, ballasts and mercury-containing batteries, which are exempted) is mandatory, the need must be formally presented to the NYULMC RED+F Facilities Operations Department to obtain express permission for its use prior to any deviation from this guideline.

I. If permission for use of mercury-containing materials (besides UV, florescent and LED light bulbs, ballasts and mercury-containing batteries) is given by RED+F Facilities Operations then engineers, designers or installers must ensure the proper inventorying, reporting and safe handling of any mercury-containing materials and equipment. These requirements include:
   a. Labeling of Material - Proper “mercury-containing material” stick-on labels can be obtained from Facilities Operations (Greenberg Hall, SC2, Rm 122)
   b. Inventorying of Material – An inventory log of properly labeled materials/equipment with installation date and specific location must be submitted to Facilities Operations by the end of project as part of closeout documentation.
   c. Complying with all safe handling and disposal guidelines outlined by NYULMC Environmental Health & Safety in its policies available on its website and referenced in contracts.

END OF GENERAL SECTION
2. **MECHANICAL**

A. **Codes, Regulations and Design Standards**
   Comply with all current New York City Building Codes, Joint Commission Standards, National Institutes of Health and all authorities having jurisdiction and applicable national, state and local codes, laws and regulations governing or relating to any portion of this work.

Laboratory and Hospital environmental conditions, air filtration, air change rates and pressurization relationships will be in accordance with the requirements set forth in American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), American Institute of Architects (AIA), National Institute for Occupational Safety and Health (NIOSH), National Fire Protection Association (NFPA), Centers of Disease Control and Prevention (CDC), and all other applicable governmental Codes.

If any design standard within this document contradicts codes or regulations, the design engineer shall notify NYULMC.

B. **Design Criteria**

I. **Chilled Water**
   a. **General Chilled Water Supply and Return Temperatures:** 45°F/57°F
   b. **Operating Room Chilled Water Supply and Return Temperatures:** Contact Facilities Operations for proper values.
   c. **If Chilled Water will be decoupled from main campus, Chilled Water system with a heat exchanger, higher design temperatures shall be used and approved by Facilities Operations**
   d. 2-way control valves shall be used

II. **Condenser Water (campus)**
   a. **Condenser Water Supply Temperature:** 85°F
   b. **Condenser Water Return Temperature:** 95°F
   c. 2-way control valves shall be used

III. **Condenser Water (process)**
   a. **Condenser Water Supply Temperature:** 80°F
   b. **Condenser Water Return Temperature:** 90°F

IV. **Steam**
   a. Working pressure of steam is 200 psi.
   b. Clean steam generation shall be used for humidification and for direct injection sterilization.

V. **Perimeter Heating**
   a. Non potable hot water shall be designed to an Outside Air Temperature reset control scheme.
VI. **Outside Design Conditions**
   a. The mechanical systems shall be selected to serve a facility as specified within the New York City Building Code.

VII. **Internal Design Conditions**
   a. Offices, Conference Rooms, Classrooms, Student Areas and Similar Areas
      1) Occupied:
         a) Heating: 68-74°F D.B.
         b) Cooling: 68-75°F D.B. with a maximum of 60% R.H.
         c) Conference rooms, libraries, study halls and similar spaces shall have CO2 monitoring and demand ventilation control.
      2) Unoccupied Setback:
         a) Heating: 65°F D.B.
         b) Cooling: 85°F D.B.
         c) Airflow Setback (non-critical only): 15-20% of design. Control shall be on a room-by-room basis with a local over-ride at the respective temperature sensor.

   b. Laboratories, Lab Support Areas and Similar Areas
      1) Occupied:
         a) Heating: 68°F D.B. with a minimum of 35% R.H ±5%
         b) Cooling: 75°F D.B. with a maximum of 50% R.H.
         c) Air Change Rate shall be determined based upon minimum code requirement or cooling load, whichever is greater. In no instance shall it be less than 6 air changes per hour unless an air sampling system is being used. Demand control ventilation is allowed on a case by case basis which shall be reviewed with Facilities Operations.
      2) Unoccupied Setback:
         a) Heating: 65°F D.B.
         b) Cooling: 85°F D.B.
         c) Airflow Setback (non-critical only): pressurization shall be maintained with reduced airflow. Methodology shall be reviewed with facilities operation prior to design.
         d) Air Change rate shall be determined based upon minimum code requirement or cooling load, whichever is greater. In no instances shall it be less than 6 air changes per hour unless an air sampling system is being used. Demand control
ventilation is allowed on a case by case basis which shall be reviewed with Facilities Operations.

c. Health Care Facility Areas
   a) Operating Rooms: 68-78°F D.B. depending on function of Operating Room. Temperature shall be discussed with Facilities Operations and with end user. Minimum of 30% R.H. and maximum of 60% R.H.
   b) All other Health Care Facility Areas shall be designed to the data listed within the latest edition of the FGI Guidelines and ASHRAE 170 – Ventilation for Health Care Facilities.

d. Vivarium and Support Areas
   The data within this section shall be superseded by the most current version of NIH Guidelines. All temperature conditions shall be reviewed with NYULMC DLAR and Facilities Operations. The final design shall be confirmed by all parties.
      1) Unoccupied Setback:
         a) Areas with animal habitats shall not be allowed a temperature or airflow setback.
         b) Any rooms that are designed with an unoccupied schedule shall be confirmed with NYULMC DLAR and Facilities Operations.

e. Electrical Closets
   1) Ventilated to 80°F D.B. average, 85°F D.B. maximum.

f. Switchgear Rooms
   1) Air Conditioned to 78°F D.B. The design shall be an N+1 configuration.

g. Communication Closets
   1) Heating: 65°F D.B. minimum (if room is on perimeter of building)

h. Storage/mechanical areas:
   1) Ventilated

i. Elevator machine rooms:
   1) Air conditioned to 78°F dry bulb minimum.
VIII. **Internal Load Criteria**

The data within this section shall be superseded by the most current version of ASHRAE Handbook – Fundamentals; Nonresidential Cooling and Heating Load Calculations Chapter and ASHRAE Handbook – Applications; Laboratories Chapter and Health Care Facilities Chapter.

### a. People

<table>
<thead>
<tr>
<th>Area Type</th>
<th>Metabolic Rates</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Sensible BTU/hr</td>
<td>Latent BTU/hr</td>
<td></td>
</tr>
<tr>
<td>Laboratories</td>
<td>275</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>Offices</td>
<td>250</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Support Areas</td>
<td>275</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>Conference/Break Rooms</td>
<td>245</td>
<td>155</td>
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<tr>
<td>Vivarium</td>
<td>250</td>
<td>250</td>
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<tr>
<td>Operating Room</td>
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<td>475</td>
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<tr>
<td>Hospital Floor (Adult)</td>
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### b. Vivarium

<table>
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<th>Sensible</th>
<th>Latent</th>
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<tr>
<td>Small Dog</td>
<td>22.7</td>
<td>105.0</td>
<td>56.4</td>
</tr>
<tr>
<td>Large Dog</td>
<td>50.0</td>
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<tr>
<td>Rabbit</td>
<td>5.41</td>
<td>39.2</td>
<td>19.3</td>
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<td>Cat</td>
<td>6.61</td>
<td>45.6</td>
<td>22.5</td>
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<tr>
<td>Guinea Pig</td>
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<tr>
<td>Nonhuman Primate</td>
<td>12.0</td>
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<tr>
<td>Hamster</td>
<td>0.260</td>
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</tbody>
</table>

IX. **Lighting and Equipment Heat Gains**

### a. Base design on data listed within ASHRAE Handbook – Fundamentals; Nonresidential Cooling and Heating Load Calculations Chapter and ASHRAE Handbook – Applications; Laboratories Chapter and Health Care Facilities Chapter.
X. **Hours of Operation**
   a. Offices: 12hrs/day, 5 days/week
   b. Laboratories/Support Areas: case by case basis to be discussed with end user.
   c. Health Care Facility/Support Areas: 24 hrs/day, 7 days/week
   d. Vivarium: 24 hrs/day, 7 days/week
C. **Mechanical Naming Convention**  
   I. **Naming Scheme**  
      Example: AHU-TH-1-2

<table>
<thead>
<tr>
<th>AHU</th>
<th>-</th>
<th>Building Name (Location of Unit)</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Type</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AC – Air Conditioning Unit (cooling only)</td>
<td>-</td>
<td>ALH – Alumni Hall</td>
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</tr>
<tr>
<td>AF – Air Filter</td>
<td></td>
<td>BRG – Berg</td>
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<tr>
<td>AHU – Air Handling Unit</td>
<td></td>
<td>EB – Energy Building</td>
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<tr>
<td>B – Boiler</td>
<td></td>
<td>GBH – Greenberg Hall</td>
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<tr>
<td>CAV – Constant Air Volume Unit</td>
<td></td>
<td>HCC – Health Care Center</td>
<td></td>
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<tr>
<td>CH – Chiller</td>
<td></td>
<td>KP – Kimmel Pavilion</td>
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<tr>
<td>CP – Condensate Pump</td>
<td></td>
<td>MSB – Medical Science Building</td>
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<tr>
<td>CSG – Clean Steam Generator</td>
<td></td>
<td>SB – Science Building</td>
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<tr>
<td>CT – Cooling Tower</td>
<td></td>
<td>SKB – Skirball</td>
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<tr>
<td>CWP – Condenser Water Pump</td>
<td></td>
<td>SRC – Smilow Research Center</td>
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<tr>
<td>ET – Expansion Tank</td>
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<td>TH – Tisch Hospital</td>
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<tr>
<td>EX – Exhaust Fan</td>
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<tr>
<td>FCU – Fan Coil Unit</td>
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<tr>
<td>FOP – Fuel Oil Pump</td>
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<tr>
<td>GX – General Exhaust Fan</td>
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<tr>
<td>HWP – Hot Water Pump</td>
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<tr>
<td>KEF – Kitchen Exhaust Fan</td>
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<tr>
<td>PCHP – Primary CHW Pump</td>
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<tr>
<td>PFHX – Plate and Frame Heat Exchanger</td>
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<tr>
<td>PRV – Pressure Reducing Station</td>
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<tr>
<td>RAF – Return Fan</td>
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<tr>
<td>SAF – Supply Fan</td>
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<tr>
<td>SCHP – Secondary CHW Pump</td>
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<tr>
<td>STHX – Shell and Tube Heat Exchanger</td>
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<tr>
<td>SX – Smoke Exhaust Fan</td>
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<td>TX – Toilet Exhaust Fan</td>
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<tr>
<td>UH – Unit Heater</td>
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<td>VAV – Variable Air Volume Box</td>
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<td>VFD – Variable Frequency Drive</td>
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<tr>
<td>WSHP – Water Source Heat Pump</td>
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</tbody>
</table>
D. **Various**

I. **Testing and Balancing** –
   a. All projects shall have a TAB baseline taken of space prior to design/demo to confirm existing conditions.
   b. All Testing and Balancing values shall be within +5% / -10% of design values on a per outlet basis.
   c. All Medium Pressure duct systems shall be duct leak tested per SMACNA Leak Test manual.
   d. Low Pressure duct systems shall be pressure tested on a case by case basis.
   e. All hydronic piping shall be hydrostatically tested to 1.5 working pressure but not less than 100psi for a minimum of 4 hours. All tests to be witnessed by owner.
   f. All pressure sensitive rooms shall have pressure relationship between room and outside space shown on report.
   g. Pressure sensitive rooms shall be tested prior to ceiling being installed with a blower door to confirm design pressure relationships between pressurized room and adjacent spaces.

II. All equipment shall be cleaned prior to starting/turnover.

III. Piping systems shall be chemically cleaned prior to connection to existing.
   a. Chemical cleaning shall meet all EPA standards and NYULMC Environmental Health and Safety requirements.
   b. NYULMC water treatment vendor shall be used for all cleaning.
   c. NYULMC house chemical company will provide chemical types for cleaning.

IV. Heat Recovery systems shall be enthalpy wheels, hydronic glycol based systems or air to air heat exchangers. These shall be designed on a case by case basis and will need to be reviewed and approved by Facilities Operations.

V. Controls: Temperature and humidity shall have cascaded loop control or Master/Sub-Master Control.

VI. Pressure dependent rooms shall always have a schedule shown on drawings indicating location, room name, room use and pressures required to meet code criteria. Testing and Balancing reports for these rooms shall always indicate design pressure and actual pressure of room.
VII. Factory Witness Tests –
   a. The following equipment shall be factory witness tested. See individual equipment sections for further information regarding required tests.
      i. Air Handling Units
      ii. Chillers

VIII. Field Testing -
   a. The following equipment shall be field witness tested. See individual equipment sections for further information regarding required tests.
      iii. Field Assembled Air Handling Units
      iv. Variable Frequency Drives

E. Equipment

1. Access Doors
   Access doors shall be provided in any spaces where maintenance of any system (air or water) will need to be provided. A minimum size of 24x24 shall be provided, if smaller size is requested, obtain permission from Facilities Operations. Access shall be provided to all piping trim, dampers, actuators, shut off valves, BMS Sensors, equipment both sides of reheat preheat and cooling coils and any other equipment required maintenance access. The doors shall not be blocked by piping, electrical conduit, ceiling support iron or hangers.

Approved Manufacturers:
   A. Finished Construction:
      a. Karp
      b. Mil-Cor

   B. Sheetmetal (doors):
      a. Duct Mate
      b. Flexmaster

   C. Sheetmetal (hardware):
      a. Arlan
      b. Duro Dyne
      c. Ventlok
2. **Air Compressors**  
Medical air compressors – see plumbing design guidelines.

   Approved Manufacturers:
   - A. Sullair
   - B. Quincy
   - C. Gardener Denver

3. **Air Curtains**  
Air curtains shall be provided with a door switch to operate only when doors are open.

   Approved Manufacturers:
   - A. Berner International Corp.
   - B. King
   - C. Mars Air Door
   - D. Powered Aire Inc.

4. **Air Filters**  
Approved Manufacturers:
   - A. Viledon
   - B. Flanders
   - C. Fiber Bond

5. **Air Handling/Conditioning Units**  
Units shall be furnished with unit controls to comply with the requirements of the most current New York City Energy Conservation Code (NYCECC).

   Fan array technology shall be used on all Air Handling Units. Provide one VFD per fan motor with no bypass.

   Non-Ducted filter boxes shall have a minimum of 1 foot clearance. Ducted intake filter boxes shall have removable panels.

   If unit is provided with factory mounted controls; the unit shall have ability for read/write access to the existing BMS system through BACnet or Modbus protocol.

   Motor section shall have doors or removable panels that are 25% larger than the motor for maintenance access. All floor plating inside each compartment shall be diamond plated. Provide hoist type access for maintenance purposes.

   If a unit is a double stack unit with access doors/panels on an upper level of the unit, the unit shall be provided with a permanent walkway/catwalk for maintenance access. Ladders without a walkway/catwalk are not allowed.

   Units are to be provided with access windows for each unit section. Lighting shall also be provided in each section. If unit is outdoors, lighting suitable
for outdoor use (flood light type) shall be provided to illuminate all walkways/catwalks and access points.

Pre-assembled units shall be factory witness tested. Tests shall consist of: Unit Leakage, Coil Leakage, Deflection, Fan Vibration, and Acoustical.

Field assembled units shall have the same test criteria as factory witness test but shall be field tested by manufacturer.

Duct seal putty shall be used in all AHU conduit connections to VFDs, control enclosures, and other sensitive electronics.

Switches, dampers, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:

A. Factory Assembled Custom Air Handling Units
   a. Air Enterprise
   b. Buffalo Air Handling
   c. Climatecraft
   d. Temtrol
   e. Ventrol

B. Packaged Roof-Mounted Air Handling Units
   a. Enviro-Tec
   b. Trane
   c. York

C. Packaged Roof-Mounted DX Air Handling Units
   a. Trane
   b. York
   c. Liebert

D. Packaged Self-Contained Chilled Water Air Handling Units
   a. Buffalo Air Handling
   b. Trane
   c. Ventrol

E. Packaged Self-Contained Computer Room Air Conditioning Units
   a. Data Aire
   b. Liebert
   c. APC (in-row cooling only)

F. Packaged Self-Contained Air Conditioning Units (Ceiling-Mounted)
   a. Data Aire
   b. Enviro-Tec
   c. Liebert
G. Packaged Self-Contained DX Air Conditioning Units (Ceiling-Mounted)
a. Data Aire  
b. Liebert  
c. Mammoth  

H. Spot Coolers (Data Closets)
a. Movin Cool  

6. Air Outlets
Any outlets that are to be installed in labs, Operating Rooms or any specialized medical space shall be specific to the usage of the room. Standard outlets are not allowed in these areas.

Approved Manufacturers:
A. Anemostat  
B. Krueger  
C. Nailor Industries  
D. Titus  

7. Air Volume Regulators
Approved Manufacturers:
A. Anemostat  
B. Krueger  
C. Nailor Industries  
D. Titus  

8. Baseboard Radiation (Steam/Water)
Approved Manufacturers:
A. Rittling  
B. Slantfin  
C. Sterling Radiator  
D. Vulcan Radiator  

9. Building Automation
Approved Manufacturers:
A. Alerton  

10. Building Automation Controllers/Sensors
Refer to NYULMC Building Automation design guidelines.

Approved Manufacturers:
A. Alerton
11. **Clean Steam Generators**

Clean steam generators shall be steam to steam type. Screen control panels with PLC shall be provided. Shell shall be pitched to completely drain the condensate.

Approved Manufacturers:
- A. Diversified Heat Transfer DHT.
- B. Patterson-Kelley, Company.
- C. Acme Engineering Products, Inc.
- D. Precision Boilers, Inc.
- E. Armstrong

12. **Chillers**

Chiller redundancy to be reviewed by Facilities Operations. All new chillers shall be reviewed and approved by Facilities Operations. Provide hoist type access for maintenance purposes.

Chillers located outdoors shall have capabilities of operating low ambient temperature conditions.

Factory witness tests shall consist of all tests required under AHRI Standard 550. Chillers shall have a four point tests - 25%, 50%, 75% and 100% design load.

Switches, dampers, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:
- A. Centrifugal
  - a. Carrier
  - b. York
  - c. Trane
- B. Absorption
  - a. York
  - b. Carrier
  - c. Trane
- C. Modular Air Cooled
  - a. ArcticChill
  - b. Carrier
  - c. Multistack
  - d. York
  - e. Trane
D. Modular Water Cooled
   a. ArcticChill
   b. Multistack
   c. York

E. Packaged Air Cooled
   a. Carrier
   b. York
   c. Trane

13. Condensate Pumps
    Approved Manufacturers:
    A. Cold Condensate
       a. Federal
       b. Hartell
       c. Little Giant
    B. Hot Condensate (Low Pressure Steam Return)
       a. Armstrong International
       b. Bell & Gossett
       c. Federal Pump
       d. Weinman

14. Cooling/Heating Coils
    All coils shall be Copper/Copper/Stainless with a minimum 0.035” wall thickness. Dielectric fittings shall be installed between all dissimilar metals. Fins shall be copper.

    All coils shall be drainable (drain downs downstream of isolation valve ¾” hose bib) and have means of removal for service or replacement. Coils shall be pitched to a low point for draining purposes. If coils have different levels, all levels shall have separate drain pans. Coils shall have capability to be removed without removing any piping trim. All coils shall have clear access for removal. Multi coils shall be staggered for ability to be removed on the same side of unit. Provide hoist type access for maintenance purposes.

    Cooling Coils must have a stainless steel condensate pan pitched in three directions toward drain. Drain pan nipples shall be stainless steel with dielectric fittings connecting to a drain plug.

    If return air is coming from the top, the coils shall be designed to have a top and bottom section. If return air is coming from the side, the coils shall be designed to have a left and right section.
Separate Freezestats shall be provided on EACH section of coil within a unit. If a unit has multiple coils, each coil section shall be provided with its own control valve.

Double actuators are not allowed. Actuators shall be sized to provide proper torque via one actuator.

Freeze type plug valves are not allowed.

Coils to be provided with a full size manual bypass ball or gate valve.

Approved Manufacturers:
- Water/Steam
  - Aerofin
  - Heat Craft
  - Temtrol

15. **Cooling Towers**

All towers shall have accessible fan motors for removal. Catwalks shall be provided for fan motors that are installed on the outside of the unit. Provide means of removal of fan motor. Railings shall always be provided on top of the unit. Ladders shall be provided for access to the top of the unit. Freeze protection (steam or electric) shall be provided on towers that will not be drained down during the winter season – freeze protection pump shall be provided on a case by case basis as secondary protection.

Major cooling towers shall be induced draft type and have stainless steel basins with PVC piping inside. If towers have multiple cells, each cell shall have means of walking between each cell. Catwalks shall be installed inside all cells for maintenance. Catwalks/platform shall be installed around entirety of cooling tower at the level of the bottom of the basin.

Minor cooling towers shall be force draft type and have stainless steel basins with PVC piping inside. Catwalks/platform shall be installed around entirety of cooling tower at the level of the bottom of the basin.

¾” hose bib shall be installed for cleaning purposes.

All cooling towers shall be reviewed and approved by Facilities Operations.

Approved Manufacturers:
- Marley
- Baltimore Aircoil Company
- Evapco
16. **Controllers (Water Level)**
Controllers shall be floats or digital type. Design shall be discussed with Facilities Operations.

Floats, controls, switches, dampers, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:
   A. McDonnell Miller
   B. B&W
   C. Magnatrol International, Inc.

17. **Dampers (ALD's)**
Shafts of dampers shall be notched to indicate the position of the damper blade. Damper adjustment hardware and actuators shall extend past ductwork insulation.

Provide Access Doors for damper blades and actuator (if access is an issue). If actuator has to be installed inside ductwork due to size requirements, the design shall be reviewed and approved by Facilities Operations.

Dampers and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:
   A. Arlan
   B. Imperial
   C. Ruskin (preferred)

18. **Dampers (Dynamic Fire/Smoke)**
All fire smoke dampers to be full throat and shall not obstruct the air stream or reduce the area of the duct in any manner. Shafts of dampers shall be notched to indicate the position of the damper blade.

Fire Smoke Dampers shall be provided with limit switches.

Dampers and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:
   A. Arlan
   B. Imperial
   C. Ruskin (preferred)
19. Expansion Compensation

Expansion compensators shall be designed and shown on drawings with proper guiding and anchors.

Approved Manufacturers:
A. Ball Type Expansion Joints
   a. Advanced Thermal Systems
   b. Hyspan-Barco

B. Braided Type Expansion Loops
   a. Metraflex

C. Corrugated Type Expansion Joints
   a. Hyspan-Barco
   b. Keflex
   c. Metraflex

D. Slip Type Expansion Joints
   a. Hyspan-Barco
   b. Metraflex

20. Expansion Tanks

Expansion tanks shall have waterside and airside gauges on bladder type tanks. Drain points shall be provided on waterside section.

Approved Manufacturers:
A. Adamson
B. Amtrol
C. Bell & Gossett
D. John Woods
E. RECO
F. TACO

21. Fans

Spring type vibration isolators shall always be provided. Neoprene type isolators can be provided for fans less than 100lbs. If neoprene is used, the design shall be reviewed and approved by Facilities Operations.

Motors which are located on the outside of the fan housing shall have an internal access point to provide access to internal sheave. Provide hoist type access for maintenance purposes.

Patient isolation rooms shall have a dedicated exhaust system, which shall not be picked up by the air handling unit.

Fume hood chemical exhaust shall be stainless steel welded ductwork. All fume hood risers shall be pitched back to the chemical fume hood.
Bearings shall have a life grade of L5 with a minimum of 50,000 hours.

Approved Manufacturers:
A. Howden-Buffalo
B. Strobic Air
C. Woods
D. Greenheck (preferred)
E. Cook
F. PennBarry
G. Twin City
H. Aerovent

22. Fan-Powered Boxes
Fan-Powered Boxes shall have pressure independent control. Units shall be designed with a local disconnect switch.

Approved Manufacturers:
A. Anemostat
B. Nailor Industries
C. Titus

23. Fan Coil Units
Provide with 2-way controls and condensate pump (or gravity drain). Separate stainless steel drain pan shall be installed underneath unit.

Pumps, switches, dampers, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:
A. Enviro-Tec
B. International
C. York
D. Liebert
E. Data Aire

24. Firestopping Products
The following shall not be specified without approval from NYULMC’s division of EH&S:

- Chemicals that are known (IARC group 1) or probable (IARC group 2a) human carcinogens.
- Hazardous substances listed in OSHA 1910 subpart Z.
- Products containing volatile organic compounds (VOCs) in excess of 50 grams/liter.
- Products whose Safety Data Sheet (SDS) rates health, fire and/or reactivity as exceeding “1” on a scale of 0 to 4.
- Products emitting strong odors.
Approved Manufacturers:
   A. Hilti

25. **Flow Measuring Devices**
    Floats, controls, switches, dampers, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Approved Manufacturers:
   A. Air Systems
      a. Air Monitor Corporation
      b. Ebtron, Inc.
      c. Tek-Air Systems, Inc.

   B. Water Systems (Permanently Installed Clamp On Ultrasonic)
      a. Flexim

   C. Steam Systems (Insertion Turbine or Vortex or Clamp On Ultrasonic)
      a. Flexim
      b. Spirax Sarco

26. **Fuel Oil Pumping Systems**
    Pumping system shall be installed in a space that will provide access for periodic maintenance including removal of motors, impellers, and accessories. In flood prone area (refer to Facilities Department for flood prone locations) provide water tight enclosure that will allow the pumps to operate during a flood. Controls and all power conduits to be within water tight installations until outside of flood zone.

Approved Manufacturers:
   A. ISP
   B. IMO
   C. Deval
   D. Viking

27. **Fuel Oil Specialties**
    Approved Manufacturers:
       A. ISP
       B. Preferred Utilities Mfg. Corp.

28. **Fuel Oil Tanks**
    Fuel oil tank shall be bolted to the structure to prevent floating in case of a flood. All preventable flood requirements shall be analyzed if fuel oil tank is to be installed in a flood prone area (refer to Facilities Department for flood prone locations).
Approved Manufacturers:

A. Fiberglass
   a. Xerxes Corp.
   b. Cardinal Fiberglass Industries
   c. Containment Solutions

B. Steel
   a. ISP
   c. Adamson Global Technology Corporation
   d. Cardinal Tank Corporation

29. Fuel Oil Tank Gauging and Leak Detection Systems
    Approved Manufacturers:
    A. ISP
    B. Veeder-Root

30. FreezeStats
    FreezeStats shall cover entire length of coil vertically and horizontally (leaving 6” from each edge of coil). The maximum vertical distance between each pass of freezeStat coils shall be 6”. All freezeStats that are installed in interior spaces shall have a test coil. Vertical steel hanger straps shall be used every three feet for mounting. The element must be supported at all changes in direction with radial bend mounting bracket. The freezeStat shall be installed on the leading face of the cooling coil. At no times shall the freezeStat be supported by other sensing elements.

31. Hangers, Anchors and Guides
    All exposed threaded rods shall be capped with an orange protective cap either rubber or plastic. All threaded rods shall be cut down to an inch of final nut – rods shall not be left at full length for safety reasons.

Approved Manufacturers:

A. Cable Support Systems for Ducts
   a. Duct Mate (Gripple)
   b. Erico Caddy Speed Link

B. Hangers
   a. Anvil International
   b. Bee-Line
   c. Carpenter Patterson
   d. Empire Industries, Inc.
   e. Erico, Michigan Hanger
   f. Hilti
   g. National Pipe Hanger Corporation
   h. Piping Technologies, Inc.
C. Inserts
   a. Bee-Line
   b. Carpenter Patterson
   c. Erico, Michigan Hanger
   d. Fee & Mason
   e. F & S Central
   f. Grinnell
   g. Piping Technologies, Inc.
   h. Simpson StrongTie

D. Mechanical Anchors (Undercut Type Only)
   Powder or power actuated devices, grip nails, expansion nails and adhesive anchors are permitted.
   a. Hilti

32. Heat Exchangers
   Relief valves shall be located on the hot and cold side of heat exchanger and sized to the working pressure of the system. Heat exchangers shall be located on a housekeeping pad. No equipment shall be installed on the plate side of a heat exchanger – proper access for removal of plates shall always be maintained.

   Heat exchangers shall be provided with strapped or clipped removable shrouds.

   Approved Manufacturers:
   A. Plate-and-Frame
      a. Alpha-Laval
      b. Plate Concepts
      c. GEA

   B. Shell-and-Tube
      a. Bell & Gossett

33. Humidifiers
   Humidifiers shall be supplied with Humidistat and also an airflow switch for preventing humidifier operation without airflow. Humidistat shall be designed to be controlled via a cascaded loop. Humidifiers shall be resistive type not electrode type.

   Approved Manufacturers:
   A. Steam
      a. Armstrong
      b. Dri Steam
      c. Nortec
B. Water Spray (cannot be used in Article 28 spaces)
   a. Armstrong
   b. Herrmidifier
   c. Cold Fog

34. Insulation (Duct and Pipe)
    All supply ductwork shall be insulated on the outside. No acoustic insulation is allowed inside the ductwork unless encapsulated with a mylar, tedlar, or approved equivalent type membrane. Insulation shall not cover any damper adjustment hardware.

    All acoustical lining on the inside of any ducts to be reviewed with Facilities Operations.

    Piping insulation shall comply with latest codes and energy conservation codes.

    Ductwork located outside shall have proper weatherproofing for use outdoors.

    The following ductwork shall be insulated:
    - Supply Air
    - Outdoor air.
    - Return located in unconditioned space.
    - Type I, commercial, kitchen hood exhaust.
    - Oven and warewash exhaust.
    - Exhaust between isolation damper and penetration of building exterior.
    - Supply and return located outdoors.

    Generator exhausts located indoors shall be insulated with Calcium Silicate.

    Approved Manufacturers:
    A. Armacell
    B. Armstrong
    C. Knauf
    D. Johns-Manville
    E. Owens-Corning Fiberglas (O-C-F)
    F. P.P.G. (Pittsburgh Plate Glass)

35. Insulation Adhesives
    The following shall not be specified without approval from NYULMC’s division of EH&S:
    - Chemicals that are known (IARC group 1) or probable (IARC group 2a) human carcinogens.
    - Hazardous substances listed in OSHA 1910 subpart Z.
• Products containing volatile organic compounds (VOCs) in excess of 50 grams/liter.
• Products whose Safety Data Sheet (SDS) rates health, fire and/or reactivity as exceeding “1” on a scale of 0 to 4.
• Products emitting strong odors.

Approved Manufacturers:
A. Benjamin Foster Company
B. Elgen
C. Venture Tape Corp

36. Insulation Pipe Shields
Approved Manufacturers:
A. Buckaroo, Inc.
B. Pipe Shields Inc.
C. Taylor Pipe Supports

37. Meters and Gauges
Controls, thermometers, meters, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

Temperature Scale Ranges:
• Chilled-Water Piping: 0 to 100 deg F
• Condenser-Water Piping: 0 to 150 deg F
• Heating, Hot-Water Piping: 20 to 250 deg F
• Steam and Steam-Condensate Piping: 0 to 250 deg F

Pressure Scale Ranges:
Design engineer shall specify proper scales based on operating pressures.

Approved Manufacturers:
A. Instrument Test Ports
   a. Peterson Equipment
   b. Sisco
   c. Watts Regulator

B. Pressure Gauges 1.00% Accuracy
   a. Ashcroft
   b. Trerice
   c. Weiss
   d. Weksler
C. Pressure Switches
   a. Barksdale
   b. Dwyer
   c. Mercoid

D. Thermometers 1.00% Accuracy
   a. Trerice
   b. Weiss
   c. Weksler

38. **Motors**

Conform to NEMA MG 1. Motors shall not operate continuously at a service factor greater than 1. Design to a service factor of a minimum of 1.15. Provide hoist type access for maintenance purposes.

Motors to be with permanently greased bearings (preferred). If permanently greased bearings are not provided, grease ports shall be provided with adequate access – grease capillaries are not allowed.

Cast iron motors are not allowed.

Bearings shall have a life grade of L10 with a minimum of 200,000 hours. If motor is part of a fan array system and over-hertzing is being implemented, L10 life shall be greater than 200,000 hours.

If motor is part of a VFD system, the motor shall be inverter duty rated.

Approved Manufacturers:

A. Standard Efficiency (Less Than 1 hp)
   a. Baldor
   b. General Electric
   c. Toshiba
   d. AO Smith
   e. U.S. Motors
   f. Dayton
   g. Marathon
   h. Weg

B. Premium Efficiency (1 hp and Above)
   a. Baldor
   b. General Electric
   c. Toshiba
   d. AO Smith
   e. U.S. Motors
   f. Dayton
   g. Marathon
   h. Weg
39. **Motor Starters**  
Approved Manufacturers:  
A. Asea Brown Boveri (ABB)  
B. ASCO  
C. Allen Bradley  
D. Siemens  
E. Yaskawa Electric America

40. **Motor Control Centers**  
See Electrical Design Guidelines

41. **Motor Controllers Variable Speed (VFD)**  
Provide two VFDs – one lead and one lag unless part of a fan array system – see Air Handling Unit Section for fan array VFDs. VFDs shall be reviewed and approved by Facilities Operations. All conduits in a controlled enclosure or electrical enclosure shall have sealed conduits.

VFDs shall not be installed under any piping trim or joints. If VFD is installed under piping due to physical install constraints, NEMA 4 or 6 shall be used. All locations of VFDs that are below piping shall be approved by Facilities Operations.

Perform electrical analysis to confirm if active front end filters shall be required.

Field Testing on all VFDs powering 25hp motors and larger shall be provided and confirmed that Total Harmonic Distortion does not exceed 5%. At the point of common connection, current Total Harmonic Distortion shall not exceed 10%.

Startup and setup shall be done by the current NYULMC VFD vendor. Contact Facilities Operations for current campus vendor.

Duct seal putty shall be used on all conduit connections to air handling VFDs.

Approved Manufacturers:  
A. Asea Brown Boveri (ABB)  
B. Yaskawa Electric America

42. **Orifice SteamTraps**  
Approved Manufacturers:  
A. Steam Gard  
B. Sarco  
C. Armstrong
43. **Pipe and Fittings**

Dielectric fittings shall be installed between all dissimilar metals.

Approved Manufacturers:

A. Brass & Copper Pipe & Tube
   a. Elkhart
   b. NIBCO
   c. American Brass Co.
   d. Bridgeport Brass
   e. Chase Brass
   f. Lewin Matheis
   g. Mueller Industries, Inc.
   h. NIBCO
   i. Phelps Dodge
   j. Reading Tube Corp.
   k. Revere
   l. Wolverine Tube Co.

B. Steel Pipe
   a. Anvil International
   b. Ameri-Forge Corporation
   c. U. S. Steel
   d. Wheatland

C. Steel Pipe Fittings
   a. Capitol Manufacturing Company
   b. Hackney
   c. Phoenix Forging Company
   d. Tube Forgings
   e. Tube Line
   f. Weldbend Corporation

D. Mechanical Couplings for Grooved Pipe
   a. Grooved piping shall be discussed with Facilities Operations and shall be based on a project-by-project basis prior to its use in design.

44. **Pressure-Regulating Valves**

Approved Manufacturers:

A. Steam
   a. Leslie
   b. Fairchild
   c. Fische
   d. Circor
B. Water
   a. Leslie
   b. Cla-Val
   c. Watts

45. Pumps
   All pumps shall be premium efficiency. Pumps shall not be provided with triple-duty valves unless install restrictions require such an install. If triple-duty valves are required, they shall be reviewed and approved by Facilities Operations. Pumps shall be provided with either a strainer or suction diffusers with drain. Pump trim shall not have a balancing valve if pump will be provided with a VFD.

   Piping and pumps are to be independently supported. Spring type isolators on piping shall be recommended by acoustical consultant. If no consultant is on project, all piping within 50 feet of pump shall have spring type isolators.

   Install pumps in such a way to allow periodic maintenance which includes removal of motors, impellers and couplings. Pumps are required to be able to be drained down.

   Provide hoist type access for maintenance purposes.

   Bearings shall have a life grade of L10 with a minimum of 200,000 hours.

   Approved Manufacturers:
   A. Horizontal Split, End Suction and In-Line
      a. Armstrong
      b. Aurora
      c. Bell & Gossett
      d. Gould
      e. Peerless
      f. Weinman
   
   B. Fuel Oil
      a. IMO
      b. Viking
      c. Simplex

46. Radiant Heating Systems
   Unit shall be supplied with a wall thermostat and a manually operated on-off switch.

   Approved Manufacturers:
   A. Ceiling
      a. Rittling
      b. Runtal
B. Floor
   a. Aero Tech
   b. Airtex
   c. Aztec
   d. Uponor

47. Refrigerant Monitoring Systems
Relay outputs for alarms and control shall be provided to connect to BMS. The unit shall also be provided with visual and audible alarms at the panel. Monitoring system shall have multi point capabilities.

Approved Manufacturers:
   A. Mine Safety Appliances Company (MSA)

48. Sound Traps
Approved Manufacturers:
   A. I.A.C. (Industrial Acoustics Co.)
   B. Dynasonics
   C. Vibro-Acoustics

49. Steam Traps – See also Orifice steam traps
Approved Manufacturers:
   A. Armstrong
   B. Sarco

50. Strainers
Strainers installed on steam piping shall not be installed in the vertical direction (facing towards ground). Steam strainers shall be installed to be in line with the horizontal piping such that when looking at the pipe and strainer, the clean out shall be facing directly towards you.

Dielectric fittings shall be installed between all dissimilar metals.

Approved Manufacturers:
   A. Fabrotech
   B. Hoffman
   C. McAlear Mfg. Co.
   D. Metraflex
   E. Mueller
   F. Sarco
   G. Titan
   H. Yarway

51. System Identification
Equipment Labels shall be engraved plastic nameplates with a black surface and white core with engraved letters. Engraved lettering shall be a minimum of 2” in letter height.
Pipe Labels shall be installed every 5 feet in concealed areas and every 10 feet in un-concealed areas and shall be self-adhesive labels with direction-of-flow arrows and the name of the service printed in black letters not less than 1 inch high for pipe 2-1/2 inches and smaller, 2 inches high for 3 inch pipe and larger. Markers shall have backgrounds of different colors for the various service groups. Pipe labels shall be color coded (per ASME A13.1) as follows:

- Fire Quenching Fluids – White on Red
- Toxic and Corrosive Fluids – Black on Orange
- Flammable Fluids – Black on Yellow
- Combustible Fluids – White on Brown
- Potable, Cooling, Boiler Feed and other Water – White on Green
- Compressed Air – White on Blue

Duct Labels shall be installed every 10 feet and shall be self-adhesive labels with direction-of-flow arrows and the name of the service printed in black letters not less than 4 inches high.

Valve Tags: Each valve tag shall be 3 in diameter, brass, aluminum or stainless steel with letters 2in in height. A schedule showing all valve locations, size, and service shall be provided.

Adhesive ceiling labels shall be installed on ceiling grids to locate valves, dampers, air terminal units etc. which are installed above acoustical tile ceilings. Labels shall state unit identification.

Approved Manufacturers:
- A. Brimar Industries Incorporated
- B. Seton Nameplate Corp.
- C. W. H. Brady Co.

52. **Unit Heaters**
Unit shall be supplied with a unit mounted thermostat.

Approved Manufacturers:
- A. Electric
  a. Berko
  b. Brasch
  c. Chromalox
  d. Indeeco
  e. Dayton

- B. Steam/Water
  a. Modine
  b. Rittling
  c. Sterling
53. **Valves**

Dielectric fittings shall be installed between all dissimilar metals.

All campus primary chilled water valves to be 300 psi rated. Secondary chilled water valves shall be designed based upon their designed system pressure. All system pressures shall be specified on design drawings. Ball valves (2 ½” maximum) must be used for manual isolation on all chilled water, secondary water, reheat water and radiation water systems. Butterfly valves are to be used for this purpose on larger piping (3” and above).

All valves and piping systems shall be designed to be able to close off to atmospheric pressure on either side of valve.

Any valve that is above 7 feet shall be provided with a chain wheel for manipulation of valve from the floor.

Approved Manufacturers:

A. Balanced Check  
   a. Fabrotech  
   b. Hager  
   c. Mueller

B. Balancing Valves (Water)  
   a. T & A  
   b. Armstrong  
   c. Autoflow  
   d. Flow Design  
   e. Milliken Valve Company, Inc.

C. Ball Type  
   a. Apollo  
   b. Jamesbury  
   c. Milwaukee  
   d. Rockwell

D. Butterfly  
   a. DeZurik  
   b. Flow Seal  
   c. Bray  
   d. Jamesbury  
   e. Keystone  
   f. W.K.M.

E. Pressure Relief Valves  
   Provide at each expansion tank, plate-and-frame heat exchanger or any pressurized water vessel, and as required by Code. Relief valve
shall match maximum allowable working pressure of piece of equipment. Relief piping shall be sized according to outlet size of relief valve and shall be piped to floor not floor drain.

a. Apollo
b. Consolidated
c. Farris
d. Fulflo Specialties Co.
e. Kunkle
f. Lunkenheimer
g. Watts

F. Soft-Seated
   a. Bray
   b. DeZurik
c. Keystone
d. Milwaukee

G. Swing Check
   a. Crane
   b. Grinnell
c. Hammond (I.B. Series only)
d. Milwaukee
e. Powell
f. Rockwell-Nordstrom
g. Stockham
h. Walworth

H. Globe Valves
   a. Crane
   b. Grinnell
c. Hammond (I.B. Series only)
d. Milwaukee
e. Nordstrom
f. Powell

I. Plug Valves (Lubricated Type)
   a. DeZurik
   b. Milliken Valve Company, Inc.
c. Nordstrom
d. Walworth

J. Plug Valves (Non-Lubricated Type)
   a. DeZurik
   b. Homestead
c. Milliken Valve Company, Inc.
K. Solenoid Valves
   a. ASCO

54. Variable Air Volume
Variable Air Volume Boxes shall have pressure independent control. All
VAVs shall have a local disconnect switch.

Unit shall be BMS controlled with read/write access through Modbus or
Bacnet. Local thermostat shall be provided local manipulation of a +/- 2.5
degree Fahrenheit differential.

Approved Manufacturers Non Critical Applications:
   A. Anemostat
   B. Nailor Industries
   C. Titus

Approved Manufacturers Critical Applications:
   A. LCS

55. Variable Frequency Drives
See Motor Controllers Variable Speed (VFD) section

56. Vibration Isolators
Vibration isolators are to be installed on all rotating equipment including
fans, air handling units, chillers, cooling towers, pumps, etc. Piping shall
have braided vibration isolators unless piping is isolated with spring type
isolators within a minimum of 50 feet of pump.

All piping in a mechanical plant shall be isolated with spring type isolators.

Approved Manufacturers:
   A. Mason Industries
   B. Amber Booth
   C. Kinnetics Noise Control, Inc.
   D. Vibration Eliminator Co.
   E. Vibration Mountings and Controls

57. Water Filtration
Sand filtration shall be installed on Condenser Water and Chilled Water
Systems. Other systems shall have bag type filtration or pot feeders. Sand
filters shall have backwash capabilities.

All water filtration to be capable of filtering a minimum of 10% of total flow.
Pot feeders to have 5 micron filtration.

All water filtration shall be reviewed and approved by Facilities Operations.
Approved Manufacturers:
   A. Ameri Water
   B. Chemworks
   C. Diamond Water Systems, Inc.

58. **Waterproof Sleeves**
Approved Manufacturers:
   A. Link Seal
   B. Zurn

59. **Water Treatment**
The system shall be an automatic chemical feed with integral controls. Water treatment shall be installed on all open and closed hydronic systems. All chemicals are to be recommended by the water-treatment system manufacturer. Chemicals shall be compatible with the piping system and components. A water analysis shall be performed to determine quality of water.

Any new equipment or piping needs to be pre-cleaned to remove the oils of manufacture, which can be accomplished with an alkaline phosphate cleaner supplied by the water treatment supplier. It is necessary that all valves and fan coil units in the system be opened to flow during the cleaning process. The cleaning process shall be as follows:

- System shall be filled with fresh water and then circulated with all process and booster pumps running.
- Alkaline phosphate detergent shall be added following the manufacturer’s instructions concerning the correct dosage. It may be necessary to add de-foamer in some instances.
- System shall be circulated for a minimum of four hours, and hourly flushed all low-point drains to remove any suspended solids that may have been displaced.
- Upon completion of the cleaning, system shall be drained and refilled with fresh water. Fresh water shall be circulated for 20 minutes and then bled heavily until the water is clear and free of foam. Flushing shall continue until the ortho phosphate level is within 1 PPM of that of the city water and the conductivity is close to that of the make-up water. If the flushing occurs over an extended period in time (more than 24 hours), the flush water should be treated water.
- The system shall be immediately sterilized by maintaining a minimum of 1 PPM as free halogen for one hour and then treated to passivate the clean metallurgies. Systems containing copper should be treated with azole levels of 20 PPM as a minimum.
Molybdenum should be used to passivate mild steel piping by achieving a minimum of 50 PPM. The recommended inhibitor levels must be maintained for 24 hours.

Systems that are having piping added that cannot be isolated for alkaline phosphate cleaning must have a surfactant added for 48 hours.

Systems that are having galvanized towers added must undergo a white rust passivation step for the first 90 days of operation.

Approved Manufacturers:
   A. Contact Facilities Operations for current campus vendor.

END OF MECHANICAL SECTION
3. **ELECTRICAL**

A. **Codes, Regulations and Design Standards.**
   I. The installation will comply with applicable provisions of the New York State Building Code and New York City Electrical Code, Department of Health (DOH) standards, Centers for Medicare and Medicaid Services (CMS) standards and all other applicable Codes.

B. **Design Criteria**
   I. All connections to the existing electrical distribution systems to be done with double hole lugs and utilize compression type copper connectors. If this is not possible, the design scheme shall be discussed and approved by Facilities Operations.

II. **Emergency Power**
   a. Emergency Power shall be provided per NFPA Standards, Joint Commission Standards, CMS Standards and New York City Electrical Code requirements. Emergency power to be reviewed with Facilities Operations prior to design.

III. **Design criteria for sizing power risers and (connected load) electric panels**
   a. Administration/Office: 5.0 W/sq.ft.
   b. Clinical Office/Exam: 5.0 W/sq.ft.
   c. Storage: 1.5 W/sq.ft.
   d. Laboratories (Basic Research): 50 W/sq.ft.
   e. Support Areas: 12.5 W/sq.ft.
   f. Technology Rooms: 50 W/sq.ft.
   g. Procedure Rooms: 30 W/sq.ft.
   h. Specialty Rooms: 3 W/sq.ft.
   i. Offices: 6 W/sq.ft.
   j. Seminar and Classrooms: 4 W/sq.ft.
   k. Lobby: 6 W/sq.ft.
   l. Mechanical Rooms: 2.5 W/sq.ft. (Lighting and Small Power)
   m. Lounge/Waiting Area: 4 W/sq.ft.
   n. Café/Cafeteria: 15 W/sq.ft.

IV. **Lighting**
   a. All lighting located outdoors, in mechanical, electrical, IT or other utility spaces, closets and storage spaces, stairwells, restrooms, and any space 16’ above the finish floor and higher shall be LED type and shall be by a NYSERDA and/or ConEd rebate/incentive eligible manufacturer. All deviations must be reviewed on a case by case basis with Facilities Operations.
b. All lamp sources shall be 3500K color temperature in non-patient care spaces, except where a different temperature is requested by end-users for clinical or technical reasons. Patient care areas will be evaluated on a case-by-case basis for color temperature and color rendering index.

c. In spaces where linear tubes are used, they shall be LEDs where possible and T-5 with high efficiency electronic ballasts in areas where LEDs are not possible for above listed reasons.

d. All other lamping should be LED or CFL. Incandescent lighting is acceptable in spaces with specialized requirements (ex. Research support spaces).

e. Emergency lighting shall be connected to Life Safety Emergency Power. Battery packs shall only be utilized for emergency generator rooms, emergency switchgear rooms, fuel oil rooms, ATS rooms, and at least one emergency light with battery pack in a procedure area where anesthesia is being administered.

f. 5% excess attic stock shall be provided for integrated, architectural LED fixtures (i.e. fixtures that need to be replaced entirely after failure).

V. Distribution

a. All power loads, such as elevators, motor control centers, etc., shall operate at 480/277 volts and shall be connected to distribution switchboards with single or multiple conduit and cable feeders.

b. Unless serving specialty equipment/lighting, receptacles as well as fluorescent and incandescent lighting shall be wired to 120 or 277 volt circuits.

c. All conduits shall be run concealed in finished areas and exposed in Machine Rooms.

d. All lighting circuits shall emanate from lighting panels and power circuits from power panels. Lighting and Power circuits shall not be mixed in the same panel.
C. **Electrical Naming Convention**

**COORDINATE NOMENCLATURE WITH NYULMC ELECTRICAL SYSTEMS MANAGER PRIOR TO LABELING OR RE-LABELING ELECTRICAL EQUIPMENT DESIGNATIONS.**

I. **Generator Panel Naming Scheme**

Example: PPH-G4-HCC-CE1

```
PPH  -  G4  -  HCC  -  C  -  E  -  1
```

**Location**
N,S,E,W
A,B,C,D

**Floor Level**

**Building Name**

- EB - Energy Building
- SB - Science Building
- KP - Kimmel Pavilion
- TH - Tisch Hospital
- MSB - Medical Science Building
- HCC - Health Care Center
- SKB - Skirball
- 660 - 660 1st Ave
- GBH - Greenberg Hall
- SML - Smilow
- MIL - Milhauser

**Generator Plant**

- G0 - Reserved for Future Use
- G1 - Kimmel Pavilion
- G2 - Skirball
- G3 - Science Building
- G4 - HCC
- G5 - Smilow
- G6 - Energy Building
- G7 - 660
- G8 - GBH
- G9 - Outpatient Surgical Center
- G10 - VZ 30th Street

**Panel Type**

- DPH - Distribution Panelboard: 480V / 277V
- PPH - Power Panel: 480V / 277V
- LPH - Lighting Panel: 480V / 277V
- LP - Lighting Panel: 120V / 208V
- PP - Power Panel: 120V / 208V
- RP - Receptacle Panel: 120V / 208V
II. Normal Power Panel Naming Scheme

Example: SS-PES-HCC-CE1

<table>
<thead>
<tr>
<th>Location</th>
<th>Panel #</th>
<th>Floor Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,S,E,W</td>
<td></td>
<td></td>
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<tr>
<td>A,B,C,D</td>
<td></td>
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</tbody>
</table>

Normal Panel Type

- **SSH**: Service Switchboard
  - Primary Electric Service: 120V / 208V
- **DPH**: Distribution Panelboard
  - Primary Electric Service: 460V / 265V
- **LPH**: Lighting Panel
  - Primary Electric Service: 460V / 265V
- **PPH**: Power Panel
  - Primary Electric Service: 460V / 265V
- **DP**: Distribution Panelboard
  - Primary Electric Service: 120V / 208V
- **LP**: Lighting Panel
  - Primary Electric Service: 120V / 208V
- **PP**: Power Panel
  - Primary Electric Service: 120V / 208V
- **RP**: Receptacle Panel
  - Primary Electric Service: 120V / 208V
- **BD**: Bus Duct
- **DESS**: Double Ended Substation

**Building Name**
- EB - Energy Building
- SB - Science Building
- KP - Kimmel Pavilion
- TH - Tisch Hospital
- MSB - Medical Science Building
- HCC - Health Care Center
- SKB - Skirball
- 660 - 660 1st Ave
- GBH - Greenberg Hall
- SML - Smilow
- MIL - Milhauser
- AMB - Ambulatory Surgery
III. UPS Naming Scheme

Example: TPP-2-G5-61-SML-M-B1

**Building Name**
- EB - Energy Building
- SB - Science Building
- KP - Kimmel Pavilion
- TH - Tisch Hospital
- MSB - Medical Science Building
- HCC - Health Care Center
- SKB - Skirball
- 660 - 660 1st Ave
- GBH - Greenberg Hall
- SML - Smilow
- MIL - Milhauser
- AMB - Ambulatory Surgery

**Generator Plant**
- G0 - Reserved for Future Use
- G1 - Kimmel Pavilion
- G2 - Skirball
- G3 - Science Building
- G4 - HCC
- G5 - Smilow
- G6 - Energy Building
- G7 - 660
- G8 - GBH
- G9 - Outpatient Surgical Center
- G10 - VZ 30th Street

**UPS System Number**
1 - HCC Cellar
2 - Smilow Ground Floor Telephone Switch Room
3 - Tisch Ground Floor MUX Room
4 - Tisch Ground Floor Communications Room
5 - Energy Building
6 - Kimmel Pavilion
7 - South TER/DR
8 - Science Building

**UPS Panel Types**
- TDP - Technology Distribution Board – 120/280V
- TPP - Technology Power Panel – 120/280V
- TDPH – Technology Distribution Panel – 480/277V
- MDSH – Medical Distribution Switchboard – 480/277V
- MDPH – Medical Distribution Panel – 480/277V
IV. Emergency Panel Naming Scheme

Example: LS-PP-G4-61-HCC-CE1

<table>
<thead>
<tr>
<th>LS</th>
<th>PP</th>
<th>G4</th>
<th>61</th>
<th>HCC</th>
<th>C</th>
<th>E</th>
<th>Panel #</th>
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<td>Location</td>
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Building Name
- EB - Energy Building
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- HCC - Health Care Center
- SKB - Skirball
- 660 - 660 1st Ave
- GBH - Greenberg Hall
- SML - Smilow
- MIL - Milhauser
- AMB - Ambulatory Surgery

ATS #
- Generator Plant
- G0 - Reserved for Future Use
- G1 - Kimmel Pavilion
- G2 - Skirball
- G3 - Science Building
- G4 - HCC
- G5 - Smilow
- G6 - Energy Building
- G7 - 660
- G8 - GBH
- G9 - Outpatient Surgical Center
- G10 - VZ 30th Street

Panel Type
- DPH - Distribution Panel – 480/277V
- PPH - Power Panel – 480/277V
- LPH - Lighting Panel – 480/277V
- LP - Lighting Panel – 120/208V
- PP - Power Panel – 120/208V
- RP - Receptacle Panel – 120/208V

Panel System
- LS - Emergency (Article 517 Life Safety) in Patient Care Buildings and Life Safety in Non-Patient
- CR - Patient Critical (Article 517)
- EM - Standby (Includes Article 517 Required Mechanical Loads)
V. **Bus Duct Naming Scheme**  
Example: BD-KP-CR-1B2

<table>
<thead>
<tr>
<th>BD</th>
<th>KP</th>
<th>CR</th>
<th>1</th>
<th>B</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>Location</td>
<td>A,B,C,D</td>
<td>Panel #</td>
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<tr>
<td>Starting Floor</td>
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<td>Type</td>
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<td>N – Normal</td>
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<td>CR – Patient Critical</td>
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<td>EM – Equipment</td>
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<td>LS – Life Safety</td>
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<td>SB – Science Building</td>
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**D. Various**

I. The following is a list of electrical gear that shall have heat runs/burn-ins performed prior to turnover.
   a. Uninterruptible Power Supply (UPS) – 24 hour burn in
   b. Uninterruptible Power Supply Rack Type – 30 minute burn in
   c. Automatic Transfer Switch (ATS) – 4 Hour Burn In
   d. Static Transfer Switch (STS) – 24 hour Burn In
   e. Generator – 12 hours

II. **Factory Witness Tests** -
   a. The following equipment shall be factory witness tested. See individual equipment sections for further information regarding required tests.
      i. Generators
      ii. Medium Voltage Transformers
      iii. Paralleling Gear
      iv. Uninterruptable Power Supply

III. **Proper wire color schemes** shall be used for all panels.

IV. **Isolated Ground (IG) receptacles** are not allowed.

V. **All emergency power** shall be in conduit.

VI. **All boxes** (splice, pull, etc.) shall be labelled with source and load.
E. Equipment

1. Automatic Transfer Switches
   Depending on application, ATS shall be bypass isolation type with load shedding capabilities. This shall be reviewed with Facilities Operations. A full monitoring package on all phases, KW, Voltage and Amperage shall be designed.

   All ATS connected to cogeneration shall be delayed transition type. Each ATS must include communication package that can communicated with sitewide CPMS. Each ATS must also allow for the acceptance of a permissive signal for retransfer to be received from the cogeneration plant.

   Approved Manufacturers:
   A. Asco

2. Busway and Accessories
   Approved Manufacturers:
   A. General Electric "Spectra Series"
   B. Siemens

3. Cable Pulling Lubricants
   Cable pulling lubricant shall not be used on isolated power systems.

   The following shall not be specified without approval from NYULMC’s division of EH&S:
   - Chemicals that are known (IARC group 1) or probable (IARC group 2a) human carcinogens.
   - Hazardous substances listed in OSHA 1910 subpart Z.
   - Products containing volatile organic compounds (VOCs) in excess of 50 grams/liter.
   - Products whose Safety Data Sheet (SDS) rates health, fire and/or reactivity as exceeding “1” on a scale of 0 to 4.
   - Products emitting strong odors.

   Approved Manufacturers:
   A. American Polywater Corporation - Type "J"
   B. Electro Compound Company - "Poly-Ease" or "Y-ER Ease"
   C. Ideal Industries - "Wire Lube"
4. **Cable Tray and Fittings**
   Approved Manufacturers:
   A. Atlas
   B. Burndy
   C. Cooper B-Line Systems
   D. M.P. Husky Corp.
   E. P-W Industries
   F. Legrand

5. **Clocks**
   In procedure areas clocks shall be wireless, synchronized, digital, and power over Ethernet.

   Approved Manufacturers:
   A. Sapling

6. **Dry-type Transformers**
   Factory testing shall be provided on medium voltage transformers and shall be discussed with NYULMC Facilities Management prior to completing specifications. Factory witness testing shall at a minimum meet NETA Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.

   Approved Manufacturers:
   A. General Electric
   B. Hammond Power Solutions
   C. Jefferson Magnetek
   D. Siemens
   E. Rex Transformers
   F. ABB

7. **Electric Heating Cable Systems**
   Approved Manufacturers:
   A. Chromalox
   B. Raychem

8. **Electrical Conductors, Copper, 600 Volt or Less**
   All shall be UL Listed.

   Approved Manufacturers:
   A. American Insulated Wire
   B. General Cable/Cablec
   C. Pirelli
   D. Rome
   E. Southwire
9. **Electrical Metallic Tubing (EMT)**
   All shall be UL Listed.

   Approved Manufacturers:
   A. Allied Tube & Conduit/Tyco
   B. Republic
   C. Robroy Industries
   D. Triangle
   E. Western
   F. Wheatland

10. **Electronic Fluorescent Ballasts**
    Approved Manufacturers:
    A. Advance
    B. MagneTek
    C. Universal

11. **Electronic Fluorescent Dimming Ballasts**
    Approved Manufacturers:
    A. Advance
    B. Lutron
    C. Universal

12. **Electronic Dimming System**
    Approved Manufacturers:
    A. Lutron

13. **Enclosed Switches**
    Approved Manufacturers:
    A. General Electric
    B. Siemens
    C. Square D

14. **Exit Signs**
    Exit signs shall meet the NYC Energy Code wattage requirements

    Approved Manufacturers:
    A. Light Guard Vintage Series edge-lit
    B. Philips Caliber Series Edge-Lit LED

15. **Fire Detection, Alarm and Communication**
    See Fire Alarm Guidelines
16. **Flexible Metal Conduit**  
All shall be UL Listed.

   Approved Manufacturers:
   A. AFC  
   B. ALFLEX  
   C. American Metal Molding  
   D. Anaconda  
   E. Cerro  
   F. International Metal Hose

17. **Flexible Metal Conduit Fittings**  
All shall be UL Listed.

   Approved Manufacturers:
   A. Appleton  
   B. Efcor  
   C. Midwest  
   D. OZ/Gedney  
   E. Raco/Hubbell  
   F. Steel City/Thomas & Betts

18. **Fluorescent Lamps**  
See Design Criteria lighting section at the beginning of the Electrical Design Guidelines for further design information.

   Approved Manufacturers:  
   A. General Electric 3500°K. T-5

19. **Fuses**  
Approved Manufacturers:  
   A. Ferraz–Shawmut – Amp-Trap 2,000 with a fuse window

20. **Generator**  
Generators shall be provided with a generator monitoring system. Base building monitoring system is a Monico System.

   Factory testing shall be discussed with NYULMC Facilities Management prior to completing specifications. Factory witness testing shall at a minimum meet NFPA 37 and NFPA 110 Standards.

   Approved Manufacturers:  
   A. Caterpillar

21. **High Intensity Discharge Lamps**  
Not allowed.
22. **LED Light Fixtures**
   See Design Criteria lighting section at the beginning of the Electrical Design Guidelines for further information. LED Fixtures to be approved on a project to project basis. All LED fixtures to be 3500K.

   **Approved Manufacturers:**
   A. General Electric
   B. Phillips (Tubes)
   C. RAB Lighting (Panels)

23. **Line Voltage Switches, Wall Plates, and Coverplates**
   Stainless steel finish plates shall be used. Hospital grade type shall be used in all areas of the facility (non-patient and patient areas)

   **Approved Manufacturers:**
   A. Hubbell
   B. Leviton
   C. Legrand

24. **Liquid-tight Flexible Metal Conduit**
   All shall be UL Listed.

   **Approved Manufacturers:**
   A. American Brass Company
   B. Anaconda (Type “UA”)
   C. Electri-Flex Company

25. **Liquid-tight Flexible Metal Conduit Fittings**
   All shall be UL Listed.

   **Approved Manufacturers:**
   A. American Brass Company
   B. Midwest
   C. O.Z./Gedney

26. **Motor Control Centers**
   Pilot lights shall be LED. Lamp test button shall be provided.

   **Approved Manufacturers:**
   A. Allen Bradley
   B. General Electric
   C. Siemens

27. **Motor Controllers Variable Speed (VFD)**
   Refer to mechanical section Motor Controllers Variable Speed (VFD) for design requirements.
28. **Multioutlet Assemblies**
   Information Technology multioutlet assemblies shall comply to NYULMC IT Design Standards.

   Approved Manufacturers:
   A. Legrand

29. **Outlets and Boxes**
   Approved Manufacturers:
   A. Appleton Electric Company
   B. Midland Ross
   C. Raco
   D. Steel City/Thomas & Betts
   E. Thepitt

30. **Overcurrent Protective Devices**
   All field adjustable breakers over 100 amperes shall be primary injection tested.

   Approved Manufacturers:
   A. Eaton
   B. General Electric
   C. Square D
   D. Siemens

31. **Panelboard**
   All panels shall have a local main breaker, double hinged door and a locking #47 key cover. Panels to have an arc-flash study performed and coordinated. Circuit breakers directories must be populated and accurate.

   Approved Manufacturers:
   A. American Switchboard
   B. All-City Switchboard
   C. Atlas Switchboard
   D. Electrotech
   E. Lincoln Electric Co.

32. **Receptacles**
   All receptacles shall be hospital grade and illuminated. Coverplates shall be metal, NOT plastic. Receptacles shall be consistent in orientation with ground facing upwards. In addition to any other code requirements, all receptacles that are accessible to the general public shall be ramper proof.

   Normal Power color shall be gray, duplex and illuminated face. Emergency power shall be red, duplex and illuminated face. Emergency receptacles shall be located in main service electrical rooms, substation rooms, ATS rooms, emergency paralleling switchgear rooms, and fuel oil pump rooms.
Duplex emergency receptacles shall be located next to each sump and ejector pit.

Approved Manufacturers:
A. Hubbell
B. Leviton
C. Legrand

33. **Rigid Aluminum Conduit and Fittings**
All shall be UL Listed.

Approved Manufacturers:
A. Alcoa
B. Anchor-Harvey
C. Harvey
D. Kaiser
E. Reynolds

34. **Rigid Nonmetallic Electrical Conduit and Fittings**
All shall be UL Listed.

Approved Manufacturers:
A. Carlon/Lamson & Sessions
B. Certainteed
C. Triangle

35. **Rigid Steel Conduit and Fittings (exposed to the weather)**
All shall be UL Listed.

Approved Manufacturers:
A. Ocal Inc.
B. Occidental Coating Company
C. Perma-Cote
D. Robroy Industries "Plasti-Bond-Red"
E. Triangle

36. **Rigid Steel and Intermediate Metal Conduit**
All shall be UL Listed.

Approved Manufacturers:
A. Allied
B. Republic
C. Triangle
D. Western
E. Wheatland
37. **Rigid Steel and Intermediate Metal Conduit Fittings**
   All shall be UL Listed.

   Approved Manufacturers:
   A. Appleton
   B. Cooper Crouse-Hinds
   C. Efcor
   D. Midwest
   E. O.Z./Gedney
   F. Raco/Hubbell
   G. Spring City
   H. Steel City/Thomas & Betts
   I. Thomas & Betts

38. **Service Switch Assemblies and Distribution Switchboards**
   Approved Manufacturers:
   A. American Switchboard
   B. All-City Switchboard
   C. Atlas Switchboard
   D. Electrotech
   E. Lincoln Electric Co.

39. **Submetering and Power Quality Metering**
   Approved Manufacturers:
   A. Siemens
   B. Ion/Schneider
   C. General Electric

40. **System Identification**
   Equipment Labels shall conform to equipment nomenclature found within these design guidelines and shall be engraved plastic nameplates with a black surface and white core with engraved letters for normal power and red surface and white core for emergency power. Engraved lettering shall be a minimum of 2” in letter height for:
   - Panels
   - Disconnect switches
   - Main Switch boards
   - ATS
   - Transformers
   - UPS

   Distribution branch circuits shall have ½” lettering.

   Conduit and cable labelling identifying the circuit designation shall be every 5’ in concealed areas and 10’ in un-concealed areas.

   Raceway identification color coding shall be provided as follows:
Normal power – Black with White lettering
Emergency power, fire alarm, ATS/MTS – Red with White lettering
Optional standby systems – Blue with White lettering
UPS – Yellow with Black lettering

41. **Transient Voltage Surge Suppression**
Surge suppression shall be integral to electrical panels located in IDF and BDF rooms.

Approved Manufacturers:
A. Current Technology
B. General Electric
C. Liebert
D. United Technologies

42. **Type "AC" (Armored Cable) Conductor Cables, 600 Volts or Less**
All shall be UL Listed. MC cable is not permitted. Armored Cable shall be hospital grade BX.

Approved Manufacturers:
A. AFC
B. Alflex
C. Southwire

43. **Vibration Isolation Devices and Seismic Restraints**
Approved Manufacturers:
A. Amber/Booth Company
B. Korfund Dynamics Corporation
C. Mason Industries, Inc.
D. Vibration Eliminator Company
E. Vibration Mounting and Controls, Inc.

44. **Wall Dimmers**
Approved Manufacturers:
A. Lutron
45. Wire Connectors and Lugs
   All shall be UL Listed.

   Approved Manufacturers:
   A. AMP
   B. Anderson/Hubbell
   C. Burndy
   D. Homac
   E. Ideal
   F. ITT-Blackburn
   G. MAC
   H. Thomas & Betts
   I. Tyco Electronics/AMP
   J. Union Connector Co.
   K. 3M

46. UPS (Central)
   Factory testing shall be discussed with NYULMC Facilities Management prior to completing specifications. Factory witness testing shall at a minimum meet NETA Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.

   Approved Manufacturers:
   A. Liebert (data equipment only)
   B. Mitsubishi (medical equipment only)

47. UPS (Rack Mounted)
   Refer to IT design guidelines.

END OF ELECTRICAL SECTION
4. **PLUMBING**

A. **Codes, Regulations and Design Standards.**
   The entire installation shall comply with the City of New York Building Codes, NYC Department of Health, Department of Environmental Protection Agency, and all other applicable local Codes.

B. **Design Criteria**
   I. Domestic Hot Water Plant Temperature shall be: 140°F in Kimmel Pavilion, all other spaces shall be 120°F.

   II. Patient room maximum domestic water temperature shall be: 110°F.

   III. Plumbing fixtures shall be of high efficiency conserving type to comply with the City of New York Water Conservation requirements.

   IV. All domestic water piping shall be type “L” copper, unless otherwise dictated by code.

   V. Point of use mixing valves shall be provided under all lavatories, hand sinks, pantry sinks and similar fixtures where required by code.

   VI. Pressure at fixtures shall be designed to provide a maximum of 85 psi.

   VII. Pressure reducing valves shall be installed wherever the water pressure exceeds 85 psi.

   VIII. The piping shall be sized to provide a maximum velocity of 6 feet per second (fps) in the mains, and 4 fps in all branch piping.

   IX. Hose bibs with ¾ inch male hose threads and vacuum breaker shall be provided in all mechanical spaces.

   X. Mechanical rooms and water service rooms shall be provided with floor drains and trap primers.

   XI. All sanitary, vent and storm drainage piping above the design flood elevation (DFE) shall be hubless cast iron pipe with heavy-duty couplings or hub and spigot piping with push-on gaskets. Piping 4” and less shall be hubless, 5” and greater shall be hub and spigot. All piping within cellars shall be hub and spigot.
XII. Storm piping, sump discharge piping and ejector discharge piping located below the design flood elevation shall be grooved, schedule 40 galvanized steel pipe with mechanical couplings. Alternative materials shall be used for sump discharge piping where dictated by ground water quality.

XIII. All sanitary, vent and storm drainage piping buried below slab, draining to an ejector or sump pit shall be extra heavy hub and spigot cast iron with push on gaskets.

XIV. All sanitary, vent, and storm piping below the design flood elevation (DFE) shall be ductile iron with mechanical couplings.

XV. All natural gas piping with gas pressures ½ psig and less shall be schedule 40 steel piping with threaded fittings for sizes up to and including 3 inches and natural gas piping larger than 3 inches shall be schedule 40 piping with welded joints.

XVI. All natural gas piping with gas pressures greater than ½ psig shall be schedule 40 steel piping with welded joints.

XVII. All medical gas piping and vacuum piping shall be brazed.

XVIII. Medical fittings, valves and piping shall come cleaned and flushed in sealed packaging from the manufacturer.

XIX. Polypropylene piping shall be mechanically joined with coupling and additional restraints shall be provided at all offsets. Fused joints shall not be used.

C. Equipment

1. Acid Neutralization
   Systems shall be centralized and comprised of sediment tank, pre-treatment tank (no limestone), chemical injection tank and sampling tank in compliance with DEP standards.

   Approved Manufacturers:
   A. Town and Country

2. Backflow Preventers
   Approved Manufacturers:
   A. Watts
   B. Febco

3. Baseboard Radiation (Steam/Water)
   See Mechanical Section
4. Drains
   Approved Manufacturers:
   A. Josam
   B. JR Smith
   C. Zurn

5. Electric Water Coolers
   Approved Manufacturers:
   A. Elkay
   B. Filtrine
   C. Halsey Taylor

6. Fixture Supports
   Approved Manufacturers:
   A. Jay R. Smith
   B. Josam
   C. Wade
   D. Zurn

7. Gauges and Thermometers
   Temperature Scale Ranges:
   Domestic Hot Water Piping: 20 to 250 deg F
   Steam and Steam-Condensate Piping: 0 to 250 deg F

   Pressure Scale Ranges:
   Design engineer shall specify proper scales based on operating pressures.

   Switches, thermometers, meters, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.

   Approved Manufacturers:
   A. Instrument Test Ports
      a. Peterson Equipment
      b. Sisco
      c. Watts Regulator
   
   B. Pressure Gauges 1.00% Accuracy
      a. Ashcroft
      b. Trerice
      c. Weiss
      d. Weksler

   C. Pressure Switches
      a. Barksdale
      b. Dwyer
      c. Mercoid
      d. Square D
D. Thermometers 1.00% Accuracy
   a. Trerice
   b. Weiss
   c. Weksler

8. Hot Water Heaters
   Approved Manufacturers:
      A. Patterson-Kelley Company

9. Insulation
   Piping insulation shall comply with latest codes and energy conservation codes.

   Approved Manufacturers:
      A. Armacell
      B. Armstrong
      C. Knauf
      D. Johns-Manville
      E. Owens-Corning Fiberglas (O-C-F)
      F. P.P.G. (Pittsburgh Plate Glass)

10. Medical Air Compressors
    Compressors shall be oil-less reciprocating compressors and compliant with the latest NFPA-99 standards.

    Approved Manufacturers:
      A. Beacon-Medaes

11. Medical Gas Equipment
    Approved Manufacturers:
      A. Beacon-Medaes

12. Medical Gas Outlets
    Outlets shall be DISS type, having a minimum pig tail connection point of $\frac{1}{2}''$ for all services. Vacuum and WAGD piping shall drop individually to each outlet. Header piping shall be readily accessible and shall be a minimum of 1”.

    Approved Manufacturers:
      A. Beacon-Medaes made by Hill Rom

13. Motors
    Conform to NEMA MG 1. Motors shall not operate continuously at a service factor greater than 1. Design to a service factor of a minimum of 1.15. Provide hoist type access for maintenance purposes.

    Motors to be with permanently greased bearings (preferred). If permanently greased bearings are not provided, grease ports shall be provided with adequate access – grease capillaries are not allowed.
Bearings shall have a life grade of L5 with a minimum of 50,000 hours.

Cast iron motors are not allowed.

Approved Manufacturers:
A. Standard Efficiency (Less Than 1 hp)
   a. Baldor
   b. General Electric
   c. Toshiba
   d. AO Smith
   e. U.S. Motors
   f. Dayton
   g. Marathon
   h. Weg

B. Premium Efficiency (1 hp and Above)
   a. Baldor
   b. General Electric
   c. Toshiba
   d. AO Smith
   e. U.S. Motors
   f. Dayton
   g. Marathon
   h. Weg

14. Motor Starters
   Approved Manufacturers:
   A. Asea Brown Boveri (ABB)
   B. ASCO
   C. Allen Bradley
   D. Siemens
   E. Yaskawa Electric America

15. Motor Controllers Variable Speed (VFD)
   VFDs and VFD bypass shall be reviewed and approved by Facilities Operations.

   Approved Manufacturers:
   A. Asea Brown Boveri (ABB)
   B. General Electric
   C. Toshiba
   D. Yaskawa Electric America
16. **Orifice Steam Traps**
   Approved Manufacturers:
   A. Steam Gard
   B. Sarco
   C. Armstrong

17. **Pipe and Fittings**
   Dielectric fittings shall be installed between all dissimilar metals.

   Approved Manufacturers:
   A. Brass & Copper Pipe & Tube
      a. Elkhart
      b. NIBCO
      c. American Brass Co.
      d. Bridgeport Brass
      e. Chase Brass
      f. Lewin Matheis
      g. Mueller Industries, Inc.
      h. Phelps Dodge
      i. Reading Tube Corp.
      j. Revere
      k. Wolverine Tube Co.
   
   B. Bronze Fittings
      a. Elkhart
      b. Flagg Co.
      c. Jamesbury
      d. Mueller
      e. NIBCO
      f. N. Y. Brass Foundry
      g. Walworth Co.
   
   C. Cast Iron and Ductile Iron Pipe and Fittings
      a. Charlotte Pipe and Foundry
      b. Tyler Pipe
      c. U.S. Pipe
   
   D. Flanges
      a. Grinnell
      b. Ladish
      c. National Flange
      d. Taylor Forge
      e. Weld Bend
E. Screwed Fittings
   a. Central
   b. Grinnell
   c. Ward

F. Steel Pipe
   a. Anvil International
   b. Ameri-Forge Corporation
   c. U. S. Steel
   d. Wheatland

G. Steel Pipe Fittings
   a. Capitol Manufacturing Company
   b. Hackney
   c. Phoenix Forging Company
   d. Tube Forgings
   e. Tube Line
   f. Weldbend Corporation

H. Mechanical Couplings for Grooved Pipe
   a. Anvil International (Gruvlok) Figure 7401 Rigidlok Coupling
   b. Grinnell Figure 772 Rigid Coupling
   c. Victaulic Zero Flex Couplings to 12 inches.
   d. Victaulic AGS Rigid Coupling 14 inches and larger.

18. Pipe Hangers and Supports
   All exposed threaded rods shall be capped with an orange protective cap either rubber or plastic. All threaded rods shall be cut down to an inch of final nut – rods shall not be left at full length for safety reasons. All components shall be galvanized or red-oxide coated.

   Approved Manufacturers:
   A. B-Line
   B. Grinnell
   C. Hilti
   D. Michigan Hanger
   E. PHD
   F. Tolco

19. Pipe Joint Compound
   The following shall not be specified without approval from NYULMC’s division of EH&S:
   - Chemicals that are known (IARC group 1) or probable (IARC group 2a) human carcinogens.
   - Hazardous substances listed in OSHA 1910 subpart Z.
• Products containing volatile organic compounds (VOCs) in excess of 50 grams/liter.
• Products whose Safety Data Sheet (SDS) rates health, fire and/or reactivity as exceeding “1” on a scale of 0 to 4.
• Products emitting strong odors.

Approved Manufacturers:
A. LACO
B. Rector-Seal
C. Hercules

20. Plumbing Fixtures
Approved Manufacturers:
A. American Standard
B. Kohler
C. Toto
D. Zurn

21. Purified Water System Equipment
Approved Manufacturers:
A. Siemens
B. Hydro (except for dialysis)

22. Safety Showers/Eyewashes
Eyewash stations shall be manual hand type. Showers shall be ball valve pull type.

Approved Manufacturers:
A. Guardian Equipment
B. WaterSaver Faucet Co.

23. Seismic Restraints
Approved Manufacturers:
A. Mason Industries
B. Tolco

24. Sump Pumps and Ejectors
Pumps shall be provided with hoisting capabilities within area of equipment. There shall be a hook in the ceiling slab or rail system.

Switches, thermometers, meters, gauges and other components shall be mercury-free in compliance with NYULMC’s Mercury Elimination Program.
Approved Manufacturers:
A. Flygt
B. Tsunami
C. Gorman Rupp

25. System Identification
Equipment Labels shall be engraved plastic nameplates with a black surface and white core with engraved letters. Engraved lettering shall be a minimum of 2” in letter height.

Pipe Labels shall be installed every 5 feet in concealed areas and every 10 feet in un-concealed areas and shall be self-adhesive labels with direction-of-flow arrows and the name of the service printed in black letters not less than 1 inch high for pipe 2-1/2 inches and smaller, 2 inches high for 3 inch pipe and larger. Markers shall have backgrounds of different colors for the various service groups. Pipe labels shall be color coded (per ASME A13.1) as follow:

- Fire Quenching Fluids – White on Red
- Toxic and Corrosive Fluids – Black on Orange
- Flammable Fluids – Black on Yellow
- Combustible Fluids – White on Brown
- Potable, Cooling, Boiler Feed and other Water – White on Green
- Compressed Air – White on Blue
- Vacuum – White on Green

Valve Tags: Each valve tag shall be 3 in diameter, brass, aluminum or stainless steel with letters 2in in height. A schedule showing all valve locations, size, and service shall be provided.

Approved Manufacturers:
A. Brimar Industries Incorporated
B. Seton Nameplate Corp.
C. W. H. Brady Co.

26. Toilet Seats
Approved Manufacturers:
A. Church
B. Olsonite

27. Vacuum Pumps
Approved Manufacturers:
A. Beacon Medaes
B. Nash

28. Valves
Dielectric fittings shall be installed between all dissimilar metals. All mixing valves shall be installed with check-valves on the hot and cold water lines.
Ball valves must be used for manual isolation on all domestic hot and cold water systems. Butterfly valves shall be reviewed by Facilities Operations. Gate valves are not permitted unless specifically required by codes or DEP.

All valves used in plumbing systems shall close bubble tight and be suitable for dead-end service designed to be able to close off to atmospheric pressure on either side of valve.

All valves located more than 7 feet above the finished floor, shall be provided with a chain wheel for operation from the floor. All fire protection valves installed 7 feet above floor or stair landing shall be provided with chain wheels and shall be padlocked securely in place.

Approved Manufacturers:

A. Ball Valves
   a. Apollo
   b. Nibco

B. Butterfly Valves
   a. Apollo

C. Pressure Relief Valves
   Provide at each pressurized water vessel and as required by Code. Relief valves shall meet the maximum allowable working pressure of piece of equipment for which it is installed. Relief valve piping shall be full sized according to outlet size of relief valve and shall be piped to the floor.
   a. Apollo
   b. Febco
   c. Watts

D. Temperature Mixing Valves
   a. Leonard
   b. Powers
   c. Holby

E. Master Mixing Stations
   a. Holby

29. Water Supply Pumps
   All pumps shall be provided with premium efficiency motors. Pumps shall not be provided with triple-duty valves unless install restrictions require such an install. If triple-duty valves are required, they shall be reviewed and approved by Facilities Operations. Butterfly valves shall not be used on the pump suction.
Piping and pumps shall be independently supported. All piping within 50 feet of pump shall be supported with hangers having spring type isolators.

Install pumps in such a way to allow periodic maintenance, which includes removal of motors, impellers and couplings. Pumps are required to be able to be drained down.

Bearings shall have a life grade of L5 with a minimum of 50,000 hours.

Provide hoist type access for maintenance purposes.

Approved Manufacturers:
A. Armstrong
B. Aurora
C. Bell & Gossett
D. Gould
E. Peerless
F. Weinman

END OF PLUMBING SECTION
5. **FIRE PROTECTION**

A. **Codes, Regulations and Design Standards.**
   The entire installation shall comply with the current City of New York Building Codes, NFPA, NYC Fire Department, Factory Mutual Global Insurance or another insurance underwriter and all other applicable local Codes.

B. **Design Criteria**

   I. Buildouts shall be provided with full sprinkler protection and sprinkler systems shall be hydraulically calculated in accordance with the current City of New York Building Code and NYC Fire Department requirements.

   II. Fire department standpipe connections shall be provided with a 2-1/2 fire hose valve and hose rack on every landing of every required stairway.

   III. Areas without ceilings (storage, mechanical spaces, etc.) shall utilize upright sprinkler heads.

   IV. Areas with suspended ceilings (back of house areas, bathrooms, offices, etc.) shall utilize concealed sprinkler heads.

   V. Areas subject to freezing shall utilize a dry pipe sprinkler system with upright sprinkler heads.

   VI. Generator Rooms shall be provided with dry pipe system or pre-action sprinkler systems. Contact Facilities Operations for review and approval.

   VII. Fuel Oil storage rooms shall be protected with a wet type foam sprinkler system or as reviewed and approved by Facilities Operations.

   VIII. New and retro-fitted sprinkler systems shall have at least a 1-1/2” valve connection for draining.

   IX. Electrical Closets shall be provided with wet side wall sprinkler heads each with protective cages.

   X. All head end technical (IT) rooms are to be provided with a preaction sprinkler system. All intermediate data distribution (IT) rooms shall be provided with wet sprinklers.

   XI. Elevator machine rooms that fall under DOH jurisdiction shall be protected by alternate means of fire suppression. This shall apply to new construction or major overhaul.

   XII. System types (wet, dry, preaction, foam, alternatives) must be reviewed with NYULMC project managers and also with Facilities Operations during design development.
C. **Equipment**

1. **Anchors and Inserts**
   Approved Manufacturers:
   - A. Grinnell
   - B. Hilti
   - C. Philips
   - D. Simpson Strong Tie

2. **Motor Starters**
   Approved Manufacturers:
   - A. Allen Bradley
   - B. ASCO
   - C. General Electric
   - D. Gould Westinghouse

3. **Motors**
   Approved Manufacturers:
   - A. Baldor
   - B. General Electric
   - C. Toshiba

4. **Pipe Hangers and Supports**
   Approved Manufacturers:
   - A. B-Line
   - B. Grinnell
   - C. Hilti
   - D. Michigan Hanger
   - E. PHD
   - F. Tolco

5. **Piping**
   Piping shall be painted per building codes. Piping up to flow control assemblies shall be painted red.

   Approved Manufacturers:
   - A. Flanges
     a. Grinnell
     b. Ladish
     c. National Flange
     d. Taylor Forge
     e. Weld Bend
B. Screwed Fittings
   a. Central
   b. Grinnell
   c. Ward

6. Preaction Control Panel/Equipment
   Approved Manufacturers:
   A. Fenwal
   B. Simplex

7. Preaction/Dry Pipe Valves
   Approved Manufacturers:
   A. Reliable
   B. Viking
   C. Victaulic

8. Pressure-Reducing Valves
   Approved Manufacturers:
   A. Cla-Val
   B. Watts

9. Pumps
   Approved Manufacturers:
   A. Fire Pump Controllers
      a. ASCO/Firetrol
      b. Joslyn-Clark
      c. Hubbell (mercury-free options)
   B. Fire Pump Controller Automatic Transfer Switch
      a. ASCO/Firetrol
      b. Eaton
      c. Russelectric
   C. Fire Pumps
      a. Aurora
      b. Patterson
      c. Peerless
   D. Jockey Pumps
      a. Aurora
      b. Grundfos
      c. Peerless
10. **Standpipe System Equipment**
(Siamese, fire hose valves, fire hose cabinets, and racks, etc.)

Approved Manufacturers:
A. Badger-Powhattan
B. Croker
C. Elkhart
D. Potter-Roemer

11. **Seismic Restraints**

Approved Manufacturers:
A. Mason Industries
B. Tolco

12. **Sprinkler Heads, Valves, Alarms, Etc.**

Approved Manufacturers:
A. Grinnell
B. Reliable
C. Viking

13. **System Identification**

Equipment Labels shall be engraved plastic nameplates with a black surface and white core with engraved letters. Engraved lettering shall be a minimum of 2” in letter height.

Pipe Labels shall be installed every 5 feet in concealed areas and every 10 feet in un-concealed areas and shall be self-adhesive labels with direction-of-flow arrows and the name of the service printed in black letters not less than 1 inch high for pipe 2-1/2 inches and smaller, 2 inches high for 3 inch pipe and larger. Markers shall have backgrounds of different colors for the various service groups. Pipe labels shall be color coded (per ASME A13.1) as follow:

- **Fire Quenching Fluids** – White on Red
- **Toxic and Corrosive Fluids** – Black on Orange
- **Flammable Fluids** – Black on Yellow
- **Combustible Fluids** – White on Brown
- **Potable, Cooling, Boiler Feed and other Water** – White on Green
- **Compressed Air** – White on Blue

Valve Tags: Each valve tag shall be 3 in diameter, brass, aluminum or stainless steel with letters 2in in height. A schedule showing all valve locations, size, and service shall be provided.
Approved Manufacturers:
A. Brimar Industries Incorporated
B. Seton Nameplate Corp.
C. W. H. Brady Co.

14. Tamper Switches
Approved Manufacturers:
A. Acme
B. Grinnell
C. Potter (mercury-free options)
D. System Sensor (mercury-free options)
E. Viking

15. Valves
Approved Manufacturers:
A. Butterfly Valves
   a. Grinnell
   b. Jamesbury
   c. Jenkins
   d. NIBCO
   e. Victaulic

B. Check Valves
   a. Crane
   b. Grinnell
   c. Kennedy
   d. Mueller
   e. NIBCO
   f. Victaulic

C. Gate Valves
   a. Crane
   b. Grinnell
   c. Jenkins
   d. Kennedy
   e. NIBCO
   f. Walworth

16. Vibration Isolators
Approved Manufacturers:
A. Amber Booth
B. Korfund Dynamics Corp.
C. Mason Industries
D. Vibration Eliminator Co.
E. Vibration Mountings & Controls
17. **Water Flow Switches**
   Approved Manufacturers:
   A. Potter Electric Signal Company (mercury-free options)
   B. System Sensor

18. **Water Proof Sleeves**
   Approved Manufacturers:
   A. Thunderline Corp. “Link Seal”

**END OF FIRE PROTECTION SECTION**
6. FIRE ALARM

A. Codes, Regulations and Design Standards.
   The entire installation shall comply with the current City of New York Building Codes, NFPA, NYC Department of Fire, Department of Environmental Protection Agency and all other applicable local Codes.

B. Design Criteria
   I. The following buildings have their separate respective EST3 fire alarm systems:
      a. Tisch Hospital
      b. Smilow Research Center
      c. Medical Science Building/Alumni Hall and Coles
      d. Schwartz Health Care Center

   II. All audibles shall be synced.

   III. Chimes shall be installed in all sensitive areas in lieu of horns. Sensitive areas include Operating Rooms, NICU, Anesthesiology, and Pre-Surgical. Contact Facilities Operations prior to designing in sensitive areas. Contractor shall obtain waiver if chimes are used in lieu of horns.

   IV. For Operating Rooms:
      a. During a detected fire/smoke alarm, only the fan/unit serving the Operating Room which the alarm was generated at shall shut down. All other operating room fans shall stay operational. For central AHU systems a variance is required to be filed with the FDNY and DOB and shall be reviewed with Facilities Operations prior to design.

   V. As part of the contractor scope of work, the contractor shall revise all code cards in the facility. There are approximately 220 code cards that will need to be revised.

C. Equipment

   1. Fire Alarm System
      Approved Manufacturers (no substitutes):
      A. Edwards – EST3

   2. Heat Detectors
      Approved Manufacturers (no substitutes):
      A. Edwards EST SIGA2-HFS
3. **Strobe/Speaker**  
   Approved Manufacturers (no substitutes):  
   A. Wheelock LSPSTR Series

4. **Strobe/Horn**  
   Approved Manufacturers (no substitutes):  
   A. Wheelock LHSR Series

5. **Strobe**  
   Approved Manufacturers (no substitutes):  
   A. Wheelock LSPKR Series

6. **Smoke Detector**  
   Approved Manufacturers (no substitutes):  
   A. Edwards EST SIGA2-PS

7. **Duct Detector**  
   Above ceiling devices shall have separate LED indication and test buttons with magnetic test switch.  
   Approved Manufacturers (no substitutes):  
   A. Edwards EST SIGA-SD

8. **Manual Pull Station**  
   Approved Manufacturers (no substitutes):  
   A. Edwards EST 270 Series

**END OF FIRE ALARM SECTION**
7. **BUILDING MANAGEMENT SYSTEM**

A. **Codes, Regulations and Design Standards.**
The entire installation shall comply with the current City of New York Building Codes, NFPA, NYC Department of Fire, Department of Environmental Protection Agency and all other applicable local Codes.

B. **Executive Summary**
The NYU Langone Medical Center (NYULMC) is served by a state-of-the-art building management system (BMS) that consists of a network of microprocessor-based direct digital control (DDC) units communicating with each other and multiple servers and operator workstations. The communication network consists of a high-speed Ethernet-based network, designed for both ring and collapsed topology.

C. **General Requirements**
NYULMC has standardized on Alerton and Automated Logic Corporation as the acceptable manufacturers for building management systems. Other systems will not be considered.

These standards apply to all projects on the NYULMC campus.

For renovation work in existing buildings, the existing manufacturer shall be used. For example, the Kimmel Pavilion is served by an Automated Logic Corporation system. Any modifications to the existing control system shall utilize Automated Logic Corporation controllers.

All products provided shall be the most current the manufacturer has to offer at the time of installation.

All system components shall be designed and conform to NYULMC standards. This document provides the minimum performance criteria and operational requirements as required by NYULMC.

All controllers shall utilize ANSI/ASHRAE 135 BACnet for communication protocol.

All controllers, sensors, field devices, etc., shall be UL-listed. Control units shall be listed for UL - 916 Energy Management Equipment.

Field-mounted sensors and transmitters will be electronic.

Actuation of automatic control valves and dampers will be electric.

Each mechanical system and/or major piece of mechanical equipment shall have one (1) dedicated DDC controller with sufficient input/output capacity such that it shall be directly connected to all field devices and sensors associated with that system and/or piece of equipment. Distributed control of one (1) single piece of major mechanical equipment or system shall not be performed by multiple controllers. In applications where expansion modules are used, they must reside in the same enclosure of the
control unit interfaced with the modules. Any deviations to this requirement must be approved by NYULMC operations team prior to installation.

D. Existing Systems

1. Direct Digital Control Systems
   In general, each building on the NYULMC campus is served by either an Alerton or Automated Logic Corporation direct digital control (DDC) system. Intent is to utilize only one (1) manufacturer’s controllers within a building. In rare cases, there may be both manufacturers controllers located within the same building. If so, contact the NYULMC operations team for direction. Manufacturer’s equipment is located as follows:
   - Automated Logic Corporation
     - Kimmel Pavilion
     - Science Building
   - Alerton
     - Alumni Hall
     - Berg
     - Coles Student Laboratory
     - Energy Building
     - Greenberg Hall
     - Medical Science Building
     - Schwartz Health Care Center
     - Skirball Institute
     - Smilow Research Center
     - Tisch Hospital

2. Flow-Tracking Systems
   Each of the following buildings is served by a flow-tracking system as manufactured by Laboratory Control Systems Inc. The intent is to utilize Laboratory Control Systems Inc. for all flow-tracking applications.
   - Smilow Research Center
   - Tisch Hospital
   - Science building
   - Kimmel Pavilion
   - Medical Science Building
E. **BMS Approved Manufacturers**

Furnish all controllers and software programs as made by the following manufacturers:

- Automated Logic Corporation - WebCTRL
- Alerton - BACtalk

The Installing Building Automation and Temperature Control (BATC) Contractor shall be:

Automated Logic Corporation  
335 Broad Street  
Clifton, New Jersey 07013  
Mr. Bruce Ravel (973) 569-4700

The NYULMC operations team will consider the use of the following Contractor in lieu of Automated Logic Corporation on a case-by-case basis. The design professional shall be responsible for reviewing approved Contractors with the NYULMC operations team during the Design Phase of project.

Skyline Automation LLC  
341 Broad Street  
Clifton, New Jersey 07013  
Mr. Kevin Kerr (862) 238-8088

F. **Submittals**

Submittals for each project, regardless of scope and size, shall include the following:

- Compliance document consisting of Specifications 23 0900 and 23 0993 and, at each section, paragraph and subparagraph, identify compliance or non-compliance by C (Comply), D (Deviate) or E (Exception). For each D and E item, describe what specific alternative approach has been taken.

- Specification sheets for each type of electronic sensors, transmitters, controllers, actuators, relays, switches and miscellaneous control devices.

- Schedule and specification sheets for control damper actuators, including material and construction details, duct size, damper size, actuator mounting location and quantity of actuators. Actuator sizing calculations and configuration shall be submitted. Actuators to be selected based on approved sheet metal shop drawings and damper submittals.

- Schedule of automatic control valves and motorized block valves with specification sheets for each valve. The schedule shall list body pressure rating, closeoff pressure rating, Cv factor, pressure drop at specified capacity, rangeability and valve flow characteristics. Valves shall be sized based on approved equipment shop drawings, not mechanical schedules.
• System Architecture Drawing Indicating Tie-In Points, Hardware, Cabling Distances, Controllers, Equipment Served, Etc.: In addition to the initial submittal of system architecture drawings, at the completion of each project, the BATC Contractor is responsible for updating the Owner’s existing system architecture drawing as per modifications made during the project construction.

• DDC controller point list.

• Control diagrams for each system with a written sequence of operation and control devices identified with instrument tag numbers. Control diagrams to include symbol and abbreviation list. Note: For variable air volume air handling systems, control diagrams are to indicate field installed location of end of duct static pressure transmitters.

• Ladder-type electrical diagrams for each control system with terminal connections identified by number and location. Include symbol and abbreviation list for electrical control diagrams.

• Complete listing and description of program routines resident in direct digital control units.

• Detailed description of software program for return from power failure or controller reboot.

• Schedule of all points trended for each system. Schedule to include system name, system tag, control panel serving equipment, point name, point description and trend interval.

• Schedule of all alarms (hardwired and software-generated) for each system. Schedule to include system name, system tag, control panel serving equipment, point name, point description and alarm value.

• Description of smart alarm program as it applies for each system.

• Riser diagrams for power and communication with locations labeled for all controllers, transformers and other relevant control components.

• Panelboard from which power shall be taken, along with total power to be taken from each panelboard.

• Point nomenclature.

• Interfaces (software and hardware) with equipment provided in other sections of the specifications. Show connection details based upon the approved submittals of the equipment being interfaced with. For software interfaces (i.e., BACnet, Modbus, etc.), submit list of all interface points transmitted to or received from the equipment.

• List of OEM equipment interface points as well as configuration point mapping.
• Architectural floor plans indicating proposed locations of all wall-mounted devices (i.e., DDC units, control panels, sensors, thermostats, risers, etc.).

• Architectural floor plans indicating proposed location of communication loop and risers.

• Mechanical piping shop drawings indicating proposed locations of all temperature, flow and pressure transmitters.

• Final calibration, commissioning and testing reports.

• Wiring and control diagrams, dimension and specification sheets, and sequence of operation for the flow-tracking system and all of its components.

• Controller reboot sequence.

• Controller power failure restart program sequence.

Note: For projects where minor modifications are made to an existing control system, submittal documentation shall be inclusive of all existing control work associated with the system as well as the new work provided as part of the project. Existing work shall be identified as shadowed block areas or other means acceptable to NYULMC operations team. New work shall be bold. Intent is to have a comprehensive submit all indicating all existing and new control work associated with the system.

G. System Architecture
The system architecture shall consist of a network of independent, stand-alone direct BACnet I/P-based digital control units and BACnet MSTP unitary controllers communicating over a two-tier local area network. Each control unit shall perform all specified control functions independently, including scheduling, alarming and storage of trend data. Failure of one (1) control unit shall have no effect upon any other unit in the network.

Each direct digital control unit shall communicate with each other and with the existing servers. The DDC units, servers and workstations shall interface to the main communication network via multiple multi-port managed communication switches.

H. Communication Protocols
Communication protocol between servers, workstations, DDC and unitary controllers shall utilize ASHRAE Standard 135 BACnet. No manufacturer variations to ASHRAE Standard 135 BACnet published communication protocol standards and rules will be accepted.

The BMS shall be capable of communicating with other industry-standard protocol (LonMarkTM/LonTalkTM, Modbus, OPC, SOAP, SNMP, XML) to other equipment and/or building systems.
I. User Access Levels and Passwords

1. User Access Levels
   There shall be ten (10) standard access levels. Assignment of an access level to a user shall be determined by the NYULMC operations team. Coordinate with the NYULMC operations team for access level assignments. Any variations to access level functionality shall be brought to the attention of the NYULMC operations team for verification.
   
i. Access Level No. 1: Account Login with No Privileges (Note: This access level opens BACnet communication port for third-party companies, such as Utilivisor, to be continuously logged in for data extraction and collection).
   
ii. Access Level No. 2: View only (e.g., nurses are allowed to view space conditions).
   
iii. Access Level No. 3: Access Level No. 2 and trend and alarm viewing.
   
iv. Access Level No. 4: Access Level No. 3, trend/alarm creation and modifications of set points, start/stop commands, etc.
   
v. Access Level No. 5: Access Level No. 4 and edit/create display privileges (i.e., graphics).
   
vi. Access Level No. 6: Access Level No. 5 and device manager viewing.
   
vii. Access Level No. 7: Access Level No. 6 and DDC software program read-only privilege.
   
viii. Access Level No. 8: Access Level No. 7 and priority array point override privilege (Note: This requires highest security level privilege set, but does not necessarily grant all privileges.)
   
ix. Access Level No. 9: Access Level No. 8 and complete privilege set (e.g., ability to modify device manager table [add/remove controllers], modify/upload DDC software programs, trend/alarm handler creation).
   
x. Access Level No. 10: Access Level No. 9 and user account modifications/creations.

2. Username and Password
   Each user should be assigned a specific username and password for the purposes of activity tracking.

J. Flow-Tracking System

1. General
   The flow control system shall consist of matching supply and exhaust tracking pairs of pressure-independent variable air volume terminal units, supply air pressure-independent variable air volume terminal units, pressure-
independent constant volume terminal units and, where required, fume hoods integrated into the flow control system. Each matched pair of supply and exhaust terminal units and exhaust valves shall be equipped with electrically actuated dampers and shall be controlled by a microprocessor-based controller. Each fume hood shall be controlled by a microprocessor-based controller. The flow control system microprocessor controllers shall be integrated into the BMS. The flow control system shall be fully stand-alone for each individual area. The system shall not use or rely on information from controllers in other areas to control the functions within its area.

The flow control system shall interface with the BMS to enable simultaneous two-way communications between the two (2) systems by utilizing ASHRAE standard BACnet protocol. This functionality shall allow an operator to remotely monitor and adjust all variables and set points associated with the flow control system via the BMS workstation.

The flow control system shall respond and maintain specific airflow (± 5% of signal) and stability (< 5% over/undershoot) within 1 second of a change in duct static pressure, irrespective of the magnitude of pressure and/or flow change or quantity of airflow controllers.

The flow control system shall use volumetric offset control to maintain room pressurization. The system shall respond and maintain room pressurization (negative or positive) within 1 second of a change in room/system condition.

The flow control system shall employ highly accurate microprocessor controllers with a minimum 8 to 1 (8:1) turndown to ensure accurate pressurization at low airflows and guarantee the maximum system diversity and energy efficiency. The end-to-end accuracy of the installed system shall be five percent (5%) over the entire range of the measurement.

2. Flow-Tracking Control Unit
Flow-tracking control unit shall control the airflow balance of the room served. At a minimum, provide one (1) complete, stand-alone control unit per tracking pair.

The control unit shall be of DDC design with analog signal inputs and outputs. The inputs shall accept signals proportional to fume hood, exhaust and supply flows and space and supply air temperatures. The output signals shall control supply terminal units, reheat coil valves and general exhaust/return terminal units where applicable.

At a minimum, the following signals (points) shall be available to the BMS:

- Fume hood exhaust flow.
- Fume hood exhaust low-flow alarm.
- Supply/makeup airflow.
- General exhaust flow.
- Total exhaust flow.
- Total supply flow.
- Room offset.
- Space temperature.
- Supply air discharge air temperature.
- Terminal device position.

The control unit shall also accept direct-input global commands from the BMS. At a minimum, the following inputs shall be available:

- Room offset adjustment.
- Temperature override.
- Occupied/unoccupied setback of air change rates.

All points shall be stored in the BMS for trending, archiving, graphics, alarm notification and status reports.

3. Transmitters and Actuators
Provision a control panel for each tracking pair that shall contain the control unit, supply terminal unit differential pressure transmitter and control transformer. The supply terminal unit shall contain a unit-mounted electric spring-return actuator, flow cross airflow sensor, and supply air temperature transmitter (located downstream of the reheat coil). The exhaust terminal unit shall contain a unit-mounted electric spring-return actuator, exhaust terminal unit differential pressure transmitter and flow cross airflow sensor.

Minimum airflow sensor measurement accuracy shall be ± 5% of actual airflow and shall have a repeatability within ± 0.15% over the entire airflow range of each air terminal.

Flow-Tracking Terminal Units Associated with Fume Hoods: Damper actuators for supply, general exhaust and fume hood terminal units shall have an electric spring return actuator (4 - 20 mA input signal) factory-mounted to each terminal unit. Loss of electric power or control signal shall cause the exhaust damper to fail open to the maximum scheduled design flow, and the supply damper to fail closed to the minimum scheduled design flow. Electric actuator stroke time shall not exceed 1.0 second for flow change from minimum flow to ninety percent (90%) at nominal load. Actuator shall be maintenance-free high-speed type with manual override and shall meet NEC Class 2 requirements.

Flow-Tracking Terminal Units without Fume Hoods: Damper actuators for supply and general exhaust terminal units shall have an electric spring return actuator (0 - 10 VDC or 2 - 10 VDC input signal) factory-mounted to each terminal unit. Electric actuator stroke time shall not exceed 90 seconds. Actuator shall be maintenance-free high-speed type with manual override and
shall meet UL Class 2 requirements. Actuator shall be either 120 VAC or 24 VAC.

- For positive or neutral pressurization areas, loss of electric power or control signal shall cause the supply damper to fail open to the maximum scheduled design flow and the exhaust damper to fail closed to the minimum scheduled design flow.
- For negative pressurization areas, loss of electric power or control signal shall cause the exhaust damper to fail open to the maximum scheduled design flow and the supply damper to fail closed to the minimum scheduled design flow.

Spider-type multiple-probe airflow-sensing tubes of the automatic averaging type shall be 316 or 304 stainless steel. Accuracy of the sensing tubes shall be ± 2.0% with a repeatability of 0.3% over a range of 0 - 3,000 ft./min. at 1 duct diameter upstream straight run duct. The flow signal shall also be used as the input to the BMS and also for balancing and field-measurement of air volume.

4. **Pushbutton**

Provide a mushroom-type pushbutton and local audible annunciation (i.e., horn) located at the exit door of each area that contains a fume hood. The switch shall, on annunciation, drive the fume hood to maximum airflow. On activation of the pushbutton switch, the audible alarm shall be activated. Switch and audible alarm shall be provided with a label for user operation as per NYULMC Health and Safety requirements. Switch shall be manually reset type furnished with protective cover to allow the switch to be viewable without tampering or accidental activation. Refer to System Standards “Laboratory Flow-Tracking Applications” for additional information.

5. **Electronic Face Velocity Monitor for Variable Air Volume Fume Hoods**

A UL 916-listed individual fume hood monitor shall be provided for each fume hood, which shall measure the average face velocity at the set point independently of the sash position. Also, provide sash sensors on each fume hood to indicate the position of all fume hood sashes to the respective fume hood controller. Sash sensors shall provide an input signal to the fume hood controller that is linearly proportional to within one-half inch of the actual sash position. All sash sensors shall be highly corrosion-resistant and allow easy removal of a fume hood’s sashes for cleaning. Sash sensor operational life shall allow a minimum of one million full sash travel cycles. Multiple sash sensors shall be utilized for combination vertical/horizontal sashes.

The fume hood controller shall also interface to the hood interface module at the designated measurement location on the front of the fume hood. The hood interface module shall provide a continuous digital display of average fume hood face velocity, which shall be the true average face velocity as calculated by the fume hood controller based upon actual measured fume hood exhaust airflow and the total fume hood open area.
The hood interface module shall also sound an audible alarm device in response to face velocity alarm conditions and the hood interface module digital display shall change to “LOW FACE VELOCITY” or “HIGH FACE VELOCITY” appropriate to the alarm condition. A “SILENCE” pushbutton on the hood interface module shall allow the user to silence the audible alarm, which shall then remain silent until a subsequent face velocity alarm occurs.

The hood interface module shall also provide an “EMERGENCY PURGE” pushbutton that shall enable a user to increase fume hood exhaust airflow to the maximum amount for a designated period of time as required by Laboratory safety standards. After the designated time has expired, the fume hood exhaust shall automatically reset to a lower level to prevent excessive demand on the exhaust system. The emergency purge mode of operation shall also be able to be canceled at any time by depressing the emergency purge button a second time. The hood interface module shall sound its audible alarm device whenever the emergency purge mode of operation is activated. The silence pushbutton on the hood interface module shall also allow the user to silence the audible alarm, which shall then remain silent until either the emergency purge operational mode is again activated or a face velocity alarm occurs.

The hood interface module shall also provide an audible sash-open alert feature that shall caution users whenever the fume hood sash opening exceeds a predetermined amount. The audible alert shall consist of one-minute repeating cycle of a series of quick “chirps” that continues until the sash opening is reduced to an allowable amount. In addition, failure of a fume hood sash sensor shall also be indicated as an alarm condition on the hood interface module.

All fume hood control and display module and operational parameters shall be established and be changeable only by authorized personnel using a portable operator’s terminal. These operational parameters shall include:

- Fume hood average face velocity set point.
- Fume hood minimum and maximum exhaust airflow set points.
- Face velocity high and low alarm limits and associated alarm time delay to avoid transient alarms.
- Face velocity high and low warning limits.
- Emergency purge time periods and exhaust levels.
- Allowable maximum sash opening associated with the sash alert feature.

The portable operator’s terminal shall plug into the hood interface module as well as into the flow-tracking room controller. In addition, all Laboratory fume hood and flow-tracking room control parameters, along with all other facility control and monitoring functions, shall be accessible to authorized
personnel from designated terminals on the DDC control and monitoring network.

Momentary or extended losses of power shall not change or affect any VAV fume hood control set points, operational parameters or stored data. Upon resumption of power after a power failure, fume hood monitor shall resume full normal operation exactly as before the power failure and without any need for manual intervention. Upon a power failure or operational failure within the fume hood controller, the fume hood exhaust air terminal shall be automatically positioned to the fully open (fail-safe) position as required by Laboratory safety standards.

a. Hood Interface Module

The hood interface module shall provide emergency override, high-flow alarm, low-flow alarm, hood status lights and programmable audible alarm (95 dB at 1 meter). Module shall be designed to fit in a 2 inch by 4 inch (single-gang) electric box and mounted on the face of the fume hood. Connection using phone jack termination. All alarm set points shall be fully field-programmable as well as the time delay interval prior to alarming. Module shall also allow high/low sash alarms and limits. All points shall be monitored at the flow-tracking control unit. Alarm and mute functions shall automatically reset when the alarm condition ceases to exist. Alarm annunciation shall be as follows:

- Normal Condition: Green LED lighted.
- Alarm Condition: Red LED lighted, indicating either:
  - Low face velocity.
  - High face velocity.
  - Emergency override.
- Caution or Control Transition: Green and red LED’s flash alternately.
- Buzzer: Energized in any alarm or override condition.

Pushbutton Functions

- Override: Push once.
- Reset to Normal Operation: Push once.
- Alarm Acknowledgment (Audible Mute): Push twice (LED remains lighted while alarm condition exists).

In addition, all system set points shall be adjustable via the keypad.

6. Constant Volume Fume Hood Interface Module

The constant volume fume hood interface module shall provide emergency override, high-flow alarm, low-flow alarm, hood status lights and programmable audible alarm (95 dB at 1 meter). Module shall be designed to fit in a 2 inch by 4 inch (single-gang) electric box and mounted on the face of the fume hood. Connection using phone jack termination. All alarm set
points shall be fully field-programmable as well as the time delay interval prior to alarming. All points shall be monitored at the flow-tracking control unit. Alarm and mute functions shall automatically reset when the alarm condition ceases to exist. Alarm annunciation shall be as follows:

- Normal Condition: Green LED lighted.
- Alarm Condition: Red LED lighted, indicating either:
  - Low hood airflow.
  - High hood airflow.
  - Emergency override.
- Caution or Control Transition: Green and red LED’s flash alternately.
- Buzzer: Energized in any alarm or override condition.
- Pushbutton Functions
  - Override: Push once.
  - Reset to Normal Operation: Push once.
  - Alarm Acknowledgment (Audible Mute): Push twice (LED remains lighted while alarm condition exists).

In addition, all system set points shall be adjustable via the keypad.

The fume hood interface module shall interface with the fume hood exhaust terminal unit for monitoring of exhaust air flow rate. The hood interface module shall provide a continuous digital display of fume hood exhaust air flow rate.

The hood interface module shall also sound an audible alarm device in response to airflow alarm conditions and the hood interface module digital display shall change to “LOW HOOD AIRFLOW” or “HIGH HOOD AIRFLOW” appropriate to the alarm condition. A “SILENCE” pushbutton on the hood interface module shall allow the user to silence the audible alarm, which shall then remain silent until a subsequent alarm occurs.

The hood interface module shall also provide an “EMERGENCY PURGE” pushbutton that shall enable a user to increase fume hood exhaust airflow to the maximum amount for a designated period of time as required by Laboratory safety standards. After the designated time has expired, the fume hood exhaust shall automatically reset to a lower level to prevent excessive demand on the exhaust system. The emergency purge mode of operation shall also be able to be canceled at any time by depressing the emergency purge button a second time. The hood interface module shall sound its audible alarm device whenever the emergency purge mode of operation is activated. The silence pushbutton on the hood interface module shall also allow the user to silence the audible alarm, which shall then remain silent until either the emergency purge operational mode is again activated or an airflow alarm occurs.
Momentary or extended losses of power shall not change or affect any fume hood control set points, operational parameters or stored data. Upon resumption of power after a power failure, fume hood monitor shall resume full normal operation exactly as before the power failure and without any need for manual intervention. Upon a power failure, the fume hood exhaust air terminal shall be automatically positioned to the fully open (fail-safe) position as required by Laboratory safety standards.

7. **Coordination**
   The fume hood manufacturer shall be responsible for installing the hood interface module and sash sensor under strict direction of the BATC Contractor. The BATC Contractor shall coordinate all necessary cutout and roughing-in information prior with the hood manufacturer. The BATC Contractor shall send the fume hood interface modules and all associated cables and connectors to the successful fume hood supplier for mounting at the fume hood manufacturer’s factory.

8. **Approved Manufacturer**
   Flow-tracking system shall be manufactured by Laboratory Control Systems - Envirottrak IV.

K. **Power Requirements**
   1. **Emergency/Standby Power Requirement**
      Regardless whether the equipment (e.g., air handling unit, chiller, etc.) served by the controller is powered by normal power or emergency/standby power, the controller shall be powered by emergency/standby power. For projects where emergency/standby power is not available, notify the NYULMC operations team that emergency/standby power is not available for controller use. NYULMC will provide direction.

   2. **Uninterruptible Power Requirement**
      All controllers, except for controllers serving variable air volume, constant air volume and/or fan-powered terminal units, shall be provided with uninterruptible power via a local panel-mounted uninterruptible power supply as manufactured by Emerson model SDU Off-Line DIN Rail AC UPS rated for 500 VA/300 watts at 120 VAC. Battery backup time shall be 4.5 minutes at half load and 18 minutes at full load. The UPS shall be monitored at the control unit served via a dry contact input.

L. **Naming Conventions (Tagging)**
   1. **Point Naming Conventions**
      [To be included in a future document version.]
M. Product Standards

1. Controllers

Controllers shall be applied to equipment as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Alerton</th>
<th>Automated Logic Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Handling Unit and Return/Spill Fan</td>
<td>VLX and expanders</td>
<td>ME line with expanders. Include an AMR or ME-LGR if integration to VFD’s is required.</td>
</tr>
<tr>
<td>Variable Air Volume Terminal Unit, Constant Volume Terminal Unit, Fan-Powered Variable Air Volume Terminal Units</td>
<td>VLX-853 with separate DP sensor and actuator</td>
<td>ZN253 with separate DP sensor and actuator, or ZN341v+ if separate sensors are not required, or SE-line controller if fan-powered</td>
</tr>
<tr>
<td>Heating and Ventilation Units</td>
<td>VLX with expanders</td>
<td>SE6166 - include AMR or switch to ME-LGR/expanders if integration to VFD’s is required.</td>
</tr>
<tr>
<td>Exhaust Fans</td>
<td>VLC-550 (constant speed) VLX (if analog output to VFD is required)</td>
<td>ZN551 - include AMR if integration to VFD’s is required.</td>
</tr>
<tr>
<td>Packaged Air Conditioning Units</td>
<td>VLC-550 or VLC-853 depending on scope</td>
<td>ZN551 or ZN253.</td>
</tr>
<tr>
<td>Primary Chilled and Condenser Water System</td>
<td>VLX and expanders depending on final point count</td>
<td>ME-LGR and expanders.</td>
</tr>
<tr>
<td>Hot Water Systems</td>
<td>VLX and expanders, depending on final point count</td>
<td>SE6166 (lower point count) or ME-LGR and expanders (higher point count or integration to VFD’s).</td>
</tr>
<tr>
<td>Secondary Water Systems</td>
<td>VLX and expanders, depending on final point count</td>
<td>SE6166 (lower point count) or ME-LGR and expanders (higher point count or integration to VFD’s).</td>
</tr>
</tbody>
</table>
2. Field Devices
   a. General

   All field devices must be labeled with tag matching “as-built” document. Label shall adhesive type, 12 mm width with black lettering on white background.

   Wall-mounted devices (i.e., temperature, humidity and CO2 sensors) must be sealed at point of connection to wall such that no air from wall cavity will enter sensor enclosure. Sensors shall be installed in vaporproof enclosure. Seal conduit with duct seal putty as manufactured by Rainbow Technology. Wire jacket/insulation shall be compatible with duct seal putty.

   All safety devices and relays shall be wired such that on a failure of the safety device or relay the system shall stop.

   Manufacturers listed below are preapproved by NYULMC operations team. Any deviations to the approved manufacturers must be approved by NYULMC operations team.

   b. Temperature Transmitters

   Duct-mounted averaging-type sensors shall consist of a 1,000 ohm platinum RTD averaging element, transmitter and weather-resistant electrical box for wiring connections. RTD accuracy shall be ± 0.5°F. Transmitter shall provide 2-wire, 4 - 20 mA DC output linear over specified temperature range, with an accuracy of 0.2% over the calibrated span. Probe length shall be 1 linear foot per 1 square foot of duct area. If sensing probe is of insufficient length to fully cover coil area, provide multiple sensors. Coil-mounted averaging sensors must be mounted as per manufacturer’s recommendations. Capillary shall be fastened utilizing capillary holder mounting clip (similar to Johnson Controls TE-6001-8 mounting bracket) to prevent damage to sensor and ensure appropriate radius bend where sensor changes direction. Installer must coordinate the mounting hardware radius with the averaging sensor minimum radius required. Capillaries must be installed such that the capillary or averaging sensor can be replaced without removing multiple devices. Transmitter shall be as manufactured by ACI Model A/1K Series (RTD) and Kele Model T85 transmitter.

   Duct-mounted non-averaging-type sensors shall consist of a 1,000 ohm platinum RTD mounted on an 18 inch probe, transmitter and NEMA 3R electrical box for wiring connections. RTD accuracy shall be ± 0.5°F. Transmitter shall provide a 2-wire, 4 - 20 mA DC output linear over specified temperature range with an accuracy of ± 0.2% over the calibrated span. Probe length shall be half the length of the duct.
Transmitter shall be as manufactured by ACI Model A/1K-2W-D-8-GD (RTD) and Kele Model T85 transmitter.

Liquid insertion-type sensors shall consist of a 1,000 ohm platinum RTD, transmitter and electrical box for wiring connections. RTD accuracy shall be ± 0.5°F at 32°F. Transmitter shall provide a 2-wire, 4 - 20 mA DC output linear over specified temperature range with an accuracy of ± 0.2% over the calibrated span. Transmitter shall be as manufactured by ACI Model A/1K (RTD) and Kele Model T85 transmitter, with sensor mounted in a thermowell.

Sensors for duct locations shall not be affected by vibrations encountered in normal duct systems.

Space sensors shall be designed for wall-mounting in a decorative ventilated enclosure and consist of a 1,000 ohm platinum RTD element, transmitter and electrical box for wiring connections. Sensor accuracy shall be ± 0.5°F. Transmitter shall provide 2-wire, 4 - 20 mA DC output linear over temperature range of 0 to 100°F, with an accuracy of ± 0.2% over the calibrated span. Transmitter shall be as manufactured by ACI Model A/1K (RTD) and transmitter shall be as manufactured by Kele Model T85 transmitter.

All space temperature sensors/thermostats located in occupied areas shall be indicating and adjustable type. Set point adjustment shall be software-limited (minimum and maximum set points) via manual command at operator workstation. Space temperature sensors/thermostats located in transient areas such as corridors shall be non-indicating and non-adjustable.

Temperature sensors used in preheat coil low-limit applications shall be installed to cover the entire coil area. Refer to probe length vs. coil area requirements of duct-mounted averaging-type sensors listed above. Multiple sensors shall be provided as required by coil areas. Each individual coil section shall be provided with individual temperature sensors. Where multiple sensors are required for a single coil section, a DDC software program shall “average” the multiple sensors.

Transmitter maximum spans shall be (normal operating point at mid-scale):

- Room temperature: 50°F.
- Chilled water: 50°F.
- Condenser water: 50°F.
- Hot water: 100°F.
• Duct Air Temperature
  – Heating: 100°F or as required by maximum duct temperature.
  – Cooling: 50°F.
• Outside air temperature: 150°F (-30°F to 120°F).

c. Thermistors

Manufacturer’s standard thermistor temperature-sensing elements are only acceptable for use serving space temperature monitoring of VAV terminal units.

The use of thermistors shall not be acceptable for other air and water applications.

All space temperature sensors/thermostats located in occupied areas shall be indicating and adjustable type. Set point adjustment shall be software-limited (minimum and maximum set points) via manual command at operator workstation. Space temperature sensors/thermostats located in transient areas such as corridors shall be non-indicating and non-adjustable.

d. Static Pressure Transmitters

Duct static pressure transmitters shall consist of static pressure probe, transmitter and electrical box for wiring connections. The static pressure probe shall extend across the width of the duct. Duct wall pressure taps shall be acceptable. Reference pressure-sensing connections to duct static pressure transmitters shall be made through an ambient pressure probe or chamber that shall minimize effects of air disturbances and maintain a steady, uniform reference pressure. Transmitter shall provide 2-wire, 4 - 20 mA DC output linear over a specified pressure range, with an accuracy of ± 0.4% of span. Transmitter range shall be selected to ensure that the normal set point is in the center of the device range. Device shall be capable of withstanding the maximum pressure that could occur at the location. Transmitter shall be Setra Model 264. Probe shall be A-300-K series as manufactured by Kele.

e. Protective Thermostats and Detectors

Electric low-temperature (freeze protection) thermostats shall have 20 foot capillary (not averaging type) installed to cover the entire length of coil vertically and horizontally, leaving 6 inches from each edge of coil. The maximum vertical distance between each pass of thermostat capillary shall be no more than 8 inches. Switch actuation shall occur if any 12 inch length of capillary senses a temperature below set point. Capillary length shall be 1 linear foot per 1 square foot of coil area. If capillary is of insufficient length to fully cover coil area, provide multiple
sensors. If multiple thermostats are provided, each thermostat shall only cover its percentage of coil. For example, if there are two (2) thermostats, each covers 50%. If there are four (4) thermostats, each covers 25%. Capillaries must be mounted as per manufacturer’s recommendations. Capillary shall be fastened utilizing capillary holder mounting clip (similar to Johnson Controls TE-6001-8 mounting bracket) to prevent damage to capillary and ensure appropriate radius bend where capillary changes direction. Installer must coordinate the mounting hardware radius with the capillary minimum radius required. Capillaries must be installed such that the capillary can be replaced without removing multiple devices. If one (1) thermostat is not sufficient to provide adequate coverage of coil, furnish and install additional thermostats to provide sufficient coverage. Sufficient coil coverage shall be field-verified by the Engineer. These thermostats shall be 2-position automatic-reset type. The elements shall be suspended at least 6 to 8 inches downstream of the preheat coils. Thermostats shall be automatic-reset type. Furnish a hardwired time-delay relay to delay fan shutdown and alarming at the workstation for 180 seconds (adjustable), unless otherwise stated. For all low-temperature thermostat capillaries, provide manufacturer-specific capillary supports to prevent unnecessary capillary crimping.

f. Relative Humidity Transmitters

Duct-mounted relative humidity transmitter shall provide 4 - 20 mA linear DC output corresponding to a range of 0 to 95% RH. Calibrated end-to-end accuracy shall be ± 2.0 RH over the range of 0 - 90% RH at 20°C. Transmitter shall be manufactured by Vaisala HMD 60 Series.

Space relative humidity transmitter shall provide a 4 - 20 mA linear DC output corresponding to the range of 0 - 95% RH. Calibrated end-to-end accuracy shall be ± 2.0% RH over the range of 0 - 90% RH at 20°C. Transmitter shall be manufactured by Vaisala HMD/60U Series.

g. Thermowells

Thermowells shall be Type 304 stainless steel, tapered pattern, 3/4 inch NPT external process connection, 1/2 inch NPT internal thread, with lagging extension, equal to insulation thickness where installed in insulated piping. Thermowells shall have an insertion length of at least 1/3 of pipe diameter but in no case shall wells be less than 4-1/2 inch insertion length. Maximum immersion length shall be 6 inches or 3/4 of pipe diameter, whichever is smaller. Thermowells shall be rated for maximum system operating pressure, temperature and fluid velocity.
Internal bore of thermowells shall be sized to exactly fit the diameter of the sensing element to be installed. Well shall be provided thermal conductive grease/paste to improve conductivity.

Thermowells to be provided with thermal grease to improve thermal conductivity.

h. Differential Pressure Transmitter (Serving Flow-Tracking Supply, General Exhaust and Fume Hood Exhaust Terminal Units)

Electronic differential pressure transmitter capable of transmitting a 0 - 10 or 0 - 5 VDC output signal. Transmitter accuracy shall be ± 0.4% of full scale. Span shall be matched for a specific cfm range, plus ten percent (10%) overpressure. Transmitter zero and span shall be field-adjustable. Transmitter shall be Ashcroft CLXdp.

i. Differential Pressure Transmitter (for Air Conditioning Systems with Piezo Rings Only)

Electronic differential pressure transmitter capable of transmitting a 4 to 20 mA DC output signal. Transmitter accuracy shall be ± 0.5% of span, including non-linearity, hysteresis and non-repeatability. Span shall be matched for a specific cfm range, plus ten percent (10%). Transmitter shall be Dwyer Model 603A, Air Monitor Veltron DPT 2500 Ultra.

j. Airflow-Measuring Stations (Differential Pressure Type)

i. Fan Inlet Type

Airflow-measuring stations shall be Air Monitor Corporation, Volu-Probe FI Airflow Traverse Probe or Tek-Air Systems VT-5000. Airflow measurement accuracy shall be ±2% of actual flow. The maximum allowable unrecovered pressure drop caused by the station shall not exceed 0.085 in. w.c. at 2,000 fpm or 0.30 in. w.c. at 4,000 fpm.

Each airflow-measuring station shall be furnished with an electronic differential pressure transmitter capable of transmitting a 4 - 20 mA DC output signal. Transmitter accuracy shall be ± 0.5% of span, including linearity, hysteresis and repeatability. Repeatability shall be ± 0.5% of span. The transmitter shall be capable of being field-recalibrated for a different span within its range limits. Span shall be matched for a specific cfm range, plus ten percent (10%) transmitter zero, and shall be field-adjustable. Transmitter shall be Air Monitor Veltron Series 2500 Ultra.
ii. **Outdoor Airflow-Measuring Stations**

Outdoor airflow-measuring stations shall consist of probe(s), transducer and monitor. The outdoor airflow-measuring stations’ accuracy shall be ± 5% of actual flow over a range of 200 to 1,000 fpm. The probe installation shall not produce any static barrier (resistance to airflow).

The probe(s) and the transducer shall be able to operate in a temperature range between -40°F to 120°F. The transducer and monitor shall be enclosed in a NEMA-4 enclosure.

The power supply voltage to the monitor shall be 24 VAC. The outdoor airflow-measuring station shall be capable of transmitting a 4 - 20 mA DC output signal. Outdoor airflow-measuring station shall be manufactured by Tek-Air Systems, Inc., Model IAQ-Tek or Air Monitor Corporation Model VOLU-flo / OAM.

k. **Resistance Temperature Detectors (RTD)**

For monitoring of temperature, use of an RTD as a direct signal input into the direct digital system is an acceptable alternate to a temperature transmitter, provided the accuracy is equal to that of the substituted transmitters.

RTD’s shall be manufactured by ACI or BAPI.

l. **Differential Pressure Transmitters (Water)**

Differential pressure transmitters shall be variable capacitance type arranged for 2-wire, 4 - 20 mA control signal output. Transmitter shall be enclosed in a gasketed, dust-free and watertight housing. All body cavities open to the process fluid shall be provided with drain ports at the cavity bottom and vent ports at the top of the cavity. Both drain and vent ports shall be a minimum 1/4 inch - 18 NPT. The transmitter shall have continuously adjustable (externally) zero and span.

The differential pressure range span shall be adjustable to permit maximum zero elevation of 600% of calibrated span and a maximum zero suppression of 500% of calibrated span. These adjustments shall be made within the transmitter housing without a change of parts. The transmitter shall be capable of sustaining differential pressures in either direction up to the body rating without damage to the instrument or a loss of accuracy or zero shift.
The transmitter shall be fully compensated for both process and ambient temperature variations and a calibrated accuracy of ± 0.25% of calibrated span.

Transmitter shall be furnished complete with factory-mounted 5-valve manifold, manufactured by Anderson Greenwood & Co. Model MDP. Transmitter shall be Rosemount Model 2051C.

m. **Current-Sensing Relays**

Relay shall be field-adjustable for detecting AC current levels in equipment served. For belt-driven equipment, relay shall be adjusted to detect a belt break. Relay shall be non-latching and shall have no time delay. Nominal input voltage and current-sensing range shall be selected based on electrical characteristics of equipment served. Relay shall be installed on one (1) lead of the load side of motor feed. Relay contacts shall be Form C-rated for 5A at 120 VAC.

n. **Differential Pressure Switch (Air)**

Differential pressure switch diaphragm and calibration spring shall be housed in a plated enclosure with removable metal guard protecting the set point screw and snap-action switch terminations. Switch shall be provided with SPST NC contacts. Contact rating shall be 15A, 125 - 277VAC.

High- and low-sensing ports shall be ferrule-and-nut compression for 1/4 in. o.d. tubing. Provide angle tips for duct insertion.

Switch shall be automatic-reset type.

Switch shall be Cleveland Controls Model AFS Series.

o. **Zone-Type Leak Detector**

Leak detector shall provide zone detection of leaks utilizing cable installed in a perimeter or serpentine configuration. Sensing cable shall lie flat and be installed with hold-down clips. Cable shall be plenum-rated and UL 916-listed. Cable shall be available in lengths of 20, 25, 30, 35 and 45 feet. Power requirements shall be 24 VAC, 120 mA. Enclosure shall be NEMA 1. Output relays shall be 2 Form C, 3A rating at 24 VAC. Detector shall be manufactured by Liebert Model LT-460.

p. **Point Type Leak Detector**

Leak detector shall provide single-point detection of leaks. Sensing probe shall be gold-plated to prevent corrosion. Sensor shall be provided with adjustable mounting brackets to allow for height and leveling adjustment. Sensing probes shall be adjusted to 1/8 in. of floor. Power
requirements shall be 24 VAC, 100 mA. Enclosure shall be NEMA 1. Output relays shall be 2 Form C, 3A rating at 24 VAC. Detector shall be manufactured by Liebert Model LT-410.

q. **Carbon Dioxide Transmitter**

The CO2 sensor/transmitter shall be a capable of detecting carbon dioxide (CO2) in the range of 0 - 2,000 ppm.

The sensor/transmitter shall consist of a single wall-mounted assembly designed for direct wall-mounting or mounting on a standard junction box.

The transmitter shall be operated on 24 VAC, 50/60 Hz, 2W. The unit shall provide a 4 - 20 mA output-based CO2 signal.

Accuracy, including repeatability, non-linearity and calibration uncertainty shall be ≤ ± 2.0% of range.

Long-term stability shall be ± 5% of range/5 years.

The response time of the CO2 sensor/transmitter shall be 60 seconds.

The CO2 sensor/transmitter sensor shall not need sample pumps or other flow devices.

Provide a calibration kit to the Owner.

Wall-mounted CO2 transmitter shall be mounted between 3 feet and 6 feet above the finished floor.

Transmitter shall be as manufactured by Vaisala Model GMD20 (duct-mounting) or GMW20 (wall-mounting).

r. **Electromagnetic Flow Meters (Insertion Type)**

Provide an insertion electromagnetic flow meter complete with integral or remote electronics module. The electronics module shall include a backlit graphic display and external keypad. The principle of operation shall be based of Faraday's Law of Electromagnetic Induction.

The flow meter shall be installed in accordance with the manufacturer's installation guide, including meter orientation and straight pipe recommendations. Connections to the piping shall be ANSI Class 150 flanges (ANSI Class 300 where required).
Each flow meter shall be individually wet-calibrated and accurate to within ± 0.2% of reading from 1.6 to 33 feet per second velocity. A Certificate of Calibration shall be provided with each flow meter.

Output signals shall be 4 - 20 mA and programmable pulse. The flow meter shall be capable of measuring bi-directional flow. Each flow meter shall be factory-programmed for its specific application, and shall be reprogrammable using the integral keypad on the electronics module (no special interface device or computer required).

Each flow meter shall be capable of generating a 4 - 20 mA signal to the DDC system and providing a local display.

In applications where the meter is not installed in a pipeline with fifteen (15) pipe diameters of straight run (ten [10] upstream and five [5] downstream of meter), provide in-line flanged type as described herein.

Insertion electromagnetic flow meter shall be ONICON Incorporated Model F 3500 with D-100 local display-mounted at eye level for operator standing on MER Floor.

5. Electromagnetic Meter (In-Line Flanged Type)

Provide an in-line flanged electromagnetic flow meter complete with integral or remote electronics module. The electronics module shall include a backlit graphic display and external keypad. The principle of operation shall be based of Faraday’s Law of Electromagnetic Induction.

The flow meter shall be installed in accordance with the manufacturer’s installation guide, including meter orientation and straight pipe recommendations. Connections to the piping shall be ANSI Class 150 flanges (ANSI Class 300 where required).

The flow tube shall be epoxy-coated steel; the sensing electrodes shall be 316SS; the liner shall be polypropylene or ebonite for low-temperature service, PFTE for hot water service (266°F maximum).

Each flow meter shall be individually wet-calibrated and accurate to within ± 0.2% of reading from 1.6 to 33 feet per second velocity. A certificate of calibration shall be provided with each flow meter.

Output signals shall be 4 - 20 mA and programmable pulse. The flow meter shall be capable of measuring bi-directional flow. Each flow meter shall be factory-programmed for its specific application, and shall be reprogrammable using the integral keypad on the electronics module (no special interface device or computer required).
Each flow meter shall be capable of generating a 4 - 20 mA signal to the DDC system and provide a local display.

Each flow meter shall be covered by the manufacturer’s two-year warranty.

In-line flanged electromagnetic flow meter shall be ONICON Incorporated Model F-3200, with DB-1201 local display (no substitutions). Local display shall be mounted remote from the meter in an accessible location.

t. Energy Btu Measurement System

The entire energy Btu measurement system shall be built and calibrated by a single manufacturer and shall consist of a flow meter, two (2) temperature sensors, a Btu meter, temperature thermowells and all required mechanical installation hardware. The Btu meter and associated sensors and flow meter shall be installed in accordance with the manufacturer’s installation guide.

The Btu meter shall provide the following points both at the integral LCD and as outputs to the direct digital control system: energy total, energy rate, flow rate, supply temperature and return temperature. Output signals shall be via protocol conforming to BACnet MS/TP.

Each Btu meter shall be factory-programmed and -tagged for its specific application, and shall be reprogrammable using the front panel keypad (no special interface device or computer required).

Temperature sensors shall be loop-powered current-based (mA) sensors and shall be bath-calibrated and matched (NIST-traceable) for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within + 0.15°F (including the error from individual temperature sensors, sensor matching, input offsets and calculations).

A certificate of NIST-traceable calibration shall be provided with each system.

Flow meter shall be in accordance with “In-Line Flanged Electromagnetic Flow Meters” as specified herein.

Btu meter shall a remote local display unit indicating flowrate.

All equipment shall be covered by the manufacturer’s two (2)-year warranty.
Energy Btu measurement system shall be ONICON Incorporated System-10 Btu Meter with D-1201 local display (no substitutions). Local display shall be mounted remote from meter in an accessible location.

u. **Steam Metering**

Steam meter shall be insertion type vortex flowmeter. Meter shall be installed through a 2 inch isolation valve and furnished with a retraction tool for insertion and removal without process shutdown.

Meter pressure rating shall be up to 900 psi based on ANSI flange rating. Temperature range shall be -40 to 500°F. Meter shall be of all stainless steel construction. Meter mounting shall be 2 inch raised face ANSI rated flanges.

Meter installation shall be in accordance with manufacturer’s requirements for straight run, orientation and alignment.

Meter electronics hardware shall be factory configured for each specific application. Electronics shall be integral mounted for meters installed which floor standing access. For all other applications electronics shall be remote mounting allowing for floor standing access. Meter electronics shall be grounded to earth ground via ground strap. Meter shall be powered by 24 VAC power supply.

Meter output shall be both 4 - 20 mA and pulse output.

Meter shall be provided with temperature and pressure transmitters for mass flow calculations.

Meter accuracy shall be ± 1.0% of flowrate. Isolation valve shall be 2 inch double flanged raised-face full port gate valve.

Meter shall be EMCO model Vbar-910 series with Model PT pressure transmitter and Model TEM temperature sensor/transmitter with well.

v. **Room Pressure Monitors**

Room pressure monitor shall include a bidirectional pressure sensor and wall-mounted digital interface module. Room pressure monitoring shall utilize differential pressure-sensing technology to display the respective room’s differential pressure with reference to the entrance corridor. Differential pressure transmitter accuracy shall be ± 10% of reading (± 0.00001 in. H20) and shall be bidirectional.

Room pressure monitor shall be designed to provide room pressure operating and alarm status, alarm indication and acknowledgment functions. Alarm set points and time delays, prior to alarming, shall be
programmable. Once the alarm condition ceases to exist, the alarm and mute functions are reset automatically.

Status indicators shall be green for normal and red for alarm. Room pressure monitoring shall include audible alarm.

Monitor shall be provided with a silence pushbutton to deactivate the alarm horn during an alarm condition.

Room pressure monitor shall be located outside of room served at entrance door.

Room pressure monitor shall interface to a dry contact input from door position contact. Provide a door position switch for each door serving the room. Switches shall be wired in series and provide an input to the room pressure monitor. In addition, provide a local alarm light, horn and silence switch located within the room served. Horn and light shall be activated if a door is maintained in the open position for a continuous 3 minute time period. Silence switch shall allow the user to silence the horn; however, the light shall remain energized until the door is closed.

Room pressure monitor shall be PresSura Model 8630-SM series as manufactured by TSI.

w. Oxygen-Monitoring System Serving MRI Equipment Rooms and MRI Rooms

Oxygen-monitoring system shall be a sample draw monitoring system that alerts and alarms when oxygen levels fall below safe limits for human health. The oxygen-monitoring system shall consist of a zirconium oxide sensor that has a 10-year service life. The sensor shall not require a reference gas for calibration and shall operate in nitrogen environments of up to 100%.

Sensor shall not be affected by temperature or pressure drift. Monitoring system shall contain built-in flow sample pump and on-board CPU with back-lit display and built-in adjustable alarm relays.

Flow pump shall continuously sample air drawn from end points up to a maximum of 100 feet from the pump. Sample tube shall be made of transparent polyurethane 1/4 in. (7 mm) in diameter. Tube end shall be positioned near the ceiling of the space being monitored.

Oxygen-monitoring system shall be provided with polycarbonate case with wall-mounted accessory. System to include a 4 - 20 mA analog output and two (2) alarm levels, user-selectable relay contacts and a
fault relay for interface with direct digital control system. Oxygen-monitoring system shall be CE-, UL- and CUL-listed.

Accuracy shall be ± 1.0% of full scale. Range shall be 0 to 25%. Repeatability shall be 2% of reading. Response time shall be within 2 seconds of any change in oxygen. System shall be provided with a 24 VDC power supply.

Oxygen-monitoring system shall be Model OMS as manufactured by ETS-Lindgren.

3. Miscellaneous Panel-Mounted Electrical Devices
   a. Transformers

Transformer shall be 100 VA rated, 50/60 Hz with either foot or single thread hub mounting. Transformer shall be provided with circuit breaker for overcurrent protection. Operating temperature shall be -30 to 140°F. Mean time between failures shall be 100,000 hours at 77°F. Transformer shall be Class 2 UL 5085-3 listed. Transformer shall be manufactured by Functional Devices Inc., Model TR100VA001.

b. Relays

General-purpose relays shall be rated for 10A switching capacity. Relays shall be configured with SPDT, DPDT, #PDT or 4PDT contact configurations based on application. Relays shall be provided with blade terminals for socket mounting. Maximum continuous applied voltage shall be 110% of rated voltage. Dropout voltage shall be thirty percent (30%) or more of rated voltage. Contact material shall be silver cadmium oxide. Contract resistance shall be a maximum of 50M ohms. Operating and release times shall be a maximum of 25 ms. Relays shall be manufactured by Idec Model RH series.

Time delay relays shall be provided with either on-delay, interval or off-delay timing functions. Adjustable timing ranges shall be from 0.1 second to 10 hours. Coils shall be rated for 24 or 120VAC, based on application. Relay type shall be DPDT. Input pulse time shall be 50 ms. Contact material shall be silver alloy. Mechanical life shall be 10 million operations at full load. Repeatability shall be 0.2%. Relay shall be Magnecraft Model TDR series.

c. Disconnect Switch

20 amp disconnect switch with duplex receptacle. Include indicating light and 10 amp fuse and 4 x 4 box with cover. Disconnect switch to be independently fused such that a blown fuse will not interrupt controller power.
4. **Field Equipment Panels and Enclosures**

The enclosure shall be made of steel or extruded aluminum with proper bracing for rigid wall or floor mounting. The enclosure shall not be attached to any piece of building equipment. Mount in this enclosure all associated temperature controls, such as controllers, power supplies, relays, switches, etc.

Hinged door shall contain a key-operated lock. [Model and manufacturer to be included in a future document version.]

Each control device mounted within enclosure shall be marked with an engraved nameplate cross-referencing it to the control diagram.

Provide a nameplate for each enclosure, mounted on the face of the door, indicating the controller tag, device instance, system served and branch circuit number and electrical panel tag from which the enclosure is fed.

Interconnections between internal devices and field wiring shall be neatly installed at terminal strips. Wiring shall be within plastic troughs. Wiring shall have identification sleeves at each termination at the terminal strip individually identified per control/interlock drawings, with adequate clearance for field wiring.

Enclosures shall be provided with space for future addition of instruments. Fully loaded enclosures shall not be acceptable. Enclosures shall be oversized by twenty-five percent (25%).

Separate terminal blocks shall be installed for 120 volt AC wiring and for low-level signal wiring within enclosures. Terminal blocks for line voltage wiring shall be separated from low-level signal wiring terminal blocks by a barrier partition.

Terminal blocks shall be 300 volt rated, medium-duty, channel-mounted, with numbered marking strips.

Each enclosure shall be provided with a plastic sleeve located on the inside of the door, which shall be used to contain “as-built” control diagrams serving the respective system. Plastic sleeve to contain controller directory indicating all input and output points labeled as per “as-built” drawings.

Field equipment panels located within building and not subject to outdoor environmental conditions shall be NEMA 12. Field equipment panels subject to outdoor environmental conditions shall be NEMA 4X with thermostatically controlled ventilation fan and electric heater.
Enclosures shall be provided with all required transformers and fused disconnect ON/OFF power switches. Disconnect shall be used to disconnect all power serving the enclosure.

All transformers shall be mounted within an enclosure. Transformers will not be permitted to be installed out of enclosures.

Each safety device serving a fan system (i.e., pressure switch and low-temperature thermostat) shall be wired to a 2-pole relay located in the controller enclosure. One (1) pole normally open of the relay shall be wired as a digital input to the controller serving the fan system identifying the specific alarm. The second pole, normally closed, shall be wired in series with the second pole of the relays serving other safety devices. The DDC controller shall provide a dedicated digital output, wired in series with all of the relay contacts, to stop the fan regardless of whether the fan is operating in the hand or auto position of a starter or hand, auto, inverter or bypass position of a variable frequency drive.

- For pressure switch alarms, provide a manual reset pushbutton switch with indicating light, mounted on the face of the enclosure door. Pushbutton shall allow an operator to reset a pressure alarm. The system shall remain off until manually reset via the pushbutton.

- Low-temperature thermostat shutdowns shall be manually reset via operator command from a workstation.

Provide a 120 volt, 60 hertz convenience outlet within each enclosure. Convenience outlet shall be provided with dedicated disconnect switch and fuse.

All labeling of control devices, controllers, transformers, relays, wire tags, etc., shall match labeling on approved “as-built” drawings.

All conduit penetrations to enclosures shall be sealed by utilizing duct seal putty as manufactured by Rainbow Technology. Wire jacket/insulation must be compatible with duct seal putty.

5. Valves

a. Automatic Control Valves Serving Air Handling Unit and Heating and Ventilation Unit Heating and Cooling Coils

Automatic control valves shall be single-seated globe valves and shall have equal percentage flow characteristics unless specified otherwise. Control valves 2 inches and smaller shall have bronze bodies and stainless steel trim and stem. End connections shall be threaded. Control valves 2-1/2 in. and larger in a service where pressure does not exceed 125 psig at 350°F, or where steam pressure does not exceed 100
psig, shall have 125 pound cast iron bodies. Trim and stem shall be stainless steel. End connections shall be flanged. Valves 2-1/2 in. and larger in a service where pressure does not exceed 250 psig at 400°F shall have 250 pound cast iron bodies. Trim and stem shall be stainless steel. End connections shall be flanged. Valves shall have sufficient stuffing box protection to ensure against leakage at hydrostatic head involved.

Single-seated valves shall meet ANSI Class IV leakage (0.01% of Cv).

b. **Automatic Control Valves Serving Terminal Unit Reheat Coils, 2- and 4-Pipe Fan Coil Units, Perimeter Radiation, Chilled Beams and Radiant Panels**

Valve shall be suitable for chilled and hot water service. Flow characteristic shall be equal percentage. Body shall be forged brass. Ball and stem shall be chrome-plated brass. Seat shall be fiberglass-reinforced Teflon PTFE. Valve shall be provided with characterized disk. Pressure rating shall be 600 psi for 1 in. valve and below, 400 psi for all others. Media temperature range shall be 0°F to 250°F. Leakage shall be ANSI Class IV. Valve actuator shall be spring-return type with 24 VAC power supply, 2 -10 VDC control signal and manual override.

c. **General**

Ball-type valves shall not be used for steam service.

Control valve operators shall be sized to close against a differential pressure equal to the design pump head plus ten percent (10%).

Valves shall be quiet in operation and fail-safe in either normally open or normally closed position in the event of power failure. All valves shall be capable of operating at varying rates of speed to correspond to the exact dictates of the controllers and variable load requirements. The valves shall be capable of operating in sequence with other valves and/or dampers when required by the sequence of operation. All control valves shall be sized by the control manufacturer and shall be guaranteed to meet the heating and cooling loads as scheduled. All control valves shall be suitable for the pressure conditions and shall close against the differential pressures involved. All valve operators shall be spring-return electrically actuated type. Body pressure rating and connection-type construction shall conform to fitting and valve schedules, as per the Heating, Ventilating and Air Conditioning Section of the specifications.

Chilled water and hot water control valves shall have equal percentage flow characteristics. Steam control valves shall be single-seated type with linear flow characteristics. Preheater valves shall be normally open type and water heater valves shall be normally closed type. Whenever the steam flow rate is such as to require a single valve larger than 2-1/2
inches, provide two (2) valves in parallel, arranged to operate in sequence. Low-pressure (15 psig) steam valves shall provide tight closure at a pressure at least 10 psig higher than the normal maximum operating pressure.

Control valve shall be provided with a travel indicator (pointer) attached to the stem and a travel indicator scale attached to the yoke to indicate valve travel.

Control valves serving reheat coils shall be provided with normally closed spring-return actuators.

Preheat valves shall be normally open spring-return type. Chilled water and reheat valves shall be normally closed spring-return type. Steam valves serving steam-to-hot-water heat exchangers shall be normally closed spring-return type.

d. **Control valves shall be sized using the following basic formulas:**

Where:

\[
\text{Sub-Critical Flow}
\]

<table>
<thead>
<tr>
<th>Type</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>( CV = Q \sqrt{\frac{GF}{\Delta P}} )</td>
</tr>
<tr>
<td>Steam</td>
<td>( CV = \frac{W}{2.1\sqrt{\Delta P(P_1 + P_2)}} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Critical Flow For Steam</th>
<th>( (\Delta P &gt; P/2) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( CV = \frac{W}{1.65P_1} )</td>
<td></td>
</tr>
</tbody>
</table>

- \( CV \) = Valve flow coefficient
- \( GF \) = Specific gravity at flowing temperature (water = 1 @ 60°F)
- \( P_1 \) = Upstream pressure, psia
- \( P_2 \) = Downstream pressure, psia
- \( \Delta P \) = Actual pressure drop \( P_1 - P_2 \)
- \( Q \) = Liquid flow rate, US gpm
- \( W \) = Steam flow rate, pounds per hour
All chilled water valves that are subject to pressure conditions of the primary chilled water service (i.e., campus chilled water loop) shall be rated for 300 psig working pressure. Where a pressure break is provided (i.e., plate-and-frame heat exchanger) between primary and secondary chilled water systems, valves located in the secondary chilled water system shall be rated for the working pressure of the secondary chilled water system.

Control valves shall be manufactured by Belimo or Siemens.

Valves used in chilled water minimum flow and chiller modulating condenser water bypass and inline valve applications shall be ball-type control valves. Ball-type valves shall be carbon steel body with 316 stainless steel ball, shaft, pins and bearings. Seat material shall be Teflon. Stem shall be stainless steel, blowout-proof. Maximum leakage shall be 1/100 of Class IV ANSI/FCI 70-2. Valves shall be furnished with electric fail-in-place actuator, with manually operated handwheel for overriding the valve in both emergency and normal position. Actuators shall be provided with digital valve controllers with position feedback for monitoring at the DSC system. Ball valve shall be DeZurik V-Port Ball, Jamesbury Corp. R21/23 Segmented Vee Ball, Flowtech or Fisher Vee Ball.

e. Butterfly Valves

Motorized butterfly valves shall be high-performance type with lug ends. Valve body shall be carbon steel with 316 stainless disc, 17-4 pH one-piece stainless shaft. Seat and seal materials shall be Teflon. Valves shall be provided with internal travel stop designed to prevent overtravel of disc to minimize possible seat damage. Valves shall be full-bodied, full-lug type only (wafer-type or semi-lugged valves shall not be permitted). Valves shall be bolted from both ends of the flanges. Valves shall be capable of bubble-tight double dead-end closure with either upstream or downstream flange removed through the valves’ full-rated pressure. Body pressure rating and connection-type construction shall conform to fitting and valve schedules. All such valves shall be provided under this section. Valve shall be Jamesbury Corp., Bray, Keystone K-LOK Figures 362 or 372.

f. Actuators

Actuator shall be sized based on valve operating torque values and safety factors stated by the valve manufacturer as well as the maximum torque developed during the stroke of the valve when operating under maximum working conditions. Actuators shall be of sufficient torque to smoothly position valve disk to maintain specified leakage classification.
All two-position actuators shall be provided with open and closed limit switches for remote monitoring at the BMS.

Actuator shall be factory-mounted to valve body and factory-tested to ensure proper operation.

Valves shall be provided with manually operated declutchable handwheels for overriding the actuator in both emergency and normal operation.

Actuator shall be provided with an external position indicator.

Tandem-mounted actuators are not acceptable.

Actuators, limit switches, manual override handwheels, position indicators, etc., that are located outdoors shall be constructed for outdoor use. All electrical devices shall be weatherproof and NEMA 4-rated. All exposed valve components (i.e., stem, shaft, gear operators, handwheel, etc.) shall be constructed of non-rusting metal or factory-coated with rust-inhibiting paint.

Actuators shall be manufactured by Bray, Limitorque or EIM.

6. **Damper Actuators Serving Automatic Louvered Dampers**

All automatic louvered damper actuators in two-position (open/closed) service shall be 120 VAC electrically actuated spring-return type. Spring-return running time shall not exceed 20 seconds.

All automatic louvered damper actuators in modulating service shall be either 120 VAC or 24 VAC electrically actuated spring-return type, and shall be fully proportioning, unless otherwise specified. Spring-return running time shall not exceed 20 seconds.

Automatic louvered damper actuators shall be provided with manual override and external direction of rotation switch.

Actuator mounting arrangement shall be outside the airstream.

Wherever possible, actuators shall be direct-coupled type, which require no crank arm and linkage, and shall be capable of direct-mounting to a jackshaft. In applications where it is not feasible to direct-mount couple actuators to damper shaft or jackshaft, provide a substantial (strong) linkage between the actuator and damper.

Actuator linkage arrangement shall be such as to permit normally open or normally closed positions of the dampers as required.
Ambient temperature operation shall be -22°F to 122°F. Storage temperature operation shall be -40°F to 176°F. Housing shall be NEMA 2.

Actuators shall be UL-listed.

Tandem-mounted actuators shall not be provided.

Actuators located outdoors shall be equipped with O-ring gaskets designed to make motors weatherproof, an internal heater to permit normal operation at minus 22°F and a weatherproof enclosure to protect against rain and snow.

Actuators shall be manufactured by Belimo.

7. **Conduit and Wiring**
   a. **Wire Type and Color**
      
      All wiring to be in accordance with manufacturer requirements and latest NYC Building Code.

   b. **Single Conductor (120 VAC)**
      
      Type THHN 12 AWG stranded copper with 600 volt insulation color-coded red for hot leg, white for neutral, black for all others, for use in conduit, EMT or IMC only. Larger-gauge cables shall be provided where necessary to limit the voltage drop to 3% or 3.6 volts.

   c. **ARC156/MSTP/Modbus Communication Cable**
      
      - 1-pair, 22 AWG Tinned Copper Shielded RS-232, RS-422 Low-Capacitance Communication, Instrumentation and Special Application Plenum Cable.
      - Color Code: Black/White
      - Shield: Aluminum Mylar Foil
      - Drain Wire: 24 AWG Stranded Tinned Copper
      - Jacket: Plenum-Rated PVC
      - Capacitance: 12.5 pF/ft. nominal
      - Impedance: 100 ohms nominal
      - Agency Approval: UL Subject 444 and NEC Article 800 Type CMP Communication Cable
      - Manufacturer and Part Number: Windy City Wire Inc., 043006AL-S

   d. **Ethernet CAT 6 Cable**
      
      - 23 AWG Category 6 Unshielded Twisted Pair (UTP) Cable for Data Transmissions up to
      - 250 MHz.
- Color Code: White-Blue/Blue, White-Orange/Orange, White-Green/Green, White-Brown/Brown
- Jacket: Flame-Retardant PVC
- Maximum Mutual Capacitance: 4.95 nF/100m @ 1KHz nominal
- Characteristic Impedance: 100 ±15 Ohms (1-250 MHz)
- Agency Approval: UL-Listed Type CMP, ANSI/TIA/EIA 568B.2.1
- Manufacturer and Part Number: Windy City Wire Inc., 556600
- Two (2)-Pair - Two (2)-Conductor Shielded - RNET
- 18 AWG 2-pair Bare Copper, Individually Shielded Plenum, UL Subject 444, Type CMP, C(UL)
  - Color Code: Black/Red and White/Green
  - Shield: Each Pair Aluminum Polyester Foil - 100% Coverage
  - Drain Wire: 24 AWG 7 Stranded Tinned Copper
  - Jacket: White Low-Smoke PVC
  - Capacitance: 59 pF/ft. nominal
  - Agency Approval: NEC Article 800; 725, UL CMP C(UL)
  - Manufacturer and Part Number: Windy City Wire Inc., 160100

e. **Three (3)-Conductor Shielded - Input/Output Points**
   - 18 AWG 3-Conductor Bare Copper, Shielded Plenum, UL Subject 444, Type CMP, C(UL)
   - Color Code: Black/White/Red
   - Shield: Overall Aluminum Polyester Foil - 100% Coverage
   - Drain Wire: 24 AWG 7 Stranded Tinned Copper
   - Jacket: Purple Low-Smoke PVC
   - Capacitance: 57 pF/ft. nominal
   - Impedance: 36 ohms/Mft.
   - Agency Approval: NEC Article 800; 725, UL CMP C(UL)
   - Manufacturer and Part Number: Windy City Wire Inc., 23350

f. **Two (2)-Conductor Shielded - Input/Output Points**
   - 18 AWG 2 Conductor Bare Copper, Shielded Plenum, UL Subject 444, Type CMP, C(UL)
   - Color Code: Black/White
   - Shield: Overall Aluminum Polyester Foil - 100% Coverage
   - Drain Wire: 24 AWG 7 Stranded Tinned Copper
   - Jacket: Purple Low-Smoke PVC
   - Capacitance: 57 pF/ft. nominal
   - Impedance: 36 ohms/Mft.
   - Agency Approval: NEC Article 800; 725, UL CMP C(UL)
   - Manufacturer and Part Number: Windy City Wire Inc., 23350

g. **Conduit - Refer to NYU Electrical Standards for conduit requirements.**
8. Network Hardware
   a. General Requirements

   Label all network hardware, switches and routers.

   All network hardware components shall be powered by emergency/standby power.

   All network hardware shall be provided with uninterruptible power via a local panel-mounted uninterruptible power supply as manufactured by Allen Bradley Model 1609-D-1000N with AB 1609HBat (battery) and AB1609-ENET Smart Card. The UPS shall be monitored at the nearest network switch via Cat 5e wire in conduit.

   b. Ethernet Switches

   Switch shall be hardened industrial grade managed, gigabit and 10 gigabit Ethernet switch designed for harsh environments. Quantity of 10 gigabit ports, 10/100/100Base-T RF-45 ports and SFP connectors shall be based on the application. Provide redundant hot swappable power supplies. Indicators shall include per-port LED’s, system LED’s and primary and redundant power supply status LED’s. Switch shall be Alcatel-Lucent Omniswitch 6855 series (no substitution allowed).

9. Workstation Components

   Workstation shall consist of the following components:

   - PC-based computer
   - Two (2) 24 inch color graphic displays per workstation

   Workstation components shall be the latest technology available on the market at the time of installation. The computer shall include the following as a minimum:

   - High-speed processor
   - Minimum of 32 GB of memory
   - Minimum of 6TB hard drive RAID
   - DVD+RW drive.
   - Graphics card suitable for two (2) monitors
   - Ports
   - Power supply

10. Server Components

    Server shall consist of the following components:

    - Rack-mounted PC-based computer
Server components shall be the latest technology available on the market at the time of installation. The computer shall include the following as a minimum:

- High-speed processor
- Minimum of 32 GB of memory.
- Minimum of 6TB hard drive RAID
- DVD+RW drive
- Graphics card
- Ports
- Power supply

N. System Standards

1. General

The following system standards identify minimum hardware, software and sequence of operation requirements for basic mechanical systems installed at NYULMC. They do not address each possible system type and variation. Additional hardware and software may be required for specific applications.

Any deviations to the standards listed below must be approved by NYULMC operations team.

2. Constant and Variable Air Volume Terminal Units (Non-Flow-Tracking Applications)

a. Hardware

Pressure-independent unitary controller utilizing differential pressure sensing.

Damper actuator shall be fail-in-place type.

For terminal units with reheat coils, provide discharge temperature transmitter.

Reheat coil control valves shall be spring-return fail-closed.

Space temperature sensor located in occupied areas shall be indicating and adjustable with a limit of ± 3°F (adjustable). Cooling and heating set points should adjust up and down and maintain a built-in bias of 2°F (adjustable). Where multiple sensors are installed in a room served by multiple terminal units, only one (1) sensor shall be indicating and adjustable type. Set point adjustment shall be common for all terminal units serving a room.

Space temperature sensors located in unoccupied or transient areas such as corridors are to be non-indicating and non-adjustable.
Power to terminal unit controls shall be 120 VAC with enclosure-mounted 24 VAC step-down transformer, fuse and disconnect switch.

Transformer, damper actuator, unitary controller with differential pressure transmitter and fuse shall be mounted in a NEMA 1 steel enclosure with removable screw cover. Disconnect switch to be mounted external to panel. Switch activation shall not require removal of enclosure panel.

b. **Software Functions**

- Occupancy sensors to enable setback functions.
- Alarms.
- Demand Response: Global software function (per building and per floor) to adjust heating and cooling set points based on operator-initiated function.
- Air quality system interface for air change rate adjustment.
- Controller Reboot or Return from Power Failure or Controller Reboot: On controller reboot or return from power failure or controller reboot, all control loop outputs shall be commanded to their position prior to reboot or power failure and all control loop integrals shall be zeroed, thus eliminating reset windup.

c. **Sequence of Operations**

**Constant Volume Terminal Units**

Constant volume terminals with normally open dampers shall be controlled from a reverse-acting, 3-mode pressure-independent (PID) software program located at the unitary controller serving the terminal unit.

For units with reheat coils, provide a space temperature sensor, which shall provide an input to a software controller that shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller, which shall modulate the reheat valve to maintain supply air set point.

Whenever the air handling system serving the terminal unit is off, the terminal unit damper shall fully open.

A space temperature transmitter shall be furnished for each terminal unit that contains a reheat coil. Space temperature transmitters shall not be provided for terminal units that do not contain reheat coils.
Each terminal unit’s unitary controller shall be capable of remote reset of all set points and damper position automatically or manually through the operator workstation.

In applications where multiple terminal units serve a common room, a software program shall calculate the average space temperature of the room by monitoring all of the space temperature transmitters. The average space temperature shall be used to calculate the terminal unit air flow set point for each terminal unit serving the room. Furthermore all terminal units shall be at minimum air flow rate prior to operating any reheat coil or perimeter radiation control valve.

Minimum data points available at the operator workstation shall be as follows:

- Terminal unit airflow reading.
- Terminal unit airflow set point.
- Discharge temperature (for units with reheat coils only).
- Discharge temperature set point (for units with reheat coils only).
- Reheat coil valve command (for units with reheat coils only).
- Space temperature (for units with reheat coils only).
- Space temperature set points (for units with reheat coils only).
- Damper position.
- Occupancy mode.
- Include six (6) additional software points to be defined by NYULMC.

**Variable Air Volume Terminal Units**

Variable air volume terminals with normally open dampers shall be controlled from a reverse-acting, 3-mode pressure-independent (PID) software program located at the unitary controller serving the terminal unit.

When the space temperature risers, as sensed by an electronic space temperature transmitter, the software controller shall modulate the terminal unit damper open.

As the space temperature decreases, the terminal unit damper shall modulate to a minimum position. For units furnished with reheat coils, on a continued decrease in temperature the space temperature sensor shall provide an input to a software controller that shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller, which shall modulate the reheat valve to maintain supply air set point.
Whenever the primary fan for the terminal unit is off, the terminal unit damper shall fully open.

A space temperature transmitter shall be furnished for each terminal unit.

Each terminal unit’s unitary controller shall be capable of remote reset of all set points and damper position automatically or manually through the operator workstation.

Perimeter Radiation Valve Control for Multiple Rooms, Each Served by an Individual Supply Air Terminal Unit and a Common Perimeter Radiation Control Valve:  (Note: Example described below is for an application where one [1] perimeter radiation valve serves common fin-tube elements serving two [2] rooms. Similar software logic shall be applied to instances where more than two [2] rooms are served by a single perimeter radiation valve.)

- The space temperature of each room shall be maintained by the supply air terminal unit and reheat coil serving the room. The perimeter radiation valve shall be used to satisfy the room that requires the greater amount of heating. A DDC software program, resident in the terminal unit controller, which is wired to the perimeter radiation valve, shall monitor the space temperature set point of each room, each room’s actual space temperature, each terminal unit’s current operating mode (heating, dead band, cooling) and calculate the difference between actual space temperature and set point.

- If either room requires heating, that room’s terminal unit controller shall modulate its reheat coil control valve to maintain space temperature set point. The perimeter radiation control valve shall be allowed to operate in parallel with the reheat coil control valve until either room’s space temperature is within 1°F below its cooling set point, at which time the perimeter radiation valve shall modulate closed regardless of the heating demand of the other room. If either room’s space temperature drops 1°F below its cooling set point, the perimeter radiation valve shall modulate open with the reheat valve position.

In applications where multiple terminal units serve a common room, a software program shall calculate the average space temperature of the room by monitoring all of the space temperature transmitters. The average space temperature shall be used to calculate the terminal unit air flow set point for each terminal unit serving the room. Furthermore
all terminal units shall be at minimum air flow rate prior to operating any reheat coil or perimeter radiation control valve.

Minimum data points available at the operator workstation shall be as follows:

- Terminal unit airflow reading.
- Terminal unit minimum airflow set point.
- Terminal unit maximum airflow set point.
- Discharge temperature (for units with reheat coils only).
- Discharge temperature set point (for units with reheat coils only).
- Reheat coil valve command (for units with reheat coils only).
- Space temperature.
- Space temperature set points.
- Perimeter radiation valve command (for units with reheat coils only).
- Damper position.
- Occupancy mode.
- Occupied cool/heat set point.
- Unoccupied cool/heat set point.
- Space temperature high-limit alarm.
- Space temperature low-limit alarm.
- Include six (6) additional software points to be defined by NYULMC.

3. **Fan-Powered Variable Air Volume Terminal Units**
   a. **Hardware**

- Pressure-independent unitary controller utilizing differential pressure sensing.
- Damper actuator shall be fail-in-place type.
- Provide discharge temperature transmitter if terminal unit is furnished with reheat coil.
- Reheat coil control valves shall be spring-return fail-closed.
- Space temperature transmitters located in occupied areas shall be indicating and adjustable with a limit of ±3°F (adjustable). Cooling and heating set points should adjust up and down and maintain a built-in bias of 2°F (adjustable). Where multiple sensors are installed in a room served by multiple terminal units, only one (1) sensor shall be indicating and adjustable type. Set point adjustment shall be common for all terminal units serving a room.
- Space temperature transmitters located in unoccupied or transient areas such as corridors to be non-indicating and non-adjustable.
• Power shall be via enclosure-mounted 24 VAC step-down transformer and fused disconnect switch.
• Provide run status monitoring of fan via current-sensing relay.
• Transformer, damper actuator, unitary controller with differential pressure transmitter, fuse, control relay and current-sensing relay shall be mounted in a NEMA 1 steel enclosure with removable screw cover.

b. Software Functions

• Occupancy sensors to enable setback functions.
• Alarms.
• Demand Response: Global software function (per building and per floor) to adjust heating and cooling set points based on operator-initiated function.
• Air quality system interface for air change rate adjustment.
• Controller Reboot or Return from Power Failure: On controller reboot or return from power failure, all control loop outputs shall be commanded to their position prior to reboot or power failure and all control loop integrals shall be zeroed thus eliminating reset windup.

c. Sequence of Operations

*Fan-Powered Variable Volume Terminal Units with Reheat and Perimeter Radiation*

Fan-Powered terminals with fail-in-place dampers shall be controlled from a reverse-acting, 3-mode pressure-independent (PID) software program located at the unitary controller serving the terminal unit.

A software interlock shall start the terminal unit fan when the primary air fan serving the terminal unit starts. Fan starting shall be time-delayed to allow the primary air damper to fully close prior to starting fan. When the fan starts, the damper shall modulate open. This shall prevent backward rotation of fan on start-up.

When the space temperature rises, as sensed by an electronic space temperature transmitter, the software controller shall modulate the terminal unit damper open.

As the space temperature decreases, the terminal unit damper shall modulate to a minimum position. On a continued decrease in temperature, the space temperature sensor shall provide an input to a software controller, which shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller, which shall modulate the normally closed reheat coil
control valve in parallel with the normally open perimeter radiation control valve to maintain supply air temperature set point.

Whenever the primary fan for the terminal unit is off, the terminal unit damper shall be positioned fully open.

Each terminal unit’s direct digital control unit shall be capable of remote reset of all set points and damper position automatically or manually through the operator workstation.

On actuation of a life safety alarm in the area served by the terminal unit, the unit fan shall stop and the primary air damper shall fully open.

All required control and communication wiring for the terminal units shall be furnished and installed by this section.

The operator, via the workstation, shall be capable of commanding all terminal units serving the same floor to a common set point via one (1) global set point command at the workstation.

Night Setback: Whenever the terminal unit fan is off, the system shall operate in the unoccupied mode. During this mode, a DDC software program shall monitor the space temperature associated with a terminal unit. On sensing a drop in space temperature to 55°F (adjustable), the controller shall start the terminal unit fan and maintain space temperature set point by modulating the reheat coil control valve and perimeter radiation control valve. On achieving space temperature set point, the terminal unit fan shall stop, if still operating in the unoccupied mode, or continue to run switched to occupied mode.

Minimum data points available at the operator workstation shall be as follows:

- Fan start/stop.
- Fan run status.
- Terminal unit airflow reading.
- Terminal unit minimum airflow set point.
- Terminal unit maximum airflow set point.
- Discharge temperature (for units with reheat coils only).
- Discharge temperature set point (for units with reheat coils only).
- Reheat coil valve command (for units with reheat coils only).
- Space temperature.
- Space temperature set points.
- Perimeter radiation valve command (for units with reheat coils only).
- Damper position.
• Occupancy mode.
• Occupied cool/heat set point.
• Unoccupied cool/heat set point.
• Space temperature high-limit alarm.
• Space temperature low-limit alarm.
• Include six (6) additional software points to be defined by NYULMC.

Perimeter Radiation Valve Control for Multiple Rooms, Each Served by an Individual Fan-Powered Terminal Unit and a Common Perimeter Radiation Control Valve: (Note: Example described below is for an application where one [1] perimeter radiation valve serves common fin-tube elements serving two [2] rooms. Similar software logic shall be applied to instances where more than two [2] rooms are served by a single perimeter radiation valve.)

• The space temperature of each room shall be maintained by the supply air terminal unit and reheat coil serving the room. The perimeter radiation valve shall be used to satisfy the room that requires the greater amount of heating. A DDC software program, resident in the terminal unit controller, which is wired to the perimeter radiation valve, shall monitor the space temperature set point of each room, each room’s actual space temperature, each terminal unit’s current operating mode (heating, dead band, cooling) and calculate the difference between actual space temperature and set point.

• If either room requires heating, that room’s terminal unit controller shall modulate its reheat coil control valve to maintain space temperature set point. The perimeter radiation control valve shall be allowed to operate in parallel with the reheat coil control valve until either room’s space temperature is within 1°F below its cooling set point, at which time the perimeter radiation valve shall modulate closed regardless of the heating demand of the other room. If either room’s space temperature drops 1°F below its cooling set point, the perimeter radiation valve shall modulate open with the reheat valve position.

In applications where multiple terminal units serve a common room, a software program shall calculate the average space temperature of the room by monitoring all of the space temperature transmitters. The average space temperature shall be used to calculate the terminal unit air flow set point for each terminal unit serving the room. Furthermore
all terminal units shall be at minimum air flow rate prior to operating any reheat coil or perimeter radiation control valve.

4. **Laboratory Flow-Tracking Applications**
   a. **Hardware**
      - Pressure independent unitary controllers utilizing differential pressure sensing.
      - Damper actuator shall be spring return type.
      - For terminal units with reheat coils, provide discharge temperature transmitter.
      - Reheating coil control valves shall be spring return fail closed.
      - Space temperature sensors located in occupied areas shall be indicating and adjustable with a limit of ± 3°F (adjustable). Cooling and heating set points should adjust up and down and maintain a built-in bias of 2°F (adjustable). Where multiple sensors are installed in a room served by multiple terminal units, only one (1) sensor shall be indicating and adjustable type. Set point adjustment shall be common for all terminal units serving a room.
      - Space temperature sensors located in unoccupied or transient areas such as corridors to be non-indicating and non-adjustable.
      - Power to terminal unit controls shall be 120 VAC with enclosure mounted 24 VAC step down transformer, fuse and disconnect switch.
      - Transformer, damper actuator, unitary controller with differential pressure transmitter and fuse shall be mounted in a NEMA 1 steel enclosure with removable screw cover. Disconnect switch to be mounted external to panel. Switch activation shall not require removal of enclosure panel.
      - Refer to section titled “Flow Tracking System” for additional information.

b. **Software Functions**
   - Occupancy sensors to enable set back functions.
   - Alarms.
   - Demand Response: Global software function (per building and per floor) to adjust heating and cooling set points based on operator initiated function.
   - Air quality system interface for air change rate adjustment.
   - Controller Reboot or Return from Power Failure: On controller reboot or return from power failure, all control loop outputs shall be commanded to their position prior to
reboot or power failure and all control loop integrals shall be zeroed, thus eliminating reset windup.

c. **Sequence of Operations**

*Variable Air Volume Flow-Tracking System Without Fume Hood*

A typical system consists of a supply variable air volume terminal unit and exhaust variable air volume terminal unit. In all flow-tracking applications, pressurization control shall take priority over temperature control.

A flow-tracking system microprocessor-based direct digital control unit shall be provided for each room to control the supply and exhaust variable air volume terminal units. Each supply air terminal unit shall be furnished with a hot water reheat coil.

The direct digital control unit shall monitor the velocity pressure of each terminal unit and calculate terminal unit airflow, the reheat coil discharge temperature via a duct-mounted electronic temperature transmitter, and space temperature via a wall-mounted electronic temperature transmitter. The direct digital control unit shall provide individual outputs to the exhaust terminal unit damper, the supply terminal unit damper and the normally closed hot water reheat coil control valve.

For rooms which are designated as "positive" pressurization, the supply terminal unit shall be the master and the exhaust shall track the supply. The supply air terminal unit damper shall be normally open. The exhaust terminal unit damper shall be normally closed.

For rooms which are designated as "negative" pressurization, the exhaust terminal unit shall be the master and the supply shall track the exhaust. The supply air terminal unit damper shall be normally open. The exhaust terminal unit damper shall be normally open.

For rooms which are designated as "neutral" pressurization, the exhaust terminal unit shall be the master and the supply shall track the exhaust. The supply air terminal unit damper shall be normally open. The exhaust terminal unit damper shall be normally open.

Negative Pressurization Rooms: The space temperature transmitter shall provide an input to a software controller. The output of the controller shall control the exhaust terminal unit between its maximum and minimum flow set points to maintain the temperature set point in the room. The supply terminal unit shall track the exhaust terminal unit to maintain a fixed air volume differential between the supply and room
exhaust. In addition, the direct digital control unit shall monitor each terminal unit's velocity pressure and modulate the terminal unit dampers to maintain pressure-independent control. On a continued drop in space temperature, when the exhaust air terminal unit is at its minimum flow set point, the space temperature sensor shall provide an input to a software controller which shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller which shall modulate the normally closed reheat coil control valve to maintain supply air temperature set point. For units serving perimeter areas, the normally open perimeter radiation valve shall modulate in parallel with the reheat valve.

Positive Pressurization Rooms: The space temperature transmitter shall provide an input to a software controller. The output of the controller shall control the supply terminal unit between its maximum and minimum flow set points to maintain the temperature set point in the room. The exhaust terminal unit shall track the supply terminal unit to maintain a fixed air volume differential between the supply and room exhaust. In addition, the direct digital control unit shall monitor each terminal unit's velocity pressure and modulate the terminal unit dampers to maintain pressure-independent control. On a continued drop in space temperature, the space temperature sensor shall provide an input to a software controller which shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller which shall modulate the normally closed reheat coil control valve to maintain supply air temperature set point. For units serving perimeter areas, the normally open perimeter radiation valve shall modulate in parallel with the reheat valve.

Neutral Pressurization Rooms: The space temperature transmitter shall provide an input to a software controller. The output of the controller shall control the exhaust terminal unit between its maximum and minimum flow set points to maintain the temperature set point in the room. The supply terminal unit shall track the exhaust terminal unit with no differential between the supply and room exhaust. In addition, the direct digital control unit shall monitor each terminal unit's velocity pressure and modulate the terminal unit dampers to maintain pressure-independent control. On a continued drop in space temperature, when the exhaust air terminal unit is at its minimum flow set point, the space temperature sensor shall provide an input to a software controller which shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller which shall modulate the normally closed reheat coil control valve to maintain supply air temperature set point. For units serving perimeter areas, the normally open perimeter radiation valve shall modulate in parallel with the reheat valve.
System variations consist of multiple supply and exhaust terminal units. The direct digital control unit shall total the exhaust and supply air to be used in the above sequencing.

In applications where multiple tracking pairs serve a common room, a software program shall calculate the average space temperature of the room by monitoring all of the space temperature transmitters. The average space temperature shall be used to calculate the master terminal unit (supply or exhaust) air flow set point. Furthermore all terminal units shall be at minimum air flow rate prior to operating any reheat coil or perimeter radiation control valve.

Perimeter Radiation Valve Control for Multiple Rooms Each Served by an Individual Supply Air Terminal Unit and a Common Perimeter Radiation Control Valve: (Note: Example described below is for an application where one (1) perimeter radiation valve serves common fin tube elements serving two (2) rooms. Similar software logic shall be applied to instances where more than two rooms are served by a single perimeter radiation valve.)

- The space temperature of each room shall be maintained by the supply air terminal unit and reheat coil serving the room. The perimeter radiation valve shall be used to satisfy the room which requires the greater amount of heating. A DDC software program, resident in the terminal unit controller, which is wired to the perimeter radiation valve, shall monitor the space temperature set point of each room, each room's actual space temperature, each terminal unit's current operating mode (heating, dead band, cooling) and calculate the difference between actual space temperature and set point.

- If either room requires heating, that room's terminal unit controller shall modulate its reheat col control valve to maintain space temperature set point. The perimeter radiation control valve shall be allowed to operate in parallel with the reheat col control valve until either room's space temperature is within 1ºF below its cooling set point, at which time, the perimeter radiation valve shall modulate closed regardless of the heating demand of the other room. If either room's space temperature drops 1ºF below its cooling set point, the perimeter radiation valve shall modulate open with the reheat valve position.
Variable Air Volume Flow-Tracking System with Fume Hood

A typical system consists of a supply variable air volume terminal unit and exhaust variable air volume terminal unit and a fume hood exhaust valve. In some areas, there are multiple supply and/or general exhaust terminal units. In all flow-tracking applications, pressurization control shall take priority over temperature control.

In a room served by a fume hood, there shall be a wall-mounted emergency override pushbutton and local alarm light and horn. On activation of the pushbutton, the fume hood exhaust valve shall be positioned to maximum airflow and the general exhaust terminal units shall track accordingly. The alarm horn and light shall be activated. When the pushbutton is reset, the alarm light and horn shall be de-energized and the fume hood shall resume normal operation.

Control of a Laboratory with a fume hood exhaust valve shall be similar to a Laboratory without a fume hood, with the following exception:

- The fume hood exhaust valve airflow, as sensed via inputs to the DDC system, shall be summed to the general exhaust airflow. The supply terminal unit shall flow-track the general exhaust terminal unit and fume hood exhaust valve.

A DDC software program shall monitor the supply air temperature, space temperature, supply airflow and exhaust airflow, and calculate the space heat content by comparing the flow and differential temperature of the supply and return air. Any upset in the room flow shall cause the system to track the change in flow, calculate the required supply air temperature based on the new flow to meet the existing content, and feed forward a signal to the reheat coil control valve to assume the correct position in an anticipator arrangement.

On an increase in fume hood exhaust airflow, the exhaust terminal unit airflow shall be reduced to maintain the room’s constant exhaust flow rate.

Space temperature control of the area shall be similar to the sequence titled “Variable Air Volume Flow-Tracking System Without Fume Hoods”.

Electronic Face Velocity Controller for Variable Air Volume Fume Hoods

The electronic face velocity controller shall be a microprocessor-based controller, which shall control and maintain a constant face velocity (adjustable) into the hood by measuring the fume hood sash position and the fume hood exhaust flow and modulating the fume hood exhaust damper to maintain face velocity set point.
The face velocity controller shall be designed for fail-safe operation. It shall operate in an occupied/unoccupied mode via a signal from the building automatic temperature control system to operate the hoods at a lower velocity set point (when it is safe).

The fume hood face velocity controller shall maintain the average fume hood face velocity at the desired set point using a proportional, integral and derivative (PID) closed-loop control algorithm. The fume hood face velocity control process shall be as follows:

- The fume hood controller shall continually determine the fume hood’s total open area by monitoring the fume hood sash position(s) by the sash sensor(s) as well as by taking account of any fume hood fixed open areas and the bypass opening(s).
- The fume hood controller shall calculate the required fume hood exhaust airflow necessary to maintain the average face velocity set point over the total open area.
- The fume hood controller shall control the fume hood exhaust airflow at the rate necessary to maintain the average face velocity set point. The fume hood controller shall ensure that the fume hood exhaust required to maintain the average face velocity set point is always maintained independently of any variations in exhaust system static pressure or any Laboratory room conditions such as the ventilation airflow or room static pressure that could otherwise affect the fume hood exhaust airflow.

Constant Air Volume Flow-Tracking System

A typical system consists of a supply variable air volume terminal unit and exhaust variable air volume terminal unit. In all flow-tracking applications, pressurization control shall take priority over temperature control.

A flow-tracking system microprocessor-based direct digital control unit shall be provided for each tracking pair to control the supply and exhaust variable air volume terminal units. Each supply air terminal unit shall be furnished with a hot water reheat coil.

The direct digital control unit shall monitor the velocity pressure of each terminal unit and calculate terminal unit airflow, the reheat coil discharge temperature via a duct-mounted electronic temperature transmitter, and space temperature via a wall-mounted electronic temperature transmitter. The direct digital control unit shall provide individual outputs to the exhaust terminal unit damper, the supply
terminal unit damper and the normally closed hot water reheat coil control valve.

The space temperature transmitter shall provide an input to a software controller which shall reset the supply temperature set point. A supply air temperature transmitter shall provide an input to a DDC software controller which shall modulate the normally closed reheat coil control valve to maintain supply air temperature set point. For units serving perimeter areas, the normally open perimeter radiation valve shall modulate in parallel with the reheat valve.

Flow-Tracking Control: The exhaust air terminal unit shall operate at a constant air flow set point. The supply terminal unit shall track the exhaust terminal unit with a differential between the supply and room exhaust. In addition, the direct digital control unit shall monitor each terminal unit’s velocity pressure and modulate the terminal unit dampers to maintain pressure-independent control.

System variations consist of multiple supply and exhaust terminal units. The direct digital control unit shall total the exhaust and supply air to be used in the above sequencing.

In applications where multiple tracking pairs serve a common room, a software program shall calculate the average space temperature of the room by monitoring all of the space temperature transmitters. The average space temperature shall be used to control all reheat coil and/or perimeter radiation control valves in parallel at the same position.

Minimum data points available at the operator workstation shall be as follows:

- Terminal unit air flow reading.
- Terminal unit minimum air flow set point.
- Terminal unit maximum air flow set point.
- Discharge temperature (for units with reheat coils only).
- Discharge temperature set point (for units with reheat coils only).
- Reheat coil valve command (for units with reheat coils only).
- Space temperature.
- Space temperature set points.
- Perimeter radiation valve command (for units with reheat coils only).
- Damper position.
- Occupancy mode.
- Occupied cool/heat set point.
- Unoccupied cool/heat set point.
• Space temperature high-limit alarm.
• Space temperature low-limit alarm.
• Include six (6) additional software points to be defined by NYULMC

5. Air Handling Units
   a. Hardware
      • BACnet IP-based direct digital control unit per air handling unit.
      • Provide BACnet or Modbus communication interface with variable frequency drive.
      • Chilled water return temperature transmitter.
      • Mixed-air temperature transmitter.
      • Utilize latching relays for air handling units serving critical areas (i.e., OR’s, Laboratories, Vivarium, patient areas)
      • Humidifier valve control signal to be wired in series with fan run status contact. If fan is off, humidifier valve hardwired to close.
      • Damper actuators (outdoor, return, spill) must have spring-return actuators with manual override.
      • Each preheat coil section to have individual temperature control valve with dedicated temperature sensor for low-limit control.
      • Cooling coil to have one (1) control valve for entire coil section with individual manual balancing valves on individual coil sections.
      • VFD’s must be programmed to skip resonance frequencies.

   b. Software Functions
      • Occupied/Unoccupied
      • Preheat Coil Low-Limit Control
      • Normal Operation - Summer Mode
      • Normal Operation - Winter Mode
      • Normal Operation Auto Mode
      • Humidification Control
      • Dehumidification Control
      • Return Air Reset
      • Supply Fan Static Pressure Control
      • Flow Control
      • Minimum Outdoor Airflow Quantity Control:
      • Indoor Air Quality Control
      • Safeties
      • Floor/Area Isolation Dampers (Combination Fire/Smoke Dampers)
c. **Sequence of Operations**

*General Description*

The air handling unit is an outdoor air economizer variable air volume air handling unit that operates in conjunction with a variable volume return/spill fan. The supply and return/spill air fans shall be provided with variable frequency drives, one (1) drive per fan. There shall be one (1) supply fan and one (1) return/spill air fan.

*Occupied/Unoccupied Mode*

The air handling unit shall operate based on a 7-day programmable schedule resident within the DDC controller serving the unit and adjustable at the operator workstation. The operator shall have the ability to override a starting or stopping of air handling unit and return/spill fan from the operator workstation or the DDC control unit.

*Unoccupied Mode*

During unoccupied mode, the air handling unit shall not be in operation. The normally closed minimum outdoor air, variable outdoor air, return air, spill air and fan discharge dampers shall be closed. The return/spill fan shall be off. No control signal shall be transmitted to the variable frequency drive of each fan. The normally closed chilled water coil valve shall be closed. Steam humidifier valve shall be closed.

Preheat Coil Low-Limit Control: The normally open steam preheat coil control valves, one (1) per coil, shall be under control of DDC software low-limit controllers to maintain a minimum air temperature of 45°F leaving the preheat coils, signal as sensed by temperature transmitters on the leaving air side of each coil section. The low-limit set point shall be reset by the BMS based on outside air temperature. As outside air temperature drops, the low-limit set point shall be raised.

When the air handling unit is off, all combination fire/smoke dampers located in supply and return ducts shall be closed.
Occupied Mode

Prior to starting the air handling unit, all combination fire/smoke dampers located in supply and return air ducts shall open.

When the air handling unit start-up is initiated, its temperature control system shall be in operation. When the air handling unit is called to start, its supply fan discharge and return air dampers shall open. A hardwired time delay shall prevent fan operation, allowing sufficient time for the dampers to open. When the supply fan and return fan are started, they shall both run at the minimum speed required to maintain rotation. Minimum speed set point shall be coordinated with the variable frequency drive manufacturer. The start of each fan shall be time-delayed to avoid simultaneous starting of fans. After the fan has achieved minimum speed, the DDC controller shall ramp up the speed of the supply fan to maintain its operating set point.

Normal Operation

i. Economizer Control

Economizer control will be enabled based on the following conditions:

- Global outside air enthalpy is enabled (i.e., outdoor air enthalpy is greater than 25 BTUs per pound of dry air) or outside air temperature plus an outside air temperature trigger deadband (adjustable) is less than the air handling unit return air temperature.
- Supply fan status is proven on.
- System is not operating in Warm-Up/Cool-Down Mode and Heating is off.

When enabled, the outside air damper, spill air damper and return air damper will modulate to maintain a mixed air temperature control set point (adjustable). The mixed air control set point will be adjusted based on the supply air temperature error set point. The supply air temperature error set point is based on how far off the supply air temperature is from the supply air temperature set point. For example, if the supply air temperature is 53°F and the supply air temperature set point is 55°F then the supply air temperature error set point is -2°F. A mixed air temperature error set point of 0 °F (adjustable) will control to the supply air temperature error set point and output a mixed air temperature heat gain set point. The mixed air temperature heat gain set point will range from a minimum mixed air
temperature heat gain set point of -4°F (adjustable) to a maximum mixed air temperature heat gain set point of 5°F (adjustable). The supply air temperature set point minus the mixed air temperature heat gain set point will determine the mixed air temperature control set point. As the mixed air temperature increases above mixed air temperature control set point, the outside air damper and spill air damper will modulate open and the return air damper will close proportionately. The reverse will occur on a decrease below the mixed air temperature control set point. The outside air damper will maintain a minimum outside air flow set point (adjustable based upon the “Minimum Outdoor Air Flow Quantity Control” sequence below.

ii. Supply Air Temperature Control

Supply air temperature control will be enabled based on the following condition:

- Supply fan status is proven on and
- System is not operating in Warm-Up/Cool-Down Mode.

When enabled the cooling valve will modulate to maintain a supply air temperature control set point as sensed by a duct mounted supply air temperature sensor. The supply air temperature control set point (adjustable) will be reset based on the worst case deviation from space temperature to the space temperature set point (adjustable) or space humidity to the humidification set point (adjustable) for all spaces being served by the air handling system. The supply air temperature control set point will range from a minimum supply air temperature set point of 45°F (adjustable) to a maximum supply air temperature set point of 65°F (adjustable). As the supply air temperature increases above supply air temperature control set point the cooling coil valve will modulate open. The reverse will occur on a decrease below the supply air temperature control set point.

The heating coil control valve will modulate to maintain a preheat supply air temperature control set point (adjustable). The preheat supply air temperature control set point will be adjusted based on the supply air temperature error set point as described in “Economizer Control”. A preheat supply air temperature error set point of 2°F (adjustable) will control to the supply air temperature error set point and output a preheat supply air temperature heat gain set point. The
reheat supply air temperature heat gain set point will range from a minimum preheat supply air temperature heat gain set point of -4°F (adjustable) to a maximum preheat supply air temperature heat gain set point of 5°F (adjustable). The supply air temperature set point minus the preheat supply air temperature heat gain set point will determine the preheat supply air temperature control set point. As the preheat air temperature decreases below preheat supply air temperature control set point, the steam heating coil valve will modulate open. The reverse will occur on an increase above the preheat supply air temperature control set point. Preheat air temperature low limit control be operational in this mode as described above.

iii. **Humidification Control**

Humidification control will be enabled based on the following conditions:

- Supply fan status is proven on (Refer to Humidifier Valve Lockout below).

A supply air dew point control loop will modulate the normally closed humidifier valve to maintain a supply air dew point set point as sensed by a duct mounted supply air humidity sensor and the supply air temperature sensor.

The supply air dew point set point (adjustable) will be reset based on the worst case deviation from space humidity to the humidification set point for all spaces being served by the air handling system. The supply air dew point set point will range from a minimum supply air dew point set point of 30°F (adjustable) to a maximum supply air dew point set point of 65°F (adjustable).

The operator at the workstation shall have the ability to override the supply air dew point set point (adjustable) within the minimum supply air dew point set point and maximum supply air dew point set point.

Humidification control will be overridden and the humidifier valve will modulate closed if the supply air humidity increases above a high limit humidity set point of 90% RH (adjustable) as sensed by the supply air humidity sensor.
iv. **Humidifier Valve Lockout**

The humidifier valve shall be prevented from opening via a hardwired interlock with a current sensing relay used to monitor fan run status.

The current sensing relay shall be wired to a double-pole, double throw relay. One normally open pole shall be wired as an input to the DDC unit for fan run status. The other normally open pole shall be wired in series with the control signal to the humidifier valve such that when the fan is off, the humidifier valve shall be “hardwired” closed.

v. **Dehumidification Control**

Refer to Supply Air Temperature Control

vi. **Return Air Reset Program**

The BMS shall contain a software program that shall reset the supply air temperature set point based on return air temperature. Supply air reset limits shall be operator-adjustable.

vii. **Supply Fan Static Pressure Control**

A static pressure transmitter shall be located in the supply air duct, upstream of the furthest terminal unit served by the air handling unit.

A reverse-acting 2-mode (proportional-plus-integral) DDC software controller resident in the unit’s DDC controller shall monitor its static pressure transmitter. The output of this controller shall modulate the respective air handling unit supply fan to maintain supply static pressure set point.

As duct static pressure decreases, the controller output shall increase, to increase fan speed. On an increase in duct static pressure, the output of the controller shall decrease, to decrease fan speed. A software auto/manual switch function shall enable the operator to override the output of the static pressure controller and adjust fan speed from the operator workstation or DDC controller.

A static pressure transmitter in the supply fan discharge duct shall provide a signal proportional to fan discharge static pressure to a software-based 2-mode pressure controller with reverse action, acting as a high limit. If fan discharge static
pressure exceeds its set point, the high-limit controller shall, through a software low selector, override the output of the system static pressure controller to proportionally reduce the speed of its respective supply fan to maintain fan discharge pressure high-limit set point. The controller set point shall be reset such that no terminal unit shall operate at its fully open position to maintain airflow set point.

Static pressure controls shall control system operation during all cycles of operation.

A DDC static pressure software program shall monitor the position of variable air volume terminal unit damper and shall calculate the quantity of dampers that are less than eighty percent (80%) open. If the majority of terminal units are less than eighty percent (80%) open, the DDC software controller shall reset the supply fan static pressure set point downward in 0.1 inch w.c. (adjustable) increments every 5 minutes until the majority of the dampers are at 80% open. If the majority of the dampers are more than ninety percent (90%) open, the program shall reset the set point upwards in 0.1 inch w.c. (adjustable) increments every 5 minutes until the majority of the dampers are at eighty percent (80%) open.

During system start-up, the static pressure control algorithm, integral control mode, shall be suppressed until the control point is within the proportional band of the controller to avoid reset windup.

viii. **Flow Control**

The unit’s DDC controller shall contain a software-based flow control program. The software controller shall receive input signals from airflow-measuring stations installed in the inlet of its respective supply and return fan, and totalize, linearize and scale them. The flow control program shall match the return fan with the supply fan and maintain the volumetric balance between return and supply airflow by varying return fan speed to maintain a constant differential between supply and return airflow. A software bias shall be provided to compensate the return flow for an outside air minimum reset, constant toilet exhaust and constant general exhaust at all operating loads. The operator shall be able to manually override the flow control program and manually control each supply and return fan.
ix. **Minimum Outdoor Airflow Quantity Control**

An airflow-measuring station installed upstream of the minimum outside air damper shall measure minimum airflow and transmit this information to the BMS. Should outside airflow be below set point, the return air damper shall be modulated closed and the spill damper open until the minimum outside airflow is at set point. Should outside airflow be above set point, the return air damper shall be modulated open and the spill damper closed until the minimum outside airflow is at set point. If the outside airflow continues to be above set point, the minimum outdoor air damper shall modulate to a preset minimum value. This program shall be overridden whenever the variable outdoor air damper is open during the economizer mode of operation. Minimum outdoor air damper shall be modulating type.

x. **Mixed Air Low Limit Temperature Control**

A mixed air temperature low limit control loop will override “Economizer Control”. When the mixed air temperature sensor decreases below a mixed air low limit set point of 39°F (adjustable), the outside air damper and spill air damper will modulate closed and the return air damper will modulate open.

xi. **Indoor Air Quality Control**

Multiple combination CO2 transmitters shall be installed in the space served by the air handling system and monitored via the BMS. In addition, a CO2 transmitter shall be installed in the unit’s main return air duct and supply air duct. The output of the installed return and space CO2 transmitters shall be monitored by the BMS and compared to the master outdoor air CO2 transmitter. The BMS shall activate an alarm if any CO2 transmitter reading is 530 ppm (adjustable) above the outdoor air system transmitter reading. A DDC software program shall continuously monitor the return and space CO2 transmitters, select the transmitter with the highest reading and calculate a supply air CO2 set point, which shall be used to vary the minimum outdoor airflow set point to maintain a maximum of 530 ppm above the outdoor air system transmitter reading for all return and space CO2 transmitters. Minimum and maximum airflow set points shall be operator-adjustable via the workstation. The operator shall be capable of enabling/disabling the automatic reset at any time from the workstation.
xii. **Safeties**

High-Discharge Pressure Switches and Low-Suction Pressure Switches: Pressure differential switches installed in the discharge of each supply and return fan, which sense discharge pressure, shall stop the fan and transmit an alarm to the operator workstation if the pressure set point of the switch is exceeded. A separate pressure switch installed in the inlet of each supply and return fan shall also stop the fan and transmit the alarm if fan suction pressure is below its set point. Pressure switches shall be automatic-reset type. The fan shutdown shall be operative whether the variable frequency drive Hand-Off-Inverter-Bypass switch is in the Inverter, Bypass or Hand position. Individual alarms (high and low) will be activated at the workstation.

Low-Temperature Switches: Low-temperature switches (freezestats), one (1) for each cooling coil section, shall stop the supply fan and transmit a digital input to the system controller, after a 180 second (adjustable) time delay, if the air entering the cooling coil drops below 35°F. Low-temperature switches shall be automatic-reset type. When the fan stops, an alarm shall be transmitted to the workstation. The fan shutdown shall be operative whether the variable frequency drive Hand-Off-Inverter-Bypass switch is in the Inverter, Bypass or Hand position.

xiii. **Floor/Area Isolation Dampers (Combination Fire/Smoke Dampers)**

Supply floor/area isolation dampers shall open when the supply fan serving the damper is started, and shall close when the fan serving the damper are stopped. All supply dampers on a floor shall be controlled in a group via a hardwired connection to the fan’s variable frequency drive. Dampers shall be positioned open prior to fan starting regardless if fan is started from BMS, manual command from VFD, bypass function of VFD or fan start from fire alarm system.

Return floor/area isolation dampers shall open when the return fan serving the damper is started and shall close when the fan serving the damper is off. All return dampers shall be controlled in a group via a hardwired connection to the fan’s variable frequency drive. Dampers shall be positioned open prior to fan starting regardless if fan is started from BMS, manual command form VFD, bypass function of VFD or fan start from fire alarm system.
xiv. **Fan Shutdown Mode**

On a command to stop a fan, the fan shall ramp down to its minimum speed and the fan shall stop. The fan discharge damper shall close slowly and shall not be fully closed until fan speed has decreased to approximately ten percent (10%). The outdoor, return and spill air dampers shall close. Refer to Unoccupied Mode.

6. **Packaged Air Conditioning Units**

   a. **Hardware**

   - Unitary controller.
   - Utilize latching relays for air conditioning units serving critical areas.
   - Leak detector.
   - Current-sensing relay (fan run status).
   - Space temperature sensor.

   b. **Software Functions**

   - Fan failure alarm.
   - Leak alarm.
   - Start/stop/status.
   - High space temperature alarm.

   c. **Sequence**

   Packaged air conditioning unit shall be chilled water-cooled type. The unit shall be furnished with a factory-installed microprocessor controller and chilled water valve.

   The unit shall be started locally and run continuously. The BMS shall be capable of starting and stopping the unit.

   A point-type leak detector in the unit’s drip pan shall be installed and wired to the BMS for alarm monitoring only. On activation of a leak detector, the respective unit shall continue to run and an alarm shall be activated at the operator workstations.

   The BMS shall monitor a common alarm from the unit originating from a dry-contact closure at the unit’s microprocessor.

   Unit run status shall be monitored at the BMS via a current-sensing relay. On failure of a unit to operate, a fan failure alarm shall be activated at the operator workstation.
A space temperature transmitter shall be monitored at the BMS and shall annunciate a high and low temperature alarm at the operator workstation on sensing a temperature above or below set point (adjustable).

When the unit is in operation, its factory-installed controller shall modulate its normally closed chilled water valve to maintain space temperature set point.

7. **Fan Coil Units**
   a. **Hardware**
      - Unitary Controller. Note: Unitary controller is to be powered by a transformer that is energized on its primary side from the line side of the power feed to fan coil unit. This is to prevent a communication loss to the controller when the fan coil unit is shut down for maintenance.
      - Utilize latching relays for fan coil units serving critical areas.
      - Leak detector.
      - Current-sensing relay (fan run status).
      - Space temperature sensor.
      - Spring-return normally closed modulating control valve for cooling.
      - Spring-return normally closed modulating control valve for heating, unless fan coil unit has ducted unconditioned outdoor air. If so, provide normally open valve for heating.

   b. **Software Functions**
      - Fan failure alarm.
      - Leak alarm.
      - Start/stop/status.
      - High space temperature alarm.
      - Controller Reboot or Return from Power Failure or Controller Reboot: On controller reboot or return from power failure or controller reboot, all control loop outputs shall be commanded to their position prior to reboot or power failure and all control loop integrals shall be zeroed, thus eliminating reset windup.

   c. **Sequence of Operations**
      Fan coil unit shall be started and stopped through the BMS. Fan run status shall be monitored at the BMS via a current-sensing relay. On failure of the unit to operate, a fan failure alarm shall be activated at the workstation.
When the fan is off, its chilled and hot water control valves shall be closed.

When the fan coil unit is in operation a DDC software program shall modulate the electrically operated, normally closed chilled and hot water valves in sequence to maintain space air temperature set point. On an increase in space air temperature above set point, the software controller shall modulate the hot water valve closed and chilled water valve open. As the temperature decreases, the reverse shall occur.

A point-type leak detector in the unit’s drip pan shall be installed and wired to the BMS for alarm monitoring only. On activation of a leak detector, the respective unit shall continue to run and an alarm shall be activated at the operator workstation.

On sensing a space temperature 5°F above set point, an alarm shall be activated at the workstation. On a decrease in space temperature to within ±2°F of set point, the alarm shall be reset.

8. **Exhaust Fans**
   a. **Hardware**
      - Unitary controller.
      - Low suction and discharge pressure switches.
      - Space temperature (as required).
      - Provide BACnet or Modbus communication interface with variable frequency drive (as applicable).
   b. **Software Functions**
      - Fan failure alarm.
      - Start/stop/status.
      - High space temperature alarm.
      - Pressure switch alarms.
   c. **Sequence**
      When a fan is off, its intake and discharge dampers shall be closed. All combination fire/smoke dampers located in associated ductwork shall be closed.

      When the fan starts, a time delay relay shall prevent the fan from starting until its intake, discharge and combination fire/smoke dampers are fully open.

      For fans that operate continuously, each fan shall be started by a manual command at the operator workstation. For fans that function to maintain space temperature, fan shall be started via a software program
that monitors space temperature. On sensing a space temperature above set point, the exhaust fan shall start. On sensing a decrease in space temperature to 5°F below set point, the exhaust fan shall stop.

Fan run status shall be monitored at the BMS via a current-sensing relay. On failure of the fan to operate, an alarm shall be activated at the workstation.

High-Discharge Pressure Switches and Low-Suction Pressure Switches: Pressure differential switches installed in the inlet and discharge of the exhaust fan shall stop the fan and transmit an alarm to the workstation by means of a digital input to the system DDC controller, if the pressure set point of the switch is exceeded. The fan shutdown shall be operative whether the variable frequency drive Hand-Off-Inverter-Bypass switch is in the Inverter, Bypass or Hand position. Individual high- and low-pressure alarms shall be activated at the workstation.

All exhaust fan combination fire/smoke dampers shall be hardwired interlocked with the operation of the exhaust fan.

9. **Chillers**
   a. **Hardware**
      - BACnet IP-based direct digital control unit to serve fifty percent (50%) of chilled water plant equipment (e.g., chillers, pumps, cooling towers). Provide two (2) control units per chiller plant.
      - Provide BACnet communication interface with factory-provided chiller control panel.
      - Provide hardwired output points for:
        - Enable/disable.
        - Common alarm monitoring.
      - Utilize latching relays for enable/disable.
      - Provide field devices for chilled water supply temperature and condenser water return temperature.

   b. **Software Functions**
      - Enable/disable control and status monitoring.

   c. **Sequence**
      - Prior to enabling chiller operation, respective chilled and condenser water pumps shall operate and chiller’s condenser and evaporator isolation valves shall be open.
• When chiller is in operation, its factory-furnished controller shall stage compressors to maintain leaving water temperature set point.

10. Pumps
   a. Hardware
      • Hardwired points to include start/stop, status and speed control.
      • Provide BACnet or Modbus communication interface with variable frequency drive.
      • Utilize latching relays for start/stop.
      • Differential pressure transmitters used for pump speed control shall be hardwired directly to the controller containing the analog output for pump speed control regardless of the transmitter location.

   b. Software Functions
      • Start/stop control and status monitoring.
      • Runtime software calculation indicating total runtime of each pump.
      • Speed control (as required).
      • The following input points shall be monitored and/or alarmed via the DDC system:
        − Speed feedback.
        − Output frequency.
        − Current (amps).
        − % torque.
        − Power (kW).
        − Kilowatt hours.
        − Operating hours.
        − Drive temperature.
        − All diagnostic warning and fault information.
        − Remote fault reset.
        − Keypad “Hand” or “Auto” selected.
        − Bypass selected.
        − Motor running in bypass mode.
        − Motor running in inverter mode.

   c. Sequence
      • The DDC system shall monitor pump status via current-sensing relays furnished and installed by this section. Should a pump fail to start, the DDC system, through a 0 - 30 second (adjustable) time delay relay, shall send an alarm to the network computer and alarm printer and start the lag pump.
An audible signal shall also alert the operator to the alarmed condition.

- A DDC software program shall rotate lead and standby pumps to equalize runtime.
- Variable Speed Pump Control: A DDC software differential pressure controller, through an input signal from an electronic differential pressure transmitter located upstream of the furthest load served by the pump, shall control the online variable speed pump to maintain set point. On decreasing differential pressure below set point, the DDC software controller output to the variable speed drive shall increase to drive the pump to full speed. On an increase in differential pressure above set point, the DDC software controller output to the variable speed drive shall decrease to drive the pump to reduce speed. On a continued increase in differential pressure, the pump minimum speed shall be limited to 30% (adjustable) of its design flow rate. On a further increase in pressure, the software controller shall modulate the differential pressure valve open to maintain system differential pressure. On an increase in pressure, the reverse shall occur.

11. Cooling Towers
   a. Hardware
      - Control to be incorporated within chiller BACnet IP controller or dedicated controller based on location of cooling tower with respect to chillers.
      - Monitor vibration alarm.
      - Monitor basin water temperature.
      - Monitor basin level.
      - Utilize latching relays for start/stop.

   b. Software Functions
      - Condenser water set point reset based on outdoor air wet bulb and tower approach.
      - Controller Reboot or Return from Power Failure or Controller Reboot: On controller reboot or return from power failure or controller reboot, all control loop outputs shall be commanded to their position prior to reboot or power failure and all control loop integrals shall be zeroed, thus eliminating reset windup.
      - The following input points shall be monitored and/or alarmed via the DDC system:
        - Speed feedback.
- Output frequency.
- Current (amps).
- % torque.
- Power (kW).
- Kilowatt hours.
- Operating hours.
- Drive temperature.
- All diagnostic warning and fault information.
- Remote fault reset.
- Keypad “Hand” or “Auto” selected.
- Bypass selected.
- Motor running in bypass mode.
- Motor running in inverter mode.
- The following alarms shall be annunciated at the operator workstation:
  - Cooling tower vibration alarm.
  - Basin low water temperature alarm.
  - Basin high water level alarm.
  - Basin low water level alarm.
  - Cooling tower fan excessive runtime alarm.

c. Sequence

- The DDC system shall be capable of starting and stopping each cooling tower fan and it shall contain a runtime software calculation indicating total runtime of each pump.
- A DDC software program shall allow an operator to select the lead-lag rotation of the cooling towers. In addition, an operator shall be capable of selecting an automatic mode, which shall allow the DDC software program to select lead-lag rotation based on runtime.
- The speed of each enabled cooling tower cell fan shall be selected by a DDC three-mode software program, based upon condenser supply water temperature, as measured by electronic temperature transmitter. The software controller shall modulate the fan speed to maintain supply water set point. Condenser water set point shall be calculated by the DDC system based on the outdoor air wet bulb temperature and the tower approach temperature. There shall be software-adjustable minimum and maximum limits. The operator shall select the initial run sequence of the towers. The DDC system shall control the speeds of the active cooling tower fans in parallel from off to minimum speed, and modulate from minimum to maximum speed, to maintain supply water temperature set point as well as the reverse, until all fans are off. On a continued decrease in condenser
water temperature, the condenser water bypass valve shall modulate open to maintain temperature set point. All cooling tower fans shall be off before the valve modulates open.

- All active fans shall operate at minimum speed prior to modulating from minimum to maximum speed.
- The condenser water supply temperature set point shall be automatically reset by the DDC system controller based on the instantaneous outdoor air wet bulb temperature plus the design tower approach (adjustable).

12. Shell-and-Tube Heat Exchangers
   a. Hardware
      - BACnet IP-based direct digital control unit to serve water system, including pumps and heat exchangers.
      - For systems with multiple heat exchangers, provide a supply water temperature sensor per heat exchanger.
      - Monitor common supply water temperature.
      - Monitor common return water temperature.

   b. Software Functions
      - The following alarms shall be annunciated at the operator workstation:
        - High supply water temperature alarm.
        - Low supply water temperature alarm.

   c. Sequence
      - Not applicable.

13. Plate-and-Frame Heat Exchangers
   a. Hardware
      - BACnet IP-based direct digital control unit to serve water system, including pumps and heat exchangers.
      - For systems with multiple heat exchangers, provide a supply water temperature sensor per heat exchanger.
      - Monitor common supply water temperature.
      - Monitor common return water temperature.

   b. Software Functions
      - The following alarms shall be annunciated at the operator workstation:
        - High supply water temperature alarm.
        - Low supply water temperature alarm.
c. **Sequence**
   - If system includes multiple heat exchangers, all heat exchangers shall be in operation simultaneously.

14. **Expansion Tanks**
   a. **Hardware**
      - Pressure transmitter
   b. **Software Functions**
      - High and low pressure alarms
   c. **Sequence**
      - Provide software high and low pressure alarms. Alarm set points shall be 5 psi above and below actual operating pressure. The DDC system shall activate a high and low pressure alarm at the DDC system.

O. **Graphics**
   1. **General Requirements**
      Dynamic graphics shall be created for each system interfaced with the building management system. Systems include, but are not limited to, air handling units, air conditioning units, heating and ventilation units, exhaust fans, pumps, chillers, heat exchangers, plumbing systems, electrical systems, etc.

      Summary graphics shall be created for systems as described herein. Summary graphics shall be updated, on a per-project basis, as modifications are made to each respective system. The summary graphics are intended to be live documents that continue to evolve as various systems are added, removed and/or modified.

      Where air handling or water systems serve areas other than Mechanical Equipment Rooms, provide dynamic color floor plan displays indicating the area served. The displays shall include all physical and virtual points associated with the respective system.

      The graphical interface shall allow users to access system schematics, floor plans, summary graphics, “as-built” documentation, operation and maintenance manuals via a hierarchal graphical penetration scheme and menu selection.

      Colors shall be used to indicate the status of points (e.g., RED = alarm, GREEN = normal) and these colors shall change as the status of the equipment changes. Provide a software program that shall notify the operator that a
point has been placed in operator override. Notification shall be identified on the respective system graphic.

Dynamic temperature values, humidity values, flow values and status indication shall automatically update to represent current conditions without operator intervention and without predefined screen refresh rates.

All values displayed on the graphics shall include appropriate engineering units.

2. **Sitewide Main Page**
   Main page shall contain the following:
   - Site map with links to each individual building.
   - Link to each campus summary graphic.
   - Common Critical Data
     - Outdoor air temperature.
     - Outdoor air humidity.
     - Outdoor air CO2.
     - Outdoor air enthalpy.
     - Outdoor air dewpoint.

3. **Individual Building Main Page**
   Graphics should organized by building and floor with links to all the equipment that serves that floor on the graphics link.

   a. **Building Operator Links**
      - Tisch Hospital
        - Ancillary
        - Millhauser
      - Alumni Hall
      - Medical Science Building - Berg
      - Coles Student Laboratory
      - Schwartz Lecture Hall
      - Skirball Institute
      - Smilow Research Center
      - Health Care Center (HCC)
      - 660 First Avenue
      - Energy Building
      - Greenberg Hall
      - Kimmel Pavilion
      - Science Building

   Each building shall be presented with an individual main page. The main page shall consist of the following:
• Link to the sitewide main page.
• Link to each respective floor plan of the building.
• Link to building summary graphics for each of the following systems:
  – Condenser water system and all connected equipment (i.e., packaged air conditioning units, Cold Rooms, freezers, etc.), regardless of whether the equipment is interfaced with the BMS or not (single-line format).
  – Chilled water system and all connected equipment (i.e., air handling units, packaged air conditioning units, Cold Rooms, freezers, etc.), regardless of whether the equipment is interfaced with the BMS or not (single-line format).
  – Air handling unit relevant data such as run status, supply temperature, static pressure, and active alarm (tabular format).
  – Supply, return and exhaust duct distribution and all connected equipment (single-line format).
  – VAV box relevant data such as temperature set point, actual temperature and list of rooms served. (Tabular Format).
  – Electrical distribution system, inclusive of all electrical status, alarm and metering points (single-line format).
  – Environmental boxes, refrigerators and freezers (tabular format).
  – Instrument air systems pressure readings, interconnections, risers, branch piping, isolation valves
  – Communication network indicating all controllers, wiring configurations, controller addresses, controller location.

Note: This is not a dynamic graphic. Intent is for a static graphic indicating “as-built” for BMS communication network.

Wherever possible, summary graphics shall include links to systems illustrated on the respective summary graphic as well as other systems associated with the system depicted. For example, VAV summary graphic should contain the AHU and reheat water system links.

• Links to each system group. Groups are defined as follows:
  – Air handling units.
  – Air conditioning units.
  – Exhaust fans.
  – Chilled water system.
  – Condenser water system.
  – Hot water system.
  – Secondary water systems.
  – Process cooling systems.
  – Domestic water.
• Medical air systems.
• Operating Rooms.
• Environmental boxes.
• Generators.
• UPS systems.
• Automatic transfer systems.
• Double-ended substations.

• Individual links to each piece of equipment and/or system within each group. All graphics must show the name of the system and its service area. All systems that serve the system illustrated on the graphic, must be identified and linked to. For example, if a fan system provides the outside air delivered to a fan coil unit, the fan system tag must be identified at the outdoor air intake on the graphic. If a system serves VAV boxes, this must be indicated on the system graphic with a link to the VAV boxes provided.

• Refer to Appendix A for sample graphic indicating a typical floor plan.

4. Campus Summary Graphics

Summary graphics include the following:

• Steam system (displayed in a single-line format).
• Chilled water system (displayed in a single-line format).
• Electric distribution systems (displayed in a single-line format).
• Pneumatic air systems (displayed in a single-line format).
• Domestic water system single-line riser diagram showing domestic water meter POE, pumping system, water tower, domestic hot water systems and other water users.
• Medical air system per building.
• Operating Rooms (tabular format).
• Energy metering (tabular format).
• Air handlers/exhaust fans by building and floor location
• Reheat/perimeter/secondary water by system by building and floor location (displayed in a "single line" format)
• Generators by building (tabular format)
• FCU's by building and floor (tabular format)
• Walk-in boxes, environmental boxes, hot rooms (tabular format)
• ATS (tabular format)
• UPS (tabular format)
• Sump/ejector pumps (tabular format)
• Critical Labs (Berg/Smilow ABSL-3 temps, pressures)
• Refrigeration cooling towers (displayed in a "single line" format)
• Control air plants (displayed in a "single line" format)
• Steam PRV's and perimeter steam control valves (tabular format)
- Sump/ejector/condensate pump (tabular format)
- Animal holding rooms (tabular format)
- Fire systems, preactions (tabular format)
- Decontamination showers (tabular format)
- Room pressure monitoring (tabular format)
- Domestic water, water heaters, booster pumps, house tanks (tabular format)
- Communication network indicating workstations, servers, network switches and primary controllers with respective locations and wiring configurations. Note: This is not a dynamic graphic. Intent is for a static graphic indicating “as-built” for BMS communication network.

Wherever possible, summary graphics shall include links to systems illustrated on the respective summary graphic as well as other systems associated with the system depicted. For example, chilled water system summary graphic should contain links to each chilled water system.

Campus summary graphics shall be a compiled building system overviews. The campus single lines will be the summation of the building single line drawings. All systems should be grouped together with similar systems in a building. If there are no other similar systems in the building a new overview shall be started for that system with LED alarm bringing you to that page in the event of a critical alarm. NO GRAPHICS SHALL BE GROUPED OR LABELED “miscellaneous”.

Summary graphics shall be updated as the systems they represent are modified.

5. **Floor Plans**

   Floor plans shall display air and piping distribution systems in single-line format.

   Floor plans shall indicate location of all equipment located on the floor (i.e., exhaust fans, air conditioning units, VAV boxes, environmental boxes, etc.) as well as links to respective individual equipment graphics. Equipment locations shall be as-installed locations.

   Floor plans shall indicate location of all equipment that is not located on the floor, but serves the floor (i.e., air handling units, exhaust fans and water systems) as well as links to respective individual equipment graphics. Equipment locations shall be as-installed locations.

   Floor plans shall show dynamic variable monitoring space conditions (i.e., temperature, humidity, CO2, room pressures, etc.) in actual field-installed location of sensing device.
Floor plans to indicate room numbers.

6. **Equipment**
   Each individual equipment graphic shall include the following links:
   - Sitewide main page.
   - Individual building main page.
   - Each floor served by the equipment.
   - Summary graphic associated with the system

   For example: Air handling unit graphic is to include links to the following summary graphics:
   - Chilled water system.
   - Steam or hot water system.
   - VAV box summary system.
   - Network communications.

   At the top of each graphic, indicate the equipment tag, location and what it serves (e.g., AHU-TH-2-1, 2nd Floor MER, Floors 3 - 7)

   Individual equipment graphics shall indicate all input/outputs points associated with the system. Points shall be shown in the appropriate locations.

   Set point increments shall be defaulted as follows. Any modifications must be approved by NYULMC operations team.
   - Temperature: 1°F.
   - Humidity: 1% RH.
   - Static Pressure: 0.1 in w.c.
   - Airflow: 100 cfm.
   - Water flow: 50 gpm.
   - Water differential pressure: 2 psig.

   Individual equipment graphics shall include links to graphic page of all points monitored via third-party equipment interface. For example, provide link for display page of all data points associated with variable frequency drive.

P. **Trending**
1. **General Requirements**
   Trends shall be established for each hardwired and software-generated point associated with a system. For each project, trends shall be identified as critical or non-critical trends by the NYULMC operations team.
2. **Critical Trend Points**

Critical trends are of the highest importance to the NYULMC operations team. Trend information is collected at the source and transmitted to the storage device.

Each critical trended point shall be supported by collection point hardware capable of storing a minimum of 9,984 trend samples for each critical point before any samples are overwritten. Where controllers do not have this capability due to the number of trended points, provide additional controllers to provide the required memory capabilities.

Transmission between the point of collection device (DDC controller) and the trend storage device is critical. Each trend shall have its buffer size (the value at which the controllers sends its stored trend data to the collection software) set to a value equal to the smaller of either four (4) times the trend rate (i.e., the amount of samples per hour) or 900 samples. Under no circumstances shall the buffer value be set more than 900 samples.

Each time the buffer reaches its trip rate, the entire volume of software samples stored in the controllers shall be sent. The collection software shall review the data and eliminate duplicate values (i.e., previous values already sent which have successfully received at the collection software).

Critical trends shall have a software routine included (separate from the “standard” trending software) that regularly monitors the trend data and alerts the user when expected trend data has not been received. For each trend, provide a software routine that shall monitor the last received trend point’s time stamp and identify when it has “aged” sufficiently to generate an alarm. Aging limit shall be exceeded when the last data point in the trend has a time stamp which is greater than two (2) times the value of the buffer size divided by the trend rate. This software routine cannot reside in the DDC controller which is the collection device for this data set.

3. **Non-Critical Trend Points**

Each non-critical trended point shall be supported by collection point hardware capable of storing a minimum of 1,000 trend samples for each non-critical point before any samples are overwritten. Where controllers do not have this capability due to the number of trended points, provide additional controllers to provide the required memory capabilities.

Proper transmission between the point of collection device (controller) and the trend storage device is important. Each trend shall have its buffer size (the value at which the controllers sends its stored trend data to the collection software) set to a value equal to the smaller of either four (4) times the trend rate (i.e., the amount of samples per hour) or 250 samples. Under no circumstances shall the buffer value be set more than 250 samples.
Each time the buffer reaches its trip rate, the entire volume of software samples stored in the controllers shall be sent. The collection software shall review the data and eliminate duplicate values (i.e., previous values already sent which have successfully received at the collection software).

4. **Analog Points**
   The following analog type points shall be trended based on an adjustable time interval.

   - Space temperature (10 minutes as standard).
   - Space differential pressure (60 seconds as standard).
   - Air handling unit supply, return, mixed-air and preheat coil discharge air temperature (10 minutes as standard).
   - Air handling unit supply and return air humidity (10 minutes as standard).
   - Air handling unit supply, return and outdoor airflow rates (10 minutes as standard).
   - Duct static pressures (3 minutes as standard).
   - Water temperatures (5 minutes as standard).
   - Water systems differential pressure (5 minutes as standard).
   - Water flow rates (10 minutes as standard).
   - Btu meters (10 minutes as standard).
   - Set points, associated process variables and control signals (Note: sample rate based on variables listed above).
   - UPS voltage per phase, current per phase, kW input and kW output.
   - PDU voltage per phase, current per phase, kW input and kW output.
   - Distribution board voltage per phase, current per phase, kW output.

5. **Digital Points**
   The following digital-type points shall be trended based on an adjustable time interval.

   - Run status (e.g., pump, fan, air conditioning unit, chiller, etc.) (10 minutes as standard).
   - Safety device (e.g., pressure switch, freezestat, leak detector, etc.) (10 minutes as standard).
   - Dry contact input from third-party equipment such as packaged air conditioning unit common alarm contact (10 minutes as standard).
   - Door contact associated with room pressure monitors (10 minutes as standard).
6. **Controller Data**
The following status/data points shall be trended based on change of state.

- Controller online/offline status.
- Controller reboot.

Q. **Alarming**

1. **General Requirements**
   All digital input points shall be alarmed on change of state from normal state. Include a 60 second time delay for deadband

   All analog input points shall be alarmed. Provide adjustable deadband to prevent nuisance alarms.

   Nuisance alarms (i.e., repeating alarms) will be corrected during warranty period. Nuisance alarms are considered alarms that repeat due to poorly configured alarms or if smart alarms are not installed and cause unnecessary lower tier alarms.

2. **Smart Alarming**
   Smart alarming feature shall be implemented when an equipment failure will trigger multiple secondary alarms causing unnecessary data transmission and operator alarm acknowledgement. Smart alarming shall be utilized to prevent unnecessary alarming of points.

   Smart alarms shall be implemented for the following systems:
   - Air handling units.
   - Chilled, condenser and hot water systems.
   - Secondary water systems.
   - Rooms that are monitored via door contacts and room pressure monitors.

   The following are some examples:

   **Air Handling Unit Run Failure**

   On failure of an air handling unit to operate when commanded on or air handling unit shut down due to a safety device, or if an air handling unit is off, provide a software program which shall disable all alarming capability of each temperature, pressure and humidity sensor associated with the air handling unit.

   On failure of an air handling unit to operate when commanded on, an alarm should trigger for the fan status loss, but no pressure sensor alarm or supply air temperature alarm or normal room temperature alarms.
All safety devices (pressure switches and freezestats) shall remain active and capable of alarming.

In general, space temperature alarms in areas served by the air handling unit shall be disabled. However, extreme room temperatures or freezing preheat temperatures should annunciate (Note: There may be critical rooms such as cold rooms which will continue to be monitored for alarm.)

All space pressurization alarms in areas served by the air handling unit shall continue to be monitored for alarm.

Upon a smart alarm activation, the alarm message must read that this is a smart alarm and some alarms have been suppressed.

Note: Alarms associated with critical areas shall not be included within smart alarming programs. Alarms include Cold Rooms, Animal Holding Rooms, Patient Isolation Rooms, etc. Verify all smart alarming functions with Owner prior to implementation.

*Secondary Water System Failure*

On failure of all pumps associated with a secondary water system, provide a software program that shall disable all alarming capability of each temperature, pressure and flow sensor associated with the water system.

All alarms associated with equipment that is disabled (i.e., off) shall be inhibited from operating.

When a piece of equipment is off, all alarms associated with the equipment, as well as alarms associated with areas served by the equipment or secondary equipment served, shall be disabled.

Note: Alarms associated with critical areas shall not be included within smart alarming programs. Alarms include Cold Rooms, Animal Holding Rooms, Patient Isolation Rooms, etc. Verify all smart alarming functions with Owner prior to implementation.

3. **Alarm Syntax**
   a. **Alarm syntax shall be structured as follows:**
      - Priority Designation, Critical, Building, Floor, System, Alarm, Contact Shop
      - Example: **** Critical Tisch 18th Floor AHU-4 Supply Fan Failure Alarm Contact Energy Shop
b. **Return to Normal syntax shall be structured as follows:**

- **Return to Normal** (Priority Designation, Critical, Building, Floor, System, Alarm)
  - Example: Return to Normal (**** Critical Tisch 18th Floor AHU-4 Supply Fan Failure Alarm)

c. **Priority Designation**

- **** 5 Star Alarms
  - Animal Facility/Vivarium-Related Alarms
  - Critical Labs - ABSL-3 Fan Failures, Space Temp/Humidity, Reheats Systems, Steam Systems
  - Critical Fan Failures Affecting Operating Room, Isolation Rooms, Protective Environment Rooms (Fans include air handling unit supply, return, and exhaust fans)
  - Emergency Power-Related Alarms
  - Medical Air System Alarms
  - Compressed Air Systems
  - Procedure Rooms Alarms
  - Data Center Alarms

- **** 4 Star Alarms
  - OR Temperature and Humidity Alarms
  - OR Fan System Failures
  - OR Reheat System Alarms
  - Sump Pit Overflow Alarms
  - Ejector Pit Overflow Alarms

- *** 3 Star Alarms
  - Vacuum System Alarms
  - General Reheat and Perimeter Space Alarms
  - General Lab Fan Failure Alarms
  - Sump Pit Alarms
  - Ejector Pit Alarms
  - Walk-In Box Alarms

- ** 2 Star Alarms
  - Office Fan Failure Alarms
  - General Lab Temperature and Humidity Alarms

- Non-Critical Alarms
  - Office Temperature and Humidity Alarms
d. **Critical vs. Non-Critical**

The designation “Critical” shall be included in the alarm syntax only for 2, 3, 4, and 5 star alarms. For all other alarms not listed above, the designation “Non-Critical” shall be used.

e. **Buildings**

- Alumni Hall - ALH
- Berg - BRG
- Coles Student Laboratory - Coles
- Energy Building - EB
- Greenberg Hall - GBH
- Medical Science Building - MSB
- Millhauser - Mil
- Tisch Hospital - TH
- Schwartz Health Care Center - HCC
- Science Building - SB
- Skirball Institute - Skirball
- Smilow Research Center - SRC
- Kimmel Pavilion – KP

f. **Floor**

Identify floor where alarm is active (e.g., 2nd Floor, Lobby, roof).

g. **System**

Utilize equipment tag or designation (e.g., AC3-7, AHU-TH-18-1, Walk-In Box Room 225, Filtration Water Holding Tank).

h. **Alarm**

Identify actual device in alarm (e.g., Cooling Tower Trip Alarm, Fan Failure Alarm, Common Alarm, High Humidity Alarm).

i. **Contact Shop**

- Energy Shop
  - All BMS-Related Communication Alarms and Outages
  - All BMS AHU, VAV, HW System Alarms (Energy to Reassign Post-Control Signal Confirmation/Verification)
  - All BMS AHU Humidity Alarms (Dual Assignment - HVAC Shop)
  - All Room Pressure-Related Alarms (Dual Assignment - HVAC Shop)

- HVAC Shop
  - All CHW FCU-Related Alarms.
- All Pneumatic-Related Alarms
- All HVAC (AHU, FCU) Filter-Related Alarms
- All Room Pressure-Related Alarms (Dual Assignment - Energy Shop)
- All Low and Medium Steam Pressure Alarms, Including HW System DP Alarms
- All AHU-Related Humidity Alarms (Dual Assignment - Energy Shop)

- Building Engineers
  - All CHW Plant-Related Alarms - Building to reassign these alarms when applicable
  - All Fire System Alarms
  - All Fuel Oil System Alarms (Dual Assignment - House Electricians)
  - All High Steam Pressure Alarms
  - All Generator-Related Alarms (Dual Assignment - House Electricians)
  - All Sump Pit-Related Alarms (Dual Assignment - Plumbing Shop is Primary)

- Plumbing Shop
  - All Sump Pit-Related Alarms (Dual Assignment - Building Engineers: Secondary)
  - All Pump-Related Alarms (Dual Assignment - Building Engineers: Secondary)
  - All Medical Air System Alarms

- House Electricians
  - All Generator-Related Alarms (Dual Assignment - Building Engineers)
  - All Fuel Oil System Alarms (Dual Assignment - Building Engineers)
  - All Power-Related Alarms

- Refrigeration Shop
  - All DX AC/AHU-related Alarms, including DX FCU’s
  - All Walk-In Box Alarms
  - Refrigeration system cooling towers

Note: The term “dual assignment” means two (2) “shops” are assigned to these alarms.
4. **Infection Prevention and Control (IPC) and Nursing**
   The BMS shall automatically generate alarms, via e-mail to IPC and Nursing based on operating room humidity levels and pressurization level. E-mail addresses shall be provided by NYULMC operations team.

   a. **Operating Room Humidity Alarms (Typical per Operating Room)**
      
      On sensing a humidity level either below 30% RH or above 60% RH, the system shall annunciate an alarm at the operator workstation.

      If the humidity level continues to remain either below 30% RH or above 60% RH for an additional 30 minutes (i.e., a total of 60 minutes from original alarm), an e-mail alarm shall be automatically sent to IPC and Nursing.

   b. **Operating Room Pressurization Alarms (Typical per Operating Room)**
      
      On sensing a neutral or negative pressurization level, the system shall annunciate an alarm at the operator workstation. Note: Entrance door must be closed for a minimum of 2 minutes prior to issuing alarm. Alarm to be disabled if door is open.

      If the pressurization level continues to remain neutral or negative for an additional 30 minutes (i.e., a total of 60 minutes from original alarm), an e-mail alarm shall be automatically sent to IPC and Nursing.

   c. **Protective Environment Room Pressurization Alarms (Typical per Isolation Room, Central Sterilizer, Bone Marrow, Air Locks, Vestibules, BSL3 Labs, etc.)**
      
      On sensing a neutral or negative pressurization level, the system shall annunciate an alarm at the operator workstation. The respective NYULMC shop will be required to respond within 30 minutes. Note: Each door serving the room must be closed for a minimum of 2 minutes prior to issuing alarm. Alarm to be disabled if door is open.

      If the pressurization level continues to remain neutral or negative for an additional 30 minutes (i.e., a total of 60 minutes from original alarm), an e-mail alarm shall be automatically sent to IPC and Nursing.

R. **Reports**
   1. **General Requirements**
      
      Reports shall be generated on demand or via a predefined schedule.

   2. **Predefined Reports**
      
      The following predefined reports shall be created and updated as modifications are made to the respective equipment and/or facility.
a. **Controller Online/Offline Status (Campus-Wide)**
   - Report to include controller tag, location, online/offline status.
   - Report generated automatically on a daily basis.

b. **Controller Reboot Status (Campus-Wide):**
   - Report to include controller tag, location, quantity of reboots and time of occurrence.
   - Report generated automatically on a daily basis.

c. **Equipment Uptime (per Building)**
   - Report to include equipment tag, location, required uptime, actual uptime.
   - Report generated automatically on a monthly basis.

d. **Operating Room Humidity**
   - Report to include Operating Room tag, location, humidity level over 24-hour period (highest, average, lowest).
   - Report generated automatically on a daily basis for a 24-hour period.

e. **Operating Room Pressurization**
   - Report to include Operating Room tag, location, pressurization level over 24-hour period (positive, neutral, negative).
   - Report generated automatically on a daily basis for a 24-hour period.

f. **Domestic Hot Water Temperature (per Building)**
   - Report to include:
     - Common supply water temperature.
     - Monthly hours.
     - Hours in Compliance (98 - 117.5°F) - Identified by total hours and percentage.
     - Out of Compliance hours (117.5 - 120°F) - Identified by total hours and percentage.
     - Out of Compliance hours (120 - 125°F) - Identified by total hours and percentage.
     - Out of Compliance hours (125 - 200°F) - Identified by total hours and percentage.
     - Out of Compliance hours (90 - 98°F) - Identified by total hours and percentage.
– Out of Compliance hours (80 - 90°F) - Identified by total hours and percentage.
– Out of Compliance hours (35 - 80°F) - Identified by total hours and percentage.
• Report generated automatically on a daily basis for a 24-hour period.

g. **Room Pressurization (per Building - Not Including Operating Rooms)**
• Report to include room tag, location, required pressurization mode, actual pressurization mode.
• Report generated automatically on a daily basis for a 24 hour period.

h. **Chilled Water Supply and Return Temperature (Campus-Wide)**
• Report to include chilled water temperature transmitter tag, location, actual temperature (highest, average and lowest). Note: Temperature data referenced in this report is only specific to each chiller plant’s common chilled water supply and return temperature.
• Report generated automatically on a daily basis for a 24 hour period.

i. **Chilled Water Differential Pressure (Campus-Wide)**
• Report to include chilled water differential pressure transmitter tag, location, actual pressure (highest, average and lowest). Note: Differential pressure data referenced in this report is only specific to each transmitter located in the campus chilled water loop.
• Report generated automatically on a daily basis for a 24-hour period.

S. **OEM Equipment Interface**
1. **General Requirements**
   Equipment identified below shall be provided with communication interface option. Preferred communication protocol is BACnet MS/TP; however, the BMS is capable of communicating via other industry-standard protocols such as Modbus. If a field server or gateway is required to communicate between the BMS and the equipment, it must be approved in writing by the NYULMC operations team prior to implementation.

   Equipment provider will be responsible for equipment start-up and to verify that communication to BMS is established and functional. The BATC Contractor must participate with the start-up to ensure proper communications.
On completion of the interface, the interface shall be demonstrated to the NYULMC operations team and issues identified after start-up demonstration will require corrective action by the responsible party.

2. **Equipment**
   At a minimum, the following equipment shall be interfaced with the BMS:
   - Electric meters.
   - Variable frequency drives.
   - Packaged air conditioning units.
   - Chillers.
   - Room pressure monitors.

3. **Metering**
   Metering shall be provided at the service entrance of each utility to each building and shall include at a minimum:
   - Steam - Refer to Section 12.2.
   - Condenser Water - Refer to Section 12.2.
   - Chilled Water - Refer to Section 12.2.
   - Electric [To be included in a future document version.]

4. **Variable Frequency Drive Interface**
   a. **General Requirements**
      Furnish and install a communication interface between each fan and pump variable frequency drive and the direct digital control system. Preferred communication protocol shall be BACnet. BATC Contractor shall be responsible for coordinating with the VFD manufacturer for communication protocol requirements per equipment per project. Interface shall allow for simultaneous two-way communications between the VFD and BMS. This functionality shall allow an operator to remotely monitor and adjust all variables via the BMS operator workstation.

   b. **Hardwired Interface**
      - Fans (Air Handling Systems, Heating and Ventilation Units, Exhaust Fans and Cooling Tower Fans)
        - Start/stop.
        - Speed control.
        - Safety shutdown (i.e., pressure switch and low temperature thermostat).
        - Common malfunction alarm.
        - Drive not in Automatic.

      **Note:** Fan run status shall be monitored via current-sensing relay, provided and installed by BATC Contractor.
• Pumps
  – Start/stop.
  – Speed control.
  – Common malfunction alarm.
  – Drive not in Automatic.

c. Communication Interface: The following input points shall be monitored via the BMS:

• Speed feedback.
• Output frequency.
• Current (amps).
• % torque.
• Power (kW).
• Kilowatt hours.
• Operating hours.
• Drive temperature.
• All diagnostic warning and fault information.
• Remote fault reset.
• Keypad “Hand” or “Auto” selected.
• Bypass selected.
• Motor running in bypass mode.
• Motor running in inverter mode.

A DDC software program shall monitor the Auto position of the VFD serving the fan via the communication interface specified herein. On receiving indication that the fan is not operating in “Auto”, an alarm shall be activated at the workstation.

5. Packaged Air Conditioning Units
Packaged air conditioning units to be provided with communication interface option. Preferred communication protocol is BACnet MS/TP. BATC Contractor is responsible for verifying the protocol provided with the units. If a field server or gateway is required to communicate between the BMS and the unit, it must be approved in writing by the NYULMC operations team prior to implementation.

6. Chillers
Chillers to be provided with communication interface option. Preferred communication protocol is BACnet MS/TP. BATC Contractor is responsible for verifying the protocol provided with the chiller. If a field server or gateway is required to communicate between the BMS and the chiller, it must be approved in writing by the NYULMC operations team prior to implementation.
7. **Room Pressure Monitors**

   Room pressure monitors to be provided with BACnet MS\TP communication interface option.

T. **Decommissioning Requirements**

1. **General Requirements**

   The following items must be included within the “General Scope of Work” section of the Contract Documents.

   - As existing mechanical and electrical systems are demolished and replaced with new systems, the existing control system serving the demolished equipment must also be removed from the BMS, in its entirety, inclusive of all field devices, controllers, wiring and server-related programming (i.e., graphics, trends, alarms, database, etc.)
   - The BATC Contractor is responsible for removing all items described below. Failure to complete any item listed below will require the BATC Contractor to perform this service free of charge when discovered, regardless of how much time has lapsed since the original demo project.
   - Prior to starting the decommissioning process, determine whether all points located within the controller are required to be decommissioned. If not, notify NYULMC operations team to determine if the remaining points are to be relocated to a different controller or the controller is to remain.
   - The BATC Contractor shall be responsible for updating existing “as-built” drawings for any systems/equipment which is demolished.

2. **Decommissioning Process**

   a. **Server Work**

      Remove all controller database.

      Transfer all alarms associated with the system to Decommissioned Links graphic.

      Transfer all trends associated with the system to Decommissioned Links graphic.

      Transfer all graphics associated with the system to Decommissioned Links graphic.

      Update all building and campus summary graphics accordingly.
b. Field Work

Determine whether the controller is the only controller on the power circuit. If so, label the circuit breaker (located in existing power distribution panel) as Spare.

Determine if the controller is at end-of-run of communication loop or if communications loop is dedicated to this controller. If controller is not at end of run in communications loop, then reterminate communications wiring such that existing controllers on same loop continue communications to server.

Disconnect communication wiring to controller.

Disconnect power wiring.

Disconnect all field wiring.

Remove conduit and wiring as much as possible. At a minimum, conduit and wiring shall be removed up to shaft or wall penetrations. Remaining conduit and wiring shall be tagged Not-In-Use.

Remove all control panels and field devices. Coordinate with NYULMC operations team to determine whether any of the existing controllers and field devices may be used as attic stock.

U. Installation Requirements

1. General Requirements

The following items must be included within the “Installation Requirements” section of the Contract Documents.

- Conduit associated with control system must be a blue color along with junction box covers. Conduit in finished spaces may be painted the color of the surroundings.
- Abandoned control wiring, pneumatic tubing, control enclosures, conduit, sensing devices, controllers and raceway shall be removed to their source.
- Safety devices (i.e., low temperature detectors, high pressure switches, low pressure switches, life safety shutdown relay contacts) shall be wired to starters and/or VFD’s such that equipment will stop regardless if operating in hand, automatic, manual, or bypass.
• All safeties serving a variable frequency drive or starter (i.e., low temperature thermostat, fire shutdown contact, pressure switch, end switch, etc.,) must be wired to a terminal strip outside of the VFD/starter, in a standard, labeled enclosure where voltage readings can be taken to facilitate troubleshooting. Each safety should be wired to an individual pair of terminals and labeled as to what safety it is. In addition, all safeties must have individual auxiliary contact wired to the BMS for alarm monitoring. In lieu of a separate enclosure, it is acceptable to utilize the DDC field equipment panel.

• Control panels shall be installed in an accessible location within sight of the equipment served. Ladders should not be required to reach controllers, except in the case of terminal equipment controllers mounted in accessible ceilings.

• Control panels serving terminal equipment such as variable air volume and fan-powered terminal installed in accessible ceiling shall have adequate access to remove covers, replace and service components.

• Control devices that are capable of manual reset shall be in an easily accessible location to allow for user access with use of a ladder.

2. Electrical Wiring
Wiring and conduit installation shall be in accordance with all local and national codes.

All systems requiring interlock wiring shall be hardwired interlocked and shall not rely on the BMS to operate (e.g., emergency generator to fuel oil pump interlock, emergency generator damper interlock, etc.). Interlock wiring shall be run in separate conduits from BMS associated wiring.

All wiring in Mechanical Equipment Rooms, communications or electrical closets shall be in approved raceways (conduit, EMT, etc.). Open wiring strung above accessible ceilings shall be plenum-rated cable, bundled together and protected from mechanical damage. Wiring within inaccessible ceilings shall be installed in conduit. Wiring within drywall cavities or enclosures or beneath raised floor construction shall be in conduit. Wiring shall be independently supported from the building structure with bridal rings and clips. The supporting of wiring from other equipment, mechanical ductwork or piping shall not be acceptable. Provide individual supports for conduit.

Cables for 120/24 VAC wiring, communications wiring and low-level signal wiring (i.e., 4 - 20 mA analog) shall always be run in separate raceways.
Use liquid-tight flexible metal conduit for making connections at instruments and devices mounted on piping or vessels or on equipment subject to vibration.

Final raceway to damper actuators and duct-mounted instruments may be either liquid-tight flexible metal conduit or MC-type cable (with a ground). Maximum length shall not exceed 3 feet. A junction box should be located within 3 feet of the damper and a flexible connection may be MC with a ground, FMC with a ground or LFMC with a ground. The flex connection must be supported within 1 foot of the junction box. Raceway must be secured within 1 foot of junction box. The use of MC-type cable shall not be acceptable in any other service or location.

120 VAC circuits used for control and instrumentation shall be dedicated to the control system and shall not be used for any other purposes.

Conveniently located terminal junction boxes shall be used for the transition from the single-pair local signal cables to the multi-pair home-run cable. These boxes shall have terminal schedules attached to the inside of their covers displaying the terminals and the service tags of the cables terminated there.

Conduits shall be run exposed in mechanical spaces, concealed in occupied spaces, and parallel or perpendicular to structural members or architectural features.

Conduit entering a cabinet, box, trough, etc., shall be secured with a locknut on the outside and on the inside, such that the conduit system is electrically continuous throughout. A bushing shall also be provided on the inside. Bushings shall be metal with insulated throats. Locknuts shall be the type designed to bite into the metal, or on the inside of the enclosure and shall have a grounding wedge lug under the locknut.

Conduit shall be installed such that any condensation in the conduit cannot run into control panels. Where necessary, conduit shall enter enclosures from the bottom or shall be sloped up to the enclosure.

Junction and pull boxes shall be securely fastened to the conduit and be accessible where required by code or where necessary to facilitate the pulling of cables.

Conduit runs that extend from the interior to the exterior of a building shall be sealed to prevent the circulation of air. This shall be accomplished by the installation of sealing fittings.

All wires terminating at each field device, terminal box, field equipment cabinet, DDC control unit or any other terminals shall be identified using...
Brady clip sleeve-type non-metallic wire markers or equivalent. The identification shall be consistent with the tagging indicated on the approved shop drawings. The same identification code shall be carried through from the field device to the final termination point. After identification is complete, the wire markers shall be anchored using a single layer of non-yellowing clear Mylar tape.

Perform continuity testing for all wiring installed.

Control raceways shall not be hung from electrical raceways or attached to ceiling grid hanger wires.

Percent fill of conduit, EMT or IMC shall not exceed code maximum, regardless of service.

No 300 volt insulated wiring shall terminate within or occupy any enclosure containing conductors operating at a voltage greater than 300 volts. This particularly applies to any analog or digital I/O wiring entering 460 volt motor starter enclosures or motor control centers.

Use of tie wraps for supporting conduit, wire, cable, etc., shall not be permitted.

Terminations shall be mechanically and electrically secure. Twist-type wire nuts shall not be acceptable. Insulated tinned copper lugs shall be provided.

All communication wiring shall be tagged with the previous and post devices on the network.

Exterior locations shall be installed in rigid conduit.

Interior, exposed locations shall be installed in EMT conduit. Flexible conduit shall be allowable for short distances for termination to field devices and shall be Sealtight-type conduit.

3. **Instrument Air Piping**
   Number-coded tubing shall be used throughout, with coding readily identifiable at points of control and equipment. Coding of each line to a controller or equipment shall be different and shall match coding indicated on control shop drawings.

   Tubing shall be installed so that it can be removed without damage or alterations to the building structure.

   Care should be exercised in the installation of pipe, tubing and fittings to see that no dirt or foreign matter is present in the system.
Connections shall be made without springing the tubing. Tubing is to be installed in such a manner that overlapping and crossovers are kept to a minimum. Where necessary, this should be done in an accessible place. Connections to instruments shall be made so that disconnect and removal of each individual instrument can be made without distortion of tubing. Instrument tubing and piping shall be arranged and supported so as to minimize the transmission of strain and vibration to the instruments to which they are connected. Instrument piping and tubing shall have the shortest possible runs and the least number of fittings required as is consistent with good design and installation practice. Instrument piping and tubing shall be installed so that there is sufficient space around the equipment for servicing and adjustment. Instrument lines shall be installed so they do not interfere with the maintenance of equipment such as the removal of tube bundles, pump casings, etc. Cap piping during installation to prevent entrance of dirt.

Normally operated manual valves or other items associated with instruments that require manipulation shall be readily accessible either from the ground or from some convenient operating level.

Care should be taken in the arrangement of the piping fittings, racks and brackets so as not produce unsafe working conditions. Special care should be taken to eliminate protruding objects that might injure personnel.

Branch air lines from high-pressure air headers shall be valved at the point of connection to the air header.

Plastic air tubing shall be supported as follows:

- Polyethylene tubing bundles shall be installed in covered aluminum raceways or shall be supported on galvanized steel hangers not more than 4 feet 0 inches on centers. At each support point at a hanger or trapeze, the tube bundle shall be protected by a 180 degree by
- 8 inch long galvanized steel shield.
- Individual plastic tubing shall be run in thin wall electric conduit or Wiremold raceway and supported by galvanized hangers on 4 foot 0 inch centers.
- Conduit or raceway shall not exceed 50 percent fill.

Copper tubing shall be fastened and rigidly supported at regular intervals to prevent sagging, using straps, trapezes and pipe hangers as approved.

No air lines shall be concealed under or within insulation or acoustic lining. The use of wire or tape to support air piping will not be permitted.

Air piping shall be run horizontally level and vertically plumb and parallel to building lines.
Install valved drip pocket at low points of mains and risers.

Only tool-made bends in copper tubing will be acceptable.

Raceway shall be terminated not more than 12 inches from terminal devices and this last section may be made with non-metallic tubing run exposed.

Non-metallic tubing, except terminal ends, shall be installed with a minimum clearance of 1 foot to any surface that may exceed 120°F.

Test metallic air piping at 150 psig air pressure, and non-metallic air tubing at 40 psig air pressure, sustained for 4 hours. If pressure loss exceeds five percent (5%) during the test period, repair or replace defective tubing and fittings and retest until the pressure loss is less than five percent (5%).

All impulse tubing related to chilled water service must be insulated to prevent condensation.

V. Project Closeout
1. General Requirements
   The following items must be included within the “Project Closeout” section of the Contract Documents.
   
   - Systems will not be added to the BMS network until they are fully commissioned, training has taken place, and operation and maintenance manuals have been provided to NYULMC operations team.
   - Training must be completed prior to occupancy and NYULMC operations team acceptance.
   - The BATC Contractor will provide onsite 24/7 coverage for all warrantied systems until commissioning and training is complete and operations and maintenance manuals have been provided to NYULMC operations team.

2. Testing and Calibrating
   Commission and test the final installed system prior to acceptance by NYULMC.
   
   Furnish labor and test apparatus required to calibrate and prepare for service control components, instrumentation and field devices. This work includes: Zero, span and range calibration checks of instruments and accessories, both field- and panel-mounted. In addition, check actuators, control valves and dampers to ensure proper action. Stroke each valve and damper actuator and make necessary adjustments for stem and blade travel.
   
   Furnish labor and test apparatus required to check the operation of control loops, set points and interlocks. Test every input/output point for proper
performance through the entire system and maintain accurate test records for each point throughout the testing cycle and thereafter. The Owner reserves the right to inspect those test records at any time and also to witness any of the point tests he deems appropriate.

Prepare and submit for approval checklists of testing procedures, including point-to-point wiring and sequence check.

All control loops shall be tuned by utilizing manufacturer specified automatic tuning software or by the use of a third-party software loop tuning program. Control loops shall be tuned to provide stable response while eliminating offset and hunting. All control loop parameters shall be recorded and maintained with the test record of each control point.

Provide trending data for 72-hour automatic system operation. Trending data to include all relevant hardwired and software data points associated with the system that shall indicate that the system is operating as per design intent.

All equipment used for testing and calibration shall be NIST (National Institute of Standards and Technology) traceable and calibrated within the preceding 12-month period. Certificates of calibration shall be available for Owner Review.

3. Commissioning Responsibility
   Assist commissioning authority in verification and performance testing. Assistance will generally include the following:
   
   • Attend commissioning (Cx) progress and coordination meetings.
   • Prepare and submit required forms and system information.
   • Establish trend logs of system operation.
   • Participate in pre-functional testing.
   • Participate in functional testing and demonstrate system operation.
   • Manipulate control systems, system components, hardwired inputs/outputs and software variables to facilitate testing.
   • Provide instrumentation necessary for verification and performance testing.
   • Provide a control technician to work at the direction of Commissioning Authority. Technician shall be knowledgeable in the installation and operation of the system being demonstrated.

   Any BATC deficiencies noted during the commissioning process shall be corrected by the BATC Contractor and redemonstrated to the Commissioning Authority.
4. **Operator Training**

Provide operating and maintenance instruction for the BMS with personal on-the-job instruction by factory-trained Engineers. Instruction shall cover all equipment and systems provided. For each instruction session provide a printed documentation and three (3) USB thumb drives containing .pdf files inclusive of the following:

- Sequence of operation.
- Hardware configuration, including network topology, control panels and individual control units.
- Software programming.
- Preventive and scheduled maintenance.
- Calibration requirements.
- Troubleshooting hardware and software failure.
- Component replacement.
- Manufacturer’s installation, operation and maintenance manuals.

5. **Operation and Maintenance Documentation**

On completion of installation, system commissioning and Owner Acceptance provide operation and maintenance manuals. Manuals shall be updated each time changes are made to the system. Manual shall be furnished in a three-ring binder and on compact disc media. Provide three (3) printed copies as well as three (3) compact discs. Operation and maintenance manuals shall include the following:

- Table of contents.
- Record drawings which shall represent the “as-built” condition of the system and incorporate all information supplied with the approved submittals inclusive of:
  - Sequence of operation.
  - Bill of Material.
  - Control diagrams depicting controlled system configuration indicating all field devices.
  - Control panel wiring diagrams.
  - Starter/VFD interface wiring diagrams.
  - Updated control system network architecture.
  - Point list for all hardwired input/output points.
  - Point list for all input/output points derived via communication interface (i.e., BACnet, Modbus, etc.) with third-party equipment such as air conditioning units, variable frequency drives and chillers.
  - Floor plans indicating exact location of all devices.
  - Updated system architecture drawing as per modifications made during the project construction indicating tie-in points, hardware, cabling distances, controllers, equipment served, etc.
– All items listed in Section 5 submittals.

Note: For projects where minor modifications are made to an existing control system, “as-built” documentation shall be inclusive of all existing control work associated with the system as well as the new work provided as part of the project. Existing work shall be identified as shadowed block areas or other means acceptable to NYULMC operations team. New work shall be bold. Intent is to have a comprehensive “as-built” shop drawing indicating all existing and new control work associated with the system.

- Programming manual containing
  - Documentation of all project-specific application and BMS programs.
  - All passwords and/or required access credentials.
  - Complete final point schedule including all hardware and software data points and documentation of calibration and configuration values for all inputs, outputs, variables and PID loops at the conclusion of system commissioning and functional testing.
  - System database as functional at the conclusion of system commissioning and functional testing, including all graphics and images used by and/or created on electronic format.

- Parts list containing supplier information (manufacturer name, address, telephone number and website address) with complete component model number and ordering information.

With each local control panel, provide a paper copy of the “as-built” control diagram, sequence of operation, bill of material and point list for the equipment served by the control panel. Documentation shall be placed in a plastic sleeve located on the inside of the door.

Operation and maintenance manual must be submitted to NYULMC operations team prior to occupancy. Systems will not be accepted by NYULMC without submission of operation and maintenance manuals.

6. “As-Built” Database
A composite “as-built” database shall be created and updated at completion of each project. The database shall contain all “as-built” documentation, project start and completion dates, warranty start and completion date, brief description of project scope, name all BATC Project Manager, field technician and software programmer and Subcontractor name and contact information. Software database shall be accessible via dynamic link on respective equipment graphics.
7. Warranty
Warranty direct digital control units, field devices, components, etc., to be free from defects in workmanship and material for a period of one (1) year from completion of final commissioning, which may occur beyond equipment acceptance and initial occupancy by the Owner. During this period, BATC Contractor shall furnish all labor to repair or replace all items or components that fail due to defects in workmanship or material. Failures on control systems, including all computer equipment, transmission equipment and all sensors and control devices during the warranty period, shall be adjusted, repaired or replaced at no additional cost or reduction in service to the Owner.

Provide necessary preventive maintenance on the system during the warranty period. Provide updates to operator workstation and server software, project-specific software, graphic software, database software and firmware that resolve software deficiencies at no charge during warranty period.

During the warranty period, BATC Contractor shall test the system under varying seasonal conditions to ensure that all operational sequences, as specified, are performed correctly. This shall include at least three (3) additional visits after initial Owner Acceptance. Where necessary, BATC Contractor shall make programming adjustments and instrument calibrations at no expense to the Owner.

At the end of the warranty period update “as‐built” documentation to reflect any modifications made during the warranty period.

8. Uncompleted Work
At the end of the warranty period, a five (5)-year uncompleted work period shall begin. The uncompleted work period shall be used to determine if the BATC Contractor has completed the entire scope of work as required for the project. If work has been found to be incomplete or never installed, as determined by the NYULMC operations team, the BATC Contractor shall be responsible for completing the work at no additional cost to NYULMC.
W. Appendix A - Sample Floor Plans
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