SECTION 01 78 23

OPERATION-MAINTENANCE- EMERGENCY INFORMATION

1.1 OPERATION, MAINTENANCE AND EMERGENCY DOCUMENTATION SUBMITTAL FORMAT

A. Format: Submit operations and maintenance and emergency manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect, Dartmouth PM, and Commissioning Authority (where applicable).

    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

2. One paper copy. Submit to Dartmouth PM.

B. Initial Manual Submittal: Submit draft copy of each manual at least thirty (45) days before commencing demonstration and training. Architect, Dartmouth PM, Engineering, and Commissioning Authority (where applicable) will comment on whether general scope and content of manual are acceptable.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least fifteen (15) days before commencing demonstration and training. Architect, Dartmouth PM, Engineering, and Commissioning Authority (where applicable) will return copy with comments.

1. Correct or revise each manual to comply with Architect's, Dartmouth PM’s, and Commissioning Authority's (where applicable) comments. Submit copies of each corrected manual within fifteen (15) days of receipt of comments and prior to commencing demonstration and training.

1.2 OPERATION, MAINTENANCE AND EMERGENCY DOCUMENTATION SUBMITTAL REQUIREMENTS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.
4. O&M TOC bookmarked and interactive with documents, only with information applicable to the project.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.
11. Inventory of equipment, parts and replacements.
12. List of added stock for equipment.
13. Copies of approved Submittals and attached to O&M

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturers where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-

reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

1.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

1.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

1.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Distributors information for replacement parts: Include a schedule of distributors for the equipment and replacement parts with appropriate contact information.

I. Warranties Information: Include a schedule listing all project warranties, contact information, start dates and end dates.

J. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

1.6 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Fuel leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.7 BAS Project O&M (Refer to Division 23 - Automatic Temperature Controls and Division 25 - Integrated Automation for additional requirements) at project completion and prior to building occupancy. It is not acceptable to go beyond and into project warranty period.

A. Confirm logics are working as intended for all seasons of year.

B. Provide O&M for all valves, actuators, control devices installed, one-line wiring diagrams, control sequence of operation, list of initial set points, 3rd party control interface, software licenses and warranties.

C. Confirm all graphics are fully completed.

D. Confirm Sequence of Operations are tested and fully commissioned.

E. For 3rd party integration, confirm all points are documented and shown in Dartmouth College system and writable for program changes. Provide to Owner all points and programming documentation from the manufacturer.

F. Confirm all field devices should be properly configured, i.e. 3-way valves , differential pressure sensors, etc.

G. Confirm all wiring to controllers tested for proper contact on connectors and correct wiring

installation.

H. All actuators shall be stroked to verify proper operation.

I. All sensors shall be tested and recalibrated as necessary, may be misconfigured on the software side.

J. Test and verify all dampers, economizer controls, system controls.

K. Visual inspection of installation and controls of all AHU's and VFD's.

L. Confirm all manual balancing dampers are checked to ensure no zones are closed.

M. Outside temperature and Outdoor relative humidity sensors should be tested and calibrated.

N. Have one central location for supervisory controller and BACnet Broadcast Management Devices (BBMD) when required by integrator.

O. All usernames and passwords shall be stored in Cyberark safe aftger being turned over to Dartmouth FO&M.

P. Turn over backup files for programming (CCT or CPO projects).

Q. Submit Commissioning agent report of all final checks performed at the site.

1.8 Appendices Attached

A. Appendix A - Training Plan

B. Appendix B – Training Agenda

C. Appendix C – Training Record

D. Appendix D – Turnover Documentation

E. Appendix E – Equipment Lists

F. Appendix F – Asset Tag & Equipment Inventory

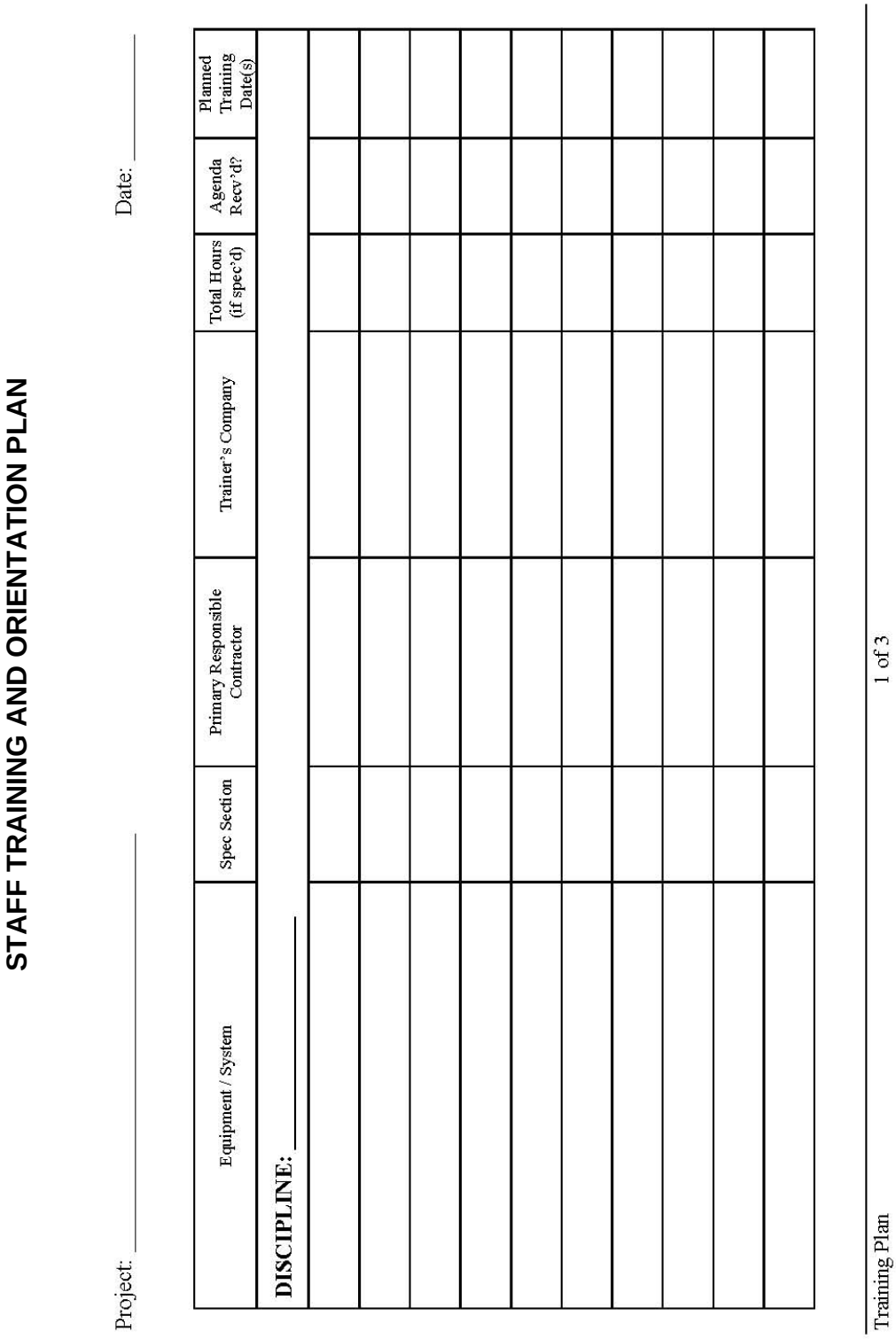
END OF SECTION 01 78 23

APPENDICES

APPENDICES

A. TRAINING PLAN SAMPLE

This sheet is to be filled out completely by the contractors and reviewed and approved by Dartmouth College Project Manager, Engineering and Operations.



STAFF TRAINING AND ORIENTATION PLAN

Project: _____ Date: _____

Equipment / System	Spec Section	Primary Responsible Contractor	Trainer's Company	Total Hours (if spec'd)	Agenda Recv'd?	Planned Training Date(s)
DISCIPLINE: _____						

Training Plan 1 of 3

APPENDICES

B. TRAINING AGENDA SAMPLES

These sheets are to be filled out completely by the contractors and reviewed and approved by Dartmouth College Project Manager, Engineering and Operations.

TRAINING AGENDA

Project: _____ Date: _____

Equipment / System: _____ Spec Section: _____

Part 1: Training Scope

General objectives and scope of training: (check all that apply)

___ A. Provide an overview of the purpose and operation of this equipment, including required interactions of trainees with the equipment.

___ B. Provide technical information regarding the purpose, operation and maintenance of this equipment at an intermediate level, expecting that serious malfunctions will be addressed by factory reps.

___ C. Provide technical information regarding the purpose, operation, troubleshooting and maintenance of this equipment at a very detailed level, expecting that almost all operation, service and repair will be provided by the trainees.

Part 2: Trainees

Intended audience type (enter number of staff): ___facility manager, ___facility engineer, ___facility technician, ___project manager, ___tenant, ___other: _____

Part 3: Instructors

ID	Trainer	Company	Position / Qualifications
1)			
2)			
3)			

Part 4: Agenda [The contractor's trainers fill out this Part and submit to Owner and Commissioning Authority for review and approval prior to conducting training.]

Location: ___site _____ Date _____

___classroom (location) _____, Date _____

Agenda of general subjects covered (√ all that will be covered) (√ when completed)	Duration (min.)	Instructor (ID)	Completed (√)
___General purpose of this system or equipment (design intent)			
___Review of control drawings and schematics (have copies for attendees)			
___Startup, loading, normal operation, unloading, shutdown, unoccupied operation, seasonal changeover, etc., as applicable			
___Integral controls (packaged): programming, troubleshooting, alarms, manual operation			
___Building automation controls (BAS): programming, troubleshooting, alarms, manual operation, interface with integral controls			
___Interactions with other systems, operation during power outage and fire			
___Relevant health and safety issues and concerns and special safety features			

___Energy conserving operation and strategies	_____	_____	_____
___Any special issues to maintain warranty	_____	_____	_____
___Common troubleshooting issues and methods, control system warnings and error messages, including using the control system for diagnostics	_____	_____	_____
___Special requirements of tenants for this equipment's function	_____	_____	_____
___Service, maintenance, and preventative maintenance (sources, spare parts inventory, special tools, etc.)	_____	_____	_____
___Question and answer period	_____	_____	_____

Other subjects covered, specific to the equipment:	**Duration**	**Instructor**	**Completed**
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Total duration of training: (hrs) ---------->			_____

Training methods that will be included (clarify as required): (Trainer checks all that apply)

_√_ use of the O&M manuals, illustrating where the verbal training information is found in writing

_√_ each attendee will be provided: 1) the control drawing schematic and sequence of operations;
2) a copy of this agenda.

___ discussion/lecture at site_____

___ site demonstration of equipment operation_____

___ written handouts_____

___ manufacturer training manuals_____

___ classroom lecture_____

___ classroom hands-on equipment_____

___ video presentation_____

_√_ question and answer period_____

Part 5: Approval

This Agenda has been reviewed by, the Owner and Commissioning Authority and may be used by the Trainer for use during training.

This signature is for approval of the Training Agenda outline by the following individuals, subject to the additions and clarifications noted in the left columns marked "add." *(This is not an approval of training completion.)*

_____ _____
Owner's Representative Date

_____ _____
Commissioning Authority Date

CLASS II TRAINING AGENDA

Project: _____ Date: _____

Building:_____ Equipment / System:_____

Training will consist of a walk-down of the newly completed spaces, systems and major equipment. During the walk down, the following topics shall be discussed:

Agenda of topics covered

1. General purpose of this system or equipment (design intent)
2. Startup, normal operation, shutdown, unoccupied operation, seasonal changeover, etc., as applicable
3. Integral controls (packaged): programming, troubleshooting, alarms, manual operation
4. Building Automation System (BAS): programming changes, troubleshooting, alarms, etc.
5. Interactions with other systems, operation during power outage and fire
6. Relevant health and safety issues and concerns and special safety features
7. Energy conserving operation and strategies
8. Any special issues to maintain warranty
9. Special requirements of tenants for this equipment's function
10. Service, maintenance, and preventative maintenance (sources, spare parts inventory, special tools, etc.)
11. Question and answer period

Unique Operational Considerations:
(add number to correspond with topic above and include a brief explanation of the unique information to be considered.)

__:
__:
__:
__:
__:
__:
__:

APPENDICES

C. TRAINING RECORD SAMPLE

These cover sheet is to be filled out completely by the contractors and reviewed and approved by Dartmouth College Project Manager, Engineering and Operations.

STAFF TRAINING AND ORIENTATION PLAN RECORD

Project Name: **System or Equipment:**

Topics Covered: _____

_____

_____

_____

_____

Length of Training (hours) _____

Total Number of Training Sessions _____

Handout Attached (Y/N) _____

Cover Page – Fill out one cover sheet for each type of training

STAFF TRAINING AND ORIENTATION PLAN RECORD

Project Name: _____ **System or Equipment:** _____

Class Date _____ Class Time _____

TRAINEE INFORMATION

	Printed Name	Department	Position	Signature
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

TRAINER INFORMATION

Printed Name	Company	Position	Signature

APPENDICES

D. TURNOVER DOCUMENTATION PACKAGE

Listing of requirements is to be assessed on a project by project basis to determine which are applicable. The list is to be filled out by Dartmouth College representative or Construction Manager. The list shown below is a representative sample. These requirements should be reviewed and approved by Dartmouth College Project Manager, Engineering and Operations.

Project Closeout Requirement	e-Builder Folder Location	Deliverable is Due:	Deliverable applicable to project? (Y/N)	Docs Provided By	Received Date	Received By	Team Responsible for Verification	Verification Date	Meridian Folder Location	Deliverable Format *See FIS Project Closeout Doc Outline V5.0 (Tab 3)
SPECIFICATIONS	**09.00**	**Interim T/O**					**Project Mgmt**		**Operations/Specification**	
CONTACT LIST	**09.01**	**Interim T/O**					**SPT**		**Operations/Contact List**	
PERMITS	**09.02**	**Interim T/O**							**Operations/Permit**	
Flammable Storage Permit	09.02.01	Interim T/O					EHS		Operations/Permit	
New MWRA Permits and/or Discharge Locations	09.02.02	Interim T/O					EHS		Operations/Permit	
Crane and Boom Operating Permit (AKA Cranes and Hoists)	09.02.03	Interim T/O					EHS		Operations/Permit	
Building Code and MAAB Variances	09.02.04	Interim T/O					Project Mgmt		Operations/Permit	
Air Quality	09.02.05	Interim T/O					EHS		Operations/Permit	
Stormwater Pollution and Prevention Plan (MS4)	09.02.06	Interim T/O					EHS		Operations/Permit	
Other	09.02.07	Interim T/O					Project Mgmt		Operations/Permit	
100% Construction Set Drawings	**09.03**	**Interim T/O**							**(Discipline)/Construction Documents**	
Architectural	09.03.01	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Audio-Visual	09.03.02	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Civil	09.03.03	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Electrical	09.03.04	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Fire Alarm	09.03.05	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Fire Protection - Sprinklers	09.03.06	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Landscape	09.03.07	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Mechanical	09.03.08	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Plumbing	09.03.09	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Security	09.03.10	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Structural	09.03.11	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Telecommunications	09.03.12	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Geotechnical	09.03.13	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
Utilities	09.03.14	Interim T/O					Project Mgmt / Utilities		*(Discipline)/Construction Documents*	
Controls	09.03.15	Interim T/O					Project Mgmt		*(Discipline)/Construction Documents*	
As Built - Coordination Drawings	**09.04**	**Interim T/O & Final**							**(Discipline)/As-Built**	
Architectural	09.04.01	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Audio-Visual	09.04.02	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Civil	09.04.03	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Electrical	09.04.04	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Fire Alarm	09.04.05	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Fire Protection - Sprinklers	09.04.06	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Landscape	09.04.07	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Mechanical	09.04.08	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Plumbing	09.04.09	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Security	09.04.10	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Structural	09.04.11	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Telecommunications	09.04.12	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Geotechnical	09.04.13	Interim T/O & Final					FEG		*(Discipline)/As-Built*	

Utilities	09.04.14	Interim T/O & Final					FEG / Utilities		*(Discipline)/As-Built*	
Controls	09.04.15	Interim T/O & Final					FEG		*(Discipline)/As-Built*	
Architect's Record Drawings	**09.05**	**Final T/O**							**Architecture/Record Design Drawing**	
Architectural	09.05.01	Final T/O					FEG		*Architecture/Record Design Drawing*	
Audio-Visual	09.05.02	Final T/O					FEG		*Architecture/Record Design Drawing*	
Civil	09.05.03	Final T/O					FEG		*Architecture/Record Design Drawing*	
Electrical	09.05.04	Final T/O					FEG		*Architecture/Record Design Drawing*	
Fire Alarm	09.05.05	Final T/O					FEG		*Architecture/Record Design Drawing*	
Fire Protection - Sprinklers	09.05.06	Final T/O					FEG		*Architecture/Record Design Drawing*	
Landscape	09.05.07	Final T/O					FEG		*Architecture/Record Design Drawing*	
Mechanical	09.05.08	Final T/O					FEG		*Architecture/Record Design Drawing*	
Plumbing	09.05.09	Final T/O					FEG		*Architecture/Record Design Drawing*	
Security	09.05.10	Final T/O					FEG		*Architecture/Record Design Drawing*	
Structural	09.05.11	Final T/O					FEG		*Architecture/Record Design Drawing*	
Telecommunications	09.05.12	Final T/O					FEG		*Architecture/Record Design Drawing*	
Geotechnical	09.05.13	Final T/O					FEG		*Architecture/Record Design Drawing*	
Utilities	09.05.14	Final T/O					FEG / Utilities		*Architecture/Record Design Drawing*	
Controls	09.05.15	Final T/O					FEG		*Architecture/Record Design Drawing*	
O&M MANUALS	**09.06**	**14 (CRSP)-60 (Capital) days Prior to Interim Turnover**							**Operations/O&M Manuals**	
Building Envelope	09.06.01	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					PM / SPT		*Operations/O&M Manuals*	
Mechanical (HVAC)	09.06.02	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Electrical	09.06.03	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Plumbing	09.06.04	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Fire Alarm	09.06.05	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Fire Protection - Sprinklers	09.06.06	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Controls	09.06.07	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Lighting	09.06.08	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
Other	09.06.09	14 (CRSP)-60 (Capital) days Prior to Interim Turnover					FEG		*Operations/O&M Manuals*	
REPORTS	**09.07**	**Interim & Final if Updated**							**Operations/Reports**	
Balancing Report	09.07.01	Interim & Final if Updated					FEG		*Operations/Reports*	
Commissioning Final Report	09.07.02	Final T/O					SPT		*Operations/Reports*	
Interim Turnover Letter (Incl: Cx, P/L, Inspection & Alarm lists)	09.07.03	Interim T/O					SPT		*Operations/Turnover Summary*	
Final Turnover Letter	09.07.03	Final T/O					SPT		*Operations/Turnover Summary*	
Asbestos Abatement Closeout Docs	09.07.04	Final T/O					EHS		*Operations/Reports*	
Hazardous Materials Sample Analysis	09.07.05	Final T/O					EHS		*Operations/Reports*	
MassDEP MCP-LSP Environmental	09.07.06	Final T/O					EHS		*Operations/Reports*	
Pull Testing Anchorage	09.07.07	Final T/O					EHS		*Operations/Reports*	
Vacated Space Decontamination	09.07.08	Final T/O					EHS		*Operations/Reports*	
Window Washing Access Study	09.07.09	Final T/O					EHS		*Operations/Reports*	
Nox Data	09.07.10	Final T/O					EHS		*Operations/Reports*	
Confined Space, Bldg, Stairways, Signage	09.07.11	Final T/O					EHS		*Operations/Reports*	

Light Fixture Access	09.07.12	Final T/O					EHS		*Operations/Reports*	
Hazardous Waste	09.07.13	Final T/O					EHS		*Operations/Reports*	
LEED	09.07.14	Final T/O					SPT		*Operations/Reports*	
SURVEYS	09.08	Interim T/O							**(Discipline)/Surveys**	
Site Survey	09.08.01	Interim T/O					Project Mgmt		*(Discipline)/Surveys*	
Other	09.08.02	Interim T/O					Project Mgmt		*(Discipline)/Surveys*	
CERTIFICATIONS ("Binder")	**09.09**	**Interim T/O**							**Operations/Certificates**	
Certificate of Substantial Completion	09.09.01	Interim T/O					Project Mgmt		*Operations/Certificates*	
Certificate of Inspection (assembly spaces)	09.09.02	Interim T/O					EHS		*Operations/Certificates*	
Certificate of Use and Occupancy (or signed bldg card) / Beneficial Use	09.09.03	Interim T/O					Project Mgmt		*Operations/Certificates*	
Eyewash and Safety Shower Acceptance Certificate	09.09.04	Interim T/O					EHS		*Operations/Certificates*	
Fall Protection Tie-Point Certifications	09.09.05	Final T/O					EHS		*Operations/Certificates*	
Exhaust Device Certifications (ASHRAE 110)	09.09.06	Interim T/O					EHS		*Operations/Certificates*	
Elevator Certificate	09.09.07	Interim T/O					QAQC / O&M		*Operations/Certificates*	
Sheet Metal Certificate	09.09.08	Interim T/O					Project Mgmt		*Operations/Certificates*	
EQUIPMENT LIST with PM numbers (w/prefunctional checklists for Cx'd equipment)	**09.10**	**Same time as O&M Manuals**					**SPT**		**Operations/Equipment list**	
TRAINING	**09.11**	**Interim & Final if Updated**							**Operations/Training Record**	
Training Records	09.11.01	Interim & Final if Updated					SPT		*Operations/Training Record*	
Training Videos	09.11.02	Interim & Final if Updated					SPT		*Operations/Training Record*	
WARRANTIES (actual and list)	**09.12**	**Interim & Final if Updated**					**SPT**		**Operations/Warranty**	
FIRE ALARM POINTS LIST	**09.13**	**Interim & Final if Updated**					**FEG**		**Operations/Fire Alarm Points**	
VALVE TAG LIST	**09.14**	**Interim & Final if Updated**					**FEG**		**Operations/Valve Tag Chart**	
CAMBRIDGE FIRE DEPT. BINDER	**09.15**	**Interim T/O**					**FEG**		**Operations/Cambridge Fire Dept Binder**	
ARC FLASH / SHORT CIRCUIT STUDY	**09.16**	**Interim & Final if Updated**					**FEG**		**Electrical/Arc Flash Study**	
VENDOR REPORT CARDS	**09.17**	**Final T/O**					**Project Mgmt**		**N/A**	
SUBMITTALS	**09.18**	**Interim & Final if Updated**							**Operations/Submittal**	
Existing Conditions	09.18.01	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Concrete	09.18.02	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Masonry	09.18.03	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Misc. Metals	09.18.04	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Structural Steel	09.18.05	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Millwork	09.18.06	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Thermal and Moisture Protection	09.18.07	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Openings	09.18.08	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Finishes	09.18.09	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
Mechanical (HVAC)	09.18.10	Interim & Final if Updated					FEG		*Operations/Submittal*	
Electrical	09.18.11	Interim & Final if Updated					FEG		*Operations/Submittal*	
Plumbing	09.18.12	Interim & Final if Updated					FEG		*Operations/Submittal*	
Fire Alarm	09.18.13	Interim & Final if Updated					FEG		*Operations/Submittal*	
Fire Protection - Sprinklers	09.18.14	Interim & Final if Updated					FEG		*Operations/Submittal*	
Controls	09.18.15	Interim & Final if Updated					FEG		*Operations/Submittal*	
Other	09.18.16	Interim & Final if Updated					Project Mgmt		*Operations/Submittal*	
RECORD OF MATERIALS TRANSFERRED (Attic Stock)	**09.19**	**Final T/O**					**Project Mgmt**		**Operations/Record of Materials Transfer**	
All Keys Returned	**N/A**	**Final T/O**					**Locksmiths**		**N/A**	
All Access Cards Returned or Deactivated	**N/A**	**Final T/O**					**IST physical Security**		**N/A**	

**** All reports should be bookmarked & have text recognition enabled**

TURNOVER DOCUMENTATION DESCRIPTIONS

1. Document Descriptions

Some items identified in the turnover document package are clear as to what is to be received (E.g. permits, test results, certificates, etc.). Others may require further definition as to what should be included. Below we clarify a number of the deliverables. For a complete list of Turnover Documents and the required formats, please refer to the R&M Project Turnover Document List above:

2. Certificate of Inspection (assembly spaces)

Required for any assembly space/room that has 50 or more people. For any building with an Assembly Space, a certificate of Assembly would also be required for the building.

The CI (certificate of Inspections) should be posted in an obvious location in a MIT Standard acrylic holder: (see MIT Signage Standard for specifics)

3. Architect Contract Drawings/ Specifications (PDF & DWG)

Contract drawings are prepared by the architect during the Construction Document (CD) phase of design. They are the drawings that form the basis of the construction. These drawings are to be provided during the Interim Turnover as a supplement to the draft as-built set and provide additional information to the R&M team while the final as-builts and record drawings are being completed.

4. Cambridge Fire Department Closeout Binder

The fire department closeout binder is important is achieving approval from the Cambridge Fire Department in order to obtain the certificate of occupancy. This binder should include the following *(as applicable to the project)*:

- Certificate of completion
- Copy of Construction Project Fire Prevention Program Manager form per NFPA 241
- Sprinkler permits
- Material and test certificates for piping
- Fire pump acceptance test and curve
- Generator acceptance test
- Fire alarm record of completion
- Smoke control testing
- Radio signal testing
- Flammability certificates for interior finishes
- Engineer's affidavit
- Evacuation plan
- Place of assembly permit

5. As-Built (Conformed) Drawings

The as-built (conformed) drawings are prepared by the contractor showing typically in red ink, on-site changes to the original construction documents. This set of drawings depicts the actual conditions of the completed construction "as it was built".

Due to the nature of as-built drawings, they cannot be completed and turned over by the DBO or Interim Turnover. Therefore, the project team is required to provide an interim set of drawings that consist of either an electronically scanned copy of the conformed drawing set or a draft electronic copy for use by R&M until the record set is complete. These drawings are to be included with the interim turnover document package. For final turnover, the contractors are required to provide a finalized electronic copy of these drawings.

6. Project Equipment List and Removed Equipment List

The Project Equipment List template is developed by MIT's R&M Planning and Scheduling Group and the latest version is provided to the Engineer Of Record to be populated with the full list of new, repaired and existing-to-remain pieces of equipment during the design phase. During construction, the contractors will update the list information based on the as-built conditions and complete the population of specific installed equipment data unavailable during design (E.g. serial numbers)

The Removed Equipment List template is developed by MIT's R&M Planning and Scheduling Group and the latest version is provided to the Engineer Of Record to be populated with the full list of removed pieces of equipment during the design phase.

See Appendix E for sample list templates.

7. Warranty and Contact List

Warranty List: The warranty information shall include the following:

- List of all warranty items including O&M references for proper maintenance so as to maintain the valid warranties, as well as unauthorized actions that may invalidate the warranty.
- Warranty start dates and durations of both the building warranty, as well as individual pieces of equipment.
- Name(s) of specific individuals from the CM/GC to administer the warranty period
- Administrative process for warranty item correction including instructions for reporting defects covered by warranty to the CM/GC or other appropriate contractor

Contact List: The purpose of the contractor contact list is to provide the R&M group with a list of people to contact in the event that they need support from the installing contractors to answer a question or resolve a problem. The contact lists shall include the following information for each contact at a minimum:

- Name of Company
- Name of Company Representative (specific person)
- Direct Phone Number to Representative
- Direct Email Address to Representative

- Hours of Business (Include afterhours/off-hours contact information if applicable)
- Systems applicable to the Company Listed

8. Approved Testing, Adjusting and Balancing (TAB) Report

At a minimum, a draft Testing, Adjusting and Balancing (TAB) report is to be included in the interim turnover package. This report shall be provided under a separate cover from the rest of the mechanical O&M documentation.

The final approved Testing, Adjusting and Balancing (TAB) report is to be included in the final turnover package. Again, this report shall be provided under a separate cover from the rest of the mechanical O&M documentation. The MIT shall not accept the HVAC systems without a completed TAB report approved by the engineer of record.

9. Final Commissioning Report

See MIT's Commissioning Standard for a definition of the Final Commissioning Report.

Interim (Draft) Commissioning Report

A draft final commissioning report shall be submitted to SPT for their review. Any comments on these packages will be sent back to the Commissioning Provider, through the SPT, for correction and resubmission.

Final Commissioning Report

The final version of the commissioning report shall be uploaded into MIT's Meridian document archive prior to the final turnover of the space. This shall be indicated in the Final Turnover package.

10. Operation & Maintenance Manuals (O&Ms)

Operational and Maintenance Manuals include equipment specifications and schedules, drawings and overall information needed to maintain installed equipment.

Interim (Draft) O&M Manuals

A draft set of O&M manuals shall be submitted to the FIS department for their review. (For FIS requirements regarding these turnover packages, see the current latest revision of the FIS "CAD&DIGITAL_FILE_GUIDELINES" and "ARCHIVING_GUIDELINES"). Any FIS comments on these packages will be sent back to the author, through the PMD, for correction and resubmission.

Final O&M Manuals

The final version of the O&M manuals is due before the first day of training. The O&M manuals shall be uploaded into MIT's Meridian document archive for R&M' use in operating the building once the DBO is reached. A copy shall be provided to the FIS department for record and document archiving in the Meridian document archive. This shall be indicated in the Final Turnover package.

11. Training Documentation Package

The training documentation shall be turned over as a part of the turnover package and shall include the following grouped and formatted per the executed training sessions:

- The Training Plan
- All approved training agendas
- All training handout materials
- The Training Record documents
- Training videos *(Only required at Final T/O)*

A copy of the training material and training videos shall be provided to the FIS department for record and document archiving in the Meridian document archive. This shall be indicated in the Final Turnover package.

12. Project Files

Project files refers to the folders of files collected during the project execution. These files are to be available in the eBuilder system for future access if required.

13. Architect's Record Drawings and Specifications

Record drawings are prepared by the architect and reflect on-site changes the contractor noted in the conformed set of drawings. They are often compiled as a set of on-site changes made for the owner per the owner-architect contract.

Due to the nature of record drawings, they cannot be completed and turned over by the DBO or Interim Turnover. Therefore, the project team is required to provide an interim set of drawings that consist of an electronically scanned copy of the conformed drawing set for use by R&M until the record set is complete. These drawings are to be included with the interim turnover document package.

Draft Record Drawing Set

A draft set of record drawings shall be submitted to the FIS department for their review. The project shall schedule all drawing reviews by the construction manager or general contractor, consultant engineers and architects as required verifying accuracy and completeness of drawing information, prior to submission to FIS. Any FIS comments on these packages will be sent back to the author, through the PMD, for correction and resubmission. (For FIS requirements regarding these turnover packages, see the current latest revision of the FIS "CAD&DIGITAL_FILE_GUIDELINES" and "ARCHIVING_GUIDELINES").

Final Record Drawing Set

Prior to Final Turnover, the final record drawing package shall be provided to the FIS department for upload into MIT's Meridian document archive. This shall be indicated in the Final Turnover package.

14. Coordination Drawings

Per ASHRAE, coordination drawings show the work of all trades to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances.

15. Submittals

Product data submittals, samples, and shop drawings are required primarily for the Architect and Engineer to verify that the correct products will be installed on the project. A shop drawing is a drawing or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator typically required for pre-fabricated components.

The turnover package shall include only the final approved submittals and shop drawings. Any marked "Approved as Noted" must have the accompanying notes from the designer of record.

16. Certificate of Occupancy Binder

The certificate of occupancy binder should include the following *(as applicable to the project)*:

- Certificate of occupancy application
- A cost affidavit certifying the final cost of the project;
- Affidavits from the architect and/or engineer and the contractor certifying that the project was built in accordance with the approved plans and all applicable codes;
- A final inspection conducted by the following inspectors: fire, wiring, plumbing, zoning, and building;
- Written approval from the zoning inspector that any special permit requirements have been met.

APPENDICES

E. PROJECT EQUIPMENT LIST AND REMOVED EQUIPMENT SUBMITTAL

Project Equipment List - Asset ID Upload Form

Date Filled Out:
Version
Project/Work Order #:
REQUIRED FIELDS
DARTMOUTH TO ASSIGN

Instructions: See written guidelines in A/E and Contractor requirements. If not provided, then request requiremnets from the project manager.

Asset ID Range (Start)
Asset ID Range (End)

DARTMOUTH		Required information prior to obtaining physical Asset ID Tags												As-built Information Required After Installation							
Parent Asset ID	Description	Status	Equipment Tag	Skid Tag	A/E Description	Building Number	Room Number	Location Info	Related Equipment	System	Area Serviced	Maintenance Owner	Project Number	Asset ID#	Manufacture Name	Model Number	Serial Number	Warranty Start	Warranty End	Approved Submittal Number	Notes
		NEW		LS-1-2	LIFT STATION	E37	310	NEAR SINK		PLUMBING DRAINAGE LAB WASTE	E37-310 ACID LAB	DC-CS	12345	To be filled out after installation							
		NEW	P10	LS-1-2	WASTE WATER PUMP	E37	310	NEAR SINK	LS-1-2	PLUMBING DRAINAGE LAB WASTE	E37-310 ACID LAB		12345								
		NEW		AC-1	AIR COMPRESSOR	E37	515	5TH FL MECH RM		HVAC COMPRESSED AIR	E37 ANIMAL QUARTERS		12345								
		NEW	P1	AC-1	COMPRESSOR	E37	515	5TH FL MECH RM	AC-1	HVAC COMPRESSED AIR	E37 ANIMAL QUARTERS		12345								
		NEW	P2	AC-1	COMPRESSOR	E37	515	5TH FL MECH RM	AC-1	HVAC COMPRESSED AIR	E37 ANIMAL QUARTERS		12345								
		NEW		AC-1	AIR DRYER	E37	515	5TH FL MECH RM	AC-1	HVAC COMPRESSED AIR	E37 ANIMAL QUARTERS		12345								
		NEW	T1	AC-1	COMPRESSED AIR TANK	E37	515	5TH FL MECH RM	AC-1	HVAC COMPRESSED AIR	E37 ANIMAL QUARTERS		12345								
		NEW		SP-1	DUPLEX SUMP PUMP	E37	0030	BSMT MECH ROOM		PLUMBING DRAINAGE STORM DRN	E37		12345								
		NEW	P1	SP-1		E37	0030	BSMT MECH ROOM	SP-1	PLUMBING DRAINAGE STORM DRN	E37		12345								
		NEW	P2	SP-1		E37	0030	BSMT MECH ROOM	SP-1	PLUMBING DRAINAGE STORM DRN	E37		12345								
		NEW		EP-1	DUPLEX SEWAGE EJECTOR	E37	0030	BSMT MECH ROOM		PLUMBING DRAINAGE SANITARY	E37		12345								
		NEW	P1	EP-1	EJECTOR PUMP	E37	0030	BSMT MECH ROOM	EP-1	PLUMBING DRAINAGE SANITARY	E37		12345								
		NEW	P2	EP-1	EJECTOR PUMP	E37	0030	BSMT MECH ROOM	EP-1	PLUMBING DRAINAGE SANITARY	E37		12345								
		NEW		CWB-1	TRIPLEX BOOSTER PUMP SYSTEM	E37	515	5TH FL MECH RM		PLUMBING POTABLE WATER	E37		12345								
		NEW	P1	CWB-1	DOMESTIC WATER BOOSTER PUMP	E37	515	5TH FL MECH RM	CWB-1	PLUMBING POTABLE WATER	E37		12345								
		NEW	P2	CWB-1	DOMESTIC WATER BOOSTER PUMP	E37	515	5TH FL MECH RM	CWB-1	PLUMBING POTABLE WATER	E37		12345								
		NEW	P3	CWB-1	DOMESTIC WATER BOOSTER PUMP	E37	515	5TH FL MECH RM	CWB-1	PLUMBING POTABLE WATER	E37		12345								
		NEW		CAS-1	COMPRESSED AIR SYSTEM	E37	515	5TH FL MECH RM		FIRE PROTECTION SUPPRESSION	E37 FIRE SUPRESSION		12345								
		NEW	P1	CAS-1	AIR COMPRESSOR	E37	515	5TH FL MECH RM	CAS-1	FIRE PROTECTION SUPPRESSION	E37 FIRE SUPRESSION		12345								
		NEW	T1	CAS-1	AIR COMPRESSOR TANK	E37	515	5TH FL MECH RM	CAS-1	FIRE PROTECTION SUPPRESSION	E37 FIRE SUPRESSION		12345								
		NEW	EF-22		EXHAUST FAN	E37	ROOF	NORTH ROOF	FH-1	HVAC AIR HANDLING EXHAUST	LAB 3-345 SPRAY BOOTH		12345								
		NEW	FH-1		FUME HOOD	E37	345		EF-22	HVAC AIR HANDLING EXHAUST	LAB 3-345 SPRAY BOOTH		12345								
		NEW		AHU-1	AIR HANDING UNIT	E37	515	5TH FL MECH RM		HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	S1	AHU-1		E37	515	INSIDE AHU-1	AHU-1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	S2	AHU-1		E37	515	INSIDE AHU-1	AHU-1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	S3	AHU-1		E37	515	INSIDE AHU-1	AHU-1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	S4	AHU-1	VARIABLE FREQUENCY DRIVE	E37	515	INSIDE AHU-1	AHU-1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	VFD-1	AHU-1	VARIABLE FREQUENCY DRIVE	E37	515	INSIDE AHU-1	AHU-1 S1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	VFD-2	AHU-1	VARIABLE FREQUENCY DRIVE	E37	515	INSIDE AHU-1	AHU-1 S2	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	VFD-3	AHU-1	VARIABLE FREQUENCY DRIVE	E37	515	INSIDE AHU-1	AHU-1 S3	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	VFD-4	AHU-1	VARIABLE FREQUENCY DRIVE	E37	515	INSIDE AHU-1	AHU-1 S4	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	HW-1	AHU-1	HEAT WHEEL	E37	515	INSIDE AHU-1	AHU-1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								
		NEW	FP-H1	AHU-1	PUMP FREEZE PROTECTION	E37	515	INSIDE AHU-1	AHU-1	HVAC AIR HANDLING CIRC.	FORUM - E37 1ST FLOOR		12345								

a) Asset ID - Unique 6 Digit number assigned and physically attached to each inventoried equipment. Used track to track maintenance history.

b) Status - This is either New or Existing. Existing equipment includes two types; First, equipment that is altered in regards to area served, location or function, Second, existing equipment that is related to new equipment and tied together with the Parent Asset(see definition below).

c) A/E Description - Description provided in project documents

d) Skid Tag - The Skid or System Tag is shown in the P&ID or plans/ schedules/risers or labeling on the skid. For example, a pump skid might have two pumps. The pumps are identified by the Equipment Tag (P1 and P2) and the associated Skid is identified by the Skid Tag (PMP-1). The logic follows for equipment that is part of AHU systems and other skids. Does not apply to all assets.

e) Equipment Tag - The Equipment Tag is shown in the P&ID or plans/ schedules/risers or labeling on the installed equipment. For example, a pump skid might have two pumps. The pumps are identified by the Equipment Tag (P1 and P2) and the associated Skid is identified by the Skid Tag (PMP-1). The logic follows for equipment that is part of AHU systems and other skids.

f) Area served - Specific location information as applicable. Use room number(s) for dedicated equipment. Use floor or building for general infrastructure.

g) System/Function - The best suited and most specific system available in the drop down list referenced from the System Index. The list is restricted to meet MIT reporting requirements. No modifications are accepted.

h) Related Equipment - Provide Equipment Tag and Skid Tag or Asset ID for related equipment. Hood/Exhaust Fan, VFD/Pump, Evaporator/Condenser, etc. Parent Asset provides the link between related equipment. In some cases related equipment is existing. This equipment should be listed in the upload form with the "Existing Status".

i) Maintenance Owner - The DC department responsible for maintenance of the equipment. In most cases this is DoF. However, there may be some equipment special cases where equipment from other departments is inventoried.

j) Approved Submittal Number - Reference to submittal(s) relating to each equipment listed in the project equipment list.

DARTMOUTH		Required information prior to obtaining physical Asset ID Tags											As-built Information Required After Installation						
Parent Asset ID	Description	Status	Equipment Tag	Skid Tag	A/E Description	Building Number	Room Number	Location Info	Related Equipment	System	Area Serviced	Maintenance Owner	Project Number	Asset ID#	Manufacture Name	Model Number	Serial Number	Warranty Start	Warranty End	Approved Submittal Number	Notes
		NEW	VAV 1-1	AHU-1	VARIABLE AIR VOLUME	E37	100LA	FORUM 1ST FL LOBBY	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL LOBBY	DC-CS	12345								
		NEW	VAV 1-2	AHU-1	VARIABLE AIR VOLUME	E37	100LA	FORUM 1ST FL LOBBY	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL LOBBY		12345								
		NEW	VAV 1-3	AHU-1	VARIABLE AIR VOLUME	E37	100LA	FORUM 1ST FL LOBBY	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL LOBBY		12345								
		NEW	VAV 1-4	AHU-1	VARIABLE AIR VOLUME	E37	192	FORUM 1ST FL RECEPTION	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL RECEPTION		12345								
		NEW	VAV 1-5	AHU-1	VARIABLE AIR VOLUME	E37	192	FORUM 1ST FL RECEPTION	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL RECEPTION		12345								
		NEW	VAV 1-6	AHU-1	VARIABLE AIR VOLUME	E37	162	FORUM 1ST FL FEM RESTROOM	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL FEM RESTROOM		12345								
		NEW	VAV 1-7	AHU-1	VARIABLE AIR VOLUME	E37	162	FORUM 1ST FL FEM RESTROOM	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL FEM RESTROOM		12345								
		NEW	VAV 1-8	AHU-1	VARIABLE AIR VOLUME	E37	162	FORUM 1ST FL FEM RESTROOM	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL FEM RESTROOM		12345								
		NEW	VAV 1-9	AHU-1	VARIABLE AIR VOLUME	E37	162	FORUM 1ST FL FEM RESTROOM	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL FEM RESTROOM		12345								
		NEW	VAV 1-16	AHU-1	VARIABLE AIR VOLUME	E37	100CB	FORUM 1ST FL NEAR ELEV G	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL NEAR ELEV G		12345								
		NEW	VAV 1-17	AHU-1	VARIABLE AIR VOLUME	E37	136	FORUM 1ST FL MECH/PUMP RM	AHU-1	HVAC AIR HANDLING CIRC.	FORUM 1ST FL MECH/PUMP RM		12345								
		NEW	FCU-3-1		FAN COIL UNIT	E37	310	ABOVE CEILING		HVAC AIR HANDLING CIRC.	E37-310 ACID LAB		12345								
		NEW			FIRE EXTINGUISHER	E37	100CB	CORRIDOR		FIRE PROTECTION SUPPRESSION	CORRIDOR		12345								
		NEW			COUPON RACK	E37	0030	BSMT MECH ROOM		HVAC HOT WATER	E37 HOT WATER FOR AHUs		12345								
		NEW			MIXING VALVE	E37	0030	BSMT MECH ROOM		PLUMBING EMERGENCY WATER	E37 SAFETY SHOWERS AND EYE WASH		12345								
		NEW			SAFETY SHOWER AND EYE WASH	E37	310	ACID LAB		PLUMBING EMERGENCY WATER	E37-310 ACID LAB		12345								
		NEW		WNS-1	WASTE WATER NEUTRALIZATION STATION	E37	0030	BSMT MECH ROOM		PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	P10	WNS-1	WASE WATER PUMP	E37	0030	BSMT MECH ROOM	WSN-1	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	P20	WNS-1	WASTE WATER PUMP	E37	0030	BSMT MECH ROOM	WSN-1	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	CF10	WNS-1	CHEMICAL FEED	E37	0030	BSMT MECH ROOM	WSN-1	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	CF20	WNS-1	CHEMICAL FEED	E37	0030	BSMT MECH ROOM	WSN-1	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	TK10	WNS-1	DILLUTION TANK	E37	0030	BSMT MECH ROOM	WSN-1	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	VFDA	WNS-1	VARIABLE FREQUENCY DRIVE	E37	0030	BSMT MECH ROOM	WSN-1 P10	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								
		NEW	VFDB	WNS-1	VARIABLE FREQUENCY DRIVE	E37	0030	BSMT MECH ROOM	WSN-1 P20	PLUMBING DRAINAGE LAB WASTE	BLDG 3,7,10,E15, E18		12345								

PROJECT EQUIPMENT LIST GLOSSARY

NOTE: The following table takes all equipment listed in the DoF SAP equipment glossary and provides additional details regarding the equipment as well as any required parent/child (SAP). This is intended as a supporting tool to help DC project managers, contractors A/E understand what categories of equipment are inventoried by Campus Services - Operations.

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
AIR COMPRESSOR	Air compressor for laboratory or control air applications. Does not include Air Compressors maintained by DLC or CUP. Sub to air compressor SKID.	*CHILD*	Skid Air Compressor
AIR COMPRESSOR FIRE SUPPRESSION	Air compressors associated with dry pipe and pre-action type sprinkler systems.	*SOMETIMES*	Sometimes related to large AHU with dedicated sprinkler system.
AIR COMPRESSOR SKID	Air Compressor Skid. This includes all compressors that serve the same function and area. They are not always on the concrete pad or platform.	*PARENT*	Related equipment is usually shown on flow or riser diagram; Air Compressors, Tanks, Air Dryers.
AIR DRYER REFRIGERATED	Dries air by passing it through a refrigerated heat exchanger which cools the air and allows water vapor to condense and drain out, thereby preventing corrosion.	*CHILD*	Skid Air Compressor
AIR DRYER REGENERATIVE DESICCANT	Desiccant air dryers use solid adsorbents in granule form to reduce the moisture content of air in a compressed air system.	*CHILD*	Skid Air Compressor
AIR HANDLING UNIT	Described as such in mechanical drawings. Coils located within the unit are considered part of the AHU and are not inventoried with separate Asset ID's.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exhaust Air Handling Unit(EAHU), Supply and return Fans, VFDs, Freeze Pumps, VAVs, Heat Wheels, Re-heat coils.
AREA DRAINS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
BACKFLOW PREVENTER	Backflow preventer valve for hydronic systems.	*NO*	
BASIN STORM CATCH	Water collection basin for capturing sediment, debris and associated pollutants. Components typically include sump pump(s).	*NO*	
BATTERY BANK SWITCH GEAR	Battery systems for substations and switchgear. Components include batteries, battery racks, chargers, inverters, and battery test equipment.	*CHILD*	MEDIUM VOLTAGE BREAKER
BIORETENTION AREA	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
BREAKER DISTRIBUTION	Low voltage circuit breaker downstream of the main breaker. Feeds distribution panelboards, busduct, and major equipment (emergency generators, fire pumps, etc.). Sub (child) to SWITCH SF6.	*CHILD*	SWITCH SF6
BREAKER MAIN	Low voltage main circuit breaker. First breaker downstream of medium voltage transformer. Feeds distribution breakers. Sub (child) to SWITCH SF6.	*CHILD*	SWITCH SF6
BREAKER MEDIUM VOLTAGE	Medium voltage breaker switch installed as an intermediary disconnect between the SF-6 switch and medium voltage transformer. Sub (child) to SWITCH SF6.	*CHILD*	SWITCH SF6
BREAKER TIE	Medium voltage breaker which functions as an intermediary disconnect between two independent medium voltage transformers.	*CHILD*	SWITCH SF6
CABINET BIOLOGICAL SAFETY	Enclosed, ventilated laboratory containment device with a defined biosafety level, hard ducted to lab exhaust system.	*CHILD*	Fan Exhaust Hood Lab

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
CHILLER	A system's primary source of chilled water used for cooling air and or process chilled water, which removes heat from a liquid via a vapor-compression or absorption refrigeration cycle. Does not include point of chilled water at air conditioners, drinking fountains, refrigerators, freezers, etc.	*PARENT*	Related equipment is usually shown on flow or riser diagram. Cooling tower, pumps, exchangers, filters, coupon rack, water treatment, etc.
COIL CHILLED WATER	Chilled water coil which is independent of supply fans or packaged units.	*NO*	
COIL PREHEAT	Preheat coil which is part of air handling units or packaged units.	*CHILD*	AHU
COIL REHEAT	Electric or hydronic heat transfer element used to reheat conditioned air before it enters a particular space. Typically used in laboratory, clean room, medical, and high ventilation applications.	*CHILD*	AHU
COMPACTOR TRASH	Hydraulically powered trash compactor used to reduce the size of waste or biomass material.	*NO*	
CONDENSER	Condenser, condensing unit, or heat pump/condensing unit combination used to provide heating or cooling. Superior (parent) to corresponding evaporators.	*PARENT*	Evaporator
CONDENSER ENVIRONMENTAL ROOM	Condensing unit used as the source of cooling for laboratory environmental cold rooms. Superior (parent) to cold room.	*PARENT*	Environmental Room
COOLING TOWER	Heat rejection device used to cool condenser water from a chiller that provides cold water for a chilled water system.	*CHILD*	CHILLER
COOLING TOWER SAND FILTER	Filter using sand media to remove suspended solids and reduce associated corrosion, scaling, and micro-biological growth from a condenser water system.	*CHILD*	COOLING TOWER
COUPON RACK	Corrosion coupons are pre-weighed and measured metal strips which are mounted in a special pipe system called a coupon rack. They are used to estimate the rate of metal corrosion.	*CHILD*	HEAT EXCHANGER SKID, COOLING TOWER, HEAT EXCHANGER
DEEP SUMP AND HOODED CATCH BASINS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
DEHUMIDIFIER	Device for removing humidity from air within a space or from ducted air in an HVAC system.	*CHILD*	AHU
DETENTION BASINS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
DOOR ELEVATOR MACHINE ROOM	Hinged swing door enclosing elevator machine rooms.	*NO*	
DOOR EXTERIOR	Exterior manual or motorized hinged swing door or revolving door.	*NO*	
DOOR FIRE	Fire rated hinged swing door or motorized overhead door used for fire & smoke containment between adjoining buildings and/or along egress routes.	*NO*	
DOOR ROLLUP EXTERIOR	Manual or motorized overhead rollup door.	*NO*	
DOOR ROLLUP INTERIOR	Manual or motorized overhead rollup door.	*NO*	
DOOR ROOF	Hinged swing door or hatch door at rooftop access points.	*NO*	
DRY WELLS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
EJECTOR KITCHEN	Pump located in an ejector pit used to remove effluent water from a kitchen drainage system or pump used to lift kitchen waste when plumbing fixtures or storage tank is below the level of the main sewer or septic line.	*CHILD*	Ejector Pit
EJECTOR PIT	Sewer Ejector Pit. Pit is a confined space, usually containing a duplex pump system.	PARENT	Ejector Sanitary

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
EJECTOR SANITARY	Pump for removal of sewage waste when plumbing fixtures or storage tank is below the level of the main sewer or septic line.	*CHILD*	Ejector Pit
ELEVATOR DUMB WAITER	Dumb waiter carriage, identified by state ID.	*NO*	
ELEVATOR FREIGHT	Freight elevator carriage, identified by state ID. Asset ID = State ID.	*NO*	
ELEVATOR PASSENGER	Passenger elevator carriage, identified by state ID. Asset ID = State ID.	*NO*	
ELEVATOR WHEELCHAIR	Single story wheelchair lift, identified by state ID. Asset ID = State ID.	*NO*	
EMERGENCY BATTERY UNIT EXIT LIGHT	Emergency battery backup for an illuminated exit sign fed by only normal power.	*NO*	
EMERGENCY BATTERY UNIT LIGHT FIXTURE	Emergency battery backup for Wall- or ceiling-mounted emergency light fixture.	*NO*	
EMERGENCY GENERATOR	Interior, exterior, or enclosed emergency generator.	*PARENT*	Radiator, fuel tank, transfer switch, fuel oil pumps
EMERGENCY GENERATOR RADIATOR	Heat rejection radiators associated with emergency generators.	*CHILD*	Emergency Generator
EMERGENCY SAFETY EYE WASH	Laboratory emergency eye wash stations fed from tempered potable water system.	*NO*	
EMERGENCY SAFETY SHOWER	Laboratory emergency shower stations fed from tempered potable water system.	*NO*	
EMERGENCY SAFETY SHOWER & EYE WASH	Laboratory emergency shower and eyewash combination stations fed from tempered potable water system.	*NO*	
ENERGY RECOVERY UNIT	Described as such in mechanical drawings. Coils located within the unit are considered part of the ERU or HRU and are not inventoried with separate Asset ID's.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Supply and return Fans, VFDs, Freeze Pumps, VAVs, Heat Wheels, Re-heat coils.
ENGINE FIRE PUMP	Diesel engine that serves as a power source for the fire pump.	*CHILD*	Pump Fire
ENGINE NATURAL GAS	Natural gas engine used to power other inventoried equipment. Not a building wide emergency generator.	*CHILD*	Fan, Pump or other inventoried equipment
ENVIRONMENTAL ROOM	Enclosed laboratory room capable of being controlled to a specific temperature. Cooled by condenser environmental room.	*CHILD*	Condenser Environmental Room
EVAPORATOR	Split system evaporator coil associated with condensing unit.	*CHILD*	Condenser
EXCHANGER CHILLED WATER	Chilled water or chilled process water fluid heat exchanger.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Cooling Tower, Exchanger Skid, Exchanger, Pump, Water Treatment, Expansion Tank, Filter
EXCHANGER DOMESTIC HOT WATER	Fluid heat exchanger used on potable domestic hot water systems. Also includes instantaneous water heaters and electric water heaters.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchanger Skid, Exchanger, Pump, Expansion Tank
EXCHANGER DOMESTIC HOT WATER FUEL	Gas or fuel oil fired, or electric boiler or hot water generator used on potable domestic hot water systems. Includes point-of-use water heaters.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchanger Skid, Exchanger, Pump, Expansion Tank
EXCHANGER GLYCOL	Fluid to fluid heat exchanger where one or more fluid includes glycol.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Cooling Tower, Exchanger Skid, Exchanger, Pump, Water Treatment, Expansion Tank, Filter
EXCHANGER HEATING HOT WATER	Heat exchanger or hot water generator used in hot water heating system. Types include plate and frame or shell and tube.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchanger Skid, Exchanger, Pump, Water Treatment, Expansion Tank, coupon rack

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
EXCHANGER HEATING HOT WATER FUEL	Gas or fuel oil fired, or electric boiler dedicated to heating hot water systems. Types include hot water heaters and steam boilers.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchanger Skid, Exchanger, Pump, Water Treatment, Expansion Tank, coupon rack
EXCHANGER HVAC SKID	Mechanical System Heat Exchanger Skid with multiple exchangers serving the same function and area.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchanger, Pump, Water Treatment, Expansion Tank, Filter
EXCHANGER PLUMBING PROCESS WATER	Fluid-to-fluid heat exchanger dedicated to process water systems, i.e. systems that are not used for heating, domestic hot water, eyewash, or safety showers	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchanger Skid, Exchanger, Pump, Expansion Tank
EXCHANGER PLUMBING SKID	Plumbing System Heat Exchanger Skid with multiple exchangers serving the same function and area.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exchangers, Pumps, Expansion Tanks
EXCHANGER STEAM	Steam generator for laboratory or building systems. Steam to Steam OR water to steam.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Equipment maintained by lab is not inventoried.
EXCHANGER STEAM FUEL	Gas or fuel oil, or electric steam generator for laboratory or building systems.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Equipment maintained by lab is not inventoried.
EXCHANGER VALANCE	Valance heating and cooling units are simply hydronic coils mounted in an architectural enclosure. The units are mounted near the ceiling, usually along an outside wall, and provide draft-free, energy-efficient heating and cooling using natural convection.	*NO*	
EXHAUST AIR HANDING UNIT	Described as such in mechanical drawings, EAHU.	*PARENT*	Related equipment is usually shown on flow or riser diagram. Fan Exhaust, VFD, EAV
FAN EXHAUST GENERAL	Exhaust fan for stairwells, corridors, offices, classrooms, and/or common area exhaust.	*SOMETIMES*	AHU, VFD, SUPPLY FAN, MAK-UP AIR
FAN EXHAUST HOOD KITCHEN	Exhaust fan dedicated to kitchen hood exhaust. Related hood(s) are inventoried with separate asset ID.	*PARENT*	Hood Kitchen, VFD
FAN EXHAUST HOOD LAB	Exhaust fan dedicated to lab hoods, fume hood, slot hoods, biological safety cabinets, and snorkel drops. Related hood(s) and biological safety cabinets are inventoried with a separate asset ID. Snorkel drops do not receive a separate asset ID.	*PARENT*	Hood Lab, Hood Fume, Biological Safety Cabinet
FAN EXHAUST TOILET	Exhaust fan dedicated to toilet room exhaust.	*NO*	
FAN RETURN	Fan used to return air to Air Handlers and Packaged Units. Fans can be housed within or separate from an air handling unit.	*PARENT*	VFD
FAN SUPPLY	All supply fans except for FAN SUPPLY FUEL and FAN SUPPLY HOOD LAB, and self-contained packaged units. Considered part of the Air Handling Unit. VFDs or other equipment are sub (child) only if external to unit.	*PARENT*	VFD
FAN SUPPLY FUEL	Supply fan dedicated to fuel storage and emergency generator rooms.	*PARENT*	VFD
FAN SUPPLY HOOD LAB	Supply fan dedicated to laboratory spaces and lab hood make-up air.	*PARENT*	VFD
FIELD UNDERDRAIN	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
FIRE EXTINGUISHER	Handheld rechargeable dry chemical or CO2 type fire extinguisher.	*NO*	
FIRE HYDRANT	Pressurized above-ground connection that provides firefighters access to a water supply. Typically connected to city water mains.	*NO*	
FOUNTAIN DRINKING	Drinking water fountain. Components include water filter(s) and chiller.	*NO*	
GRAVEL WETLANDS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
HEAT TRACE DIWATER	Heat trace wire and heat trace control module dedicated to deionized water system piping.	*NO*	
HEAT TRACE EXTERIOR	Heat trace wire and heat trace control module dedicated to de-icing exterior rain gutters, drains and overhangs.	*NO*	
HEAT TRACE FIRE	Heat trace wire and heat trace control module dedicated to fire protection system piping.	*NO*	
HEAT WHEEL	As described in mechanical drawings	*CHILD*	ERU, HRU, RTU, AHU, MAU
HOOD FUME	Enclosed, ventilated exhaust hood for toxic fumes not specific to laboratory use. For hoods in labs, use HOOD LAB	*CHILD*	Fan Exhaust Hood Lab
HOOD KITCHEN	Open exhaust hood dedicated to kitchen exhaust.	*CHILD*	Fan Exhaust Hood Kitchen
HOOD LAB	Enclosed, ventilated laboratory exhaust hood or lateral slot exhaust hood.	*CHILD*	Fan Exhaust Hood Lab
HUMIDIFIER	Humidifiers used for general HVAC and/or laboratory purposes.	*CHILD*	ERU, HRU, RTU, AHU, MAU
ICE MACHINE	Ice machines located in public corridors.	*NO*	
INFILTRATION BASINS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
INSTRUMENTATION METER FLOW	Hydronic system flow meter.	*NO*	
LEVEL SPREADERS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
LIFT HYDRAULIC	Stationary loading dock lift, or portable scissor or boom type lift.	*NO*	
LIFT STATION LAB WASTE	Lift Station or Transfer station that stores and pumps untreated lab waste to another Lift Station or Central Neutralization Station(CNS) or Stand Alone Neutralization Station(SANS). Parent to Acid Waste Pumps.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Parent to Acid Waste Pumps. Reference Site Utility drawings for campus wide system map with CNS, SANS and major Lift Stations.
LIGHT UV	UV Light used for swimming pool sterilization.	*NO*	
MAKE UP AIR UNIT	Described as such in mechanical drawings, MAU. Coils located within the unit are considered part of the MAU and are not inventoried with separate Asset ID's.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exhaust Air Handling Unit(EAHU), Supply and return Fans, VFDs, Freeze Pumps, VAVs, Heat Wheels, Re-heat coils.
MANHOLE ELECTRIC	Sub-grade electrical manhole or vault, housing medium voltage electrical equipment, sump pump, or splices.	*NO*	
MANHOLE STEAM	Sub-grade steam manhole or vault, housing high and medium pressure steam equipment.	*NO*	
MANHOLE STORMWATER	Manhole or vault providing access to sub-grade storm water infrastructure. Filters may be a part of a storm water manhole	*NO*	
METER CONDENSATE	Meter that measures condensate flow within a steam system.	*NO*	
METER ELECTRIC	Meter that measures energy flow and/or demand. Sub (child) to any upstream switch.	*CHILD*	SWITCH SF6

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
METER GAS	Meter used to measure fuel gas flow.	*NO*	
METER STEAM	Meter used to measure steam flow.	*NO*	
METER WATER	Meters used to measure water flow.	*NO*	
MOTOR CONTROL CENTER	Remote assembly comprised of multiple enclosed sections, each containing motor starters, fuses or circuit breakers, and a power disconnect. Each assembly typically fed via a single bus.	*NO*	
OIL WATER SEPERATORS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
OTHER	Equipment which does not fall under any of the existing equipment descriptions.	*NO*	
PACKAGE UNIT	Self-contained packaged unit with on-board compressors. Internal components may include internal VFDs, fans, coils, or heat wheels. VFDs or other equipment are sub (child) only if external to unit.	*PARENT*	VFD
PANEL ANNUNCIATOR FIRE	Fire alarm panel which indicates the zone and approximate location of the source of alarm. Operates in conjunction with the fire control panel, warning strobes, and audible warning devices.	*CHILD*	Related equipment is usually shown on flow or riser diagram. Panel in fire command is used to apply measurement points for water flow test for entire system. Annunciators and Nodes are child to the main control panel in commend center.
PANEL CONTROL DISTILLED REVERSE OSMOSIS	Separately mounted control panel on reverse osmosis system. This represents the RO system or site.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. RO Panel, RO Skids,pumps,tanks.
PANEL CONTROL FIRE	Fire alarm control unit which acts as the controlling component of the fire alarm system. Receives information from nodes, annunciators, smoke detectors, CO detectors, etc. Panel located in fire command center.	*PARENT*	Related equipment is usually shown on flow or riser diagram. Panel in fire command is used to apply measurement points for water flow test for entire system. Annunciators and Nodes are child to the main control panel in commend center.
PANEL NODE FIRE	Fire alarm panel or remote addressable device with direct communication with the fire alarm network.	*CHILD*	Related equipment is usually shown on flow or riser diagram. Panel in fire command is used to apply measurement points for water flow test for entire system. Annunciators and Nodes are child to the main control panel in commend center.
PANELBOARD BRANCH CIRCUIT	Branch circuit panelboard generally contains overcurrent protection devices up to 30 amps and neutral connected loads, overcurrent protection over 30 amps and not neutral connected make up not more than 10% of devices. Panelboard is used to distribute energy to outlets, appliances, and lighting.	*NO*	
PANELBOARD CONTROL LIGHTING	Programmable lighting control panel for use with occupancy sensors, photocell sensors, time clocks, and remote switches. Includes Lutron Panels(Asset ID goes on the control panel). Does not include dimmer racks or relay panels.	*NO*	
PANELBOARD DISTRIBUTION	Panelboard that generally contains overcurrent protection over 30 amps and may or may not have neutral connections which delivers power to branch circuit panelboards, as well as motors and equipment.	*NO*	
POROUS PAVEMENT	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
POWER CONDITIONER	Includes only Power Conditioners/Harmonic Filters that are part of general building infrastructure with maintenance owned by MIT R&M. Excludes Power Conditioners that are part of DLC owned equipment.	*NO*	

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
POWER FACTOR CORRECTION CAPACITOR BANK	Several power factor correction capacitors tied in series, used with systems having large inductive loads.	*NO*	
PUMP CHEMICAL FEED	Peristaltic or diaphragm pump specifically to add chemicals into a fluid system. Typically considered part of a WATER TREATMENT CONDENSER WATER system, and not inventoried separately.	*CHILD*	Waste Water System
PUMP CHILLED PROCESS WATER	Pump in a process chilled water system.	*SOMETIMES*	VFD
PUMP CHILLED WATER	Chilled water pump other than process chilled water. Pumps occasionally operate as dual function pumps, circulating heating or cooling water to the heating hot water or chilled water systems, in which case, system operation would be dependent upon the season and BMS controls sequence. Superior (parent) to any associated VFD.	*SOMETIMES*	VFD
PUMP DOMESTIC WATER	Pump in a domestic potable water system.	*SOMETIMES*	Duplex and triplex pump skids, expansion tank, exchange
PUMP DRAIN CONDENSATE	Pump that removes waste condensate from equipment involved in HVAC heating and cooling, refrigeration, condensing boilers, or steam systems.	*CHILD*	FCU, Evaporator, Air Conditioner, AHU
PUMP EMERGENCY WATER	Booster pump used to increase or maintain pressure in a tempered water system supplying emergency showers, eyewashes, and shower/eyewash combination stations.	*PARENT*	VFD
PUMP FIRE JOCKEY	Pump which works with the main fire pump as part of the fire protection system, used to maintain system pressure when system is not in use.	*CHILD*	FIRE PUMP
PUMP FIRE MAIN	Main fire pump on the fire protection system, typically powered via the emergency generator or a building's emergency power supply. Pump intake is connected to a static water source (tank) or the city water supply.	*PARENT*	JOCKEY PUMP, ENGINE
PUMP FUEL OIL	Pump used to provide fuel oil, typically to emergency generators.	*CHILD*	Emergency Generator
PUMP GLYCOL	Pump that is part of a glycol system.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Chiller, Cooling Tower, Exchanger Skid, Exchanger, Pump, Expansion Tank, Coupon Rack, Water Treatment, etc.
PUMP GRAYWATER	Pump that is part of a rainwater reclaim or run-off/overflow/gray water collection system, or skid which includes pumps.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Plumbing Pump Skid, Expansion Tank, Pumps, VFD.
PUMP HEATING WATER	Pump that is part of a heating hot water system. Pumps occasionally operate as dual function pumps, circulating heating or cooling water to the heating hot water or chilled water systems, in which case, system operation would be dependent upon the season and BMS controls sequence. Superior (parent) to any associated VFD.	*SOMETIMES*	VFD
PUMP HVAC SKID	Mechanical System Pump Skid serving the same function and area.	*PARENT*	Pump, VFD
PUMP NATURAL GAS	Booster pump used to elevate pressure in a natural gas system.	*NO*	
PUMP PLUMBING PROCESS WATER	Pump dedicated to domestic hot OR cold non-potable OR protected water systems.	*SOMETIMES*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Plumbing Pump Skid, Expansion Tank, Pumps, VFD, Exchanger.
PUMP PLUMBING SKID	Plumbing System Pump Skid serving the same function and area. Triplex booster pump is an example.	*PARENT*	Pumps, expansion tank
PUMP RO/DI	Reverse osmosis water filtration pumps. Includes distribution, circulation, reject and RO Pumps.	*CHILD*	Reverse Osmosis Ski

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
PUMP STEAM CONDENSATE RETURN	Pump or duplex pumps that sit on top of the condensate receiver tank, used to return condensate back to a steam generator, boiler, or the CUP. Pumps ID'd individually.	*CHILD*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. RO Panel, RO Skids,pumps,tanks.
PUMP STEAM CONDENSATE RETURN SKID	Steam Condensate Return Skid. Usually duplex pump system with receiver and sometimes a vacuum pump.	*PARENT*	Pump Steam Cond Ret, Vacuum Pump
PUMP STORM WATER	Ejector pump for storm water overflow tanks.	*NO*	
PUMP SUMP ACID	Submersible pump that is part of a laboratory waste water system, typically discharging to an acid neutralization tank. Pump for untreated lab waste; part of a lift station or transfer station.	*CHILD*	Lift Station
PUMP SUMP PIT	Stormwater Sump Pit. Pit is a confined Space. Parent to the sump pumps.	*PARENT*	Pump Sump Water
PUMP SUMP WATER	Submersible pump used to eject non-corrosive water into storm drain. Not part of lab waste system.	*CHILD*	Pit Sump
PUMP ULTRAVIOLET DISINFECTION	Pump that is part of an ultraviolet disinfection system, typically used on gray water retention and storage systems.	*CHILD*	N/A
PUMP VACUUM	Vacuum pump used in laboratory applications, or skid which includes vacuum pump(s).	*CHILD*	Skid Pump Vac
PUMP WASTE WATER	Pump located within wastewater treatment tanks on a buildings wastewater system. Pumps neutralized water.	*CHILD*	Waste Water System
PURIFIER GENERATOR FUEL	Stand alone fuel purification system for emergency generator.	*CHILD*	Generator
RADIANT PANEL	Electric or hydronic radiant heating panels used for perimeter and/or supplementary heating.	*NO*	
RAIN TANK	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
REVERSE OSMOSIS SKID	RO/DI System Skid. Parent to RP/DI Pumps. Parent to pumps.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. RO Panel, RO Skids,pumps,tanks.
ROOF TOP UNIT	Described as such in mechanical drawings, RTU. Coils located within the unit are considered part of the RTU and are not inventoried with separate Asset ID's.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Exhaust Air Handling Unit(EAHU), Supply and return Fans, VFDs, Freeze Pumps, VAVs, Heat Wheels, Re-heat coils.
SENSOR CO DUCT	Carbon monoxide sensor located within a supply or return duct.	*CHILD*	AHU, FAN
SENSOR CO FIRE	Carbon monoxide sensor located in areas with high potential for hazardous levels of CO, such as sub-grade parking structures. Sensor triggers the fire alarm when concentration of CO reaches hazardous levels.	*CHILD*	AHU, FAN
SENSOR CO HVAC	Carbon monoxide sensor located in areas with high potential for hazardous levels of CO, such as sub-grade parking structures. Sensor initiates sequence enabling garage exhaust fans once concentration of CO exceeds acceptable levels.	*CHILD*	EXHAUST FAN
SENSOR DIFFERENTIAL PRESSURE	Sensor that measures the difference in pressure between two or more ports on supply and return lines of a hydronic system.	*NO*	
SENSOR OXYGEN DEPLETION ALARM	Sensor located in laboratory spaces where oxygen depletion is a concern. Typically found in rooms with helium, some chemistry labs, or MRI rooms.	*NO*	
SENSOR SMOKE	Aspirating smoke detection device that provides early warning smoke detection through continuous air sampling.	*NO*	
SENSOR TEMPERATURE	HVAC temperature probe. Not commonly inventoried.	*NO*	

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
SENSOR WEATHERSTATION	Weather sensors that measure any combination of the following: solar irradiance, precipitation, barometric pressure, air temperature, humidity, dew point, wind speed, and wind direction. Typically located on rooftops.	*NO*	
SOLAR PHOTOVOLTAIC ARRAY	Rooftop solar panel or solar panel array.	*CHILD*	SOLAR POWER INVERTER
SOLAR POWER INVERTER	DC to AC power inverter specific to solar panel arrays.	*PARENT*	SOLAR PHOTOVOLTAIC ARRAY
SPRINKLER SYSTEM GLYCOL	Water-based fire sprinkler system with an antifreeze additive, glycerin or propylene glycol, for freeze protection.	*NO*	
STORMWATER OUTFALLS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
SWITCH ISOLATOR	Isolator or disconnect switch used in electrical distribution system.	*NO*	
SWITCH MEDIUM VOLTAGE	Medium voltage switch, typically an intermediary disconnect between the SWITCH SF-6 and medium voltage transformer. Sub (child) to SWITCH SF6.	*CHILD*	SWITCH SF6
SWITCH SF6	Medium voltage gas-filled switch, typically fed from adjacent buildings or CUP. Superior (parent) to switch medium voltage, breaker medium voltage, transformer medium voltage, meter electric, breaker main, and breaker distribution.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. SWITCH MEDIUM VOLTAGE, BREAKER MEDIUM VOLTAGE, TRANSFORMER MEDIUM VOLTAGE, METER ELECTRIC, BREAKER MAIN, BREAKER DISTRIBUTION
SWITCH TRANSFER	Automatic transfer switch. Automatically transfers electrical loads from normal power to emergency power upon power failure.	*CHILD*	GENERATOR, SF6 SWITCH
TANK COMPRESSED AIR	Compressed air storage tank associated with AIR COMPRESSOR.	*CHILD*	Air Compressor Skid, Vacuum Pump Skid
TANK CONTAINMENT	Laboratory waste or chemical spill containment tank.	*CHILD*	WASTE WATER SYSTEM
TANK DILUTION	Acid neutralization tanks used to dilute and neutralize lab waste water for discharge.	*CHILD*	Waste Water System
TANK DILUTION MANHOLE	Manhole or vault containing sub-grade acid neutralization tank	*CHILD*	WASTE WATER SYSTEM
TANK EXPANSION	Hydronic expansion tank on a hydronic system including heating hot water systems, domestic hot water systems, or chilled water systems. Not a Flash Tank.	*CHILD*	EXCHANGER SKID, EXCHANGER, PUMP SKID
TANK FUEL OIL	Fuel oil storage tank for emergency generators.	*CHILD*	Emergency Generator
TANK STORAGE CHILLED WATER	Chilled water storage tank for use on chilled water systems.	*SOMETIMES*	CHILLER
TANK STORAGE RODI	Plastic storage tank for RO/DI water / RO/DI systems.	*CHILD*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. RO Panel, RO Skids,pumps,tanks.
TERMINAL UNIT FAN COIL	2-pipe or 4-pipe fan coil unit used for heating and/or cooling.	*PARENT*	CONDENSATE PUMP
TERMINAL UNIT HEATER	Electric or hot water unit heater.	*NO*	
TERMINAL UNIT HEATER FUEL	Gas-fired unit heater.	*NO*	
TRANSFORMER	Electrical transformer other than medium voltage transformer	*NO*	
TRANSFORMER MEDIUM VOLTAGE	13,800V (normal power) or 2,400V (emergency power) medium voltage transformer. Typically feeds distribution switchgear. Typically sub (child) to SWITCH SF6.	*CHILD*	SWITCH SF6
TRAP GAS	Trap used to prevent any sediment that may be found in gas supply lines from entering and damaging equipment. Used on boilers, water heaters, unit heaters, etc.	*NO*	
TRAP GREASE	Catch basin for oils, fats, and grease released into drains / drainage systems. Typically used in kitchen applications.	*NO*	
TRAP SAND	Catch basin used to filter particulate matter out of a water system.	*NO*	

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
TRAP STEAM	Various types separate steam from condensate in a steam system.	*NO*	
TREE BOX FILTERS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
TRENCH DRAIN	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
UNDERGROUND DETENTION SYSTEM	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
UPS	Uninterrupted power supply used to keep power/data systems online in the event of a power failure.	*NO*	
VACUUM PUMP SKID	Vacuum System Pump Skid. Duplex or Triplex Vacuum Pump Skid. Parent to Vacuum Pumps.	*PARENT*	Pump Vac, TANK
VACUUM RECEIVER		*CHILD*	VACCUM PUMP SKID
VALVE AIR EXHAUST	Pressure independent, flow metering, variable air or constant volume exhaust air venturi valves used to modulate and maintain proper pressurization of exhaust air flow as part of critical airflow systems.	*CHILD*	RETURN OR EXHAUST FAN
VALVE AIR SUPPLY	Pressure independent, flow metering, variable air or constant volume supply air venturi valves used to modulate and maintain proper pressurization of supply air flow as part of critical airflow systems.	*CHILD*	AHU OR SUPPLY FAN
VALVE MIXING	Thermostatic mixing valve used on domestic hot water systems to maintain temperature.	*NO*	
VALVE MIXING TEMPERED WATER	Thermostatic mixing valve used on potable water systems dedicated to emergency safety eyewash and shower stations.	*NO*	
VALVE STEAM PRESSURE REDUCING	Steam valve used to reduce incoming high pressure steam to low pressure steam for use in building systems.	*NO*	
VALVE STEAM SAFETY	Steam safety relief valve used to relieve steam pressure to avoid over pressurization of the system.	*NO*	
VARIABLE FREQUENCY DRIVE	Used to modulate the speed of a motor. Sub (child) to most fans and pumps.	*CHILD*	Inventoried Equipment w/ Motor
VEGETATED SWALES	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
WASTE WATER SYSTEM	Chemically treated laboratory wastewater treatment system. Components include wastewater treatment tanks, chemical feed pumps, and ejection pumps. Discharges neutralized water. Lift stations and acid pumps are inventoried under separate descriptions.	*PARENT*	Related equipment is usually shown on flow or riser diagram and or detailed parts breakdown. Parent to Lift Stations, chemical feed pumps, treatment tanks. Reference Site Utility drawings for campus wide system map with CNS, SANS and major Lift Stations.
WATER QUALITY UNITS	Long-Term Stormwater Pollution Prevention Plan And Stormwater Operation And Maintenance Plan - Locations are Identified on site plans turned over by projects that install or modify them.	*NO*	
WATER SYSTEM BUILDING FILTRATION	Filter or Strainer used as part of a building's plumbing, chilled water or grey water system through the use of filters and water softeners. This is intended to capture stand alone filters that serve a system and are not associated with a particular piece of equipment.	*CHILD*	EXCHANGER SKID, EXCHANGER, PUMP SKID, CHILLER

SAP/CMMS EQUIPMENT NAME	ADDITIONAL EQUIPMENT DETAILS	PARENT / CHILD?	RELATED EQUIPMENT
WATER TREATMENT CLOSED LOOP SYSTEM	Treatment system used to treat and/or filter system water; Corrosion coupon rack is a separate inventoried piece of equipment..	*PARENT*	Coupon Rack, Pump Chemical Feed
WATER TREATMENT CLOSED LOOP SYSTEM	Treatment system used to treat and/or filter system water; Corrosion coupon rack is a separate inventoried piece of equipment..	*PARENT*	Coupon Rack, Pump Chemical Feed
WATER TREATMENT CONDENSER WATER	Cooling tower water treatment system; may include blowdown, filters, and chemical injection.	*CHILD*	COOLING TOWER
WATER TREATMENT CONDENSER WATER	Cooling tower water treatment system; may include blowdown, filters, and chemical injection.	*CHILD*	COOLING TOWER

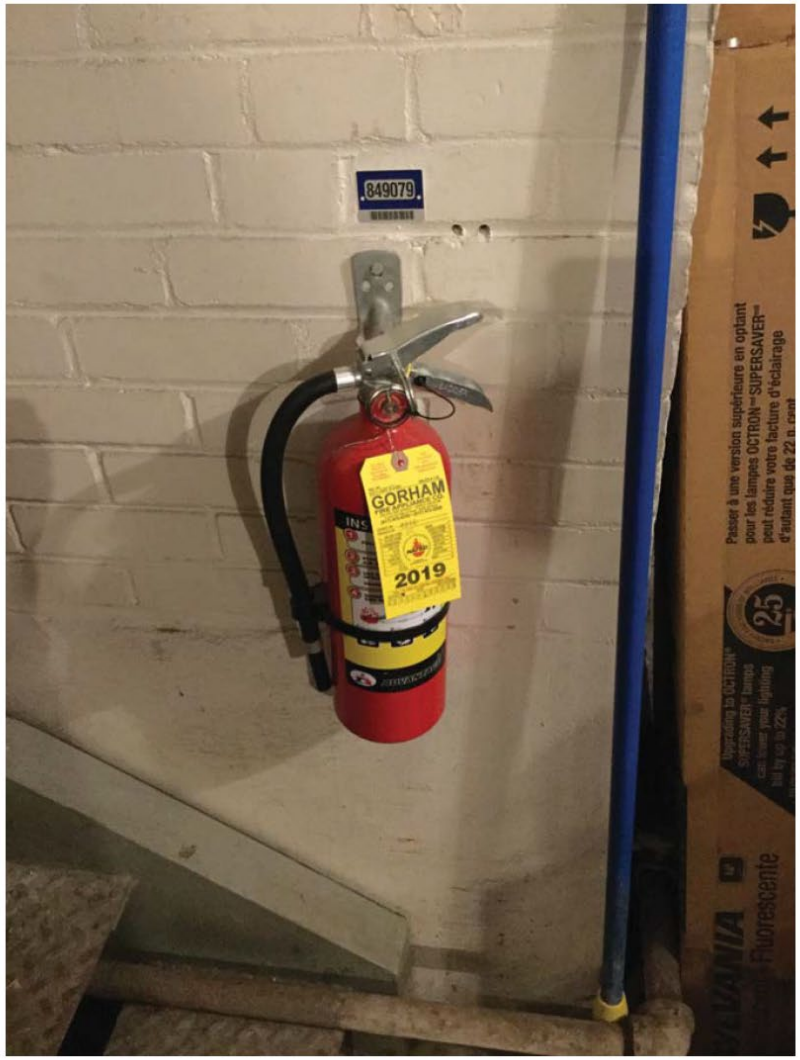
REMOVED EQUIPMENT SUBMITTAL SAMPLE

Itemized Removed Asset Tag Study (Only a sampling of photos is shown on the following pages. Information and photos of all removed equipment is required.)

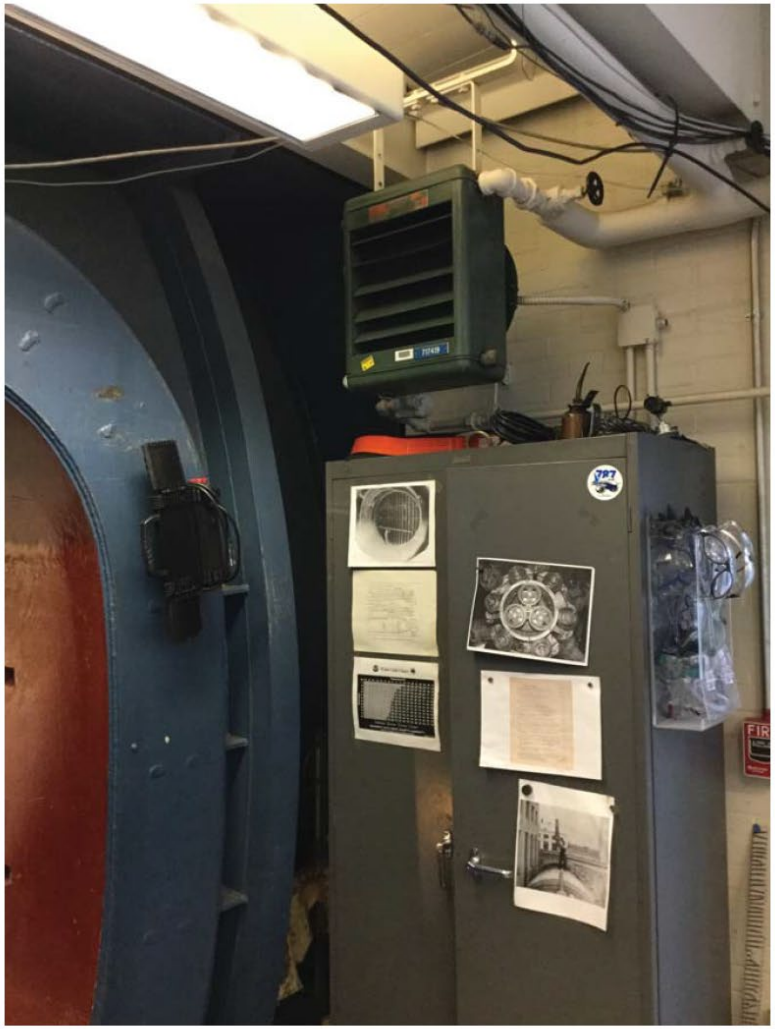
Equipment	Description	Sort field	Room	Manufacturer	Model number	ManufSerialNo.	Location	Area Serviced by Equ	Function	Mai	More Location Info
849084	PANELBOARD BRANCH CIRCUIT	GEN-ELC-PWR	000CA	WESTINGHOUSE			17	BUILDING 17			WEST SIDE OF ROOM
849087	PANELBOARD BRANCH CIRCUIT	GEN-ELC-PWR	104	WESTINGHOUSE	BS-24526		17	ROOM 104			EAST WALL OF ROOM
754481	WATER TEST WATERFLOW ALARM	GEN-FPR		NA	AUTOCALL EAST LOOP	TRANS NO -456	17	SPRINKLER SYSTEM			ITEM NOT PRESENT / FOUND
849082	PANEL CONTROL FIRE	GEN-FPR-CTL	000CA	NOTIFIER	XP SERIES		17	BUILDING 17			SOUTH SIDE OF ROOM
849077	FIRE EXTINGUISHER	GEN-FPR-SUP	004	BADGER	ADV-550	B01030528	17	RM 004			004 NORTH END
849079	FIRE EXTINGUISHER	GEN-FPR-SUP	004	BADGER	ADVE-550	B01030544	17	ROOM 004 SOUTH			SOUTHEAST CORNER
849081	FIRE EXTINGUISHER	GEN-FPR-SUP	000CA	AMEREX	VV-432498	B456	17	000CA			NEXT TO STAIRS
849085	FIRE EXTINGUISHER	GEN-FPR-SUP	1000SA	BADGER	ADV-550	B01030496	17	STAIRWELL			LANDING ON STAIRS
849086	FIRE EXTINGUISHER	GEN-FPR-SUP	104	BUCKEYE	10HI SA80 ABC	ZE-739308	17	104			EAST SIDE OF ROOM
849089	FIRE EXTINGUISHER	GEN-FPR-SUP	104	GENERAL	TGPA-10A	AP-110248	17	STAIRWELL			NEXT TO ENTRANCE TO 110
717419	TERMINAL UNIT HEATER		104	STURTEVANT			17	17-104	HEATING		OVERHEAD NORTH WEST CORNER
849088	TERMINAL UNIT HEATER	GEN-HVC-AIR-CIR	104A				17	RM104A TUNNEL SPACE			OVERHEAD - WIND TUNNEL
732088	PUMP STEAM CONDENSATE RETURN		004	HOFFMAN-WATERMAN	W60-12-208	160032	17	STEAM LINES	CONDENSATE RETURN		BSMT MECH RM - NORTH END
732089	PUMP STEAM CONDENSATE RETURN		004	HOFFMAN-WATCHMAN	WCD-12-208	160032	17	STEAM LINES	CONDENSATE RETURN		BSMT MECH RM - NORTH END
790088	WATER SYSTEM EXTERIOR DOMESTIC	GEN-PLM	UNKNOWN				17	GROUNDS			ITEM NOT PRESENT / FOUND
849080	PUMP SUMP WATER	GEN-PLM-DRN	004				17	004 STEAM CONDENSATE PUMPS			NORTH WEST END
702290	EXCHANGER DOMESTIC HOT WATER		004	RUUD	PE30-2	RU 0293104555	17	DOMESTIC HOT WATER			BSMT MECH RM - SOUTH END
716304	BACKFLOW PREVENTER	GEN-PLM-POT	004	WATTS	909	268711	17	EQUIPMENT LASER			ITEM NOT PRESENT / FOUND
849078	BACKFLOW PREVENTER	GEN-PLM-POT	004	WATTS	LF909M10TRP	007159	17	LAB EQUIPMENT			WEST WALL CENTER
849083	FOUNTAIN DRINKING	GEN-PLM-POT	000CA	HALSEY TAYLOR	S300_2EQ_1M	081022327	17	000CA			EAST SIDE OF ROOM

Equipment ID#: **849084** | Description: PANELBOARD BRANCH CIRCUIT

Equipment ID#: **849082** | Description: PANEL CONTROL FIRE



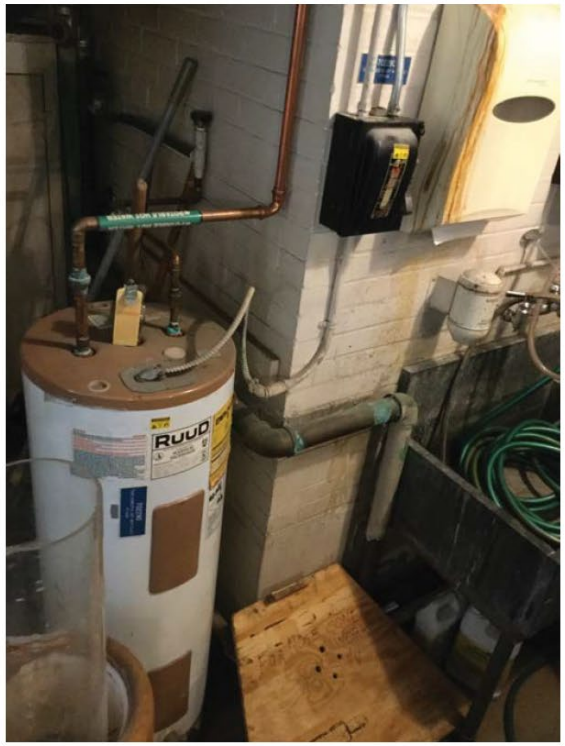
Equipment ID#: **849079** | Description: FIRE EXTINGUISHER



Equipment ID#: **717419** | Description: TERMINAL UNIT HEATER

Equipment ID#: **732088** | Description: PUMP STEAM CONDENSATE RETURN

Equipment ID#: **8490809** | Description: PUMP SUMP WATER



Equipment ID#: **702290** | Description: EXCHANGER DOMESTIC HOT WATER

Equipment ID#: **849078** | Description: BACKFLOW PREVENTER

Equipment ID#: **849083** | Description: FOUNTAIN DRINKING

APPENDICES

A/E Requirements

Asset ID Tags

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Contents

1 As-bid Project Equipment List

1.1 General

This section refers only to the A/E requirements for providing the As-bid Project Equipment List. If the template spreadsheet is not provided, request it from the DC Project Manager.

DC requires that all projects provide an As-bid Project Equipment List to clearly define the scope of inventory. The list contains all equipment inventoried by Maintenance and Operations. The list will be used to assign a range of DC Asset ID numbers to the project, it will also be used as a baseline from which the contractor will provide an As-built Project Equipment List.

The guidelines in this section supplement the Equipment Asset ID Tagging Process and have been set forth to facilitate communication of inventory changes triggered by projects. The inventory is changed when equipment is moved, modified, removed or added. The Project Equipment List is ultimately uploaded to the DC Computer Maintenance Management System (CMMS). The information is critical for preparing preventative maintenance plans, requesting shut downs, identifying asset locations, reporting and trouble shooting.

1.2 Inventoried Equipment

Inventoried equipment pertains to equipment listed in the Glossary, which is provided as a reference tab in the Project Equipment List template. The Glossary includes Commissioned and Non-Commissioned equipment. It is expected that the A/E reviews the Glossary to ensure all inventoried equipment is captured. The list is not the same for all projects.

1.3 Definitions

a) **Project Equipment List** –An excel spreadsheet that has multiple tabs.
   - Upload Form to list all new equipment, modified existing equipment, related existing equipment.
   - Glossary – List of inventoried equipment types.
   - Existing Equipment – List of existing inventoried equipment provided upon request by Maintenance and Operations. This used to identify removed, modified and related equipment.
   - System Index – List of system categories used by Maintenance & Operations which is used to group equipment in a consistent manner for reporting and analysis purposes.

b) **DC Asset ID#** – Unique 6 Digit number assigned and physically attached to each inventoried equipment. Used to track maintenance history.

c) **Status** – This is either New or Existing. Existing equipment includes two types; First, equipment that is altered in regards to area served, location or function, Second, existing equipment that is related to new equipment and tied together with the Parent Asset(see definition below).

d) **A/E Description** – Description provided in project documents

e) **Skid Tag** – The Skid or System Tag is shown in the P&ID or plans/schedules/risers or labeling on the skid. For example, a pump skid might have two pumps. The pumps are identified by the Equipment Tag (P1 and P2) and the associated Skid is identified by the Skid Tag (PMP-1). The logic follows for equipment that is part of AHU systems and other skids. Does not apply to all assets.

f) **Matching Drawing Equipment Tag** – The Equipment Tag is shown in the P&ID or plans/schedules/risers or labeling on the installed equipment. For example, a pump skid might have two pumps. The pumps are identified by the Equipment Tag (P1 and P2) and the associated Skid is identified by the Skid Tag (PMP-1). The logic follows for equipment that is part of AHU systems and other skids.

g) **Area served** – Specific location information as applicable. Use room number(s) for dedicated equipment. Use floor or building for general infrastructure.

h) **System/Function** – The best suited and most specific system available in the drop down list referenced from the System Index. The list is restricted to meet DC reporting requirements. No modifications are accepted.

i) **Related Equipment** – Provide Equipment Tag and Skid Tag or DC Asset ID for related equipment. Hood/Exhaust Fan, VFD/Pump or Fan, Evaporator/Condenser, etc. Parent Asset provides the link between related equipment. In some cases related equipment is existing. This equipment should be listed in the upload form with the "Existing Status".

j) **Maintenance Owner** – The DC department responsible for maintenance of the equipment. In most cases this is DC . However, there may be some equipment special cases where equipment from other departments is inventoried.

k) **Approved Submittal Number** – Reference to submittal(s) relating to each equipment listed in the project equipment list.

1.4 Project Equipment List Population

a) Starting with the blank template, incorporate all changes to the inventory.

b) A/E to fill out Upload Form Tab with new and related existing equipment information. See definitions in 1.3.

- Status
- A/E Description
- Building Number
- Room Number
- Equipment Tag
- Skid Tag
- System
- Related Equipment
- Area Served
- Location Info
- Project Number
- Maintenance Owner

1.5 Submit As-Bid project Equipment List

c) After equipment list is complete, arrange a turn page meeting with DC Maintenance and Operations. This can be combined with or tagged onto an FE review meeting when the CD's are close to 100%. Incorporate changes based on the turn page and submit the As-bid Project Equipment list.

Contractor Requirements
Asset ID Tags

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Contents

1 Part 1 - As-built Project Equipment List

1.1 General

If the project results in no change in room numbers and there is no inventoried equipment added, removed or otherwise modified, then this requirement is not applicable to the project.

DC requires that all projects submit an As-built Project Equipment List after all equipment is installed. The list contains all equipment inventoried by DC Maintenance and Operations.

The guidelines in this section supplement the Equipment Asset ID Tagging Process and have been set forth to facilitate communication of inventory changes triggered by projects. The inventory is changed when equipment is moved, modified, removed or added. The Project Equipment List is ultimately uploaded to the DC Computer Maintenance Management System (CMMS). The information is critical for preparing preventative maintenance plans, requesting shut downs, identifying asset locations, reporting and trouble shooting.

1.2 Inventoried Equipment

Inventoried equipment pertains to equipment listed in the Glossary, which is provided as a reference tab in the Project Equipment List template. The Glossary includes Commissioned and Non-Commissioned equipment. It is expected that contractor reviews the Glossary to ensure all inventoried equipment is captured. The list is not the same for all projects. The preliminary As-bid Project Equipment List is prepared by the A/E and provided in the Bid Documents. If there is no As-bid Project Equipment List, then see Item 1.4a below.

1.3 Definitions

a) **Project Equipment List** –An excel spreadsheet that has multiple tabs.

- Upload Form to list all new equipment, modified existing equipment, related existing equipment.
- Glossary – List of inventoried equipment types.
- Existing Equipment – List of existing inventoried equipment provided upon request by R&M planning and scheduling. This used to identify removed, modified and related equipment.
- System Index – List of system categories used by DC repair and maintenance which is used to group equipment in a consistent manner for reporting and analysis purposes.

b) **DC Asset ID** – Unique 6 Digit number assigned and physically attached to each inventoried equipment. Used to track maintenance history. Also referred to as PM Number and Asset ID.

c) **Status** – This is either New or Existing. Existing equipment includes two types; First, equipment that is altered in regards to area served, location or function, Second, existing equipment that is related to new equipment and tied together with the Related Equipment(see definition below).

d) **A/E Description** – Description provided in project documents

e) **Skid Tag** – The Skid or System Tag is shown in the P&ID or plans/schedules/risers or labeling on the skid. For example, a pump skid might have two pumps. The pumps are identified by the Equipment Tag (P1 and P2) and the associated Skid is identified by the Skid Tag (PMP-1). The logic follows for equipment that is part of AHU systems and other skids. Does not apply to all assets.

f) **Matching Drawing Equipment Tag** – The Equipment Tag is shown in the P&ID or plans/schedules/risers or labeling on the installed equipment. For example, a pump skid might have two pumps. The pumps are identified by the Equipment Tag (P1 and P2) and the associated Skid is identified by the Skid Tag (PMP-1). The logic follows for equipment that is part of AHU systems and other skids.

g) **Area served** – Specific location information as applicable. Use room number(s) for dedicated equipment. Use floor or building for general infrastructure.

h) **System/Function** – The best suited and most specific system available in the drop down list referenced from the System Index. The list is restricted to meet DC reporting requirements. No modifications are accepted.

i) **Related Equipment** – Provide Equipment Tag and Skid Tag or DC Asset ID for related equipment. Hood/Exhaust Fan, VFD/Pump, Evaporator/Condenser, etc. Parent Asset provides the link between related equipment. In some cases related equipment is existing. This equipment should be listed in the upload form with the "Existing Status".

j) **Maintenance Owner** – The DC department responsible for maintenance of the equipment. In most cases this is DC-CS. However, there may be some equipment special cases where equipment from other departments is inventoried.

k) **Approved Submittal Number** – Reference to submittal(s) relating to each equipment listed in the project equipment list.

1.4 Project Equipment List Population

a) Starting with the As-Bid Project Equipment List, incorporate changes to the inventory. In the event of conflicting or missing information, RFIs should be directed to the A/E providing construction services. If there is no As-bid Project Equipment List, then the contractor is responsible for obtaining and reviewing the glossary of inventoried equipment types and preparing an initial list of inventoried equipment in order to request a range of DC Asset ID tags referred to in the Requirements for Asset ID Tag Application.

b) Fill out As-Built Project Equipment List Upload Form Tab with new equipment information.
- DC Asset ID – Range provided by DC Maintenance & Operations.
- Status
- A/E Description
- Manufacturer Name
- Model Number
- Serial Number

- Building Number
- Room Number
- Equipment Tag
- Skid Tag
- System
- Related Equipment
- Warranty Start
- Warranty End
- Area Served
- Location Info
- Project Number
- Maintenance Owner
- Approved Submittal Number

1.5 Submit As-built project Equipment List

a. After equipment is installed, tagged and the Project Equipment list is complete, submit the As-Built Project Equipment List along with verification photos referenced in Part 3.

2 Part 2 – Removed Equipment Submittal

Prepare a submittal which lists all equipment removed and provide back-up photos showing the DC Asset ID of each piece of equipment. This does not apply to projects where all the equipment is removed such as gut renovations.

3 Part 3 – DC Asset ID tag Application

3.1 General

This section refers only to the Application of DC Asset ID Tags and supplements the Equipment Asset ID Tagging Process.

Guidance in regards to filling out the related As-built Project Equipment List is provided in Part 1.

Guidance in regards to Equipment Nameplates, Valve Tags and other labeling is provided in other contract documents.

Contractor needs to confirm with DC Project manager whether or not contractor is responsible for the application of the DC Asset ID tags.

- For Capital Projects and Major Renovations, the contractor is responsible for the application of DC Asset ID Tags and submission of the As-Built Project Equipment List.

- For CRSP Renovations and other partial renovations, DC is responsible for the Application of the DC Asset ID tags via WO submitted by the DC Project Manager. The contractor is responsible for the completion of the As-built Project Equipment List in all projects.

3.2 Obtain MIT Asset ID Tags

After the count of new equipment is established. Request DC Asset ID tags from the DC Project Manager.

3.3 Application of DC Asset ID Tags

A. For each type of inventoried equipment, DC Asset IDs are applied in a uniform location. When obstructions or other conditions prevent access to the normal location for that equipment type, good judgement is required with consideration towards the following:
   a. Consistency ± Tags should be placed on equipment in a manner which is consistent throughout a building and campus.
   b. Visibility ± Tags should be visible to O&M staff without having to open cabinet doors or equipment compartments. They should not be obstructed by existing ductwork or other equipment.
   c. Durability ± Tags must be placed on surfaces which are properly cleaned and are unlikely to be refinished (eg. Painted)
   d. For equipment which serves hot or cold systems, hang the tags with metal hangers. Holes are provided in the aluminum tags. Tags should never be applied directly to hot or cold piping, or piping insulation.
   e. For equipment which will be located above hung ceilings, the ID should be applied directly to the equipment itself. The additional location information provided in the Project Equipment List and other labeling as described in Section 2.4 will indicate where the equipment is located.

B. Verification photos are required for each inventoried piece of equipment.
   a. Photos are saved in the e-builder folder 09.10 or other agreed upon location.
   b. Create one folder or PDF Binder for each inventoried equipment using standard nomenclature for each folder or PDF Binder;
      i. AAAAAA DDDDDDDDDD SSSSSS
         1. A = DC Asset ID
         2. D = Equipment Description
         3. S = Equipment Tag as Shown on Drawings
   c. The photos shall clearly show the following as applicable;
      i. DC Asset ID
      ii. Equipment Tag
      iii. Equipment Nameplate(s)
      iv. Motor Nameplate(s)
      v. Installation location (distance shot showing whole equipment as installed).
   d. Photos are used to verify DC Asset ID, Equipment Tag and Nameplate information provided in the project equipment list and are attached to equipment records in the DC CMMS.

C. Record DC Asset ID for each equipment in the As-built Project Equipment List. See Part 1.