

Froedtert Health

Front End Document



January 2022

Version 6.0

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SECTION 01 11 01 CONFIDENTIALITY & PATIENT PRIVACY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for maintaining confidentiality and patient privacy according to the Health Insurance Portability and Accountability Act (HIPPA).
 - 2. Proper code of conduct for individuals conducting work within Froedtert Hospital.

1.2 APPLICABILITY

- A. This Section applies to all Contractors, Architects, Vendors, and Suppliers that conduct project activities within the hospital facility (ies) and on the hospital grounds.

1.3 DEFINITIONS

- A. Not used.

PART 2 PRODUCTS

- A. Not used.

PART 3 EXECUTION

3.1 CONFIDENTIALITY

- A. Privacy of patients is a priority for the hospital. Contractor's personnel must respect the privacy of hospital patients and their guests / visitors. Under no circumstances shall Contractor reveal the presence of a patient at the hospital to anyone else. Contractor shall not approach patients with whom they may be familiar with unless the patient first initiates communication. Any information Contractor may overhear, or records/documents Contractor may inadvertently view is strictly confidential. Breach of any confidentiality may result in Contractor's personnel being directed to leave hospital property immediately.

3.2 HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT (HIPPA)

- A. Federal HIPPA regulations mandate various patient rights and protections for handling of private health information. Every Contractor is responsible for safeguarding patient confidentiality whether communicating verbally, in written or electronic form, or in any other medium.

END OF SECTION

SECTION 01 14 19 USE OF THE PREMISES

PART 1 GENERAL

1.1 DESCRIPTION

A. Section Includes:

1. Situations in which the Contractor or their representatives, including but not limited to, suppliers, subcontractors, employees, etc. enter the Owner's property.

1.2 APPLICABILITY

- A. This Section applies to all Contractors, Architects, Vendors, and Suppliers that conduct project activities within the hospital facility (ies) and on the hospital grounds.

1.3 RELATED SECTIONS

- A. Reference Section 01 35 13 – Special Procedures for Working in Healthcare Facilities for

PART 2 PRODUCTS

- A. Not used.

PART 3 EXECUTION

3.1 USE OF SITE

- A. Site Utilization Plan. Contractor shall prepare a Site Utilization Plan (SUP) for the project. The SUP shall be a hi-level overall project document that can be used for external communications and planning by facility staff. The SUP shall be submitted to Owner's designated representative for approval. The SUP shall include, but not be limited to:
1. Anticipated Phasing
 2. Construction Logistics
 3. Access Points
 4. Parking
 5. Material Storage Locations (if any)
 6. Other pertinent overall project information
- B. Smoking & Tobacco use. Smoking and tobacco use is NOT permitted by any person anywhere on the Froedtert Hospital or MRMC campus. This includes all buildings, parking structures, parking lots, and grounds areas. Individuals discovered violating the hospital's smoking and tobacco rules will be directed to leave hospital property.
- C. Conduct, Attire & Language. Contractor's personnel shall not wear abusive, suggestive, or inappropriate clothing or attire. Abusive, suggestive, or profane language or conduct are not permitted or tolerated. Individuals using inappropriate language, engaging in this type of behavior, or wearing inappropriate clothing may be directed to leave hospital property.
- D. Parking. Contractors shall use parking areas as assigned by the Owner's designated representative and the hospital parking office (414-805-7338). The parking office is located on the ground floor of the East Parking Structure.
1. Parking costs are the responsibility of the individual Contractor's personnel. Parking in existing Hospital lots or parking structures is not permitted.
 2. Contractors shall not park vehicles at any loading dock area, except to load and unload materials.

- E. Weapons and Concealed Carry. Possession, use, and storage of weapons, firearms, or other equipment, tools, or instruments intended to inflict bodily harm are not permitted anywhere on campus or within the premises.

3.2 USE OF FACILITIES

- A. Construction personnel shall not enter the premises of the facilities unless required to complete the Contractor's scope of work. It is expected that Contractor's and their representatives, suppliers, subcontractors, employees, etc. use the facility to conduct their business only in areas appropriate to the scope of work.
- B. Use of existing lunch facilities, cafeteria, café's, and toilet facilities shall be discussed with Owner's designated representative and Contractor, and documented approvals shall be indicated on the Site Utilization Plan.

3.3 CONTRACTOR ORIENTATIONS

- A. Contractor shall review the Site Utilization Plan, facility rules and regulations, and corresponding safety, quality, and work expectations with all suppliers, subcontractors, vendors, employees during a first-day, first-hour orientation at the project site. Contractor shall obtain sign-off from the individual(s) receiving orientation guidelines and training upon completion.
- B. Contractor shall prepare a written set of project guidelines to be reviewed with all workers participating on the project. Documentation of orientations shall be kept by Contractor (i.e. logs, minutes, sign-offs, hard hat stickers, etc.).

END OF SECTION

SECTION 01 29 00 PROJECT INVOICING PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Froedtert Health (FH) has developed specific procedures, guidelines and forms to be followed and utilized for every project. This standardized process will reduce errors and confusion and will result in an efficient and harmonized process among Team members. The following outlines the established processes and references tools that are to be used consistently on all FH projects.

1.2 INITIAL PROJECT CONCEPT AND PLANNING PHASE - BACKGROUND

- A. Every project starts as a concept to accommodate and support strategic initiatives. The FH Director, Facility Planning & Development will assign a FH Project Manager at the concept stage and work with that Project Manager to develop an initial Total Project Cost Status Report (TPCSR). The initial TPCSR will reflect the total approved project budget, approved by FH Administration.
- B. After the Project is approved and funded, FH Facility Planning & Development will communicate with FH Finance to establish a capital project number. This step must be accomplished before any project related cost commitments are made.
- C. The assigned FH Project Manager will then begin to retain professional services related to project planning, design, construction, etc.

PART 2 PRODUCTS

- A. Not used.

PART 3 EXECUTION

3.1 PROJECT INVOICING PROCEDURES

- A. Prior to submitting the initial invoice, the CM/GC shall submit an initial draft copy of the invoice 1 week prior to the due date specified below. The invoice format and level of detail shall be reviewed and approved by the FH Project Manager prior to submitting the final invoice.
- B. All project related invoices must be sent to the FH Project Manager no later than the 5th day of each month. All invoices must be accompanied by an appropriate lien waiver; if applicable.
- C. Any invoices received by the Project Manager after the 5th of each month will miss the current invoice timeline and will await the following month's draw cycle.
- D. CM/GC invoices with self performed work (SPW) and/or equipment rental shall include the following minimum level of detail:
 - 1. Labor, materials and equipment charges shall be provided with separate subtotals for each scheduled value with SPW
 - 2. Labor charges shall identify the individual, including role/title, hourly rate and hours billed for the period of the invoice.
 - 3. An equipment rental summary shall be provided which itemizes each piece of billable equipment, identifies the billing rate established in the Agreement between Owner and Contractor, duration charged to the Project, and cumulative charge for each piece of equipment in relation to the Contract equipment billing cap. See sample sheet provided in Section 01 29 00B.

- E. Further information related to project invoicing requirements, format, and inclusions shall be found in the Agreement between Owner and Contractor.

3.2 LIEN WAIVER PROCEDURES FOR PROJECT INVOICING

- A. Invoices must be submitted with an appropriate lien waiver.
- B. Types of Lien Waivers
 - 1. Conditional Waiver of Lien (Conditional Waiver)
 - a. A waiver releasing any claim to the portion of work performed or materials provided to Froedtert Health on the referenced project “to date” or to a specific invoice number(s) with the condition that specific dollar amount /payment is received, upon such time a clean waiver will be provided prior to receipt of further payments. (Please note: dollar amount(s) and invoice number should be listed on conditional waivers.)
 - 2. Unconditional Waiver of Lien (Clean/Partial Waiver)
 - a. A waiver releasing any claim to the portion of work performed or materials provided to Froedtert Hospital on the referenced project. This should specify for “work performed to date” or should list corresponding invoice number(s) that are being submitted for payment. No dollar amounts or invoice numbers should be inserted for final waivers.

3.3 CONTRACTOR’S TAX EXEMPT CONSTRUCTION PURCHASE ORDERS

- A. Since Froedtert is a not-for-profit entity all purchases made on behalf of Froedtert by the CM/GC are tax exempt.
- B. Contractor’s shall obtain a copy of the Owner’s tax exempt number, if needed, from the Owner’s designated representative.

3.4 PROJECT FINANCIAL REVIEW & MONTHLY REPORTING

- A. On a monthly basis, CM/GC shall prepare and submit to Owner electronically and in hard copy format a Monthly Progress Report with the following standard/default components (subject to change based on individual project needs):
 - 1. Executive Summary (CM/GCs narrative of current project status)
 - 2. Construction Schedule
 - a. Past 30 days accomplishments
 - b. Next 30 days planned activities
 - c. Updated overall project schedule
 - 3. Financial Update
 - a. Updated TPCSR
 - b. Contract Status Report (by CM/GC)
 - 1) Initial Contract Amount
 - 2) Approved Change Orders to Date
 - 3) Pending Change Order to Date (approved and open)
 - 4) Estimated Pending Change Orders
 - c. Current Cost Event Tracking Log (by GC/CM on Froedtert Health Form found in Exhibit A)
 - d. Contingency summary
 - e. Forecasted or anticipated final Contract Amount
 - 4. Other Project Information Tracking
 - a. RFI Log
 - b. Submittal Log
 - 5. Project Photos

3.5 PROJECT CLOSE-OUT PHASE

- A. CM/GC shall submit completed “Consent of Surety” forms for all subcontractors that are bonded.
- B. Upon completion of the project the Project Manager and CM/GC will reconcile the following:

1. All outstanding change order requests.
 2. All outstanding change orders.
 3. Reconcile construction contingency returning all savings to Owner via deductive change order.
 4. Reconcile all set-aside funds returning all savings to Owner via deductive change order.
 5. Reconcile all project allowances making necessary final adjustments via change order as required.
 6. Reconcile all general conditions costs (if contract includes a not-to-exceed general conditions provision) returning any savings to Owner via deductive change order.
 7. Reconcile any cost-plus self performed work categories (if contract allows for self performed work) returning any savings to Owner via deductive change order.
 8. Release final retainage when all project close-out issues are resolved to satisfaction.
 9. Obtain final lien waivers.
- C. Owner will not release final payment without final (not conditional) waivers from CM/GC and all first tier subcontractors and vendors.
- D. Owner can and will mitigate the “financial time gap” by allowing reduction in retainage (contingent upon other close-out tasks/requirements being completed to satisfaction) to allow CM/GC to receive and distribute the funds in exchange for final waivers followed by a final pay application for the small retainage amount all with final waivers.

END OF SECTION

Froedtert Health

Project name

Cost Event Log

Date

| <u>PCO Identification/Description:</u> | | | | <u>PCO Pricing Status</u> | | | <u>Approved/Funding Source</u> | | | | | | | | | | | | |
|--|--------------|------------|--------------------|---------------------------|------------------------------|-----------------|--------------------------------|--------------------|--------------------|----------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|---------------------|--------------------|--|
| | | | | <u>Estimated</u> | <u>Pending</u> | <u>Approved</u> | <u>PFE's/</u> | <u>Constr.</u> | <u>Owner's</u> | <u>Buy-out/</u> | <u>Unforeseen</u> | <u>AE Design</u> | <u>Plumbing</u> | <u>HVAC</u> | <u>Electrical</u> | <u>Life Safety</u> | <u>Coordination</u> | <u>Owner</u> | |
| <u>PCO#</u> | <u>RFI #</u> | <u>CO#</u> | <u>Description</u> | <u>Cost</u> | <u>Cost</u> | <u>Cost</u> | <u>Set-Asides</u> | <u>Contingency</u> | <u>Contingency</u> | <u>Scope gap</u> | <u>&/or Project</u> | <u>Clarifications</u> | <u>Clarifications</u> | <u>Clarifications</u> | <u>Clarifications</u> | <u>&/or AHJ</u> | <u>w/ Owner's</u> | <u>Requested</u> | |
| | | | | | | | | | | | <u>Conditions</u> | <u>Corrections</u> | <u>Corrections</u> | <u>Corrections</u> | <u>Corrections</u> | <u>Requirements</u> | <u>FF&E</u> | <u>Change/Adds</u> | |
| | | | | | | | | | | | | | | | \$ - | \$ - | | | |
| Subtotals: | | | | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | |
| 2 Total Number of Cost Events | | | | | Starting Amounts: \$ - \$ - | | | | Check # | Check # | | | | | | | | | |
| | | | | | Balance Remaining: \$ - \$ - | | | | \$ - | \$ - | | | | | | | | | |
| | | | | | <u>AIA CO Summary:</u> | | | | <u>PFE/SA's</u> | <u>Constr. Cont.</u> | <u>Out-Scope</u> | | | | | | | | |
| | | | | | AIA CO# 1: | | | | \$ - | \$ - | \$ - | | | | | | | | |
| | | | | | AIA CO# 2: | | | | \$ - | \$ - | \$ - | | | | | | | | |

End of Cost Event Log

EQUIPMENT RENTAL PAY APPLICATION FORM

PROJECT NAME: _____

PAY APPLICATION #: _____

[illegible]

End of Summary

SECTION 01 31 13 PROJECT ADMINISTRATION REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Guidelines and expectations for Contractor's project supervision.
 - 2. Project Meetings.
 - 3. Project Reporting (Monthly & Daily)
 - 4. Solicitation, Recommendation, and Award of Subcontractors
 - 5. Coordination with Authorities Having Jurisdiction (AHJs)
 - 6. Requests for Information
 - 7. Project Document Control
 - 8. Tax Exempt Construction Purchase Orders (TEPCOs)
 - 9. EBE/DBE/MBE/WBE Requirements
 - 10. BIM Protocol
 - 11. Coordination Between Architect and Contractor

1.2 RELATED SECTIONS:

- A. 01 31 13A – Diversity and Inclusion
- B. 01 31 13B – BIM Protocol
- C. 01 31 13C – Builder's Risk Survey Form

PART 2 PRODUCTS

- A. None

PART 3 EXECUTION

3.1 CONTRACTOR'S SUPERVISION

- A. Contractor shall provide adequate supervision for the duration of the project.
- B. At request of the Owner, Contractor shall submit a proposed organization chart of proposed project staff for approval prior to starting work. Contractor shall designate one (1) individual as the 'project lead'. Authorized person must be approved by hospital Facilities Planning & Development and Plant Operations prior to commencement of the work.
- C. Proposed project organization chart, at a minimum, must include the following roles: Principal-In-Charge, Project Manager, Superintendent, and Construction Foreman.
- D. Contractor's personnel may not be replaced or substituted without approval of the Owner.
- E. Contractor shall prepare and emergency contact list for use on the project and submit to Owner for review. This contact list must be posted within the project limits during construction activities.

3.2 PROJECT MEETINGS

- A. Contractor shall facilitate the following meetings throughout the duration of the project:
 - 1. Owner/Architect/Contractor (OAC) Meetings –Weekly at a minimum.
 - 2. Subcontractor Coordination Meetings – Weekly.
 - 3. Disruption Avoidance Meetings – Weekly at a minimum. More frequent meetings may be required depending on construction activities.

4. Plant Operations Coordination – Weekly at a minimum.
 5. User Group Coordination – Weekly at a minimum.
 6. Move & Relocation Meetings – Reference Section 01 37 10 for further responsibilities related to this series of meetings.
 7. Major Medical Equipment Meetings.
 8. Minor Medical Equipment Meetings.
 9. All other meetings as determined by Owner.
- B. Location. All meetings shall be held at the hospital, in a location specified by Owner. Contractor to coordinate with Owner to determine attendees list and for scheduling of conference room(s) to facilitate meetings.
- C. Minutes. Contractor shall keep, maintain, and publish minutes for each meeting and distributed electronically to all participants within 48 hours following the meeting.
- D. Agendas. Meetings shall have a consistent agenda from week to week. Agenda's shall be published electronically by Contractor at least 24 hours prior to the next scheduled meeting.
- E. Sign-In Sheets. Contractor shall prepare, pass around, and include a copy of the meeting sign-in sheets with the minutes.

3.3 PROJECT REPORTING

- A. Monthly Reports. Contractor shall prepare and publish a monthly project report to Owner that includes, but is not limited to:
1. Summary of work activities completed in the previous month.
 2. Forecast of work activities scheduled for the next month.
 3. Project Financial Summary – format and content to be determined by Owner, including TPCSR from Owner
 4. Look ahead Schedule.
 5. Project progress photos.
- B. Daily Reports. Contractor shall prepare and file a comprehensive daily report of project activities. Daily reports shall be made available to Owner at their request, and turned in with the project documentation at the completion of the project. Daily Reports includes, but is not limited to:
1. Number of workers and subcontractor on-site during that day.
 2. List of visitors to the project site.
 3. Narrative of work activities completed that day.
 4. Other pertinent information including site conditions, weather (if applicable), temperature, etc.

3.4 SOLICITATION, RECOMMENDATION, AND AWARD OF SUBCONTRACTORS

- A. Initial Proposed Bidders List. Upon award of a project, Contractor shall prepare an initial list of proposed subcontractors that will/may be solicited during the project. Contractor shall submit the list to Owner for review and approval prior to issuance of solicitation(s) and requests for bids/proposals.
- B. Pre-Qualification. Proposed Subcontractors must be capable of performing respective work packages, in stable financial condition, and familiar with requirements associated with work in occupied healthcare facilities. Contractor is responsible for pre-qualification efforts associated with subcontracted work.
- C. Multiple Packages. If a project consists of multiple bid packages, a separate bidders list must be submitted to Owner for each bid package.
- D. Organization. Contractor's proposed bidders list shall be organized by type of work and include firm name(s), location, and union affiliation(s) (if any). Owner has the right to review, approve, reject, add, or remove subcontractors.

- E. Bid Summaries. Upon receipt of bids, Contractor shall prepare a bid summary for presentation to Owner. Bid Results summary shall include list of solicited Subcontractor(s), initial bid results, scoping adjustments, post-scoping results, and listing of alternates (if any) organized by type of work.
- F. Recommendation. For each type of work, Contractor shall prepare a Subcontractor recommendation letter for Owner approval and signature. Recommendation letters shall include all applicable bid results, narratives, and other pertinent information applicable to the type of work being recommended. Contractor is not allowed to hire any Subcontractor without prior written consent of Owner. Copies of award recommendation(s) must be kept with project files and be made available to Owner at any time.
- G. Contractor may self-perform work as appropriate to project scope. Prior to self-performing any work, Contractor shall discuss with Owner's designated representative with regards to agreement terms and conditions for self-performed work scope, schedule, and price. Owner may require Contractor to competitively bid/compete for the opportunity to self-perform work. Discussions, determination, decisions, and process shall be documented by Contractor and approved by Owner prior to commencement of the work (whether bid or negotiated).

3.5 COORDINATION WITH AUTHORITIES HAVING JURISDICTION (AHJS)

- A. Contractor shall coordinate all required inspections by Authorities Having Jurisdiction (AHJs). This includes, but is not limited to, all inspections (final or progress) with the following:
 - 1. Local Municipalities – General Building inspections such as in-wall, above-ceiling, and progress inspection(s), occupancy inspections.
 - 2. Local County – If applicable.
 - 3. Local Fire Department.
 - 4. State of Wisconsin Department of Health Services (DHS) - General Building inspections such as in-wall, above-ceiling, and progress inspection(s), occupancy inspections.
 - 5. OSHA
- B. Contractor shall schedule these meetings in advance, and ensure that Architect, Owner, and/or Owner's designated Representative are in attendance.
- C. Contractor shall prepare a written report of all inspection(s) and publish electronic minutes of the meetings with AHJs within 24 hours of the inspection.

3.6 REQUESTS FOR INFORMATION (RFI)

- A. Contractor shall coordinate with Architect and Owner prior to issuance of Requests for Information. When preparing project RFIs, Contractor shall provide recommended solutions to Owner and Architect for review. Copies of RFIs must be kept with Contractor on-site, and incorporated into the project As-Builts at the completion of the project.
- B. Contractor shall work with Architect to define a process for timely RFI resolution, documentation, and format.

3.7 PROJECT DOCUMENT(S) CONTROL

- A. Contractor shall maintain copies of all project documents including, but not limited to:
 - 1. Progress Drawings. SDs, DDs, and CDs.
 - 2. State Approved Drawings. Copies of all state approved drawings and documents must be kept at the project site and made available during applicable inspection(s).
 - 3. Construction Document Changes. CBs, ASIs, Field Instructions, etc. that change the construction drawings shall be kept current on Contractor's field set throughout the project.
 - 4. Requests for Information (RFIs).
 - 5. Submittals.
 - 6. Project Photos. Photos shall be organized by area, and labeled with a corresponding date in which the photo was taken.

7. Other miscellaneous project documentation.

- B. Transmission of Project Documents. Contractor shall work with Architect and Owner to determine how project documents will be transmitted, stored, and retrieved (ex. Via email, FTP site, shared project website, or collaboration portal, etc.). Reference Section 01 33 00 Submittals for more information.
- C. All project documentation may be kept in hard copy or electronic format at the preference of Contractor. However, all project documentation must be submitted electronically at the completion of the project consistent with Owner's Project Closeout Requirements.

3.8 TAX EXEMPT CONSTRUCTION PURCHASE ORDERS (TEPCO)

- A. Contractor shall utilize Owner Direct Purchase Orders for materials with a minimum aggregate value of \$5,000.
- B. Contractor shall procure ODP materials consistent with the terms and conditions of Agreement between Owner and Contractor.

3.9 EBE/DBE/MBE/WBE REQUIREMENTS

- A. See Section 01 31 13A for the Froedtert Diversity and Inclusion Goals.

3.10 BIM PROTOCOL

- A. See Section 01 31 13B for BIM policies and procedures.

3.11 COORDINATION BETWEEN ARCHITECT AND CONTRACTOR

- A. Contractor and Architect commit at all times to cooperate fully with each other, and proceed on the basis of trust and good faith.
- B. It is the Owner's expectation that the Contractor and Architect approach the project as a team and strive to resolve construction related issues proactively with the best interest of the Owner and Project in mind.

3.12 SECURITY OF THE SITE

- A. Watchman. Watchmen will not be provided by Owner. Each Contractor shall be responsible for loss or injury to persons or property where their work is involved, and shall provide such watchmen and take such precautionary measures as may be deemed necessary.
- B. Security. Contractor shall be responsible for and make good any loss or damage due to vandalism or robbery during construction.
- C. Contractor shall be responsible for loss or injury to persons or property wherever their work is involved. Each Contractor shall take precautionary measures to secure materials, equipment and finished or in-progress work.

END OF SECTION



Enterprise Facility Services

Diversity Program

Effective July 1, 2021

PURPOSE: In direct support of the Froedtert Health Strategic Goals, this policy states Froedtert Health's position of maximizing procurement and employment opportunities for minority and women owned businesses and workers on facility projects. All Froedtert Health facility projects will require minority and women owned business and worker inclusion.

POLICY:

1. It is the policy of Froedtert Health that minority and women owned businesses ("MWBE") **are given equal access and opportunity to provide high quality goods** and services to any and all aspects of our organization.
2. Froedtert Health is committed to being a leader in the development of mutually beneficial relationships with diverse suppliers.
3. Froedtert Health is committed to being a leader within our industry and community within the area of supplier diversity.

VALUE PROPOSITION: Froedtert Health believes that it is essential to develop a more inclusive supplier base because:

1. We are committed to our local community and its economic development.
2. We are committed to diversity and inclusion for our organization and the community.
3. We choose to be a leader in strengthening our local diverse business community.
4. We are committed to act as a role model for corporate citizenship to our employees and the community.
5. We are committed to a healthy community.
6. We realize that supplier diversity makes good business sense and will add value to the organization.

DEFINITIONS: Apprentice - A person who is learning a trade from a skilled employer, having agreed to work for a fixed period at lower wages.

Approved Certifying Agency – an organization whose certifies a business as a **minority business enterprise or women business enterprise and its' certification is** accepted by Froedtert Health. The approved certifying agencies are:

1. **National Minority Supplier Development Council ("NMSDC") or a regional council**
2. North Central Minority Supplier Development Council ("NCMSDC")
3. **Women Business Enterprise National Council ("WBENC")**
4. Wisconsin Department of Administration ("WDOA")
5. Wisconsin Unified Certification Program ("WI UCP")

Inclusion – The active, intentional, and ongoing engagement which seeks, accepts, and welcomes diverse suppliers and workers.

Minority Business Enterprises ("**MBE**") - A business that has been certified by an approved agency and that is at least 51% owned, operated and controlled by a minority individual or minority group. In the case of publicly owned businesses, at least 51% of the stock is owned, controlled, and managed by one or more such individuals.

Minority Classifications: As defined by the National Minority Supplier Development Council ("**NMSDC**"), a minority group member is an individual who is a U.S. Citizen with at least ¼ or 25% minimum of the following:

1. African American / Black – A US Citizen having origins in any of the Black racial groups of Africa.
2. Hispanic American – A US citizen of true-born Hispanic heritage, from any of the Spanish speaking areas of the following regions: Mexico, Central America, South America, and the Caribbean basin only. Brazilians (Afro-Brazilian, indigenous/Indian only) shall be listed under Hispanic designation for review and certification purposes.
3. Native American – A person who is an American Indian, Eskimo, Aleut, or native Hawaiian and regarded as such by the community of which the person claims to be part of. Native Americans must be documented members of a North American tribe, band of otherwise organized group of native people who are indigenous to the continental United States and proof can be provided through a native American Blood Degree Certificate (for example, a tribal registry letter, tribal roll register number).

4. Asian Pacific American – A US citizen whose origins are from Japan, China, Indonesia, Malaysia, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Thailand, Samoa, Guam, the US Trust Territories of the Pacific of the Northern Marianas.
5. Asian Indian American – A US citizen whose origins are from India, Pakistan, and Bangladesh.

MWBE – Minority and Women Business Enterprise

MWW – Minority and Women Workers

NCMSDC – North Central Minority Supplier Development Council is a regional council of NMSDC and certifies businesses in Iowa, Minnesota, North Dakota, South Dakota and Wisconsin as minority business enterprise.

NMSDC - National Minority Supplier Development Council advances business opportunities for certified Asian, Black, Hispanic and Native American business **enterprises and connects them to corporate members.** NMSDC's rigorous certification process is considered the gold standard for certifying minority-owned businesses by corporate America.

On-the-Job Trainee – A person that acquires both general skills that they can transfer from one job to another and specific skills that are unique to a particular job in a normal working situation.

Professional Service - means occupations requiring special training in the arts or sciences. Some professional services require holding professional licenses such as architects, auditors, engineers, and lawyers. Other professional services involve providing specialist business support to businesses of all sizes and in all sectors; this can include tax advice, supporting a company with accounting, or providing management advice.

Supplier Diversity – The process of developing a supplier base that mirrors **Froedtert Health's** community and emerging diverse patient base. It is a key part of the overall Diversity and Inclusion Strategic Focus for Froedtert Health.

WBENC - **Women's Business Enterprise National Council** is dedicated to advancing the success of Corporate Members, certified women business enterprises and government entities in partnership with its 14 Regional Partner Organizations. WBENC is the largest third-party certifier of businesses owned, controlled and operated by women in the United States

WI UCP - Wisconsin Unified Certification Program (UCP) is a cooperative of 24 different Wisconsin cities, counties, and airport authorities that benefit from USDOT funding. These state and local agencies certify minority and women owned enterprises as disadvantaged business enterprises.

Women Business Enterprises (“WBE”) - A business that has been certified by an approved agency and that is at least 51% owned and controlled by a woman or women. In the case of publically owned business, at least 51% of its stock is owned by one or more women, and whose management and daily business operations are controlled by one or more women.

Worker Hours – The total hours worked on a construction project by skilled and unskilled construction trade workers, where those workers are employed by the contractor or any subcontractor. In determining the total worker hours to be furnished at the construction site, the number of hours devoted to all tasks customarily performed on a construction site shall be included, whether or not such **tasks are performed on the construction site**. “Worker hours” includes work performed by persons filling apprenticeships and participating in on-the-job training programs

INCLUSION:

In accordance with the Froedtert Health Policy and Value Proposition, the Enterprise Facility Services Diversity Program specifies the inclusion requirements for Minority **and Women Business Enterprises, minority and women workers (“MWW”)**, and apprentices and on-the-job trainees on a Froedtert Facility Project. The inclusion goals are:

1. 20% of Professional Service spending required with Minority and Women Business Enterprises with a goal of 25%.
2. 20% of Construction spending required with Minority and Women Business Enterprises with a goal of 25% .
3. 25% of the total construction hours worked by Minority and/or Women workers.
4. Apprentice or On-The-Job Trainees employed by each contractor and subcontractor in accordance with the maximum ratio of apprentices to journeymen established by Froedtert Health.

PROCEDURES:

A. MWBE Inclusion Goal

1. Percentage Requirements – 20% of the contract value of Professional Service and Construction contracts.

2. Inclusion Levels – Professional Service firms and Contractors shall seek to include MWBE at all levels of the project and document their efforts to achieve the inclusion goal.
3. Measuring - The following criteria will be used to determine if the inclusion level has been met:
 - a. A MBE or WBE must be certified as such by an approved certifying agency.
 - b. A MWBE may participate as a prime contractor, consultant, subcontractor, joint venture partner with a prime or subcontractor, or vendor of materials, supplies, equipment, or trucking.
 - c. A MWBE must be responsible for a clearly defined portion of the work to be performed, in addition to satisfying the statutory requirement for ownership and control.
 - d. A MWBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the Project work and must carry out its responsibility by actually performing, managing, and supervising the work involved. To determine whether the MWBE is performing a commercially useful function, the professional service firm, contractor, or vendor and Project Team will evaluate the amount of work subcontracted, usual and customary industry practices, and other relevant factors.
 - e. Only that portion of the total dollar value of the contract equal to the percentage of inclusion of the MWBE joint venture partner in a certified MWBE Joint Venture will be counted.
 - f. Credit for the inclusion of MWBE subcontractors, which are suppliers of materials, equipment, and supplies, will be counted as follows:
 - 1.) One hundred percent (100%) of the expenditures of equipment, materials and supplies required under the contract and obtained from a wholesale or retail distributor that owns, operates, or maintains a store, warehouse, or other establishment in which the materials or supplies required for the performance of the Project are bought, kept in stock, and regularly sold to the public in the usual course of business. The distributor must engage in, as its principal business, and in its own name, the purchase and sale of the products in question. A distributor in such bulk items as steel, cement, gravel, stone, and petroleum products need not keep such products in stock if it owns or operates distribution equipment.

- 2.) One hundred percent (100%) of expenditures for equipment, materials and supplies obtained from an MWBE manufacturer, subcontractor, or supplier who substantially alters the material before resale or installation.
- 3.) Equipment, materials and supplies obtained from an MWBE wholesale broker, retail broker, or packager that owns, operates, or maintains an establishment in which the materials or supplies required for the performance of the project are ordered, not kept in stock, and/or not regularly sold to the public in the usual course of business may only be counted for up to 20% of the 20% MWBE inclusion goal. The broker or packager must engage in, as its principal business, and in its own name, the brokering or packaging of the products in question.
4. Maintaining Certification - MWBE firms participating on a facility project must maintain MWBE certification during the entire term of their contract on the project. Should the MWBE firm lose its certification during the performance of any contract on this Project, expedient and diligent efforts shall be made by the contracting firm and the MWBE firm to meet all requirements for reinstatement.

B. Minority and Women Worker Inclusion Goal

1. Percentage Goal – 25% of the construction worker hours shall be performed by minority or women workers (“MWW”).
2. Inclusion Levels – MWW shall be utilized in all trades performing work on a facility project.
3. Measuring – Hours worked by MWW will be measured as a percentage of the total worker hours on the construction of the project, including hours worked by apprentices and on-the-job training participants.

C. Apprentice and On-the-Job Trainee Requirements

1. Inclusion Levels – Each contractor and subcontractor shall employ apprentices or on-the-job trainees in performance of **its'** construction contract for the project in accordance with the maximum ratio of apprentices to journeymen established by Froedtert Health. The Construction Trades Ratios is attached as Form D.
2. Measuring – Apprentice or on-the-job trainee to journey ratio will be measured on a per-person basis.

D. Community Outreach

Professional Service firms and Construction Managers shall create and implement a Community Outreach Plan to bring awareness within the minority and women business community about the project and contract opportunities. The community outreach plan shall include, but is not limited to:

1. Identifying MWBE professional service firms, contractors and vendors by trade required for the project.
2. Distributing lists of MWBE professional service firms, contractors and vendors to the invited, non-minority contractors.
3. Depending on project size, host an event to inform construction industry (non-minority, minority and women) about the project and the Froedtert Health Enterprise Facility Services Diversity Program.
4. Requesting MWBE firms to complete pre-qualification forms.
5. Establishing Targeted Bid Packages with bids solicited from MWBE firms only.
6. Electronic notification of bid release to each MWBE contractor and vendors whose trade is included in the bid package.
7. Hosting pre-bid meetings and invite MWBE contractors and suppliers
8. Following up via email or phone with MWBE contractors and encouraging them to bid as prime or subcontractor.
9. Distributing information about the project, bid package release, pre-qualification requirements, etc. to the community plan rooms listed below.
 - African American Chamber of Commerce, okendrix@aaccwisconsin.org
 - American Indian Chamber of Commerce, beverly@aiccw-facc.org
 - Hispanic Chamber of Commerce, bids@hccw.org
 - Hmong Chamber of Commerce, info@hmongchamber.org
 - National Association of Minority Contractors – WI Chapter, glawrencejr@hotmail.com

E. Reporting

Professional Service firms and Construction Managers shall submit the following **reports about its'** inclusion on a facility project:

1. Inclusion Plan. Each Professional Service firm and Construction Manager awarded a project by Froedtert Health must submit an Inclusion Plan detailing how the firm will achieve the inclusion goals on the project. The plan shall include, but is not limited to,
 - The expected dollar value and percentage inclusion by professional/trade/division along with the anticipated MWBE firms that may perform the work.
 - The Community Outreach Plan to inform the minority and women professional service and/or contracting community about the project.
 - The procedures the Professional Service firm and Construction Manager will implement to inform consultants and subcontractors of the minority, women and apprentice worker goals for the project and reporting requirements to measure compliance.
 - Form IP-1 - Project Cost Subject to Inclusion shall be submitted with the Inclusion Plan. This form itemizes the deductions from the project costs to determine the project costs to which the inclusion percentage goal will be applied to calculate the dollar value needed to meet the MWBE inclusion goal. The deductions may include construction manager fee, permits fees, insurance, and bonds, and estimated cost for divisions or trades for which a MWBE does not perform that work (i.e. elevators, precast, et.al.).
2. Form A – Proposed MWBE Inclusion Achieved shall be submitted along with the Award Letter for each bidder or group of bidders submitted for approval by Froedtert Health during the bidding phase of the project. On Form A, the Professional Service firm and Construction Manager shall include the following information for all contracts awarded to date:
 - The Contract or Award Numbers
 - Name of Firm receiving contract
 - Services to be performed or materials supplied by firm
 - Value of contract
 - MWBE % Inclusion Proposed by firm receiving contract
 - Dollar Value of Proposed MWBE Inclusion
 - Name of MWBE Professional Service firm, Contractor or Supplier
 - Services to performed or materials supplied by MWBE

2. Form B – Minority and Women Business and Workforce Inclusion Report shall be submitted with the monthly invoice or Application for Payment. On this form, the Professional Service firm or Construction Manager will report narrative and numerical information about the MWBE, MWW and apprentice and on-the-job trainee on the project.
3. Form C - MWBE Payment Certification shall be prepared by each MWBE firm and submitted with the Professional Service firm or **Construction Manager's** final Form B – Minority and Women Business and Workforce Inclusion Report. On Form C, MWBE firms will enter the total amount paid for work performed or materials supplied on the project.

PROPOSED MWBE INCLUSION ACHIEVED

[illegible]



FORM B - MINORITY AND WOMEN BUSINESS AND WORKFORCE INCLUSION REPORT

PROJECT NAME

Minority and Women Business and Workforce Inclusion

Monthly Report – [Month Year]

Presented by:

Date:



FORM B - MINORITY AND WOMEN BUSINESS AND WORKFORCE INCLUSION REPORT

Project Description

Summary

Project Address:

Professional Service Firm or Construction Manager:

Total Cost Subject to Inclusion

Minority and Women Business Inclusion

Minority and Women Workforce Hours

hours or % of Total Hours Worked

Apprentices

Minority and Women Business Enterprise Inclusion

[Enter a narrative summary of the MWBE inclusion achieved or expected. Provide information about any activities performed to meet or exceed the inclusion requirement, any mentor/protégé relations or any training to assist an MWBE improve their capacity. Include charts or graphs that depicts the inclusion. In the table below, enter information for each minority and women contractor or vendor.]



FORM B - MINORITY AND WOMEN BUSINESS AND WORKFORCE INCLUSION REPORT

Total Cost Subject to Inclusion: \$

Payments Received to Date: \$

MWBE Inclusion: 20% \$ *[Enter 20% of Total Cost Subject to Inclusion]*

| MWBE FIRM | SUBCONTRACTOR TO | MBE or WBE | SERVICES PERFORMED OR MATERIALS SUPPLIED | TOTAL CONTRACT AMOUNT | AMOUNT PAID THIS MONTH | TOTAL PAID TO DATE |
|---|------------------|------------|--|-----------------------|------------------------|--------------------|
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| TOTAL MWBE INCLUSION | | | | | | |
| MWBE INCLUSION, AS PERCENT OF TOTAL CONTRACT VALUE AND PAID TO DATE | | | | | | |



FORM B - MINORITY AND WOMEN BUSINESS AND WORKFORCE INCLUSION REPORT

Apprentices and On-the-Job Trainees

[Enter a narrative summary of the apprentices and on-the-job trainees. Provide information about any special efforts by contractors to assign apprentices or become a company that can hire apprentices. In the table below, list every contractor, the number of journeymen/foremen and the number of apprentices or on-the job trainees that have worked on the project.]

[In lieu of completing with section, Professional Service firms should include information about any interns working for the firm.]

[illegible]



FORM B - MINORITY AND WOMEN BUSINESS AND WORKFORCE INCLUSION REPORT

Community Outreach

[Enter a narrative summary of the outreach activities to bring awareness to minority and women consultants, contractors and vendors. Provide information about any special activities performed to meet or exceed the inclusion goals, increase the number of MWBE firms that became pre-qualified, certified, formed mentor/protégé relationships etc. Include charts or graphs that depicts the inclusion achieved.]



MWBE PAYMENT CERTIFICATION

Project Name:

MWBE Firm:

Subcontractor To:

Scope of Work:

This certificate is to be prepared and signed by the MWBE Firm that was utilized in connection with the above-referenced project, either for service performed, and/or material supplied.

I, _____ hereby certify that our firm has received \$ _____
(Print Name)

for work performed and/or material supplied on the above-referenced project.

Signature: _____ Title: _____

Print Name: _____ Date: _____

THIS FORM MUST BE ATTACHED TO FINAL MINORITY AND WOMEN BUSINESS
AND WORKFORCE INCLUSION REPORT

Apprentice-to-Journeyperson Ratio

| Trades | Initial Ratio |
|--|--|
| | Apprentice (APR) : Journey workers (JW) |
| Bricklayer | 1:1; thereafter 1:1 |
| Carpenter | 1:1; thereafter 1:3 |
| Ceiling (Interior system carpenter) | First APR may be employed when 1-3 JWs are employed. thereafter, 1:3. |
| Cement Mason | 1:1; thereafter 1:1 |
| Drywall Taper | 1:1; thereafter 1:3 |
| Electrical - Shop | 1:1 |
| | then 2nd APR for 3-4 JW |
| | then 2 more JW for each APR (between 5 and 12 JW) |
| | then 1APR for each 2 JW |
| Electrical - Jobsite | 1:1 (5 th year APR may work alone on jobs for which they are trained and qualified; they are ratio neutral but not counted as JW) |
| Finisher | 1:1 |
| Floor Coverer | First APR may be employed when 1-3 JWs are employed. Thereafter, 1:3. |
| General Laborer | 1:3, then 2:8; then 3:30, thereafter 1 APR to 10 additional JW |
| Glaziers | 1:1; thereafter 1:3 |
| Heat / Frost Insulators | 1:1; thereafter 1:5 |
| Ironworkers (Structural) | 1:4 |
| Ironworkers (Ornamental) | 1:1 |
| Laborers (Building) | 1:3, then 2:8; then 3:30, thereafter 1 APR to 10 additional JW |
| Lather | |
| Millwrights | First APR may be employed when 1-3 JWs are employed; thereafter, 1:3. |
| Operating Engineers/ Heavy Equipment Operators | 1:1; thereafter 1:6 |
| Piledrivers | First apprentice may be employed when 1-3 JW's are employed; thereafter 1:3 |

| Trades | Initial Ratio |
|-----------------------------------|--|
| | Apprentice (APR) : Journey workers (JW) |
| Plasterer | Initially 1:1; thereafter 1:3 |
| Plumber | 1:1 (Master Plumber and licensed APR) |
| | then 1 APR to 2 JW |
| | then 2 APR to 3 JW |
| | then 3 APR to 4 JW, |
| | then 4 APR to 5 or 6 JW |
| | then 5 APR to 7, 8 or 9 JW |
| | then 6 APR to 10 JW |
| | thereafter 1 APR to 2 JW |
| | 4th and 5th year APR may work alone after completion of all paid and unpaid related instruction and they are ratio neutral |
| Refrigeration | Initially 1:1; thereafter 1:2 |
| Roofers | 1:1 or 2 JW, thereafter 1 APR to 2 JW |
| Sewer, Tunnel & Water | Initially 1:1; thereafter 1:2 up to and including 9 APR's; thereafter 1:5 |
| Sheet Metal Workers | 1:1; thereafter, 1:2 |
| | 5th year APR may work alone for jobs for which they are trained and competent. 5th year APR ad ratio neutral |
| Sprinkler Fitters | 1:1; thereafter 1:1 |
| Steamfitters | 1:1 |
| | 2nd APR if 3 JW; 3rd APR if 5 JW; 4th APR if 7 JW |
| Terrazzo (Installers & Finishers) | 1:1 |
| Tile layer | 1:1 |
| Wall Insulation | Initially 1:1; thereafter 1:3 |
| Water proofers | Initially 1:1; thereafter 1:2 |

Project Cost Subject to MWBE Inclusion

Project:

Line

| | | | |
|----|--|-----------------------------|--------------------------------|
| 1 | Total Project Cost | | \$ |
| | Deductions | | |
| 2 | Bond Fee | \$ | |
| 3 | Construction Manager Fee | | |
| 4 | General Conditions - Personnel Cost | \$ | |
| 5 | General Requirements | \$ | |
| 6 | Insurance | \$ | |
| 7 | Permit Fee - Building | \$ | |
| 8 | Permit Fee - Electrical | \$ | |
| 9 | Permit Fee - Plumbing | \$ | |
| 10 | Permit Fee - HVAC | \$ | |
| 11 | Precast Concrete | \$ | |
| 12 | Utilities - Electric and Gas Cost | \$ | |
| 13 | Utilities - Fees for service installation | \$ | |
| 14 | | \$ | |
| 15 | | \$ | |
| 16 | | \$ | |
| 17 | | \$ | |
| 18 | | \$ | |
| 19 | | \$ | |
| 20 | Total Deductions (Sum of Line 2 - 19) | <u> </u> | \$ <u> </u> |
| 21 | Project Cost Subject to Inclusion (Line 1 - Line 20) | | \$ <u> </u> |
| 22 | 15% MWBE Inclusion (Line 21 x .15) | | \$ <u> </u> |



Enterprise Facility Services

The undersigned approves \$_____ as the Project Cost Subject to Inclusion for the _____ Project.

Signature _____

Date _____

Print Name _____

Title _____

SECTION 01 31 13B FROEDTERT HEALTH BIM GUIDE

| Suggested TOC and Document Format – Short Term | | |
|--|---|---|
| Sec | Subsections | Notes |
| 1.0 | Executive Summary | |
| | 1.1 Purpose 1.2 Goals | <ul style="list-style-type: none"> ▪ Define general purpose of the document / context <ul style="list-style-type: none"> ○ Document is “in progress” with expected continued development in coming years ▪ Discuss goals and general expectations related to use of BIM on all projects |
| 2.0 | BIM Management | |
| | 2.1 BIM Management Plan 2.2 Design Team BIM Manager 2.3 Construction Team BIM Manager 2.4 Level of Development (LOD) Requirements 2.5 Shared Coordinate System 2.6 Model Sharing Protocols 2.7 Clash Detection | <ul style="list-style-type: none"> ▪ Present standardized BIM management plan and establish as required submittal to Froedtert Health ▪ Define duties and expectations of design team BIM manager ▪ Define duties and expectations of construction team BIM manager ▪ Level of Development <ul style="list-style-type: none"> ○ Describe Froedtert Health expectations of uniform Level of Development for all projects ○ Establish LOD Matrix as required submittal on all projects (customized for project design packaging strategy) ○ Define levels of Development ○ Present standardized generic Level of Development Matrix ▪ Mandate use of common Shared Coordinates model provided by Froedtert Health for all projects. No deviations permitted. ▪ Define model sharing requirements and protocols <ul style="list-style-type: none"> ○ Design phase ○ Construction phase ▪ Define requirements and process relative to Clash Detection. More strictly define responsibilities of design versus construction BIM teams |
| 3.0 | Design Models | |
| | 3.1 Purpose & Definition 3.2 Architectural Requirements 3.3 Structural Requirements 3.4 Plumbing / Fire Protection Requirements 3.5 Electrical Requirements 3.6 Telecommunications Requirements 3.7 Mechanical Requirements | <ul style="list-style-type: none"> ▪ Define Design Models as working models used through course of design and construction phases of the project. Delineate as separate from Campus Plan models, which are simplified for efficiency ▪ Define basic modeling requirements and expectations for design disciplines, regardless of who performs modeling <ul style="list-style-type: none"> ○ Example, Architecture: <ul style="list-style-type: none"> ▪ All partitions modeled at actual thickness and height ▪ All ceiling planes modeled at actual distance AFF ▪ All spaces must be defined with a room object ▪ All room objects must contain building, floor, room number, room name, area, department, cost center ○ Example, Structural |

| | | |
|------------|---|---|
| | | <ul style="list-style-type: none"> ▪ All primary structural members must be modeled to conform to actual shapes/sizes ▪ Miscellaneous metals construction need not be modeled ▪ Consider Mechanical requirements as optional given current lack of BIM use in fabrication |
| 4.0 | Building & Collector Models | |
| | 4.1 Building Model Purpose & Definition 4.2 Collector Model Purpose & Definition 4.3 Structure of Building Models 4.3.1 Required Content 4.3.2 Required Nomenclature 4.3.3 Required View Setup | <ul style="list-style-type: none"> ▪ Define Building models as distinct from Design Models. Explain primary purposes / uses ▪ Define structure of Building model structure in Revit <ul style="list-style-type: none"> ○ Collector Model ○ Individual Models (breakdown TBD) ▪ Define required model content to inform Collector Model <ul style="list-style-type: none"> ○ Exterior Assemblies ○ Interior Assemblies: Partitions, doors, ceilings, raised floors, rooms, graphics and views for Life Safety Plans ▪ Define nomenclature for views <ul style="list-style-type: none"> ○ General floor plan working views, life safety working plan views, life safety sheet views ▪ Define sheet setup <ul style="list-style-type: none"> ○ Title block families to be employed (provided by Froedtert Health) ○ Sheet setups |

| Suggested TOC and Document Format – Future/Longer Term (List to be Developed) | | |
|--|---|--|
| <i>Section to be Edited</i> | <i>New Content</i> | <i>Notes</i> |
| 3.2 | <ul style="list-style-type: none"> ▪ Partition families | <ul style="list-style-type: none"> ▪ Provide Froedtert Health specified families for all partitions which shall be employed on all projects |
| 3.2 | <ul style="list-style-type: none"> ▪ Door families | <ul style="list-style-type: none"> ▪ Provide Froedtert Health specified families for all doors which shall be employed on all projects |
| 3.2-3.7 | <ul style="list-style-type: none"> ▪ Asset management | <ul style="list-style-type: none"> ▪ Define protocol and requirements to include asset ID data in modeled objects |
| 3.7 | <ul style="list-style-type: none"> ▪ MEP modeling requirements | <ul style="list-style-type: none"> ▪ Provide more definitive requirements relative to modeling HVAC |

END OF SECTION



Froedtert Hospital Campus BIM Standards

Version 1.0
July 28, 2014

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1. General Background

- a. The design and construction industry has embraced Building Information Modeling (BIM) in lieu of two-dimensional CAD for the development of new construction projects. The benefits of BIM are clear and numerous, such as:
 - i. Three-dimensional visualization of building components to facilitate dynamic viewing
 - ii. Powerful data-driven graphical representations of building objects
 - iii. Robust database capabilities that allow for multiple methods to control and modify objects (rooms, doors, ceilings, MEP components, etc.)
 - iv. More accurate coordination and clash detection between disciplines
 - v. Facilitated annotation, sheet, and project management
- b. The Building Information Model Project Standard Committee formally defines BIM as follows:
“Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition”¹

2. Building Management at Froedtert Hospital

- a. Until very recently, Froedtert Hospital Facility Planning and Development (FP&D) has recorded campus building information using a combination of CAD facility drawings and a visual database software package. Together, these tools have been utilized to manage physical space assignments and inform lease documents. They have also informed the campus-wide building occupancy and life safety plans, which are crucial to demonstrate compliance and to facilitate future planning.
- b. Froedtert Health recognizes the long term benefits of using BIM in lieu of two-dimensional CAD platform / visual database combinations, particularly with respect to facility planning, asset management, and space management. As such, FP&D has discontinued the use of visual database software in favor of a CAD-only based management protocol. This temporary measure is a bridge strategy until the campus drawings are fully migrated to a BIM platform – a procedure that will take several years to complete.

3. Purpose

- a. In order to facilitate an orderly migration from two-dimensional CAD to a multi-dimensional BIM environment, and to support longer-range facility management goals, FP&D has developed this BIM Standards document (a.k.a. “Standards”) in concert with its design and construction partners.
- b. The BIM Standards document is intended to define Froedtert Health requirements with respect to the use of BIM and tendering of BIM-related deliverables, as further outlined in Section 1.2. The Standards shall be referenced by the following parties:
 - i. Architects

¹ National BIM Standard – United States. National Building Information Model Standard Project Committee, <http://www.nationalbimstandard.org/faq.php#faq1> (accessed: 3/4/2013)

- ii. Interior Designers
- iii. Consulting Engineers
- iv. Construction Managers / General Contractors

4. Application

- a. These Standards are intended as an exhibit to Agreements pertaining to facility design and construction, which may be individual project Agreements (i.e. A101 or B101) or Master Services Agreements (MSA's) that control a variety of smaller projects via Individual Project Scope Orders.
- b. Froedtert Health recognizes that architects, consulting engineers, GC's, CM's and related parties have variant amounts of experience with BIM. As such, any party to this document shall carefully review the information contained herein to assess whether it is capable of complying with the Standards prior to entering into an agreement with Froedtert Health.
- c. In the event that the Standards cannot be supported by a potential design or construction partner, for any reason, such matters shall be discussed with the Director of Facility Planning and Development prior to executing any project agreements. The parties shall mutually agree on a combination of the following:
 - i. Limiting the Standards by striking language
 - ii. Amending the Standards by adding language
 - iii. Waiving the Standards in their entirety

5. Scope

- a. All projects, unless determined otherwise, shall comply with these Standards.

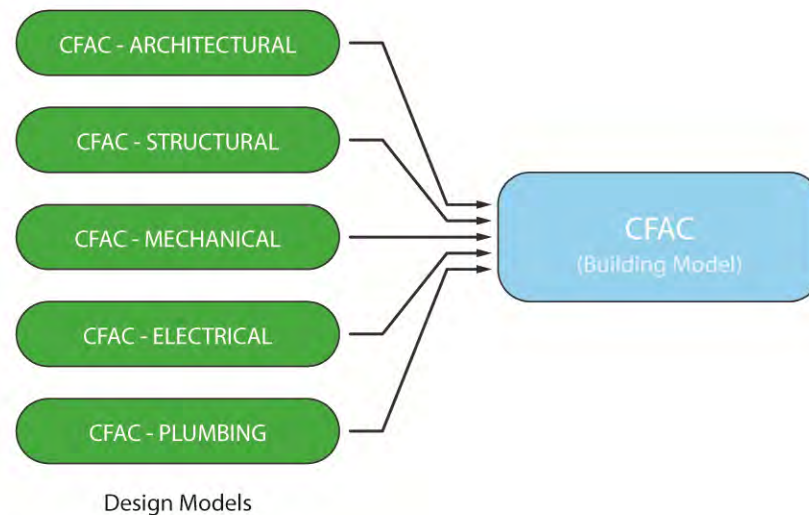
6. Software

- a. For the purposes of this document, it is assumed that the design team will utilize the most current version of AutoDesk Revit® software for project production. The software platform shall be cleared with Froedtert Health at the project outset and also presented on the BIM Management Plan (See also Section 2.1)

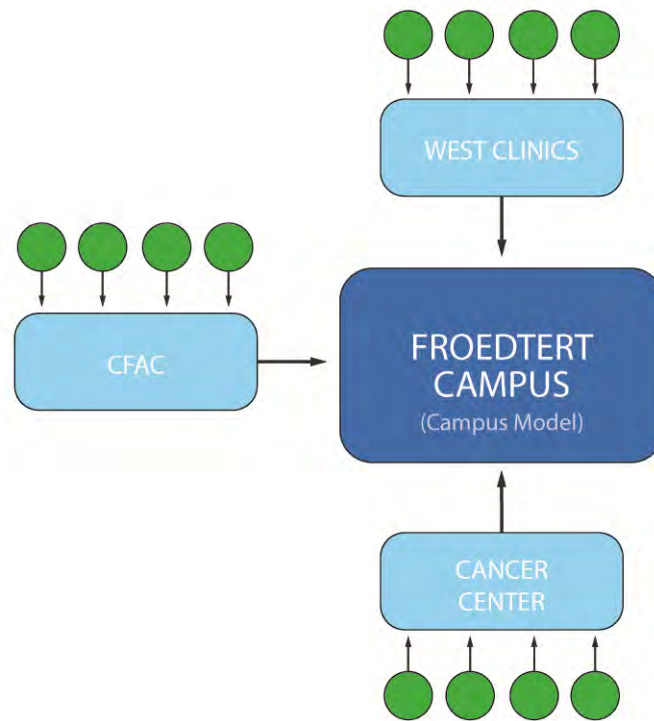
7. Structure

- a. Working Models are used by design professionals to execute the project, facilitate documentation, and generally produce contract documents. Generally, working files are created for each major design discipline. This BIM standard does not address Working Models, which shall be the purview of design teams, and which are not required as a deliverable to Froedtert.
- b. In order to manage BIM execution for the Froedtert Hospital campus, a three-tier approach to model management shall be utilized by project teams and the hospital:
 - i. **Design Models** are versions of the working models that have been cleaned of extraneous families, views, metadata and other unnecessary content. In general, a design model will be created from each working model. Design Models shall conform to the standards set forth in this document in Section 3. Design models are retained by Froedtert to enable future remodeling of newly built space.

- ii. A **Building Model** is created and/or modified at the end of a project. This essentially collects a required set of content and views into one single building model. Each campus building shall have only one building model (i.e. West Clinics, CFAC, North Tower, etc), and therefore this model must be refined when renovations are completed.
- iii. The **Campus Model** is managed by Froedtert or a consultant to Froedtert. This model contains links to each Building Model, and therefore allows for collected views of the entire campus by level. Formerly known as a Collector File, the Campus Model is simply a device to facilitate campus master drawing views which exhibit the following:
- iv. Formerly known as a Collector File, the Campus Model and Building Model is simply a device to facilitate campus master drawing views which exhibit the following:
 - 1. Life Safety
 - 2. Occupancy Plans
 - 3. Department Plans
 - 4. Fire Protection One-lines
 - 5. HVAC
 - 6. Medical Gas One-lines
 - 7. Plumbing Plans
 - 8. Electrical Plans
- c. The diagrams below further explains the logic of the Froedtert Hospital model setup:



Design Models are linked to a building-specific **Building Model** and are replaced/updated as needed.



Each **Building Model** is linked to an overall **Campus Model** that documents the entire facility.

1. Principle

- a. This document is meant to evolve as the use of BIM in the design and construction arenas continues to develop, and as Froedtert Health develops its internal use of BIM.

2. Short-Term Goals

- a. All new projects shall be designed using BIM software (presumably AutoDesk Revit®). The model(s) used to facilitate design shall hereafter be termed Design Models
- b. At the completion of any project, the Architect shall tender all Design Models to Froedtert Health FP&D. These models will be used by the owner as further defined in an Owner-Architect or Owner-Consultant Agreement.
 - i. Design models shall conform to the requirements of Section 3.0
- c. At the completion of any project, the Architect shall prepare and tender Building Model(s) of the project, which will be used for campus life safety plans, occupancy plans, and to facilitate space management.
 - i. Building Models will conform to the requirements of Section 4.1.
- d. Froedtert Health or a consultant to Froedtert Health will maintain master campus plans in BIM via the use of a Campus Model. The Campus Model will contain a combination of linked Building Models (for new projects / buildings) and linked CAD files (for existing buildings) so that the entire campus can be viewed in one model. The Campus Model will enable the following:
 - i. Management of room information (name, area, department, cost center, building, floor)
 - ii. Viewing life safety information (rated partitions, stairs / exit doors)
 - iii. Viewing building occupancy classifications
 - iv. Viewing departmental information
 - v. Viewing MEP model/diagram information

3. Long-Term Goals

- a. A variety of long-term goals may be of interest to Froedtert Health, including the following:
 - i. Froedtert may internally manage its campus models using a BIM manager FTE
 - ii. Froedtert may internally manage and mandate the use of a BIM template file that standardizes the model structure, view names, etc. This template is used for all new project work.
 - iii. Froedtert may internally manage and mandate the use of standard families for any of the following
 - 1. Title Blocks
 - 2. Annotations and symbols
 - 3. Partitions
 - 4. Ceilings

5. Other TBD
- iv. Building Models are used to track campus assets, such as:
 1. VAV boxes
 2. Dampers
 3. Valves
 4. Doors
 5. Other TBD

1. Overview

- a. The intent of a BIM Management Plan is to provide a framework that will let the owner, architect, engineers, and construction manager deploy building information modeling (BIM) technology and best practices on a project faster and more cost-effectively. The plan delineates roles and responsibilities of each party, defines the detail and scope of information to be shared, and establishes relevant business processes and supporting software.
- b. An example BIM management plan will be made available to the design team by Froedtert Health. This document shall be amended by the design team as needed to define the specific management plan for the project.
- c. The information below is meant to provide guidance to the design team as to how to complete the BIM Management Plan. The team shall thoroughly review the Management Plan to ensure that it addresses the project at hand.

2. Project Information

- a. This section defines basic project information (Name, project numbers used by all organizations, etc). Enter information into this section to define general project information.

| | |
|----------------------|--|
| Project Name*: | |
| Project Numbers: | |
| | |
| | |
| Project Address: | |
| Project Description: | |

*Note: The Project Name defined herein is a Parameter that is reused by multiple applications; it must be an agreed-upon name by all parties as it is used across applications for coordination of specifications and cost estimating.

3. Core BIM Collaboration Team

- a. Provide a list of lead BIM contacts for each organization that will access the BIM models.

| Contact Name | Role/Title | Company | Email | Phone |
|--------------|-------------------------|---------|-------|----------------|
| | Collector Model Manager | HGA | | (414) 278-8200 |
| | | | | |
| | | | | |

4. Project Phases / Schedule

- a. Provide details on project phases and milestones, listing phase names, start and completion dates, and key stakeholders.

| PROJECT PHASE / MILESTONE | ESTIMATED START DATE | ESTIMATED COMPLETION DATE | PROJECT STAKEHOLDERS INVOLVED |
|---------------------------|----------------------|---------------------------|-------------------------------|
| PRELIMINARY PLANNING | | | |
| DESIGN DOCUMENTS | | | |
| CONSTRUCTION DOCUMENTS | | | |
| CONSTRUCTION | | | |
| | | | |

5. Project BIM Goals and BIM Uses

- State the major BIM goals into the table below. Use the “Potential BIM Uses” cells for additional uses not listed.
 - For example, if the goal is defined as:
“Goal: Quickly assess cost associated with design changes.” Then, the BIM Uses would be: “Use: Cost Estimation”
- Priorities are established to resolve conflicting goals.

| BIM Goal | Potential BIM Uses | Priority (L,M,H) |
|----------|--------------------|------------------|
| | | |
| | | |
| | | |

6. BIM Uses Table

- Fill out the BIM use table as shown below. Mark all intended uses with an “X”

| X | PLAN | X | DESIGN | X | CONSTRUCT | X | OPERATE |
|---|---------------|---|---------------------|---|----------------------------|---|---------------------------------|
| | PROGRAMMING | | DESIGN AUTHORIZING | | SITE UTILIZATION PLANNING | | BUILDING MAINTENANCE SCHEDULING |
| | SITE ANALYSIS | | DESIGN REVIEWS | | CONSTRUCTION SYSTEM DESIGN | | BUILDING SYSTEM ANALYSIS |
| | | | 3D COORDINATION | | 3D COORDINATION | | ASSET MANAGEMENT |
| | | | STRUCTURAL ANALYSIS | | DIGITAL FABRICATION | | SPACE MANAGEMENT / TRACKING |
| | | | LIGHTING ANALYSIS | | 3D CONTROL AND PLANNING | | DISASTER PLANNING |
| | | | ENERGY ANALYSIS | | RECORD MODELING | | RECORD MODELING |
| | | | MECHANICAL ANALYSIS | | | | |

| | | | | |
|--|---------------------------------|-------------------------------------|---------------------------------|---------------------------------|
| | | OTHER ENG. ANALYSIS | | |
| | | SUSTAINABILITY (LEED) EVALUATION | | |
| | | CODE VALIDATION | | |
| | PHASE PLANNING (4D MODELING) | PHASE PLANNING (4D MODELING) | PHASE PLANNING (4D MODELING) | PHASE PLANNING (4D MODELING) |
| | COST ESTIMATION | COST ESTIMATION | COST ESTIMATION | COST ESTIMATION |
| | EXISTING CONDITIONS MODELING | EXISTING CONDITIONS MODELING | EXISTING CONDITIONS MODELING | EXISTING CONDITIONS MODELING |

7. BIM Collaborative Process Mapping (Coordination Plan)

- a. This chart outlines the expectations of the team members at the different phases of the project. It is meant as a guide and should be adjusted as needed, according to the project needs.

| | Owner | Architect | Engineers | Construction Manager | Commissioning Agent |
|--|---|--|--|--|---|
| Conceptualization / Program of Requirements | Provide requirements related to form, function, cost and schedule | Begin design intent model with massing concepts and site considerations | Provide feedback on initial building performance goals and requirements | Provide feedback on initial building cost, schedule, and constructability | Provide feedback on advanced commissioning requirements |
| Criteria Design / Schematic Design | Provide design review and to further refine design requirements | Refine Design Model with new input from Owner, Consulting Engineers, and Construction Manager. Conduct Reverse Phase Scheduling Activity | Provide schematic energy modeling and system iterations as Design Model continues to develop | Provide design review and continued feedback on cost, schedule, and constructability | Refine advanced commissioning requirements |
| Detailed Design / Design Development | Department design reviews. Final approval of project design and metrics | Continue to refine Design Model. Introduce consultants models and perform model coordination | Create Discipline specific Design Models. Create detailed energy model. | Create Construction Model for simulation, coordination, estimates, and schedule | Review design model for all disciplines |
| Implementation Documents / Construction Documents | | Finalize Design Model, Construction Documents, and Specifications | Finalize Discipline specific Design Models and Final Energy Model | Enhance Construction Model and perform final estimate and final | Review design model for all disciplines |

| | | | | |
|---|--|---|---|---|
| | | | construction schedule | |
| Agency Coordination/Final Buyout | Assist with code compliance negotiations and permitting | Work with agencies on code compliances, plan acceptance and respond to construction RFI's | Work with agencies on code compliances, plan acceptance and respond to construction RFI's | Manage bid process, project buyout, and preconstruction RFI's |
| Construction | Monitor construction and give input to construction changes and issues | Perform contract administration, update Design Model with changes | Assist with RFI's and update Discipline specific Design Models, field conditions, and commissioning | Manage construction with subcontractors and suppliers, inform changes to Design Model |
| Facility Management | Engage Architect and Facilities Group for model turnover to staff. | Coordinate information exchange through model to Facilities Group | | Observe construction and perform advanced commissioning. |

8. Project Phases/Milestones

- Use this table to identify key dates and project stakeholders.

| Project Phase / Milestone | Estimated Start Date | Estimated Completion Date | Project Stakeholders Involved |
|--|----------------------|---------------------------|--|
| Conceptualization/ Program of Requirements Phase | | | Owner, Architect, Consulting Engineers, CM |
| Criteria Design/Schematic Design Phase | | | Owner, Architect, Consulting Engineers, CM, Commission Agent |
| Detailed Design/ Design Development Phase | | | Owner, Architect, Consulting Engineers, CM, Commission Agent |
| Implementation Documents/ Construction Documents Phase | | | Owner, Architect, Consulting Engineers, CM |
| Agency Coordination/Final Buyout Phase | | | Owner, Architect, Consulting Engineers, CM |

| | | | |
|------------------------------|--|--|--|
| Construction Phase | | | Owner, Architect, Consulting Engineers, CM, Commission Agent |
| Facility Management Phase | | | Owner, Architect |
| | | | |
| | | | |

9.

Planned Modeling

- a. In the table provided, outline the models that will be created for the project. List the model name, model content, project phase in which the model will be delivered, the model's primary authoring company, and the model authoring tool that will be used. For models that will not be used or created in your project, leave the row blank. Add rows for planned model types that are not already listed. See the Model Progression Specification for detailed level of modeling requirements by phase.

| Model Name | Model Content | Project Phase | Model Element Author | Authoring Tool |
|----------------------------|---|---|----------------------|------------------------------------|
| Architectural Model | Architectural objects, code information | Conceptualization / Program of Requirements Phase | | <i>Autodesk Revit Architecture</i> |
| Civil Model | Topography, site utilities to within 5 feet of perimeter, hard and soft surfaces, other site objects | Criteria Design / Schematic Design Phase | | <i>Autodesk Civil 3D</i> |
| Structural Model | Floor and roof slabs, structural framing members, column grids, bearing and shear walls, analytical structural model, lintels | Criteria Design / Schematic Design Phase | | <i>Autodesk Revit Structure</i> |
| Mechanical Model | Mechanical systems, equipment, load information, | Criteria Design / Schematic Design Phase | | <i>Autodesk Revit MEP</i> |

| | | | | |
|---------------------------|--|--|--|----------------------------------|
| | utilities within 5 feet of building perimeter | | | |
| Electrical Model | Electrical systems, equipment, load information, utilities within 5 feet of building perimeter | Criteria Design / Schematic Design Phase | | <i>Autodesk Revit MEP</i> |
| Plumbing Model | Plumbing systems, equipment, load information, utilities within 5 feet of building perimeter | Criteria Design / Schematic Design Phase | | <i>Autodesk Revit MEP</i> |
| Energy Model | Energy data, run iterations, life cycle costing, peak loads | Criteria Design / Schematic Design Phase | | <i>Autodesk Ecotect</i> |
| Construction Model | Scheduling information, sequencing information | Criteria Design / Schematic Design Phase | | <i>Autodesk Navisworks</i> |
| Estimate Model | Costing data, quantity takeoffs | Criteria Design / Schematic Design Phase | | <i>Autodesk Quantity Takeoff</i> |
| CoordinationModel | Design Intent Models and Fabrication information | Construction | | <i>Autodesk Navisworks</i> |

10. Model Management

a. File Format

- All Revit files will be the same version which shall be defined by the project team.
- All exports to Cad from Revit and other applications will be saved to AutoCad DWG format.

b. File Naming convention

- Determine and list the structure for model file names as required for your project. Enter the model names into the table provided.

| | |
|--|---------------------|
| File Names for Models Should Be Formatted as: | |
| <i>Project Number(optional)-Project Name- DISCIPLINE.rvt (example: XXXXXX-Name-AR.rvt)</i> | |
| Architectural Core and Shell Model | -AR |
| Architectural Fit Out model | -FO |
| Civil Model | -CV |
| Mechanical Model | -MECH |
| Electrical Model | -EE |
| Plumbing Model | -PL |
| Furniture/Equipment | -FE |
| Structural Model | -ST |
| Energy Model | -EM |
| Construction Services Model | -CS |
| Cost Estimate Model | -CE |
| Coordination Model | -COORD |
| Shared Coordinates Master | -MASTER_COORDINATES |

11. Model Progression

- a. Refer to Level of Design requirements under section 2.4

12. Analysis Planning/Modeling

- a. The project scope of work may require certain types of analysis, such as those listed below, which may be performed on existing or specially created model(s). In most cases the quality of the analysis output depends on the quality of the model from which the data is derived. Team members who use BIM models for analyses shall first ensure with the model authors that they are contractually allowed to use models for these purposes.
- b. A list of potential uses has been provided in the example BIM Management Plan, and is outlined below:
 - Quantity Takeoff Analysis
 1. The objective of quantity takeoff analysis is to use modeling property data to automate or simplify the quantity takeoff process. This information from the quantity takeoff tool can then be imported or tied to cost-estimating software. In order for the quantity takeoff process to work seamlessly, the original modeling author will need to include the relevant property information in the design and an agreement of modeled content communities to estimate.
 - Scheduling Analysis
 1. Scheduling analysis allows the project team use the project model to analyze the timeline and sequencing for construction. This information can then be used to modify or adjust the construction schedule. Tools currently exist that allow project team members to visualize the construction over time, but no systems exist yet that interact automatically with scheduling tools.

- Visualization Analysis
 1. Visualization tools let the project team view the design or construction of the project in 3D, giving them a more accurate perspective of the end product.
 - Structural Analysis
 1. Structural analysis tools use the model to analyze the building's structural properties. Structural analysis programs typically use the finite element method (FEM) to measure the stresses on all structural elements of the design. For structural analysis to work seamlessly, the original structural modeling tool needs to be compatible with the structural analysis tool, and the original structural model property data must include information about the structural elements.
- c. Detailed Analysis Plan
- For each type of analysis that may be performed for your project, list the models used for the analysis, which party will perform the analysis, the file format required for the analysis, the estimated project phase, and the analysis tool that will be used. If there are other special instructions associated with the analysis, mark the Special Instructions column and list the details in the Special Instructions table in the next section.

| Analysis | Analysis Tool | Model | Analyzing Company | Project Phase | File Format Required |
|-------------------|---------------|---------------------|-------------------|---------------|----------------------|
| Visualization | | Architectural Model | | | .rvt/.nwf |
| Structural | | Structural Model | | | .rvt/? |
| Quantity Takeoff | | All Models | | | .rvt |
| Scheduling /4D | | All Models | | | .rvt/.nwf/? |
| Cost Analysis /5D | | All Models | | | .rvt/.nwf |
| Energy | | Architectural Model | | | .rvt/.GBXml |
| Daylight/Lighting | | Architectural Model | | | .rvt/.FBX |

13. As-Built Modeling

- a. The team shall define how as built modeling will be performed. The text provided in the example BIM Management Plan should be amended as needed to outline this process.

14. Collaboration Plan

- a. Creating a collaboration plan—including permissions and file structures—will help team members efficiently communicate, share, and retrieve information throughout the project. Use the table provided to define specific meetings and interactions that will occur to foster collaboration throughout the design and construction phases of the project.

| BIM REQUIREMENTS KICK-OFF | | | | |
|------------------------------|--|--|--|--|
| BIM USAGE AND GOALS | | | | |
| BIM PROCESS ID | | | | |
| MODEL PROGRESSION SPEC | | | | |
| DESIGN REVIEWS | | | | |
| COORDINATION REVIEWS | | | | |

1. A Design Team BIM Manager shall be identified for all new projects. This individual shall be responsible for maintaining the Design models throughout the design and construction phases of the project, and for coordinating the Building Model setup at the end of the project.
2. The Design Team BIM Manager shall be identified on the BIM Management Plan (see also Section 2.1), which shall be submitted to Froedtert.
3. For large projects using multiple Design models, it may be necessary to identify a Design Team BIM Manager for architectural models, one for structural models, and one for MEP-FP models or a combination thereof. This decision shall rest with the design team as a whole, but in any case shall be outlined in the BIM Management Plan and clearly communicated to the project team
4. Design Team BIM Manager(s) shall possess the following:
 - a. Proven experience and fluency with the BIM software
 - b. Ability to manage a complex set of models
 - c. Ability and willingness to troubleshoot model issues, which may include off-hours consultation during critical deadlines
 - d. Excellent communication skills
5. Primary Design Team BIM Manager Responsibilities
 - a. Administer the BIM Management Plan and submit this to the production team and Froedtert Health
 - b. Set up regular Project Coordination meetings to discuss the Revit Model and progression of work.
 - i. Coordination meetings may be held with internal production staff, other BIM Coordinators, the CM, and Early Trade Involvement Partners depending on the phase of work and topic of the meeting.
 - c. Consult with their firms' technical leadership to obtain necessary support, guidance and management when the project has special requirements.
 - d. Develop and document plot setups.
 - e. Perform file/directory maintenance; purge / clean files, and maintain good model health.
 - f. Maintain / Update Project Information in design models. This includes regular maintenance, such as compacting the Central file, and addressing warnings in the Model.
 - g. Monitor model performance, particularly when design models files become large. If the models sizes exceed typical workstation performance capabilities, the BIM Manager may elect to split content into multiple design models.
 - h. Coordinate design model archiving at the end of the project and at important milestones.
 - i. Coordinate and arrange for design models to be transmitted to Froedtert Health at the end of construction
 - j. Coordinate building models at the end of construction
6. Design Team BIM Manager Model Controls

- a. The BIM Manager will be the sole controller of line weights and other drawing standards on the project.
 - b. The BIM Manager will be the sole controller of Revit worksets and creation of Central File(s)
 - c. The BIM Manager will be the primary controller of visibility settings for views that are placed on sheets, in order to maintain a visually orderly set of drawings. Team members shall not adjust visibility templates without the BIM Manager's approval
 - d. The BIM Manager will be consulted first in the event of a central file corruption or failure. The BIM Manager shall determine how the file will be restored.
7. Please note that the responsibilities list above may be delegated to other team members. However, it is the Design Team BIM Manager's job to see that they are done.

1. A Construction Team BIM Manager shall be identified for all new projects. This individual shall be responsible for maintaining the Construction models throughout the construction phase of the project, and for coordinating the Design and Building Model setup at the end of the project.
2. The Construction Team BIM Manager shall be identified on the BIM Management Plan (see also Section 2.1), which shall be submitted to Froedtert.
3. Construction Team BIM Manager(s) shall possess the following:
 - a. Proven experience and fluency with the BIM software
 - b. Ability to manage a complex set of models
 - c. Ability and willingness to troubleshoot model issues, which may include off-hours consultation during critical deadlines
 - d. Excellent communication skills
4. Primary Construction Team BIM Manager Responsibilities
 - a. Overall responsibility for the Construction BIM model creation and information developed during construction
 - b. Act as the main point of contact for the Construction BIM and related issues between the Construction Team, subcontractors, Froedtert, the Design Team, and others as required
 - c. Ensure that the Construction Team has necessary hardware and BIM Software properly installed and accessible for project use
 - d. Coordinate construction sequencing and scheduling activities, and assure they are integrated with the BIM
 - e. Facilitate use of composite trade models in construction coordination/clash detection meetings and provides detection reports. Communicate with the Design Team BIM Manager to resolve clashes.
 - f. Coordinate with the Design Team to facilitate design changes in the field have been documented and are updated in the BIM in a timely manner
 - g. Coordinate updates of as-constructed conditions into the Design Model deliverables including implementation of SIs, CBs, RFPs, etc.
 - h. Ensure that the minimum required LOD is included in the Construction BIM as defined in the BIM Management Plan.
5. Please note that the responsibilities list above may be delegated to other team members. However, it is the Construction Team BIM Manager's job to see that they are done.
- 6.

1. Overview

- a. Level of Development (LOD) definitions help the project team understand the appropriate development of the Revit models as work progresses. Additionally, the LOD standards form a shared set of expectations with Froedtert Health, Design Consultants, and the CM/GC.
- b. The purpose of the LOD Matrix is to define the design team's expectations for model progression / development for each major Revit element category at each phase of the project.

2. LOD definitions were first developed by the AIA and are outlined below.

- a. 100 Level: Overall Massing
 - i. Overall building massing indicative of the area, height, volume, location, and orientation may be modeled in three dimensions.
- b. 200 Level: Generalized systems
 - i. Model elements are modeled as generalized systems or assemblies with approximate, size, shape, location, and orientation. Non-geometric information may also be attached to model elements.
- c. 300 Level: Specific Assemblies
 - i. Model elements are modeled as specific assemblies which are generally accurate in terms of size, shape, location, and orientation. Non-geometric information may also be embedded into Model Elements. However, most elements are typically only specific to the "Basis of Design" where more than one option is specified or they are specific only to the "indicative" element where final selection has not been made. This level of development is typically the highest level that a design team documents.
- d. 400 Level: Accurate Assemblies
 - i. Model elements are modeled as specific assemblies that are accurate in terms of size, shape, location, quantity, and orientation with complete fabrication, assembly, and detailing information. Non-Geometric information may also be attached to modeled elements. These model elements are typically created by contractors or subcontractors. This level of development does not typically reside in the Design Model.
- e. 500 Level: Constructed Assemblies
 - i. Modeled elements are modeled as constructed assemblies actual and accurate in terms of size, shape, location, quantity, and orientation. Non-geometric information may also be attached to the modeled elements. These model elements are typically created by the contractors or subcontractors. This level of development does not typically reside in the Design Model.

3. LOD Matrix

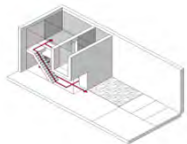
- a. An LOD matrix is to be established by the design and construction teams. This Matrix is to establish required levels of development per Revit Category and by project phase. The LOD matrix follows the Unifomat system.

- i. A - Structure
 - ii. B – Shell
 - iii. C – Interiors
 - iv. D – Services
 - v. E – Equipment & Furnishings
 - vi. Special Construction & Development
 - vii. Building Sitework
 - viii. Revit Specific Content
4. An example LOD Matrix is furnished with this document, and may be used by project teams. The LOD Matrix shall be established as early in project design as possible, and shall be shared with Froedtert Health alongside the BIM Management Plan.

Froedtert Health LOD Matrix

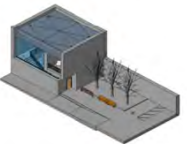
Level 100: Overall building massing indicative of area, height and volume

- Conceptual program requirements
- Conceptaul cost estimating
- Conceptual Phasing



Level 200: Generic geometry modeled, overall aproximate quantity, size, location and orientation

- Room Criteria
- Schematic Utility requirements, Schematic Code requirements
- Schematic Cost Estimating
- Schematic Phasing
- LEED Material and Energy Strategy (Verify if LEED project)



Level 300: All 3D geometry described accurately; quantity, size and orientation

- Utility Requirements defined
- Code Requirements defined
- Cost Estimation
- Construction Scheduling
- LEED material and energy assessment



| SCHEMATIC DESIGN | DESIGN DEVELOPMENT | CONTRACT DOCUMENTS | Level of Detail at completed Contract Documents |
|------------------|--------------------|--------------------|---|
| LOD | LOD | LOD | |

| Uniformat | |
|--|--------------|
| A | Substructure |
| A10 Foundations | |
| A1010 Standard Foundations | |
| A1011 Wall Foundations, Waterproofing, & Insulation | |
| A1012 Column Foundations & Pile Caps | |
| A1013 Perimeter Drainage & Insulation | |
| Footings/Foundations modeled to designed dimensions. "Area of Influe | |
| A1020 Special Foundations | |
| A1022 Grade Beams | |
| A1024 Underpinning | |
| A1025 Dewatering | |
| Footings/Foundations modeled to dimensions provided by owner/contr | |
| A1030 Slab on Grade | |
| A1031 Standard Slab on Grade | |
| A1032 Structural Slab on Grade | |
| A1033 Inclined Slab on Grade | |
| A1034 Trenches, Pits & Bases | |
| A1035 Under-Slab Drainage & Insulation | |
| Slab on Grade modeled per thickness, dimensions, and elevations provit | |
| B | Shell |
| B10 Superstructure | |
| B1010 Floor Construction | |
| B1011 Suspended Floor Construction | |
| B1012 Floor Construction | |
| B1014 Ramps | |
| Structural Frame/Columns/Bearing Walls, and Composite Floors/Concre | |
| B1020 Roof Construction | |
| B1021 Flat Roof Construction | |
| B1022 Pitched Roof Construction | |
| B1023 Canopies | |
| Structural Frame/Columns/Bearing Walls, Steel/Masonry/Concrete Roo | |
| Structural Components (columns, beams, etc) | |
| B1031Concrete (Beams, Columns, walls & concrete specialties) | |
| B1032 Structural Rebar | |
| B1033 Steel Structure | |
| B1034 Steel Framing & Misc. Metals | |
| B1035 Steel Connections | |
| Structural Frame/Columns/Bearing Walls, and Composite Floors/Concre | |
| B20 Exterior Enclosure | |
| B2010 Exterior Walls | |
| B2011 Exterior Wall Construction | |
| (including Precast and CMU) | |
| B2012 Parapets | |
| B2013 Exterior Louvers, Screens, & Fencing | |
| B2014 Exterior Sun Control Devices | |
| B2016 Exterior Soffits | |
| Exterior wall modeled to designed dimensions. General composition mo | |
| B2020 Exterior Windows | |
| B2021 Windows | |
| B2022 Curtain Walls | |
| B2022Curtain Panels, Metal Panels, Mullions and Systems | |
| B2023 Storefronts | |
| Location, general layout and generic massing modeled to designed dime | |
| B2030 Exterior Doors | |
| B2031 Glazed Doors & Entrances | |
| B2032 Solid Exterior Doors | |
| B2033 Revolving Doors | |
| B2034 Overhead Doors | |
| B2039 Other Doors & Entrances | |
| Location, general layout and generic massing modeled to designed dime | |
| B30 Roofing | |
| B3010 Roof Coverings | |
| B3011 Roof Finishes | |
| B3012 Traffic Toppings & Paving Membranes | |
| B3013 Roof Insulation & Fill | |
| B3014 Flashings & Trim | |
| General slope and boundary of roof modeled to designed dimensions. | |

| SCHEMATIC DESIGN | | | DESIGN DEVELOPMENT | CONTRACT DOCUMENTS | Level of Detail at completed Contract Documents |
|---|--|--|--------------------|--------------------|---|
| LOD | | | LOD | LOD | |
| C | Uniformat | | | | |
| | B3015 Roof Eaves and Soffits | | | | |
| | B3020 Roof Openings | | | | |
| | B3021 Glazed Roof Openings | | | | |
| | B3022 Roof Hatches | | | | |
| | Interiors | | | | |
| | C10 Interior Construction | | | | |
| | C1010 Partitions | | | | |
| | Model partition to designed thickness. Height to be represented by wal | | | | |
| | C1011 Fixed Partitions | | | | |
| C1012 Demountable Partitions | | | | | |
| C1013 Retractable Partitions | | | | | |
| C1014 Site Built Toilet Partitions | | | | | |
| C1015 Wall Blocking | | | | | |
| C1017 Interior Windows & Storefronts | | | | | |
| C1020 Interior Doors | | | | | |
| Location, general layout and generic massing modeled. Hardware not m | | | | | |
| C1021 Interior Doors | | | | | |
| C1022 Interior Door Frames | | | | | |
| C1023 Interior Door Hardware | | | | | |
| C1024 Interior Door Wall Opening Elements | | | | | |
| C1025 Interior Door Sidelights & Transoms | | | | | |
| C1026 Interior Hatches & Access Doors | | | | | |
| C1027 Door Painting & Decoration | | | | | |
| C1030 Fittings | | | | | |
| See Implementation Plan. (Fabricated Compartments, Bath & Toilet Acc | | | | | |
| C1031 Fabricated Toilet Partitions | | | | | |
| C1032 Fabricated Compartments & Cubicles | | | | | |
| C1033 Storage Shelving and Lockers | | | | | |
| C1034 Ornamental Metals and Handrails | | | | | |
| C1035 Identifying Devices | | | | | |
| C1036 Closet Specialties | | | | | |
| C1037 Equipment Supports & Misc. Metals | | | | | |
| C1038 Wall Protection & Guards | | | | | |
| C20 Stairs | | | | | |
| 2010 Stair Construction | | | | | |
| Rise, run and general composition of stair modeled. Railing overall heig | | | | | |
| C2011 Regular Stairs (Steel & Precast) | | | | | |
| C2014 Stair Handrails and Balustrades | | | | | |
| C2020 Stair Finishes | | | | | |
| Not modeled. Documented in schedule and details. Ramps - Rise and ru | | | | | |
| C2021 Stair, Tread, and Landing Finishes | | | | | |
| C2022 Stair Soffit Finishes | | | | | |
| C2023 Stair Handrail & Balustrade Finishes | | | | | |
| C30 Interior Finishes | | | | | |
| C3010 Wall Finishes | | | | | |
| Not modeled. Documented in schedule and details/annotations. | | | | | |
| C3011 Wall Finishes to Inside Exterior Walls | | | | | |
| C3012 Wall Finishes to Interior Walls | | | | | |
| C3013 Column Finishes | | | | | |
| C3020 Floor Finishes | | | | | |
| Not modeled. Documented in schedule and details/annotations. | | | | | |
| C3021 Floor Toppings | | | | | |
| C3022 Traffic Membranes | | | | | |
| C3023 Hardeners and Sealers | | | | | |
| C3024 Flooring | | | | | |
| C3025 Carpeting | | | | | |
| C3026 Bases, Curbs and Trim | | | | | |
| C3030 Ceiling Finishes | | | | | |
| Ceiling finish plane modeled and pattern shown. Material documented | | | | | |
| C3031 Ceiling Finishes | | | | | |
| C3032 Suspended Ceilings | | | | | |
| D Services | | | | | |
| D10 Conveying | | | | | |
| D1010 Elevators & Lifts | | | | | |
| Conveying elements and overruns to be modeled in 3D. Clearances to k | | | | | |
| D1011 Passenger Elevators | | | | | |
| D1012 Freight Elevators | | | | | |
| D1020 Escalators & Moving Walks | | | | | |
| See Implementation Plan | | | | | |
| D1090 Other Conveying Systems | | | | | |
| See Implementation Plan. To be determined by system. (Pneumatic Tut | | | | | |
| D1092 Pneumatic Tube Systems | | | | | |
| D20 Plumbing | | | | | |
| D2010 Plumbing Fixtures | | | | | |
| Location, general layout and generic massing modeled. Fixtures, flush v | | | | | |
| D2011 Water Closets | | | | | |
| D2012 Urinals & Lavatories | | | | | |
| D2013 Fixtures | | | | | |
| D2014 Sinks & Bathtubs | | | | | |
| D2015 Equipment | | | | | |
| D2016 Eye Wash Fountains | | | | | |
| D2017 Showers | | | | | |
| D2018 Drinking Fountains and Coolers | | | | | |
| D2019 Toilet & Bath Accessories | | | | | |
| D2020 Domestic Water Distribution | | | | | |
| Base level of service routes piping for 2D construction document clarity. | | | | | |
| D2021 Cold Water Service | | | | | |
| D2022 Hot Water Service | | | | | |
| D2023 Domestic Water Supply Equipment | | | | | |
| D2030 Sanitary Waste | | | | | |
| Location, general layout and generic massing modeled. Mains modeled | | | | | |
| D2031 Waste Piping | | | | | |
| D2032 Vent Piping | | | | | |
| D2033 Floor Drains | | | | | |
| D2034 Sanitary Waste Equipment | | | | | |
| D2035 Pipe Insulation | | | | | |
| D2040 Rain Water Drainage | | | | | |
| Location, general layout and generic massing modeled. Mains modeled | | | | | |
| D2041 Pipe & Fittings | | | | | |
| D2042 Roof Drains | | | | | |

| | | | | Level of Detail at completed Contract Documents |
|---|--------------------|--------------------|-----|---|
| SCHEMATIC DESIGN | DESIGN DEVELOPMENT | CONTRACT DOCUMENTS | | |
| | LOD | LOD | LOD | |
| Uniformat | | | | |
| D2043 Rainwater Drainage Equipment D2044 Pipe Insulation | | | | Base level of service routes piping for 2D construction document clarity. |
| D2090 Other Plumbing Systems | | | | |
| D2091 Gas Distribution D2092 Acid Waste Systems D2096 Medical Gas Piping & Equipment | | | | |
| D30 HVAC | | | | |
| D3010 Energy Supply | | | | Equipment modeled at nominal sizes and locations as Basis of Design. |
| D3011 Oil Supply System D3012 Gas Supply System D3014 Steam Supply System D3015 Hot Water Supply System | | | | Equipment modeled at nominal sizes and locations as Basis of Design. |
| D3020 Heat Generating Systems | | | | |
| D3021 Boilers D3022 Boiler Room Piping & Specialties D3023 Auxiliary Equipment D3024 Insulation | | | | |
| D3030 Cooling Generating Systems | | | | |
| D3031 Chilled Water Systems D3032 Direct Expansion Systems | | | | Equipment modeled at nominal sizes and locations as Basis of Design. |
| D3040 Distribution Systems | | | | |
| D3041 Air Distribution Systems D3042 Exhaust Ventilation Systems D3043 Steam Distribution Systems D3044 Hot Water Distribution D3045 Chilled Water Distribution D3052 Package Units | | | | |
| D3060 Controls & Instrumentation | | | | |
| D3061 Heating Generating Systems D3062 Cooling Generating Systems D3063 Heating/Cooling Air Handling Units D3064 Exhaust & Ventilating Systems D3065 Hoods and Exhaust Systems D3066 Terminal Devices (diffusers & grills) D3068 Building Automation Systems D3069 Temperature Control Devices | | | | Sensors (T-Stats, Humidistats, Gas Detection Monitors, etc.) Approximat |
| D3090 Other HVAC Systems & Equipment | | | | |
| D3091 HVAC Equipment | | | | |
| D40 Fire Protection | | | | |
| D4010 Sprinklers | | | | Standpipes, alarm valve locations, main shut off and main drain will be r |
| D4011 Sprinkler Water Supply D4012 Sprinkler Pumping Equipment D4013 Dry Sprinkler System | | | | Standpipes, alarm valve locations, main shut off and main drain will be r |
| D4020 Standpipes | | | | |
| D4021 Standpipe Water Supply D4022 Pumping Equipment D4023 Standpipe Equipment | | | | |
| D4030 Fire Protection Specialties | | | | |
| D4031 Fire Extinguishers D4032 Fire Extinguisher Cabinets | | | | Standpipes, alarm valve locations, main shut off and main drain will be r |
| D4090 Other Fire Protection Systems | | | | |
| D4091 Carbon Dioxide Systems D4092 Foam Generating Equipment D4093 Clean Agent Systems D4094 Dry Chemical System | | | | |
| D50 Electrical | | | | |
| D5010 Electrical Service & Distribution | | | | Main incoming service conduits and ductbanks,transformers, and major |
| D5011 High Voltage Service & Dist. D5012 Low Voltage Service & Dist. | | | | Lighting fixtures modeled as worse case sceneario size for basis of desig |
| D5020 Lighting & Branch Wiring | | | | |
| D5021 Branch Wiring Devices D5022 Lighting Equipment | | | | |
| D5030 Communication & Security | | | | |
| D5031 Public Address & Music Systems D5032 Intercommunication & Paging Systems D5033 Telephone Systems D5034 Call Systems D5035 Television Systems D5036 Clock and Program Systems D5037 Fire Alarm Systems D5038 Security and Detection Systems D5039 Local Area Networks | | | | Communication panels and devices modeled generically. Major commu |
| D5090 Other Electrical System | | | | |
| D5091 Grounding Systems D5092 Emergency Light & Power Systems D5093 Floor Raceway Systems D5094 Other Special Systems & Devices D5095 General Construction Items (Elect.) | | | | |
| E Equipment & Furnishings | | | | |
| E10 Equipment | | | | Location and generic size modeled. |
| E1010 Commercial Equipment | | | | |
| E1017 Vending Equipment E1018 Office Equipment | | | | |
| E1020 Institutional Equipment | | | | |
| E1025 Audio-visual Equipment | | | | Location and generic size modeled. |

| | | Schematic Design | Design Development | Contract Documents | Level of Detail at completed Contract Documents |
|---|--|------------------|--------------------|--------------------|--|
| | | LOD | LOD | LOD | |
| Uniformat | | | | | |
| E1028 Medical Equipment | | | | | |
| E1030 Vehicular Equipment | | | | | Not modeled |
| E1032 Parking Control Equipment | | | | | |
| E1033 Loading Dock Equipment (Dock Leveler) | | | | | |
| E1090 Other Equipment | | | | | Location and generic size modeled. |
| E1091 Maintenance Equipment | | | | | |
| E1097 Window Washing Equipment | | | | | |
| E1098 Fire Shutters | | | | | |
| E20 Furnishings | | | | | |
| E2010 Fixed Furnishings | | | | | Not modeled. For walls that are to be disrupted in the scope of work of |
| E2011 Fixed Artwork | | | | | |
| E2012 Fixed Casework | | | | | |
| E2013 Blinds and Other Window Treatment | | | | | |
| E2014 Fixed Floor Grilles and Mats | | | | | |
| E2015 Fixed Multiple Seating | | | | | |
| E2016 Fixed Interior Landscaping | | | | | |
| E2020 Movable Furnishings | | | | | Furniture location, general layout and generic massing modeled. |
| E2021 Movable Artwork | | | | | |
| E2022 Furniture & Accessories | | | | | |
| E2023 Movable Rugs and Mats | | | | | |
| E2024 Movable Interior Landscaping | | | | | |
| E2025 Cubical Curtain Tracks | | | | | |
| F Special Construction & Demolition | | | | | |
| F10 Special Construction | | | | | |
| F20 Selective Building Demolition | | | | | |
| F2010 Building Elements Demolition | | | | | Location, general layout and generic massing modeled. (prefabricated b |
| F2011 Building Interior Demolition | | | | | |
| F2012 Building Exterior Demolition | | | | | |
| F2010 Building Elements Demolition | | | | | Not modeled |
| G Building Sitework | | | | | |
| G10 Site Preparation | | | | | |
| G1010 Site Clearing | | | | | To be determined, dependent on scope of work |
| G1011 Clearing & Grubbing | | | | | |
| G1020 Site Demolition & Relocation | | | | | To be determined, dependent on scope of work |
| G1024 Utilities Relocation (New & Existing) | | | | | |
| G1030 Site Earthwork | | | | | To be determined, dependent on scope of work |
| G1031 Site Grading Excavation | | | | | |
| G1034 Site Dewatering | | | | | |
| G1035 Site Shoring | | | | | |
| G1037 Erosion Control | | | | | |
| G1040 Hazardous Waste Remediation | | | | | Not modeled |
| G20 Site Improvement | | | | | |
| G2010 Roadways | | | | | Not modeled |
| G2020 Parking Lots | | | | | Not modeled |
| G2024 Parking Booths & Powered Equipment | | | | | |
| G2025 Markings & Signage | | | | | |
| G2030 Pedestrian Paving | | | | | Not modeled |
| G2031 Paving & Surfacing | | | | | |
| G2040 Site Development | | | | | Not modeled |
| G2050 Landscaping | | | | | Not modeled |
| G30 Site Mechanical Utilities | | | | | |
| G3010 Water Supply | | | | | To be determined, dependent on scope of work |
| G3011 Potable Water Distribution & Storage | | | | | |
| G3020 Sanitary Sewer | | | | | To be determined, dependent on scope of work |
| G3021 Piping | | | | | |
| G3030 Storm Sewer | | | | | To be determined, dependent on scope of work |
| G3031 Piping | | | | | |
| G3040 Heating Distribution | | | | | To be determined, dependent on scope of work |
| G3041 Steam Supply | | | | | |
| G3050 Cooling Distribution | | | | | To be determined, dependent on scope of work |
| G3051 Chilled Water Piping | | | | | |
| G3060 Fuel Distribution | | | | | To be determined, dependent on scope of work |
| G3061 Fuel Piping | | | | | |
| G3062 Fuel Equipment | | | | | |
| G3063 Fuel Storage Tanks | | | | | |
| G3090 Other Site Mechanical Utilities | | | | | To be determined, dependent on scope of work |
| G40 Site Electrical Utilities | | | | | |
| G4010 Electrical Distribution | | | | | Service entrance conduits from transformer secondary to service ente |
| G4013 Underground Power Distribution | | | | | |
| G4020 Site Lighting | | | | | Site lighting poles location, general layout and generic massing modelec |
| G4030 Site Communication & Security | | | | | Not modeled |
| G4031 Site Communications Systems | | | | | |
| G4032 Site Security & Alarm Systems | | | | | |
| G4090 Other Site Electrical Utilities | | | | | Not modeled |
| G90 Other Site Construction | | | | | |
| G9010 Service & Pedestrian Tunnels | | | | | Location, general layout and generic massing modeled for portions with |
| G9090 Other Site Systems | | | | | Location, general layout and generic massing modeled for components |
| Z Revit Specific Content | | | | | |
| Z10 Volume and Area | | | | | |
| Areas | | | | | |
| HVAC Zones | | | | | |
| Rooms | | | | | |
| Spaces | | | | | |
| Z20 Coordination | | | | | |
| Shaft Openings | | | | | |

1. Purpose and definition

- a. The Froedtert Campus Model has an internal coordinates system for all the elements that compose the model. These coordinates originated from a CAD based collector file. The coordinate system has been arranged on an origin-to-origin basis.

2. Design Models

- a. All Design BIM projects will utilize the internal coordinates system from the Building / Campus model (see also section 4.0) that will be distributed at the project commencement. This will be done as a means to ensure that any new work or renovations are appropriately positioned within the Froedtert owned and maintained Campus Model. At no point in time should the shared coordinates system be modified. A project base point may be used as means for individual project coordination and will not impact the usage of the model after transmission to Froedtert.
- b. Any issues with the coordinates system should be resolved through the Froedtert team.

3. Building Models

- a. Named Locations
 - i. All new and existing building models will contain a named location determined by Froedtert. This named location will aid in the assembly of the Campus Models and is the responsibility of the campus/building model managers (see also section 4.1-4.3). Refer to the BIM management plan for collector model manager contact info.

1. Background

- a. BIM workflow requires a highly organized approach to determine whether and how team members will either directly or indirectly access models.
- b. As workflow continues to evolve, it is not uncommon for multiple design organizations, early trade partners, and construction management personnel to either exchange design models at regular intervals or directly access design models during project design.
- c. Model sharing may involve the following parties
 - i. Architect of Record
 - ii. Engineer of Record
 - iii. Interior Designer
 - iv. Other Design Consultants
 - v. Construction Manager / General Contractor
 - vi. Early Trade Involvement Partners (ETIPs)
 - vii. Froedtert Health
- d. The Design Team and Construction Team BIM Managers shall jointly develop a model sharing protocol to facilitate design model information exchange and coordination between disciplines. This protocol shall be in place at the outset of new projects to avoid future complications, and shall be documented in the BIM Management Plan. If requested by Froedtert Health, the Design and Construction team shall be prepared to summarize model sharing protocols. At a minimum, the model sharing protocol shall delineate the following:
 - i. Parties that will access exchanged or shared models
 - ii. If applicable, the means and timing of design model exchanges
 - iii. How each party will use the design models
- e. Parties to model sharing, with the exception of Froedtert Health, shall be able to demonstrate that their team has the skill and qualifications necessary to use design BIM models
- f. Sharing of models carries potential legal consequences for all involved. It is expected that team members will collaborate in good faith to define model sharing solutions that support project goals. However, team members shall also involve their respective legal counsels to determine the appropriateness of sharing protocols with respect to individual firm risk management policies.

2. Model Sharing Methods

- a. The project team may elect to share design models in one or more of the following ways. The chosen method should be selected based on workflow needs, technological capabilities, and risk mitigation:
- b. Regularly scheduled file transfers between team members
 - i. If this method of sharing is chosen, it is expected that the lead design firm and its consultants will, at a minimum, exchange design models once per week. Additional

special exchanges shall be coordinated so as not to delay the progress of design work.

- ii. The project team as a whole shall develop a regular schedule of information exchanges. Some team members may require more frequent file transfers (design consultants) than others (such as the Owner), depending upon the project phase.

When transmitting design models, the sending party shall ensure that associated linked files are also transmitted as necessary so that the models are usable. Linked files may be additional BIM models or CAD links, depending on project circumstances.

- c. Shared access to design models via a dedicated project server hosted by the project team
 - i. This method may be employed to permit the design team and selected construction team members to access models directly. By using a shared server environment, the project team may be able to avoid reliance on scheduled model transfers.
 - ii. The owner, design and construction team members shall jointly determine how the server equipment will be funded, structured, maintained, and accessed.
 - iii. Direct access to the design models shall be limited to staff who fully understand how to use the BIM software and who are contractually permitted to access and use the models
- d. Shared access to design models provided by one team member to others
 - i. This method requires one party, generally the architect of record, to grant access to design models via remote access to its project server. Remote access may be granted via a virtual desktop, cloud workstation, or other technology. It shall be the responsibility of the granting organization to restrict server access as needed.
 - ii. If this method of model sharing is used, sharing parties shall test the system as early as feasible to ensure productivity needs are achieved. Connection bandwidth and speed can greatly affect the viability of this method, particularly for production tasks that require frequent communications between local and central models.
 - iii. Direct access to the design models shall be limited to staff who fully understand how to use the BIM software and who are contractually permitted to access and use the models

3. Right of Reliance

- a. The concept of Right of Reliance is based upon the principle that, at a specific contractually defined point in time and for specific content, "the Contract Documents and the Design Models will be consistent, to the extent of the information contained in both the Contract Documents and the Design Models. The Owner and Contractor shall not be responsible for conducting a comparison of the Design Model with the Contract Documents for the purposes of determining conflicts or discrepancies in information contained in both."
- b. The above statement means that at such a defined point in time, the Owner and CM are granted the right to rely upon the model as being consistent with the Contract Documents, thereby allowing these parties to utilize the model as a tool for planning and coordinating

construction operations. This right shall only apply to the content that has been defined in writing (i.e. Steel Columns and Beams), and only at the defined point in time.

- c. The project team shall determine whether a Right of Reliance provision is appropriate or necessary for a given project, and if so, shall work collectively to define the contractual language that will govern this provision.
- d. A Right of Reliance provision shall not alter privity of contract between Froedtert Health and the Architect or Froedtert Health and the GC/CM.

1. Purpose

- a. The intent of clash detection is to flush out any system or building collisions that might take place during installation. In order for clash detection to take place successfully, the project team must utilize Building Information Models. This process will benefit all parties involved through increased planning and better understanding of the installed systems throughout the project. In order for Clash Detection to take place, there must be modeling involvement on behalf of multiple trades or disciplines. At the very least this includes the Mechanical, Plumbing, Electrical, and Fire Protection subcontractors on the project. Their systems can be easily fabricated off site and Clash Detection will aid in making that fabrication possible.

2. Responsibility

- a. The Construction Team BIM Manager will ultimately be responsible for the clash detection process
- b. Examples of contractor trades that may be included in the process are as follows: Mechanical, plumbing, electrical, fire protection, casework, concrete, doors and hardware, drywall and framing, earthwork, elevator, enclosure, landscape, misc metals, pneumatic tube, precast, roofing, shoring, stair, structural steel.
- c. The contractor should facilitate clash detection coordination meetings with all involved subcontractors in attendance
- d. The clash detection or construction model elements shall include dimensionally accurate 3D objects, parametric data, and labels
- e. The model intent is to show all material, equipment, data and services in a true representation of its final location on the project. Whereas specific dimensional location of material, equipment, data and services may not be included in the contract documents, such items shall be included in the construction models.
- f. Deliverables to the design team may include a combination of 2D representations of the 3D models (extracted directly from the 3D models) and information that exists in 2D only. This can be submitted for final location approval.
- g. It is important to maintain a coordination schedule that allows the proper time for systems to be fabricated and shipped to the project before the system installation date. This schedule shall be maintained by the CM/GC and the Construction Phase BIM Manager
- h. After an area (building floor or portions of a floor) have been fully coordinated with all systems, a sign off document should be produced to confirm that coordination is approved by all parties to the process. Once the sign off documented has been signed by all coordination team leads, the next area can be coordinated

1. Design BIM Purpose and Definition

- a. Working Models are used by design professionals to execute the project, facilitate documentation, and generally produce contract documents. This BIM standard does not address Working Models, which shall be the purview of design teams, and which are not required as a deliverable to Froedtert.
- b. Design Models are versions of the working models that have been cleaned of extraneous families, views, metadata and other unnecessary content. Design Models shall conform to the standards set forth in Section 3. Design models are retained by Froedtert to enable future remodeling of newly built space.
- c. In most cases, design models will be created for various disciplines and then linked together. The decision of how many models are required for a given project shall be led by the Design Team BIM Manager, and documented in the BIM Management Plan. The following disciplines may be documented in separate models:
 - i. Architecture and Interiors
 - ii. Structural
 - iii. Plumbing and Fire Protection
 - iv. Electrical
 - v. Telecommunications
 - vi. Mechanical
 - vii. Other TBD
- d. Sections 3.2 thru 3.7 of this document further define requirements relative to the typical design models listed above.
- e. Design models are to be managed by the Design Team BIM Manager (see Section 2.2) who ensures that they have been properly cleaned of extraneous unused families, views, and metadata
- f. Design models are separate and distinct from Building and Campus Models, which are used to facilitate specific functions required by Froedtert Health. See also Sections 4 and 5.

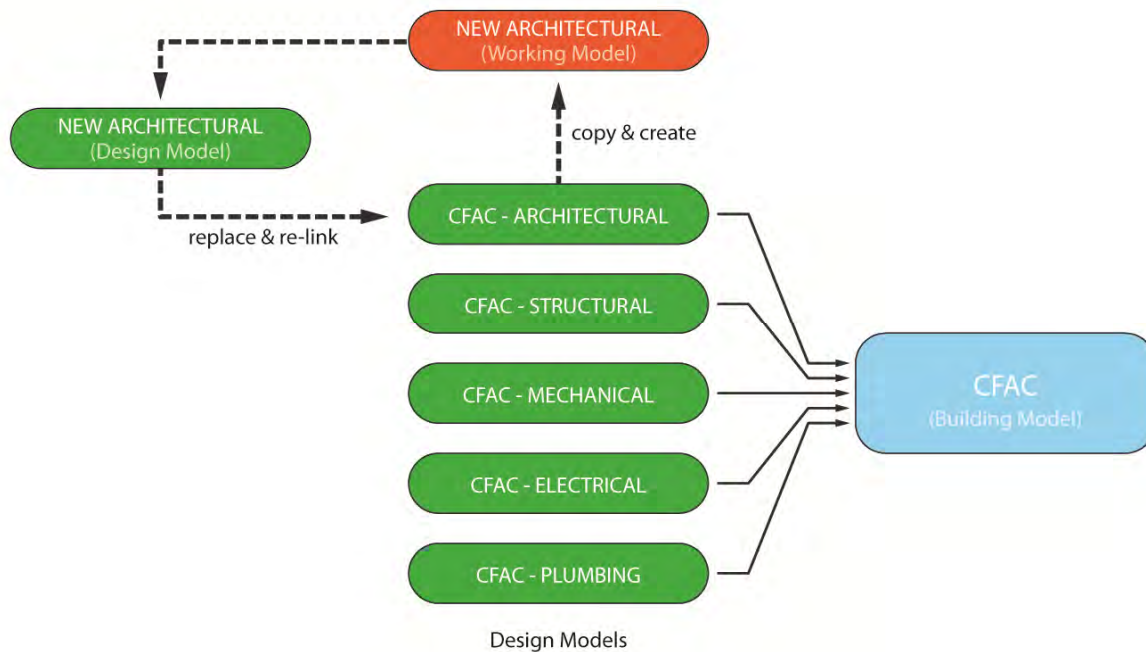
2. Compatibility

- a. All Design Models shall be 3D and compatible with Autodesk Revit.
- b. 3D AutoCAD or alternative 3D modelling software may considered compatible and be linked into a Revit Design Model if approved in writing by Froedtert Health.

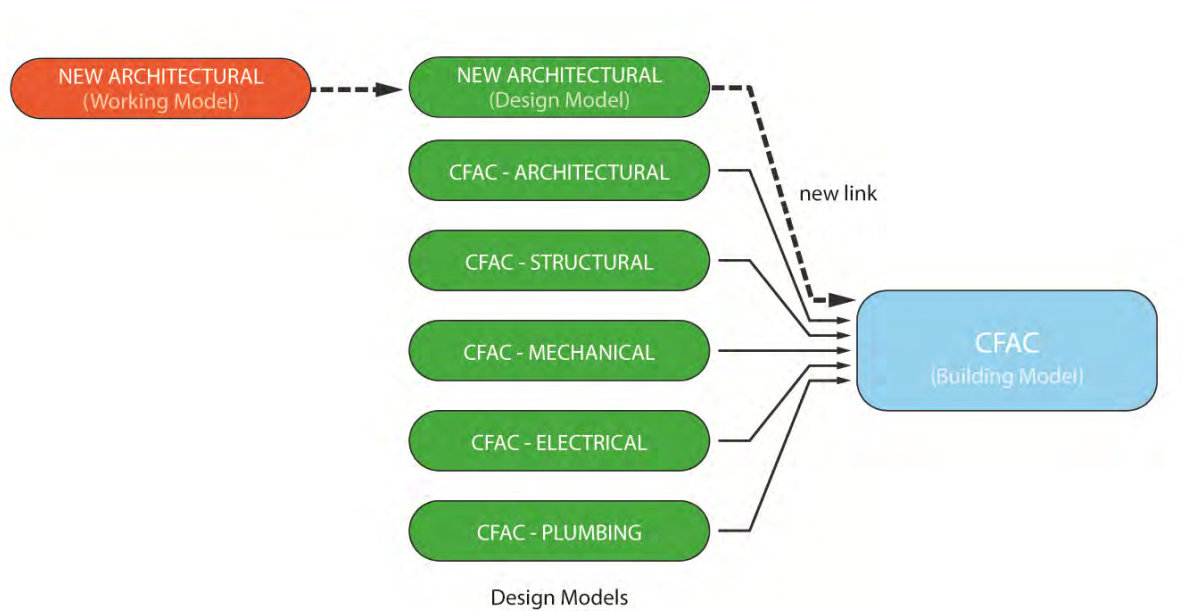
3. Updates to the Design Models

- a. Eventually, every campus building shall be represented via a series of Design Models that are linked into the Building Model.
- b. The model file structure is set up so that all modeled information resides exclusively in the Design Models. Thus, updating information should begin at the Design Model level.

- c. In the event that a portion of a building is slated for renovation or expansion, the design team involved will, based on careful consideration, either:
- i. **Inherit** the current Design Models and use them as a starter file for their working project BIM model; Upon completion, they would replace the original Design Model with an updated version for re-linking into the Building Model. For buildings that have already been fully modeled in BIM (i.e. CFAC), this approach is advisable.



- ii. Create a **new** Design Model that coordinates scope of work appropriately with the existing Design Models; Upon completion, linking new Design Models into the Building Model shall result in an accurate representation of the facility.. For existing buildings that have not been modeled in BIM, this approach will be necessary. In some cases, this approach may also be advisable for buildings that have already been modeled in BIM, but the project team shall determine the best approach collaboratively.



- d. No matter what approach is used to modify or create Design Models, when they are (re)inserted into the Building Model, all linked views shall be reconciled as needed.

1. Final BIM Deliverables (3D)

- a. It is Froedtert Hospital's intention to use the Design Models for ongoing building management upon occupancy. Information that matures during the construction process is to be captured in the appropriate models on an on-going basis throughout the construction phase.
- b. At project commencement it shall be determined by the project team whether the most current version of BIM software should be utilized. Unless the project team determines a reason to the contrary, the most current version shall be used.
- c. Upon Substantial Completion, BIM files shall be submitted to Froedtert, and shall be cleaned of extraneous "scrap" or "working space", stories, abandoned designs / design options, object creation and testing places, empty worksets, and other content which may be produced in BIM production.
- d. With the exception of the required views (section 2.b) - all sheets, sheet schedules, erroneous sheet-specific views, drafting views, section views, detail views, and information redundant to the issued drawing set should be removed from the BIM model.
 - i. Froedtert shall receive Design Model Deliverables from the Design team. The Design model should include the as-built modeled information and conform to the General Model Requirements as laid out below. A Froedtert BIM template will be provided as a starting point for the information to be generated below. If additional models are required due to size / scale of the project, those separate models shall be transmitted as well as a comprehensive Design model with all models linked together.

2. Requirements for Downstream Froedtert Use

a. Required Views

- i. The following views shall be created by the design team in the Design Models. These views will be utilized via linked view in both the Design Models and Building Model. The required views are as listed below:
 - 1. Life Safety
 - 2. Occupancy Plans
 - 3. Department Plans
 - 4. Structural Plans
 - 5. Fire Protection Plans
 - 6. HVAC Plans
 - 7. Medical Gas Plans
 - 8. Plumbing Plans
 - 9. Electrical Plans
- ii. The matrix below describes the major elements that must be included in each of the linked views. It is important to note that the Building Model will be limited to these elements so the linked Collector Model does not become too large and unwieldy to work with.

| | | Life Safety Plan | Occupancy Plan | Fire Protection | HVAC | Medical Gas | Plumbing | Electrical | | Notes |
|---------------|--------------------|------------------|----------------|-----------------|-------|-------------|----------|------------|--|---------------------------|
| | Format | 11x17 | 11x17 | 30x42 | 30x42 | 30x42 | 30x42 | 30x42 | | |
| Structural | Slabs | X | X | X | X | X | X | X | | helps define "cut planes" |
| | Columns | X | X | X | X | X | X | X | | |
| | Beams | | | | | | | | | |
| | Grid Lines | | | X | X | X | X | X | | |
| | | | | | | | | | | |
| Architectural | Walls | X | X | X | X | X | X | X | | |
| | Doors | X | X | X | X | X | X | X | | |
| | Casework | X | X | X | X | X | X | X | | |
| | Room Tags | X | X | X | X | X | X | X | | |
| | Wall Ratings | X | | | X | | | | | |
| | Smoke Zones | | X | | | | | X | | |
| | Suites | X | | | | | | X | | |
| | Fire Extinguishers | X | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Plumbing | Fixtures | X | X | | | | X | X | | |
| | Zone Valve Boxes | | | | | X | | | | |
| | Mains | | | X | | X | X | | | |
| | Risers | | | X | | X | X | | | |
| | Valves | | | X | | | X | | | |
| | Major Equipment | | | X | | X | X | | | water heaters, pumps, |
| | F.P. Wet/Dry | | | X | | | | | | |
| | Hydrants | X | | X | | | | | | |
| | | | | | | | | | | |
| HVAC | Ductwork Mains | | | | X | | | | | |
| | Dampers | | | | X | | | | | |
| | Major Equipment | | | | X | | | | | AHU's, fans, |
| | Zones (T-stats?) | | | | X | | | | | |
| | | | | | | | | | | |
| Electrical | Panels | | | | | | | X | | |
| | Cable Tray | | | | | | | X | | |
| | Major Equipment | | | | | | | X | | transformers, switchgear, |
| | Major Conduit Runs | | | | | | | | | verify size (ie over 4") |
| Systems | Smoke Detectors | | | | | | | X | | |
| | Security Cameras | | | | | | | X | | |
| | Duress Buttons | | | | | | | X | | |
| | | | | | | | | | | |

- b. Required Worksets
 - i. The following worksets are included in the Froedtert starter project and should be adhered to through project completion:
 - 1. Existing and Demolition
 - 2. Core and Shell
 - 3. Interiors
 - 4. Equipment
 - 5. Life Safety
- c. Required Space Naming and Coding
 - i. The attributes below for Space Naming and Coding shall be applied to the Froedtert-supplied .rfa room tag family. This tag will support the required views generated (section 2.a):
 - 1. Building Name Code
 - 2. Floor Level
 - 3. Department Name
 - 4. Department Cost Center Code
 - 5. Room Number
 - 6. Room Name
 - 7. Room Occupant (FMLH, MCW or other)
 - 8. Room Area (square feet, which should automatically populate)
 - ii. As a result of ongoing changes made by Froedtert each space shall be maintained through project completion by the Design Team and updated as needed thereafter by the Campus Model management team.
- d. Fonts for required views
 - i. Arial font typeface shall be used.
- e. Modeled objects
 - i. It is important for all created/imported content to be assigned to the appropriate category/subcategory within Revit.
 - ii. The following objects must be modeled to dimensional and categorical accuracy:
 - 1. Exterior Enclosure
 - 2. Exterior Openings (rough)
 - 3. Floor/Roof Slabs
 - 4. Mechanical Shafts
 - 5. Vertical Circulation Space
 - 6. Interior Partitions (thickness and height)
 - 7. Interior Openings (rough)
 - 8. Ceilings and Soffits (with respect to their distance above the finished floor)

1. Final BIM Deliverables

- a. See also section 3.2, section 1.
- b. Froedtert shall receive the following 3D Deliverables from the Structural Design team:

- i. Design Model

- The Design model should include as-built modeled information and conform to the General Model Requirements as laid out below.

2. Requirements for Downstream Froedtert Use

- a. Required Views

- i. The following views shall be created by the design team in the Design Models. These views will be utilized via linked view in both the Design Models and Building Model. The required views are as listed below:

- 1. Framing Plans
 - 2. Column Schedules
 - 3. Framing Sections as needed
 - 4. Unique Details as needed

- b. Required Worksets

- i. The following worksets are included in the Froedtert starter project and shall be maintained through project completion:

- 1. Existing
 - 2. Major Levels and Grids
 - 3. Minor Levels and Grids

- c. Modeled objects

- i. It is important for all created/imported content to be assigned to the appropriate category/subcategory within Revit.
 - ii. The following objects must be modeled to dimensional and categorical accuracy:
 - 1. All structural steel elements
 - 2. Structural footings
 - 3. Structural walls
 - 4. Structural slabs

1. Final BIM Deliverables

- a. See also section 3.2, section 1...
- b. Froedtert shall receive the following Deliverables as described in Agreement:

- i. Design Model

- The Design model should include the as-built modeled information as provided and modeled by the GC / CM and conform to the General Model Requirements as laid out below.

2. Requirements for Downstream Froedtert Use

- a. Required Views

- i. The following views shall be created by the design team in the Design Models. These views will be utilized via linked view in both the Design Models and Building Model. The required views are as listed below:

- 1. Plumbing Plans
 - 2. Medical Gas Plans
 - 3. Roof Drainage Plans
 - 4. Fire Protection Plans
 - 5. Sprinkler/Sprinkler Zone Plans
 - 6. Schematic Riser Diagrams
 - 7. Equipment and Fixture Schedules

- b. Required Worksets

- i. The following worksets are included in the Froedtert starter project and should be adhered to through project completion:

- 1. Existing
 - 2. Domestic Service
 - 3. Sanitary
 - 4. Vent
 - 5. Storm
 - 6. Fire Protection
 - 7. Medical Gas

- c. Modeled objects

- i. It is important for all created/imported content to be assigned to the appropriate category/subcategory within Revit.

- ii. The following objects must be modeled:
 - 1. Major Equipment (Pumps, Heat Exchangers, Water Heaters, Expansion Tanks, etc.)
 - 2. Plumbing Fixtures
 - 3. Sprinklers
 - 4. Piping and vents greater than 4" in diameter
 - 5. Valves
- iii. Nomenclature
 - 1. Major Equipment shall be tagged on all plan and sections views and be referenced on a schedule
 - 2. Plumbing Fixtures shall be tagged on all plan and sections views and be referenced on a schedule
 - 3. Piping shall be tagged to indicate system name and size

1. Final BIM Deliverables

- a. See section 3.2, section 1...
- b. Froedtert shall receive the following Deliverables as described by Agreement

- i. Design Model

- The Design model should include the as-built modeled information provided by the GC / CM and conform to the General Model Requirements as laid out below.

2. Requirements for Downstream Froedtert Use

- a. Required Views

- i. The following views shall be created by the design team in the Design Models. These views will be utilized via linked view in both the Design Models and Building Model. The required views are as listed below:

- 1. Lighting Plans
 - 2. Power Plans
 - 3. Systems Plans (Fire Alarm)
 - 4. Schematic Riser Diagrams

- b. Required Worksets

- i. The following worksets are included in the Froedtert starter project and should be maintained through project completion:

- 1. Existing
 - 2. Power
 - 3. Lighting
 - 4. Systems

- c. Modeled objects

- i. It is important for all created/imported content to be assigned to the appropriate category/subcategory within Revit.

- ii. The following objects must be modeled:

- 1. Light Fixtures
 - 2. Electrical Panels
 - 3. Major Pieces of Equipment (Generators, Transformers, Switchgear, etc)
 - 4. Cable Tray
 - 5. Feeders

- iii. Nomenclature

- 1. Major Equipment shall be tagged on all plan and sections views and reference a schedule

2. Electrical Panels shall be tagged on all plan and sections views and reference a schedule
3. Light Fixtures shall be tagged on all plan and sections views and reference a schedule

1. Final BIM Deliverables

- a. See section 3.2, section 1...
- b. Froedtert shall receive the following Deliverables as described in Agreement

- i. Design Model

- The Design model should include the as-built modeled information provided by the GC / CM and conform to the General Model Requirements as laid out below.

2. Requirements for Downstream Froedtert Use

- a. Required Views

- i. The following views shall be created by the design team in the Design Models. These views will be utilized via linked view in both the Design Models and Building Model. The required views are as listed below:

- 1. Telecom Plans
 - 2. Security Plans (if designed by the design team)
 - 3. Audio/Visual Plans (if designed by the design team)
 - 4. Nurse Call Plans (if required)
 - 5. Schematic Riser Diagrams
 - 6. Equipment Schedules

- ii. Plan views may be combined based on clarity and scale of views

- b. Required Worksets

- i. The following worksets are included in the Froedtert starter project and should be adhered to through project completion:

- 1. Telecommunications
 - 2. Security (if applicable)
 - 3. Audio/Visual (if applicable)
 - 4. Nurse Call (Paging)
 - 5. Wireless
 - 6. Major Levels and Grids

- c. Modeled objects

- i. It is important for all created/imported content to be assigned to the appropriate category/subcategory within Revit.

- ii. The following objects must be modeled to categorical accuracy:

- 1. Major Pieces of Equipment (Monitors, Speakers, Security Access Devices, Cameras, Server Racks, etc)

- iii. Nomenclature

1. Major Equipment shall be tagged on all plan and sections views and reference a schedule or specification

1. Final BIM Deliverables

- a. See section 3.2, section 1...
- b. Froedtert shall receive the following Deliverables as described in Agreement

- i. Design Model

- The Design model should include the as-built modeled information provided by the GC / CM and conform to the General Model Requirements as laid out below.

2. Requirements for Downstream Froedtert Use

- a. Required Views

- i. The following views shall be created by the design team in the Design Models. These views will be utilized via linked view in both the Design Models and Building Model. The required views are as listed below:

- 1. Ductwork Plans
 - 2. Piping Plans
 - 3. Schematic Flow Diagrams
 - 4. Schematic Control Diagrams
 - 5. Control Points List
 - 6. Sequences of Operation
 - 7. Equipment Schedules

- b. Required Worksets

- i. The following worksets are included in the Froedtert starter project and should be maintained through project completion:

- 1. Existing Ductwork
 - 2. Existing Piping
 - 3. Existing Shared Equipment
 - 4. Ductwork
 - a. All ductwork
 - b. All Airside Equipment
 - i. Terminal Boxes
 - ii. Fans
 - c. All Airside Terminals
 - i. Diffusers
 - ii. Grilles
 - iii. Transfer Grilles
 - d. Associated Airside Controls (if shown)

- i. CO₂ Sensors
 - ii. Thermostats controlling Terminal Boxes
- 5. Piping
 - e. All Piping
 - i. Hydronic
 - ii. Fuel
 - iii. Condenser
 - iv. Vents
 - f. All piping related equipment
 - i. Pumps
 - ii. Control Valves
 - g. Piping Service Components
 - i. Isolation Valves
 - h. Associated Controls (if shown)
 - i. Thermostats
 - ii. Flow Meters
- 6. Shared Equipment
 - i. All equipment with both airside and piping connections
 - i. Air Handling Units
 - ii. Fan Coil Units
 - iii. Reheat Boxes
 - iv. Chilled Beams
- 7. Major Levels and Grids
- 8. Linked Models
- c. Modeled objects
 - i. It is important for all created/imported content to be assigned to the appropriate category/subcategory within Revit.
 - ii. The following objects must be modeled to dimensional and categorical accuracy:
 - 1. Major Pieces of Equipment (Air Handling Units, Heat Exchangers, Chillers, Boilers, Central Plant Equipment, etc)
 - 2. Zone Level Equipment (Terminal Boxes, Pumps, Fans, Fin Tube, etc)
 - 3. Diffusers, Grilles, etc
 - 4. Ductwork

5. Piping greater than 4" in diameter
- iii. The following items may be modelled schematically:
 1. Piping less than or equal to 4" in diameter
 2. Small Distribution Equipment (Control Valves)
 3. Control Point Locations (Thermostats, Duct Pressure Sensors, etc)
 - iv. Nomenclature
 1. Major Equipment shall be tagged on all plan and sections views and reference a schedule
 2. Distribution Equipment shall be tagged on all plan and sections views and reference a schedule
 3. Ductwork shall be tagged to indicate system name and size
 4. Piping shall be tagged to indicate system name and size

1. Building Model Definition

- a. A Building Model is created and/or modified at the end of a project. This essentially collects a required set of Design Models into one single Building Model. Each campus building shall have only one Building Model (i.e. West Clinics, CFAC, North Tower, etc), and therefore this model must be refined when renovations are completed.

2. Generated Views

- i. The following views will be linked into the Building Model using the corresponding view templates generated in the Design Model:
 - 1. Life Safety
 - 2. Occupancy Plans
 - 3. Department Plans
 - 4. Fire Protection One-lines
 - 5. HVAC
 - 6. Medical Gas One-lines
 - 7. Plumbing Plans
 - 8. Electrical Plans

3. Required Worksets

- a. The worksets required for the building model will mirror the file-link structure of the linked Design Models. Each Design Model shall occupy a separate workset of the same name.

4. Required Views

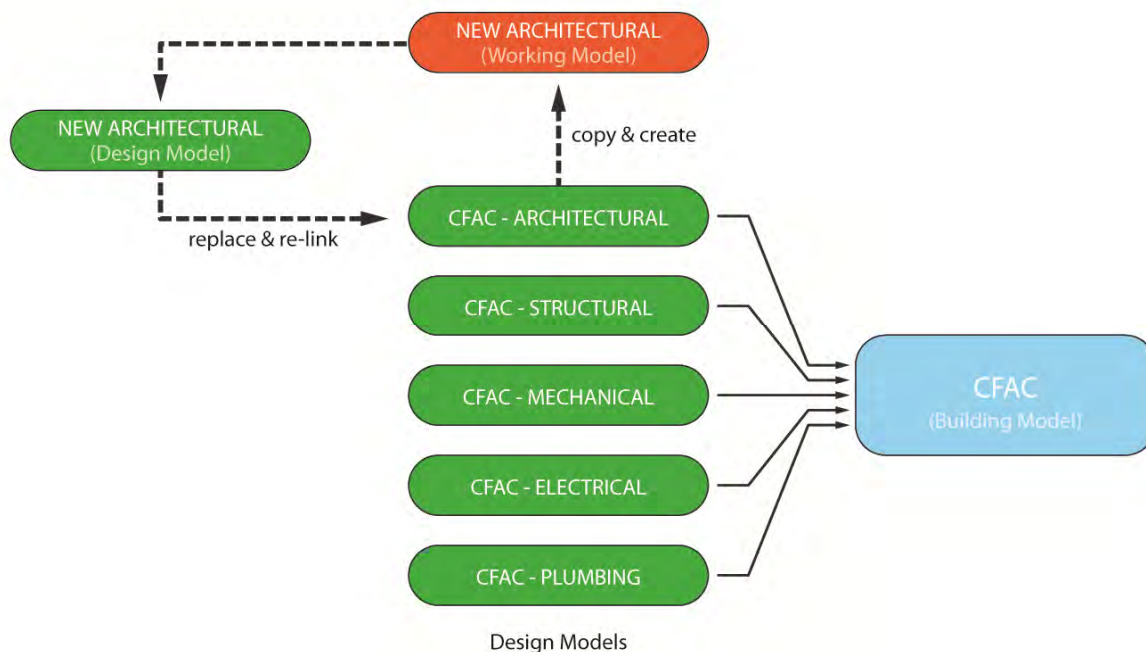
- a. The required views created in each Design Model shall be linked onto sheets for quick access from within the Building Model. The views are as listed below:
 - i. Life Safety
 - ii. Occupancy Plans
 - iii. Department Plans
 - iv. Structural Plans
 - v. Fire Protection Plans
 - vi. HVAC Plans
 - vii. Medical Gas Plans
 - viii. Plumbing Plans
 - ix. Electrical Plans

- b. The matrix below describes the major elements that must be visible in each of the required views. It is important that the Building Model is limited to these elements so the linked Collector Model does not become too large and unwieldy to work with.

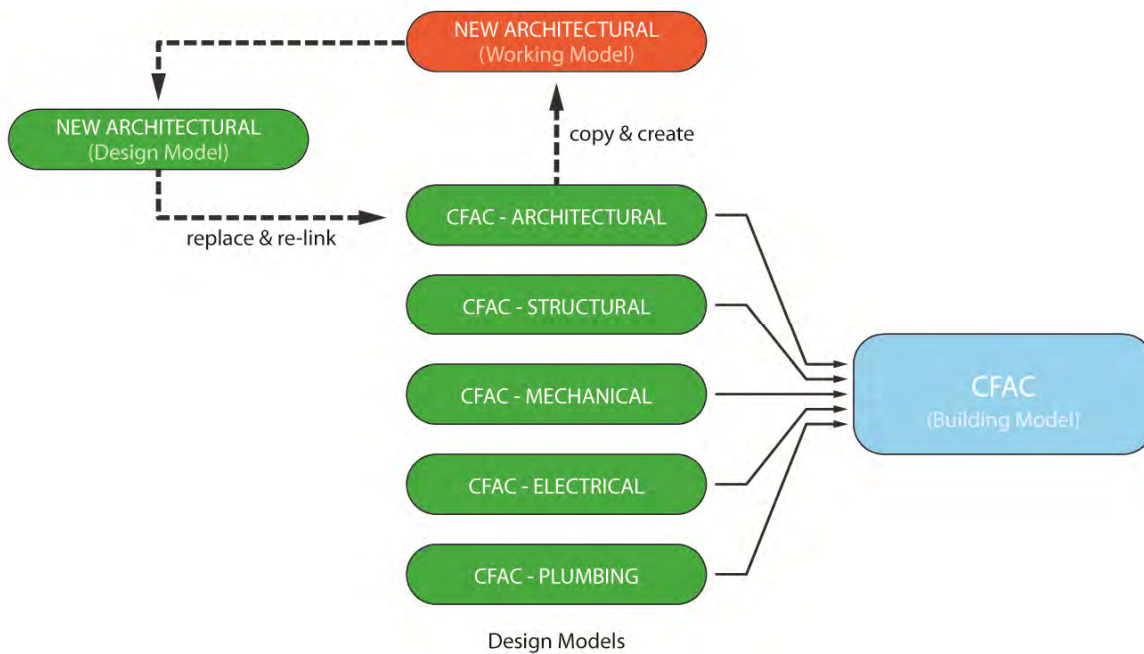
| | | Life Safety Plan | Occupancy Plan | Fire Protection | HVAC | Medical Gas | Plumbing | Electrical | | Notes |
|---------------|--------------------|------------------|----------------|-----------------|-------|-------------|----------|------------|--|---------------------------|
| | Format | 11x17 | 11x17 | 30x42 | 30x42 | 30x42 | 30x42 | 30x42 | | |
| Structural | Slabs | X | X | X | X | X | X | X | | helps define "cut planes" |
| | Columns | X | X | X | X | X | X | X | | |
| | Beams | | | | | | | | | |
| | Grid Lines | | | X | X | X | X | X | | |
| | | | | | | | | | | |
| Architectural | Walls | X | X | X | X | X | X | X | | |
| | Doors | X | X | X | X | X | X | X | | |
| | Casework | X | X | X | X | X | X | X | | |
| | Room Tags | X | X | X | X | X | X | X | | |
| | Wall Ratings | X | | | X | | | | | |
| | Smoke Zones | | X | | | | | X | | |
| | Suites | X | | | | | | X | | |
| | Fire Extinguishers | X | | | | | | | | |
| | | | | | | | | | | |
| Plumbing | Fixtures | X | X | | | | X | X | | |
| | Zone Valve Boxes | | | | | X | | | | |
| | Mains | | | X | | X | X | | | |
| | Risers | | | X | | X | X | | | |
| | Valves | | | X | | | X | | | |
| | Major Equipment | | | X | | X | X | | | water heaters, pumps, |
| | F.P. Wet/Dry | | | X | | | | | | |
| | Hydrants | X | | X | | | | | | |
| | | | | | | | | | | |
| HVAC | Ductwork Mains | | | | X | | | | | |
| | Dampers | | | | X | | | | | |
| | Major Equipment | | | | X | | | | | AHU's, fans, |
| | Zones (T-stats?) | | | | X | | | | | |
| | | | | | | | | | | |
| Electrical | Panels | | | | | | | X | | |
| | Cable Tray | | | | | | | X | | |
| | Major Equipment | | | | | | | X | | transformers, switchgear, |
| | Major Conduit Runs | | | | | | | | | verify size (ie over 4") |
| Systems | Smoke Detectors | | | | | | | X | | |
| | Security Cameras | | | | | | | X | | |
| | Duress Buttons | | | | | | | X | | |
| | | | | | | | | | | |

5. Updates to the Building Model (post as-built)

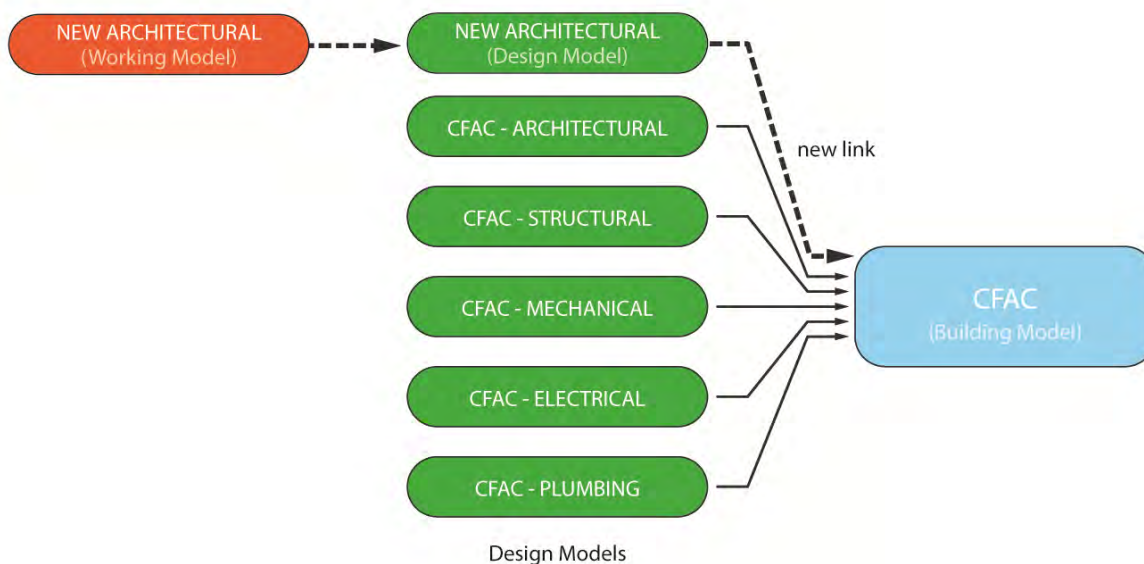
- a. Each building model is intended to be an updated BIM representation of the campus' condition. This requires each model in the hierarchy to be updated as needed when facilities are renovated or expanded.
- b. The file structure is set up so that all modeled information resides exclusively in the Design Models. Thus, updating information should begin at this level.
- c. In the event that a portion of a building is slated for renovation or expansion, the design team involved will, based on careful consideration, either:
 - i. **Inherit** the current Design Models and use them as a starter file for their working project BIM model; Upon completion, they would replace the original Design Model with an updated version for re-linking into the Building Model. For buildings that have already been fully modeled in BIM (i.e. CFAC), this approach is advisable.



..



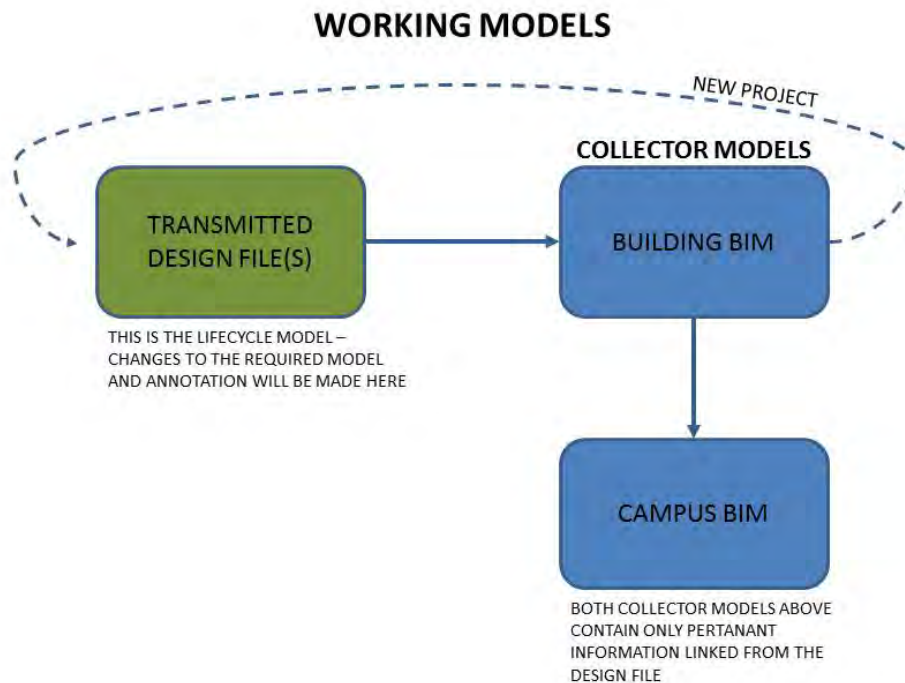
- i. Create a **new** Design Model that coordinates scope of work appropriately with the existing Design Models; Upon completion, linking new Design Models into the Building Model shall result in an accurate representation of the facility.. For existing buildings that have not been modeled in BIM, this approach will be necessary. In some cases, this approach may also be advisable for buildings that have already been modeled in BIM, but the project team shall determine the best approach collaboratively.



- d. The Design Models (re)inserted into the Building Model should have all linked views reconciled as needed.

1. Working Model Purpose and Definition:

- a. The campus as-built drawing information currently exists primarily in 2D AutoCad drawing format. Going forward, the intent is to utilize BIM to capture additional facilities data and have a 3D as-built model that will become part of an overall campus wide BIM. The Building / Campus BIM will be updated on a project by project basis as areas of the campus are renovated.
- b. To achieve this goal, two types of collector models (i.e. models that link together other models) will be used (illustrated in the diagram below). Requirements for these models can be found in the following sections. These models will include only the pertinent information specific to regularly requested output from Froedtert.



2. File Storage

- a. Contact Froedert for access to the files shown above.

3. Collector Model Manager

- a. The collector model manager is responsible for assembly of all transmitted design models (from all disciplines) into the collector model environment. Any minor alterations to the transmitted design model will be made by this team. This includes but is not limited to life safety, room codes, and asset tags.

1. The **Campus Model** is managed by Froedtert or a consultant to Froedtert. This model contains links to each Building Model, and therefore allows for collected views of the entire campus by level. Formerly known as a Collector File, the Campus Model is simply a device to facilitate campus master drawing views which exhibit the following:
 - a. Occupancy Plans
 - b. Life Safety Plans
 - c. Department/Cost Center Plans
 - d. Generated Views
2. Required Worksets
 - a. The worksets required for the building model will be as follows:
 - i. Architectural
 1. Existing
 2. Core and Shell
 3. Interiors
 4. Major Levels and Grids
 5. Life Safety
 - ii. Structural
 - iii. Mechanical
 - iv. Electrical
 - v. Plumbing
3. Changes and updates to the Campus Model (post as-built)
 - a. See also section 4.1 – 5.

REQUEST FOR ID BADGE

APPLYING FOR: ID / ACCESS CARD ID CARD ONLY ACCESS CHANGE

Cell # _____

Name: _____ PH/Ext _____

Dept. / Unit: _____ Start Date: _____

Title: _____ Employee #: _____

Employed By: ☐ FROEDTERT ☐ MCW ☐ VOLUNTEER

☐ STUDENT ☐ OTHER

Status: ☐ SFT ☐ SPT ☐ OPT ☐ TEMP ☐ FLOAT

Shift: ☐ FIRST ☐ SECOND ☐ THIRD ☐ ROT

Vehicle Info- 1) Make: _____ 2) Make: _____

Model:  Model:

Plate:  Plate: 

State: _____ State: _____

I understand that I am required to pay a \$5 (non-Refundable) fee before I receive my ID/access card. I further understand that I must return the card to Security in person when no longer working at Froedtert. I also understand that if I lose or damage this card, I am required to replace this card and pay an additional \$20.00 (non-refundable) before a replacement card will be issued. I further understand that parking in areas other than my assigned location may result in the issuance of a parking ticket.

Signature

Date

Parking assigned to: ☐ West Structure ☐ West Surface ☐ Physician
☐ East Structure ☐ East Surface ☐ State Fair

Card Number: _____ Payment Amount: _____ Type: _____

Access Group should mirror what staff member

Manager Signature _____

PRECONSTRUCTION RISK ASSESSMENT (PCRA)

PROJECT: _____

DATE: _____

| Item Assessed | | Yes | No | N/A |
|--------------------|---|-----|----|-----|
| AIR QUALITY | 1. Have potential sources of odor been identified? <u>Action:</u> | | | |
| | 2. Can all odors be contained within the construction area? <u>Action:</u> | | | |
| | 3. Has the contractor provided MSDS's for hazardous materials that will be used on site? <u>Action:</u> | | | |
| | 4. Has the construction area been inspected for asbestos? <u>Action:</u> | | | |
| | 5. Has an asbestos abatement plan been incorporated into the construction project? <u>Action:</u> | | | |
| | 6. Has a process been put into place to ensure contractors use only non-asbestos materials? <u>Action:</u> | | | |
| | 7. Has the construction area been inspected for lead? <u>Action:</u> | | | |
| | 8. Has a lead abatement plan been incorporated into the construction project? <u>Action:</u> | | | |
| | 9. If new lead shielding or other lead construction materials will be installed, have special precautions been implemented to contain lead? | | | |

| | | | | |
|----------------|---|--|--|--|
| | <u>Action:</u> | | | |
| | 10. Has the construction area been inspected for mold? | | | |
| | <u>Action:</u> | | | |
| | 11. Has a mold abatement plan been incorporated into the construction project? | | | |
| | <u>Action:</u> | | | |
| | 12. Has the construction area been inspected for mercury? | | | |
| | <u>Action:</u> | | | |
| | 13. If excavation will occur, has the area been evaluated for potential hazardous materials in soils? | | | |
| | <u>Action:</u> | | | |
| | 14. Has a soil abatement/remediation plan been incorporated into the construction project? | | | |
| <u>Action:</u> | | | | |

ENVIRONMENTAL QUALITY

| Item Assessed | | Yes | No | N/A |
|---------------|--|-----|----|-----|
| NOISE | 1. Have potential sources of noise been identified? | | | |
| | <u>Action:</u> | | | |
| | 2. Will noise be contained within the construction area? | | | |
| | <u>Action:</u> | | | |
| | 3. Will noise mitigation controls be used during construction? | | | |
| | <u>Action:</u> | | | |
| | 4. Can or will work be done during non-patient care hours? | | | |
| | | | | |

| | | | | |
|--|---|--|--|--|
| | <u>Action:</u> | | | |
| | 5. If patient care areas will be affected by noise, has the hospital staff been notified? | | | |
| | <u>Action:</u> | | | |

ENVIRONMENTAL QUALITY (CONT.)

| | Item Assessed | Yes | No | N/A |
|-----------|--|-----|----|-----|
| VIBRATION | 1. Have potential sources of vibration been identified? | | | |
| | <u>Action:</u> | | | |
| | 2. Can vibration be contained within the construction area? | | | |
| | <u>Action:</u> | | | |
| | 3. Have patient care areas adjacent to the construction been evaluated for medical equipment that may be sensitive to vibration? | | | |
| | <u>Action:</u> | | | |
| | 4. Will vibration mitigation controls be used during construction? | | | |
| | <u>Action:</u> | | | |
| | 5. Can or will work be done during non-patient care hours? | | | |
| | <u>Action:</u> | | | |
| | 6. If patient care areas will be affected by vibration, have they been notified? | | | |
| | <u>Action:</u> | | | |

EMERGENCY PROCEDURES

| | Item Assessed | Yes | No | N/A |
|-------|--|-----|----|-----|
| PROC. | 1. Have construction personnel been trained on the facility's emergency management policy? | | | |
| | <u>Action:</u> <div style="height: 40px;"></div> | | | |

PREPROJECT APPROVALS

- ☐ Blueprints and/or project plan reviewed with project manager.....

Date: _____ Signature: _____
- ☐ Project review and approval obtained from Infection Control Coordinator designee.....

Date: _____ Signature: _____
- ☐ Department manager or designee notified of any project specific Infection Control issues.....

Date: _____ Signature: _____

COMMENTS _____

Appendix A

Infection Prevention Program

Froedtert Hospital

Infection Control Risk Assessment Matrix

Infection Prevention Project #: _____ **Date:** _____

EFS Planning, Design, and Construction Project #: _____

Step One: Please submit a brief description of the project as planned along with an area floor map showing where the affected areas will be. Please include details about terminal cleaning, room settling time, air quality testing, etc.

Step Two: Indicate the Construction Project Activity TYPE : _____

| | |
|---------------|---|
| TYPE A | <p>Inspection and non-invasive activities Includes, but is not limited to:</p> <ul style="list-style-type: none"> • Opening of a single ceiling tile for visual inspection or tile replacement. • Painting (but not sanding) • Wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection |
| TYPE B | <p>Small scale, short duration activities which create minimal dust Includes, but is not limited to:</p> <ul style="list-style-type: none"> • Opening of no more than one ceiling tile per 10 tiles • Installation of telephone and computer cabling • Access to mechanical chase or shaft spaces • Cutting of walls or ceiling where dust migration can be controlled • Minor renovation of existing space • Wet sanding of walls |
| TYPE C | <p>Work that generates a moderate to high level of dust Includes, but is not limited to:</p> <ul style="list-style-type: none"> • Dry sanding of walls • Cutting of walls, removal of drywall or building finish components where work is limited to one room or suite (including removal of floor coverings, ceiling tiles, and casework) • Wall demolition or new wall construction • Minor duct work, plumbing work, or electrical work above ceilings (not including system demolition or installation) • Moderate renovation of existing space • Major cabling pulling activities, multiple rooms/lines where multiple access points are needed • Any activity which requires construction of a containment barrier that does not qualify as Type D |
| Type D | <p>Major demolition and major construction projects Includes, but is not limited to:</p> <ul style="list-style-type: none"> • Activities which require the closure of a unit/wing or relocation of an entire patient area • Demolition, removal, or installation of a complete cabling, HVAC, plumbing, medical gas, or electrical system • Demolition of major fixed building components, assemblies, fit-out elements, or structural elements • New construction of a free-standing patient care building (as determined by the Primary ICRA team) • Outdoor construction of new structures located in close proximity (as determined by the Primary ICRA team) to existing patient care facility • Excavation activities within close proximity (as determined by the Primary ICRA team) of hospital building |

Step Three:Indicate the **RISK GROUP** for the job location: _____**(If more than one risk level is identified, select the higher risk level)*****

| Low Risk | Medium Risk | High Risk | Highest Risk |
|--|--|--|--|
| <ul style="list-style-type: none"> • Mechanical spaces • Areas not directly adjacent to patient care areas • Office areas not attached to or adjoining patient care areas or areas used for patient interviews, exams, or evaluations • Public corridors and spaces not on or directly attached to patient units or treatment locations • Clinical Laboratory: Non-specimen areas | <ul style="list-style-type: none"> • Admissions • Cardiac Rehab • Echocardiography • GI Clinic • Main Kitchen/Cafeteria • Neurophysiology • Orthotics/Prosthetics • Outpatient Rehab • Physical Therapy • Preadmissions • Patient care areas not listed under “High” or “Highest” • Soiled Utility rooms (not behind red-line) • Urology/Cystology Exam Rooms • Units: 2NT, 4PV, 4SE, 4SW, 5NE, 5NW, 5SE, 5SW, 7NT, 8NT, 9NT, 10CFAC, 11CFAC | <ul style="list-style-type: none"> • Apheresis Lab • Autopsy Suite/Morgue • Breast Center/Clinic • Bronchoscopy Lab • Cancer Center • Clean Utility rooms (not behind red-line) • Clinical Laboratories: Specimen handling areas, including Blood Bank, Histology, Microbiology • Dialysis • Distribution • Emergency Department • ENT Clinic • Eye Institute (excluding OR) • GI Lab • High Level Disinfection areas (dirty/clean rooms) • Infusion Clinics • Lab Collection Areas • Newborn Nursery • Nuclear Medicine • Orthopedics • Outpatient Surgery • Post-Anesthesia Care unit (PACU) • Pharmacy (excluding compounding rooms) • Post-partum care • Procedural Arrival & Recovery (PAR) • Pulmonary Clinic • Non-IPP Radiology: CT, MRI, NI, Ultrasound • Urology/Cystology Procedural Rooms • Units: 3WEST, 4NW, 4NE, 12CFAC, L&D at CHW: 6EL/EN, 7EN/EP, 8EL/EN | <ul style="list-style-type: none"> • All red-lined spaces: Imaging, ORs, SPD (sterile processing, packaging, storage), Utility/Equipment rooms, Sterile Cores, Control Rooms • Eye Institute Operating Rooms and adjoining suites • ICUs: CVICU, MICU, NICU, SICU, TICU, 7CFAC, 8CFAC, 9CFAC • Labor & Delivery Operating Rooms • Non-IPP Sterile Processing areas • Pharmacy: Compounding Rooms |

*****Risk classifications of any areas not listed above will be left up to the discretion of the Infection Prevention and Control department based upon the clinical risks of exposure of construction contaminants on the affected patient populations as well as disruption to patient care.*****

Step Four:

Use the ICRA Classification Grid to determine the ICRA CLASSIFICATION LEVEL for mitigating interventions.

Match the Construction Project Activity TYPE and the RISK GROUP to identify the associated ICRA CLASSIFICATION LEVEL : _____

| Project Activity → | TYPE A | TYPE B | TYPE C | TYPE D |
|--------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| RISK GROUP ↓ | ICRA Classification Level ↓ | ICRA Classification Level ↓ | ICRA Classification Level ↓ | ICRA Classification Level ↓ |
| Low Risk | I | II | II | III or IV |
| Medium Risk | I | II | III | IV |
| High Risk | I | III | III or IV | IV |
| Highest Risk | III | III or IV | III or IV | IV |

Step Five: Identify the areas surrounding the project area and the RISK GROUP for that location.

| Unit Below | Unit Above | Lateral | Lateral | Behind | Front |
|------------|------------|------------|------------|------------|------------|
| | | | | | |
| Risk Group | Risk Group | Risk Group | Risk Group | Risk Group | Risk Group |
| | | | | | |

Step Six: Water Incursion: Indicate potential risk of water damage outside construction zone:

Step Seven: As necessary, please identify and describe the risk of waterborne pathogen growth and spread for new or existing plumbing distribution system within the containment area (construction zone) and outside containment but within the protection area (i.e. system components of the building water distribution system):

Step 7a) Indicate the Construction Project Activity TYPE FOR WATERBORNE: _____

TABLE 1: Waterborne Project Activity TYPES

| | |
|---------------|--|
| TYPE A | Inspection and non-invasive activities <ol style="list-style-type: none"> 1. Replacing fixture trim(s) 2. Replacing fixture "in-kind" (meaning 1:1 or like for like) 3. Impacts/risk is to users in immediate area of construction activities 4. Water by fixture or area is dormant for ≤ 24 hours (stagnation/water age) |
| TYPE B | Small scale, short duration activities <ol style="list-style-type: none"> 1. Replacing or installing fixtures and trim 2. Work within wall cavities and ceiling areas to potable water distribution systems 3. Impacts / risk is to users in immediate area of construction activities and potentially downstream areas 4. Water by fixture or area is dormant for ≤ 7 calendar days (1 work week) |
| TYPE C | Moderate <ol style="list-style-type: none"> 1. Plumbing work requiring multiple fixtures (existing, replacement or new) 2. Valve installation and modification to the piping distribution system 3. Major water system components replacement (boilers, heaters, water main shutdowns, etc.) 4. Work in wall cavities and ceilings with major disruption to piping distribution system and surrounding downstream areas 5. Change of functional space program in existing building area 6. Water by fixture or distribution area is dormant ≤ 30 calendar days |
| Type D | Major demolition and major construction projects (major renovation, major addition or expansion): <ol style="list-style-type: none"> 1. Change of functional space program in existing buildings 2. Tenant Improvements (existing shell areas with new construction) 3. Water by fixture or distribution area is not active (new start-up), high dormancy, or shut down > 30 calendar days 4. Tenant improvements (shell areas within new building construction) 5. New building addition or expansion on campus 6. New building construction on or off campus 7. Water distribution system is new and must be commissioned and/or connect |

7b) Utilize same Risk Group(s) as Step Three above and determine waterborne risk groups

Indicate the **RISK GROUP** for WATERBORNE the job location: _____

ICRA CLASSIFICATION LEVEL for WATERBORNE:

Step 7c:

Use the ICRA Classification Grid to determine the ICRA CLASSIFICATION LEVEL for mitigating WATERBORNE interventions.

Match the Construction Project Activity TYPE and the RISK GROUP to identify the associated ICRA CLASSIFICATION LEVEL: _____

| Waterborne ICRA Classification | | | | |
|--------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Project Activity → | TYPE A | TYPE B | TYPE C | TYPE D |
| RISK GROUP ↓ | ICRA Classification Level ↓ | ICRA Classification Level ↓ | ICRA Classification Level ↓ | ICRA Classification Level ↓ |
| Low Risk | I | II | II | III or IV |
| Medium Risk | I | II | III | IV |
| High Risk | I | III | III or IV | IV |
| Highest Risk | III | III or IV | III or IV | IV |

Step 7d: Identify the areas surrounding the project area and the RISK GROUP for that location.

| Unit Below | Unit Above | Lateral | Lateral | Behind | Front |
|------------|------------|------------|------------|------------|------------|
| | | | | | |
| Risk Group | Risk Group | Risk Group | Risk Group | Risk Group | Risk Group |
| | | | | | |

7e) Review Froedtert Front-End Section 01 56 16 Waterborne Contaminants Control for additional Owner criteria.

Infection Prevention Interventions for Corresponding Classification Levels

| | | |
|-----------|---|--|
| LEVEL I | <ol style="list-style-type: none"> 1. Execute work by using methods to minimize dust generation from construction activities. 2. Immediately replace any ceiling tile displaced for visual inspection. 3. All policies & procedures for renovation/construction/maintenance will be followed. | <ol style="list-style-type: none"> 4. Contractor is educated before the start of the project about the importance of adhering to dust mitigating engineering controls and work practices. 5. When complete immediately clean up any dirt or debris. |
| LEVEL II | <ol style="list-style-type: none"> 1. Provide active means to prevent air-borne dust from dispersing into atmosphere, which may include the use of a Control Cube or anteroom. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with masking tape. 4. Block off and seal air supply vents. If possible, reduce air supply to the room by adjusting VAVs or CAVs. 5. Doors and windows within the work zone to remain closed at all times except during ingress/egress. | <ol style="list-style-type: none"> 6. Place adhesive mat at entrance and exit of work area as necessary. 7. Cover transport receptacles or carts and clean wheels prior to leaving containment. 8. Contain construction waste before transport in tightly covered containers. 9. Use designated removal route/elevators for removal of debris. 10. Wet mop and/or vacuum with HEPA filtered vacuum at end of job or end of work shift. Area to be free of dust and or debris. |
| LEVEL III | <ol style="list-style-type: none"> 1. Isolate HVAC system in area where work is being done to prevent contamination of duct system. Maintain until barrier is removed at completion of project. 2. Designate entry and exit traffic pattern, unauthorized personnel are not permitted to enter work zone, traffic control signs placed. 3. Complete all critical barriers or implement control cube method before construction begins. Will stay in place until IP&C or PM authorizes removal. 4. Maintain negative pressure within work site and utilize HEPA equipped negative air machines. Both will be maintained until project & terminal cleaning are completed and IP&C authorizes removal. 5. Air pressure differential between the construction and hospital-occupied areas to be monitored & documented at least once per shift during active work. 6. Adhesive mats placed at all entrances & exits of work area. | <ol style="list-style-type: none"> 7. The contractor will maintain the construction zone in a clean manner. 8. The area will be HEPA-vacuumed or damp mopped daily or more often as necessary to minimize dust. 9. Daily cleanup of debris, material and waste shall be completed. 10. Adhesive mats monitored & changed on a regular basis so that they remain effective. 11. Any dust or construction debris tracked outside of the work area will be promptly cleaned. 12. Terminal cleaning will be performed following protocol outlined in Appendix B of the ICRA policy. 13. The construction cleaning will be inspected by the Owner prior to the authorization for the barrier removal. 14. Air samples may be performed following IP&C/Safety protocol. 15. Barriers will be removed carefully to minimize spreading of construction dust and debris. The areas surrounding the containment will be cleaned following removal of critical barriers. |
| LEVEL IV | <ol style="list-style-type: none"> 1. Seal all holes, pipes and conduits penetrations in work area. 2. Construct anteroom for staging of equipment & donning of coveralls. 3. Workers will wear coveralls in work area. Upon completion of major dust generating activities, coverall requirement is removed. 4. Coveralls are removed in work zone before entering anteroom. 5. Any residual dust left on workers shall be removed by using a HEPA-filtered vacuum. 6. Shoe covers will be worn by workers and removed in work area. | <ol style="list-style-type: none"> 7. All renovation, construction, maintenance & tool carts leaving area must be covered & the wheels wiped down with a bleach solution. 8. Environmental Services (EVS) or a contract cleaner will vacuum or damp mop the area outside the work zone and adjacent areas. |

ICRA CLASSIFICATION LEVELS FOR WATERBORNE

Infection Prevention Interventions for corresponding Classification Levels for Waterborne Contaminants

| | |
|-------------------------|--|
| <p>LEVEL I</p> | <p>1) Prior to construction activities determine baseline measurements (i.e. temperature, residual oxidant, pH, or other).</p> <p>2) Flush fixture (hot) for minimum 5 minutes; following flushing collect water temperature using digital thermometer; perform the same minimum 5 minute flush (cold) and collect water temperature; record both measurements.</p> <p>3) Collect residual oxidant measurements (free or total) using a digital colorimeter instrument and record measurement.</p> <p>4) Perform repair or replacement of plumbing components (i.e. plumbing fixture, trim, or other).</p> <p>5) When construction activities are complete, and area is ready to return to service, flush the fixture for minimum of 5 minutes hot, then 5 minutes cold. Take corresponding temperature and residual oxidant measurements. Repeat steps until measurements are the same or better than pre-existing conditions.</p> <p>a) Temperature: Hot water range [113°F (45°C) to 120°F (48.9°C)] and Cold water range [≤ 77°F (25°C)]</p> <p>b) Residual oxidant range: Hot water = 0.20 ppm to 4.0 ppm and Cold water range = 0.20 ppm to 4.0 ppm</p> <p>6) Report any discolored water, flecks, or floating debris at baseline or after completion of work; none should be present.</p> <p>7) Record information on organization's flushing form or project information system.</p> |
| <p>LEVEL II</p> | <p>Perform ALL of Class I and adjust for scale of project</p> <p>8) Establish enclosure to prevent aerosolized water (and potential pathogens) from dispersing into the environment</p> <p>a) close door of area (i.e. patient room door, toilet/shower room door, etc.)</p> <p>b) install non-flammable visqueen or clear plastic sheeting or other approved barrier for protection</p> <p>c) install isolation valve, backflow prevention device, or other piping isolation method</p> <p>9) Construction staff to:</p> <p>a) leave barriers in place until all plumbing work is complete including flushing activities</p> <p>b) thoroughly clean and dry area(s) upon completion of construction work</p> <p>c) remove barriers or seals in place</p> <p>10) Environmental services to perform routine cleaning before the area is occupied</p> |
| <p>LEVEL III</p> | <p>Perform ALL of Class I and II and adjust for scale of project</p> <p>11) Calculate water volumes for area of piping within building water distribution system under construction.</p> <p>12) Perform flushing protocol [____ min. per day/ ____ days per week on [circle day(s)] M, T, W, TH, F @ ____ fixtures in <i>occupied</i> areas adjacent to the construction zone. Report on flushing form.</p> <p>13) Perform flushing protocol [____ min. per day/ ____ days per week on [circle day(s)] M, T, W, TH, F @ ____ fixtures in <i>unoccupied</i> areas adjacent to the construction zone. Report on flushing form.</p> <p>14) Obtain residual oxidant and temperature readings post flushing activities 1 day per week in unoccupied and occupied areas at 15% of designated fixture locations as representative sample of fixtures to maintain adequate temperature and residual oxidant levels. Report on fixture analysis form.</p> <p>15) Review any disinfection (i.e. hyperchlorination) procedures to be performed with the Owner's Project Representative including location(s), method, schedule, and timing to return water system for potable usage. Provide any reports of activities for building water main (i.e. point-of-entry), building distribution systems (hot and/or cold).</p> <p>16) If necessary, provide any temporary inline or point-of-use filtration during construction for designated sinks, showers, or other fixtures or piping lines to reduce risk of exposure.</p> <p>17) If necessary, provide any temporary auto-flushing devices at fixtures (i.e. sinks or toilets) at distal locations to pull water through system; set timing devices for [____ min per hour / ____ times per day / ____ days per week]</p> <p>18) Review installation for patient and medical equipment with water reservoirs (i.e. ice machines or other) on the project and preventative maintenance prior to occupant start up.</p> <p>19) Review options and finalize decision to perform analytical laboratory sampling for water chemistry (i.e. metals), water quality (i.e. bacteria), or microbials (i.e. pathogens of interest). Use risk of occupants, baseline sampling, or historical performance of the building water distribution system, or records from water management program as consideration.</p> |

| | |
|------------------------|---|
| <p>LEVEL IV</p> | <p>Use controls from Class I, II and III and prepare a project specific WMC plan for operation</p> <ol style="list-style-type: none"> 1) Contact the Owner's Project Representative for preparing a WMC Project Analysis 2) Conduct a project specific pre-construction risk assessment for potential growth and spread of waterborne pathogens <ol style="list-style-type: none"> a) review site /civil construction activity risk factors b) review building design and construction activity risk factors 3) Based upon the risk assessment prepare a project specific WMC plan for commissioning the building water system(s) per ANSI/ASHRAE 188 process for WMPs <ol style="list-style-type: none"> a) establish WMC schedule w/ milestones starting from date of water activation through first-day of patient care operations b) implement/operationalize project specific controls (i.e. protocols for flushing, temperature, and residual oxidant) c) confirm WMC plan & operations with verification and validation 4) Obtain Owner's Project Representative approval of the WMC plan, process, and documentation. 5) Implement the agreed upon WMC Plan for water quality and safety. 6) Obtain any authorities having jurisdiction (AHJs) and Owner's approval before initiating patient care operations. |
|------------------------|---|

Appendix A Continued

Froedtert Enterprise Infection Prevention Program

| Infection Control Risk Assessment WORK PERMIT | | | | | |
|---|-----------------------------|------------------|-------------------------|-------------------|-----------|
| Date: | | | Permit #: | | |
| Prepared by: | | | Phone #: | | |
| Project # and Location: | | | | | |
| Project Start Date: | | | Estimated Duration: | | |
| Project Manager and Phone #: | | | | | |
| Contractor performing work: | | | Permit Expiration Date: | | |
| Contractor Supervisor & Cell phone #: | | | | | |
| Clinical Department Manager & Phone #: | | | | | |
| RISK Group - (circle one) | Low Risk Area | Medium Risk Area | High Risk Area | Highest Risk Area | |
| Construction Activity / Project Type → | TYPE A | TYPE B | TYPE C | TYPE D | |
| RISK GROUP ↓ | ICRA Classification Level ↓ | | | | |
| Low Risk | I | II | II | III or IV | |
| Medium Risk | I | II | III | IV | |
| High Risk | I | III | III or IV | IV | |
| Highest Risk | III | III or IV | III or IV | IV | |
| GENERAL Classification Level for mitigating interventions (circle applicable level) | NA | I | II | III | III or IV |
| WATERBORNE Classification Level for mitigating interventions (circle applicable level) | NA | I | II | III | III or IV |
| Note: Infection Prevention and Control approval and an ICRA Work Permit will be required for Level III or Level IV projects. | | | | | |

Signatures for Project Approval

FH Project Manager: _____

Date: _____

Contractor Representative: _____

Date: _____

Infection Prevention and Control: _____

Date: _____

Appendix B

Last Revision: 12/29/2020

INFECTION CONTROL GUIDELINES FOR MAJOR CONSTRUCTION ACTIVITIES IN HIGH AND HIGHEST RISK AREAS

SPECIFICATIONS:

- A. The project site must be completely contained with construction barriers extending from floor, beyond the suspended ceiling, to the underside of the floor above ("**the deck**"). That area should be vacuumed prior to beginning construction. All penetrations into the construction area must be sealed, windows closed, and HVAC ducts capped. The construction areas should be enclosed using hard plastic partition or drywall barriers. Exception: Barriers may go to the ceiling if the ceiling integrity will remain intact.
- B. Construction barrier entrances must have gasketed doors with self-closing latching hardware and appropriate walk-off mats both inside and outside of the construction area. Materials, tools and equipment should be covered with plastic or a clean cloth and transported into and out of the hospital on construction designated elevators and egress routes. Construction personnel visibly contaminated with debris or dust shall either don clean coveralls or clean off clothing using a HEPA-filtered vacuum prior to exiting the construction area and entering a hospital-occupied area.
- C. Class III and IV projects, which are more likely to occur in High and Highest risk areas, require an anteroom. Exceptions can be made with the approval of the Infection Prevention & Control and Enterprise Facility Services departments during the Infection Control Risk Assessment process.
- D. Negative pressure must be maintained within the project site at all times by the use of air fan units vented directly to the outside or fitted with high-efficiency particulate air (HEPA) filters if outside venting is not possible. Contractor is required to monitor pressure differential between the construction area and surrounding areas using a digital monitoring device. Monitor the pressure differential between the construction containment and the adjacent occupied areas on a continuous basis. Multiple differential pressure monitoring devices may be required to monitor and document negative pressure. Verify with IP&C and/or the PM how many monitoring devices will be required. Setup the manometer to alarm if the pressure differential is below 0.005 inches water column for more than one minute. Notify IP&C and the PM if negative pressure has been lost for more than one minute in order to assess whether patients are at risk.
- E. Debris removal from the construction site must be completed following a predetermined route at times when patients are in their rooms with their doors closed. Debris should be transported in clean containers with tight-fitting lids. Waste is not to be transported through patient / staff areas without the approval of the project manager and the affected department director or manager.
- F. Construction activities required in patient-occupied areas outside of the barricade must be contained and require a mini-enclosure around the work area (control cube or Non-combustible plastic enclosure).
- G. Any dust tracked outside of the barrier must be removed immediately. Cleaning in patient occupied areas shall be performed using HEPA-filtered vacuum cleaners. Thorough cleaning will be done at the end of each workday and at the end of the project.

- H. All air-handling ducts should be shut down or covered during all demolition activities. Baseline air quality sampling will be done from different locations when little or no activity exists prior to construction. Air quality sampling will be done monthly until breaking through walls and weekly thereafter. Records of air quality sampling will be kept pursuant to the details outlined in the ICRA policy.
- I. Weekly walk through monitoring of the construction area will be done by the Director of Enterprise Facility Services and/or Infection Control or their designees when the project meets the requirements for weekly walk through.

Last Revision: 09/08/2021

Daily Infection Control Checklist for Use During Construction and Renovation

Location/Area of Construction:

Project Start Date:

Estimated Project Duration:

Contractor:

Phone:

FH Project Manager:

Phone:

Injection Control Coordinator:

Phone:

[illegible]

APPENDIX D
Infection Prevention Program
Froedtert Health

Specifications for Construction and Terminal Cleaning

A. Responsibilities:

a. The Contractor:

- i. Arrange for construction cleaning to be performed before the containment barrier is removed as well as during the removal of the barrier and any post-barrier removal cleaning required.
- ii. Once construction cleaning has been completed and barrier removed, arrange for the facility's Environmental Services department (EVS), or a hospital approved third party professional cleaning company, to perform terminal cleaning.
 1. if utilizing a professional Cleaning Company (CC) they must be able to demonstrate competence and experience cleaning in an institutional environment.
 2. Preferably a CC that is hired would have experience cleaning in a healthcare setting.
- iii. The contractor shall not perform terminal cleaning themselves in any situation. Terminal cleaning shall be performed by the facility's EVS or an EVS approved CC.

b. Environmental Services (EVS) or CC:

- i. Perform terminal cleaning as coordinated by the Contractor.
- ii. Notify the Contractor of completion of the terminal cleaning.

B. Cleaning Requirements: Provide a Two Step Clean:

1. **CONSTRUCTION Cleaning – Pre-barrier Removal:**

- a. Clean inside the project area with the barrier in position. First, HEPA vacuuming of all horizontal and vertical surfaces, including the barrier and the inside of the metal studs and track. Second, completely clean the inside of the barrier – all dust, dirt, debris, and grime must be cleaned from all surfaces located within the project area, including from electrical outlet and switch covers.
- b. Clean the covers that are isolating the HVAC system.
- c. Clean the outside of the negative air machine and its exhaust duct.
- d. Clean all flooring and apply floor finishes as prescribed by the manufacturer of the product and/or HMC EHS department.

- e. Remove the covers from the HVAC system and restore the HVAC air. If this action produces any dust or dirt, use a HEPA-filtered vacuum to clean up and wipe down horizontal surfaces again. See item 2.b below.
- f. Prior to removal of the barrier, the Contractor may lightly mist the barrier with bleach solution to prevent residual dust from aerosolizing during the barrier removal.
- g. The Contractor will remove the barrier. The Post Barrier Removal Cleaning will be completed to remove any dirt generated when the barrier was removed. This includes all surfaces in the same room, the location of the barrier, and/or other affected areas. Additionally, if dust has resettled on horizontal surfaces, these surfaces shall be re-cleaned.
- h. Once the Post Barrier Removal Cleaning is complete the Contractor will remove the negative air machine.

2. TERMINAL Cleaning – Post-barrier Removal:

- a. Coordinate terminal cleaning by Environmental Services (EVS). EVS or an EVS approved cleaning contractor shall provide a final thorough cleaning of all Class III and IV projects.
- b. All surfaces including walls, lights, trim, cove base etc. must be cleaned of dust, grime, etc. using a general cleaning agent. Cleaning solutions must be changed frequently so that the solution does not leave a film when it dries (due to an over burden of dust and dirt in the solution).
- c. Clean and finish all flooring using manufacturer and HMC recommended products.

C. Specific Cleaning Expectations: When complete, all surfaces should have a “white glove” finish.

- 1. Clean all ceiling, lights, and ceiling diffusers and grills
- 2. Clean all walls, from top to bottom, including vents, trim, recessed spaces and other detail in walls, and built-in cabinets.
- 3. Clean the blinds and windows.
- 4. Clean the inside all cabinets and drawers.
- 5. Clean all horizontal surfaces (equipment, TV, computers, phones, furniture, desks, countertops, lodges, sills, hand or guard rails, door jambs, handles, crevices, etc.).
- 6. Clean all cove base, floor tile, sheet vinyl, and carpet.
- 7. Clean bathroom in sequence going from toilet, to shower/tub, to sink, to floor.
- 8. Clean shower/tub using friction to remove all visible stains, grime, rust, and soap scum.

D. Cleaning Products:

- 1. All cleaning products are to be the same as used by Froedtert Health’s Environmental Health Services Department. Products must also be of the same product type as specified by the original equipment manufacturer.
- 2. Contact the EVS Department for a current list of approved products.

E. Carpet Cleaning Equipment:

- 1. Carpet shampooing equipment must be steam or hot water extraction type.

2. Vacuums must be equipped with brushes and HEPA filters.
- F. The appropriate timing of air-testing will be determined by The Enterprise Facility Services and Infection Prevention departments during the project pre-planning phase of the Infection Control Risk Assessment.

APPENDIX E
Infection Prevention Program
Froedtert Health

Corrective Action Plan

Infection Prevention Project Title and Number:

Date of noted ICRA Non-compliance:

Specific details of Non-compliance noted:

Contractor Responsible:

Project Manager Responsible:

Date Contractor and Project Manager Notified:

Action Plan:

Due Date:

*****This action plan has been agreed upon by the Contractor, assigned Froedtert Health Project Manager, and the Infection Prevention and Control Department. If the issues of non-compliance outlined above are not rectified within the agreed upon timeframe, the Infection Prevention and Control department reserves the right to halt all work on the project in question if patient care and safety is deemed to be at risk. Per Froedtert Health policy, if the contractor continues being in violation of the ICRA work permit, the Administrative leadership of the property in question will be notified by the Infection Prevention and Control department of said deficiencies and their bidding of future projects may be revoked.**

Signatures:

FH Project Manager: _____

Date: _____

Contractor Representative: _____

Date: _____

Infection Prevention: _____

Date: _____

Corrective Action Plan completed and project deemed safe to continue by _____, of the Infection Prevention and Control department, on _____.

Site: **7718 Froedtert Memorial Lutheran Hospital, Inc**

Program: **Hospital**

| Observation Header | |
|--------------------------------------|--|
| Tracer Instructions: | Perform construction rounding on major projects weekly. If the current phase is not covered in a given tracer question, select N/A. |
| Observation Title: | |
| Total Completed Observations: | |
| FMLH Name: | |
| Service Area Name: | |
| Department Name: | |
| Survey Team: | |
| Observation Date: | |
| Medical Staff Involved: | |
| Staff Interviewed: | |
| Location: | |
| Unique Identifier: | |
| Equipment Observed: | |
| Contracted Service: | |
| Notes: | |
| | |
| Questions (* = Required) | |
| ICRA & Work Permit | |
| 1 | Was an Infection Control Risk Assessment performed and agreed upon before the project started? |
| <input type="checkbox"/> N/A | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ |
| | Notes: |
| | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|---------------------------------|--|-------------------------------------|
| 2 | <input type="checkbox"/> N/A | If this is a Class III or IV project, is an ICRA work permit signed and posted on all containment walls facing patient-care space? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 3 | <input type="checkbox"/> N/A | Are construction staff wearing appropriate hospital-approved identification badges? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 4 | <input type="checkbox"/> N/A | Is there a daily infection control checklist on-site (or available electronically upon request) and up to date? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| Containment | | | |
| 5 | <input type="checkbox"/> N/A | Is erected containment material (hardwall, edge guard, vinyl sheeting) as agreed upon in the ICRA? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|--------------------------|--|-------------------------------------|
| 6 | <input type="checkbox"/> | Is containment continuous from floor to ceiling up to the deck (where necessary)? | |
| N/A | <input type="checkbox"/> | | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| Notes: | | | |
| 7 | <input type="checkbox"/> | Are seams of containment sealed along the floor, ceilings, walls, and doorway? | |
| N/A | <input type="checkbox"/> | | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| Notes: | | | |
| 8 | <input type="checkbox"/> | Are hand hygiene stations available near the exit/entrance for contractor use? | |
| N/A | <input type="checkbox"/> | | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| Notes: | | | |
| 9 | <input type="checkbox"/> | Is the entrance/exit to the project site locked and inaccessible to patients, visitors, and hospital-staff (applicable to hard-wall and edge guard containment)? | |
| N/A | <input type="checkbox"/> | | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| Notes: | | | |

Site: **7718 Froedtert Memorial Lutheran Hospital, Inc**

Program: **Hospital**

| Questions (* = Required) | | | |
|--------------------------|---------------------------------|--|-----------------------|
| 10 | <input type="checkbox"/> N/A | Are tacky walk-off mats present and changed routinely? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 11 | <input type="checkbox"/> N/A | Are the floors around the outside of the containment clean and well kempt? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 12 | <input type="checkbox"/> N/A | Does the containment allow for free and unobstructed egress of hospital equipment and personnel traffic around it? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| Pressurization | | | |
| 13 | <input type="checkbox"/> N/A | Is the project space negatively pressured compared to the space on the outside of the project? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|--|-------------------|-------------------|
| 14 | Is there an operational pressure monitor in plain site within the entrance/exit to the job site? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| Notes: | | | |
| 15 | Can the contractor provide documentation of air pressure monitoring history upon request? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| Notes: | | | |
| 16 | If there is an anteroom present, is it clean and sealed? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| Notes: | | | |
| 17 | Are HEPA filtration units present throughout the project site? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| Notes: | | | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

Questions (* = Required)

| | | | |
|---------------------------------|--|-------------------|-------------------|
| 18 | Can the contractor provide documentation of HEPA filtration unit maintenance history upon request? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |

Flooring

| | | | |
|---------------------------------|--|-------------------|-------------------|
| 19 | Is the flooring surface dry and free of water and mold? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |

| | | | |
|---------------------------------|--|-------------------|-------------------|
| 20 | If new flooring has been laid down, is it covered and protected from construction traffic? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |

| | | | |
|---------------------------------|--|-------------------|-------------------|
| 21 | Is welded vinyl/sheet flooring intact and free from splits, cuts, or gouges? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|---------------------------------|---|--|
| 22 | <input type="checkbox"/> N/A | Does carpeting installed have impermeable backing and welded seams (where necessary)? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | |
| | | Notes: | |
| 23 | <input type="checkbox"/> N/A | Is carpet appropriately vacuumed and clean? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | |
| | | Notes: | |
| Walls | | | |
| 24 | <input type="checkbox"/> N/A | Are open wall cavities vacuumed and clean from dust/debris? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | |
| | | Notes: | |
| 25 | <input type="checkbox"/> N/A | Are installed electrical boxes, medical gas outlets, and dialysis boxes dusted and cleaned before being sealed? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | |
| | | Notes: | |

Site: **7718 Froedtert Memorial Lutheran Hospital, Inc**

Program: **Hospital**

| Questions (* = Required) | | | |
|--|--|------------|------------|
| 26 | Is all drywall intact, continuous, and free from damage? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |
| 27 | Is painted/finished drywall, as well as outlets and switches, dust free? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |
| 28 | Are all wall elements free of moisture, water, and mold? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |
| Ceilings & Above Ceiling Spaces | | | |
| 29 | Are areas above ceiling dry? | | |
| <input type="checkbox"/> N/A | | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ | Den: _____ |
| | Notes: | | |

Site: **7718 Froedtert Memorial Lutheran Hospital, Inc**

Program: **Hospital**

| Questions (* = Required) | | | |
|---|---------------------------------|--|-----------------------|
| 30 | <input type="checkbox"/> N/A | Are ceiling tiles, once installed, dust-free and showing no signs of moisture damage? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| Roofing (if part of the project) | | | |
| 31 | <input type="checkbox"/> N/A | Upon inspection, is the roof surface appropriately sealed and impervious to water incursion? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 32 | <input type="checkbox"/> N/A | Are all roof penetrations appropriately sealed to mitigate water incursion around the penetration? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| Windows & Exterior Wall Penetrations | | | |
| 33 | <input type="checkbox"/> N/A | Are exterior wall penetrations dry and free from any evidence of water incursion or mold? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |

Site: **7718 Froedtert Memorial Lutheran Hospital, Inc**

Program: **Hospital**

Questions (* = Required)

| | |
|---------------------------------|--|
| 34 | Are window panes and sills free from condensation, mold growth, and water incursion? |
| <input type="checkbox"/> N/A | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ |
| | Notes: |

Build-ins

| | |
|---------------------------------|--|
| 35 | Are countertops and cabinets solid, continuous, and undamaged? |
| <input type="checkbox"/> N/A | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ |
| | Notes: |

| | |
|---------------------------------|---|
| 36 | Do sinks installed in patient rooms have off-center drains to mitigate splashing from the faucet/fixture? |
| <input type="checkbox"/> N/A | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ |
| | Notes: |

The Water System

| | |
|---------------------------------|--|
| 37 | Are all uninstalled water pipes stored off of the ground and capped on both ends? |
| <input type="checkbox"/> N/A | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ |
| | Notes: |

Site: **7718 Froedtert Memorial Lutheran Hospital, Inc**

Program: **Hospital**

| Questions (* = Required) | | | |
|--------------------------|---------------------------------|--|-----------------------|
| 38 | <input type="checkbox"/> N/A | Is the water system energized at a time agreed upon in the ICRA? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 39 | <input type="checkbox"/> N/A | If the water system is energized, is the contractor or Enterprise Facility Services representative performing flushing activities as agreed upon in the ICRA? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 40 | <input type="checkbox"/> N/A | During flushing activities, are all plumbing fixtures draining appropriately and not leaking? (If not present during flushing, run the faucet yourself and look for water dripping or pooling, or sinks backing up anywhere) | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| HVAC Duct Work | | | |
| 41 | <input type="checkbox"/> N/A | If applicable, are the outdoor air intakes properly isolated away from the construction site? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|---|--|--|
| 42 | If applicable, are storm drains outside of the project open and free flowing, so as to limit the pooling of water into the construction site? (Drain filters over the storm drain covers are acceptable, but should appear clean and unclogged) | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | | |
| Notes: | | | |
| 43 | For minor projects in existing spaces, are supply and return vents filtered or sealed where applicable? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | | |
| Notes: | | | |
| 44 | Is all uninstalled ductwork sealed on both ends and stored in a clean manner? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | | |
| Notes: | | | |
| 45 | If the air handling system is not functional yet, are all supply and return vents sealed within the ceiling grid? | | |
| | <input type="checkbox"/> N/A | | |
| | Compliant? <input type="radio"/> Yes <input type="radio"/> No Num: _____ Den: _____ | | |
| Notes: | | | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|---------------------------------|--|-----------------------|
| 46 | <input type="checkbox"/> N/A | If the air handling system is functional, are all supply and return vents clean, free from damage, and functioning appropriately? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 47 | <input type="checkbox"/> N/A | Does the pressurization of the ventilation match the ASHRAE-170 requirements for the room based upon the room's intended use? (All room, clean utility, etc.) | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| Quality Assurance | | | |
| 48 | <input type="checkbox"/> N/A | Are food and beverages found only within the space designated by the Contractor and note elsewhere within the project space? (closed water bottles containing only water are acceptable) | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 49 | <input type="checkbox"/> N/A | Is any patient care equipment remaining in the room covered and protected from construction dust/debris? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--------------------------|---------------------------------|--|-----------------------|
| 50 | <input type="checkbox"/> N/A | Is the egress of construction debris done to limit dust/dirt in covered carts? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 51 | <input type="checkbox"/> N/A | Is the egress route agreed upon in the ICRA being adhered to? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 52 | <input type="checkbox"/> N/A | Is the contractor, or contractor's representative, performing daily cleaning activities to mitigate dust being tracked outside of the project site? | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |
| 53 | <input type="checkbox"/> N/A | Is the contractor, or contractor's representative, following the guidelines for construction cleaning enumerated in Appendix D of the ICRA Policy? (Specifications for Construction and Terminal Cleaning) | |
| | | Compliant? <input type="radio"/> Yes <input type="radio"/> No | Num: _____ Den: _____ |
| | | Notes: | |

Site: 7718 Froedtert Memorial Lutheran Hospital, Inc

Program: Hospital

| Questions (* = Required) | | | |
|--|--|-------------------|-------------------|
| 54 | Post construction clean, are all delivered items removed from their shipping boxes before being delivered to their final area? | | |
| <input type="checkbox"/> | N/A | | |
| Compliant? <input type="radio"/> Yes <input type="radio"/> No | | Num: _____ | Den: _____ |
| Notes: | | | |
| 55 | Is Environmental Services performing terminal cleaning following the guidelines enumerated in Appendix D of the ICRA policy? (Specifications for Construction and Terminal Cleaning) | | |
| <input type="checkbox"/> | N/A | | |
| Compliant? <input type="radio"/> Yes <input type="radio"/> No | | Num: _____ | Den: _____ |
| Notes: | | | |
| | | | |

[illegible]

| Appendix I: WMC ICRA Pre-Construction Risk Evaluation | | | | | | | | | | | | | |
|---|----|--------------|--|--|--|---------------------|----|--------------|---|-------------------|-------------------------------|--------------------|--|
| Froedtert Health | | | | | | | | | | | | | |
| Water Management for Construction Pre-Construction Risk Evaluation Checklist | | | | | | | | | | | | | |
| Project Number: | | | | | | Facility: | | | | | | | |
| Inspector | | | | | | Department/Location | | | | | | | |
| Date | | | | | | Description: | | | | | | | |
| Water Management for Construction (WMC) involves a risk managment process for commissioning water quality and safety associated with construction activities to verify and validate that the building water distribution systems (potable, non-potable, and utility) are activated and safely operating within the parameters established within the Froedtert Health Water Management Program. The WMP must include water management for all construction projects including any new building, or any renovation, alteration, and demolition to an existing building. Construction activities are a known risk factor impacting the growth and spread of waterborne pathogens in building water systems. Please check off which risk factors are present on the project. Additionally provide as much additional information as possible in the Note Section involving potential impacts of construction activities on building water systems as part of this pre-construction water quality/safety risk assessment. | | | | | | | | | | | | | |
| YES | NO | NOTE SECTION | SITE RISK FACTORS | | | YES | NO | NOTE SECTION | BUILDING RISK FACTORS | | | | |
| | | | Excavation | | | | | | High Water Age / Stagnation Challenges | | | | |
| | | | Potential for soil and sediment invasion | | | | | | < 24 hours | ≤ 5 calendar days | >5 days to ≤ 30 calendar days | > 30 calendar days | |
| | | | Describe location | | | | | | Inadequate residual disinfectant | | | | |
| | | | Underground utility connections | | | | | | Is disinfectant residual measurement between TRO > 0.5 ppm or < 4.0 ppm / or / FRO > .02 ppm or < 4.0 ppm | | | | |
| | | | Potential for soil and sediment invasion | | | | | | Provide verification of existing residual disinfectant measurements | | | | |
| | | | Repressurization of building main / point-of-entry water system | | | | | | Incoming municipal water main | | | | |
| | | | Water service disruption - reduces water delivery pressure below 20 psi | | | | | | Pre - Post water softener | | | | |
| | | | New construction tie-ins | | | | | | Pre - Post RO or other central filtration system | | | | |
| | | | Replacement valves | | | | | | Return hot water loop system | | | | |
| | | | Hydrants | | | | | | Distal distribution points on each floor of construction | | | | |
| | | | Meters | | | | | | Confirm existing temperature control ranges | | | | |
| | | | Pumping failures | | | | | | Hot water range ≥ 113°F | | | | |
| | | | Pipeline breaks | | | | | | Cold water range ≤ 77°F | | | | |
| | | | Other system repairs | | | | | | Does the project utilize point-of-use mixing valves | | | | |
| | | | Emergency conditions | | | | | | Unoccupied areas or low or no use areas pre or post occupancy | | | | |
| | | | Lengthy underground piping connections | | | | | | Shell areas with active water piping | | | | |
| | | | Site routing of water utility piping | | | | | | Unoccupied areas with active water system | | | | |
| | | | Fire hydrant locations and piping routing with dead-ends | | | | | | Low use areas with active water system | | | | |
| | | | Distance from building main connection to the street connection/invert | | | | | | Vibration activities | | | | |
| | | | Vibration activities | | | | | | Demolition | | | | |
| | | | Pile Driving/structural foundation | | | | | | Jackhammering | | | | |
| | | | Jackhammering | | | | | | Saw cutting | | | | |
| | | | Saw cutting | | | | | | What departments are above, below, or downstream/near vibration activities? | | | | |
| | | | What buildings are these activities adjacent to? | | | | | | Efficiency design challenges | | | | |
| | | | Demolition Activities | | | | | | Water system design for conservation measures | | | | |
| | | | Creates air plumes of dust into water reservoirs | | | | | | Participating in LEED, WELL, or FitWEL Rating Systems | | | | |
| | | | Drift toward cooling towers | | | | | | Auto-fixtures (electronic, sensor, or push button) | | | | |
| | | | Drift toward HVAC intake | | | | | | Aerators | | | | |
| | | | Demolishing building water system components | | | | | | Other - mixed temperature fixtures, etc. | | | | |
| | | | Impacting other building water supply connection points | | | | | | Repressurization (start-up and shut-down) | | | | |
| | | | Demolishing tunnels | | | | | | Water service disruption - reduces water delivery pressure below 20 psi | | | | |
| | | | Utility | | | | | | New construction tie-ins | | | | |
| | | | Passage / transportation | | | | | | Replacement valves | | | | |
| | | | Construction equip with water reservoirs typically(i.e. spray activities) | | | | | | Meters | | | | |
| | | | Water tankers | | | | | | Pumping failures | | | | |
| | | | Paving equipment | | | | | | Other system repairs | | | | |
| | | | Spray nozzles | | | | | | Emergency conditions | | | | |
| | | | Misters | | | | | | Construction equipment with water reservoirs typically with spray activities | | | | |
| | | | Other | | | | | | Showers | | | | |
| | | | Water main disruptions | | | | | | Spray nozzles | | | | |
| | | | Opportunity for water main breakage | | | | | | Misters | | | | |
| | | | Length of shut down in hours/days | | | | | | Other | | | | |
| | | | Off-site construction of municipal water delivery system | | | | | | Inadequate or untimely disinfection of building water distribution system | | | | |
| | | | Central Utility System Modifications/Alterations | | | | | | Does the project call for building water distribution system disinfection? | | | | |
| | | | Water heaters | | | | | | When during the project is this activity scheduled to be performed? | | | | |
| | | | Boiler system | | | | | | | | | | |
| | | | Cooling Towers | | | | | | | | | | |
| | | | Replacement | | | | | | | | | | |
| | | | Addition | | | | | | | | | | |
| | | | Inadequate or untimely disinfection of underground utility connections or building | | | | | | | | | | |
| | | | Does the project call for building water main disinfection? | | | | | | | | | | |
| | | | When during the project is this activity scheduled to be performed? | | | | | | | | | | |

Interim Life Safety Measures (ILSM) Assessment for Life Safety Code Deficiency

Deficiency:

Date:

Evaluate the deficiency using the criteria below to determine which ILSM are applicable.

| Deficiency | Y or N? | Deficiency | Y or N? |
|--|---------|---|---------|
| Corridor door latching / gap / rating problems | | Nonconforming building construction type | |
| Fire door latching / gap / rating problems | | Improperly protected vertical openings | |
| Smoke door latching / gap / rating problems | | Large penetration in fire / smoke barriers | |
| Lacking a code-compliant barrier | | Corridor walls do not extend to the structure | |
| Fire exit stairs discharge improperly | | Fire protection systems* failure <4 hours | |
| Excessive travel distance to approved exit | | Fire protection systems* failure >4 hours | |
| Lacking two remote exits | | Hazardous area not properly protected | |

*alarm, detection or suppression

| | |
|----|--|
| 1 | Notify the fire department and initiate a fire watch. |
| 2 | Post signage identifying the location of alternative exits to everyone affected. |
| 3 | Inspect exits in affected areas on a daily basis. |
| 4 | Provide temporary but equivalent fire alarm and detection systems for use when a fire system is impaired. |
| 5 | Provide additional firefighting equipment. |
| 6 | Use temporary construction partitions that are smoke-tight, or made of noncombustible or limited-combustible material that will not contribute to the development or spread of fire. |
| 7 | Increase surveillance of buildings, grounds, and equipment, giving special attention to construction areas and storage, excavation, and field offices. |
| 8 | Enforce storage, housekeeping, and debris-removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level. |
| 9 | Provide additional training to those who work in the hospital on the use of firefighting equipment. |
| 10 | Conduct one additional fire drill per shift per quarter. All areas. |
| 11 | Conduct one additional fire drill per shift per quarter. Local area. |
| 12 | Inspect and test temporary systems monthly. |
| 13 | Conduct education to promote awareness of building deficiencies, construction hazards, and temporary measures implemented to maintain fire safety. |
| 14 | Train those who work in the hospital to compensate for impaired structural or compartmental fire safety features. |

ILSM Requirements

Project #: _____ **Date:** _____

Project Name: _____

Life Safety Code Deficiency: _____

Building: _____ **Floor:** _____ **Room(s):** _____

| Mandatory ILSM | | Yes | No |
|----------------|--|-----|----|
| 1 | Notify the fire department and initiate a fire watch. | | X |
| 2 | Post signage identifying the location of alternative exits to everyone affected. | | X |
| 3 | Inspect exits in affected areas on a daily basis. | | X |
| 4 | Provide temporary but equivalent fire alarm and detection systems for use when a fire system is impaired. | | X |
| 5 | Provide additional fire-fighting equipment. | | X |
| 6 | Use temporary construction partitions that are smoke-tight, or made of noncombustible or limited-combustible material that will not contribute to the development or spread of fire. | | X |
| 7 | Increase surveillance of buildings, grounds, and equipment, giving special attention to construction areas and storage, excavation, and field offices. | | X |
| 8 | Enforce storage, housekeeping, and debris-removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level. | | X |
| 9 | Provide additional training to those who work in the hospital on the use of firefighting equipment. | | X |
| 10 | Conduct one additional fire drill per shift per quarter. All areas. | | X |
| 11 | Conduct one additional fire drill per shift per quarter. Local area. | | X |
| 12 | Inspect and test temporary systems monthly. | | X |
| 13 | Conduct education to promote awareness of building deficiencies, construction hazards, and temporary measures implemented to maintain fire safety. | | X |
| 14 | Train those who work in the hospital to compensate for impaired structural or compartmental fire safety features. | | X |

Staff Training

| Subject(s) (use above numbers) | Names/Groups Trained | | Date |
|-----------------------------------|----------------------|--|------|
| | | | |
| | | | |
| | | | |

Dates of Fire Drills

| Area | Date | Time | Area | Date | Time |
|------|------|------|------|------|------|
| | | | | | |
| | | | | | |
| | | | | | |

Filled out by: _____

Organization: _____

Contact Information: _____

Implementation Date: _____

Duration of ILSM _____

Approved by EFS PM _____

Approved by Director of Plant Operations or Designee: _____

**FROEDERT HOSPITAL
CONSTRUCTION& RENOVATION PROJECTS
INTERIM LIFE SAFETY MEASURES – DAILY CHECK LIST**

Project: _____

Date: _____

| | | YES | NO |
|-----|--|-----|----|
| 1. | Are all fire exits (permanent and temporary) and corridors clear and unobstructed? | | |
| 2. | If exits need to be closed off, have all hospital and construction personnel been notified of alternate exit routes? | | |
| 3. | Are hallways free and unobstructed to allow emergency forces access to department/services? | | |
| 4. | If fire alarm, detection, or suppression systems are impaired, has an equivalent system been provided? | | |
| 5. | Have temporary and equivalent fire and equivalent fire systems been inspected and tested on a monthly basis? | | |
| 6. | Are all temporary construction partitions smoke tight and built of noncombustible materials? | | |
| 7. | Has additional fire fighting equipment and training been provided for personnel? | | |
| 8. | Is the no smoking policy being enforced in or adjacent to all construction areas including interstitial spaces and service bays? | | |
| 9. | Is housekeeping and removal of excess debris being done on a daily basis and is combustible storage limited? | | |
| 10. | Have a minimum of two fire drills been conducted per shift per quarter? | | |
| 11. | Are weekly safety audits of the entire site being conducted? | | |
| 12. | Is the integrity of all smoke walls and fire walls being maintained and are personnel trained to detect compromised systems? | | |
| 13. | Do the weekly and monthly safety meetings cover the items noted above? | | |
| 14. | Are fire extinguishers fully charged and inspection date current? | | |
| 15. | Are exit signs visible to construction personnel in the construction area? | | |
| 16. | Have all floor penetrations been sealed/covered? | | |
| 17. | Is the electrical ground fault program being followed? | | |
| 18. | Is the ILSM still accurate? Did something change since it was first created? | | |
| | | | |

COMMENTS: _____

Reviewed by: _____

SECTION 01 35 35 DISRUPTION AVOIDANCE PLANNING (DAP)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Disruption Avoidance Program.
 - 2. Shutdown Requests & Disruption Notices
 - 3. Shutdown Procedure

1.2 REFERENCES

- A. Froedtert Hospital Mechanical / Utility Shutdown and Disruption Notice Form

1.3 DEFINITIONS

- A. Disruption: Any activity that causes a change in the Owner's normal and day-to-day operations. This includes, but is not limited to: interruptions in utility service(s), paths of travel, noise and vibration, odors, room closures, relocations, etc.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 DISRUPTION AVOIDANCE PROGRAM

- A. Contractor shall develop and maintain a Disruption Avoidance Planning (DAP) program for the duration of the project. The DAP Program should be documented in written format and reviewed with Owner's designated representative shortly after award. The DAP Program should include the following items:
 - 1. Identification of anticipated existing utility shutdowns.
 - 2. Process for review and approval of disruption plans
- B. Disruption Avoidance Log. The DAP Log shall be developed and maintained by Contractor in order to track which disruption plans are prepared, reviewed, and approved. Log should consist of all known disruptions in advance so they can be communicated, planned, and discussed in a timely manner.
 - 1. Log should be updated at a minimum of weekly and distributed at the scheduled OAC meeting(s).
 - 2. Log shall forecast anticipated shutdowns or impacts when they are discovered or known.
- C. Meetings. Contractor shall be responsible for scheduling meetings with all affected users and departments to discuss, review, and approve the disruption plans. Owner's designated representative shall assist Contractor in establishing the attendees list, however, Contractor shall be responsible for scheduling attendees. Meeting minutes should be kept and published by Contractor. Meetings should be held weekly at a minimum, or at scheduled times as confirmed by Owner's designated representative.
- D. Should it be necessary, Contractor shall review anticipated disruption avoidance plans with specific users to ensure their requirements are being considered, planned, and met.
- E. Timing of meetings and disruption notice reviews will be based on project timeline requirements and may be monthly, weekly, or daily as determined by Owner and project team.

3.2 SHUTDOWN REQUESTS & DISRUPTION NOTICES

- A. Contractor shall submit a Shutdown / Disruption Notice for any construction work that will affect a mechanical, electrical, plumbing, or other utility prior to performing any work.
- B. Contractor shall follow timeline requirements as detailed in 01 35 35 Exhibit A. ONLY EMAIL REQUESTS FOR SHUTDOWNS ARE ACCEPTED. Submitting the request does not automatically guarantee approval of the shutdown request.
- C. Shut Down notice form is included in 01 35 35 Exhibit A.
- D. Shutdown Contacts: Froedtert Designated Representative.

3.3 SHUTDOWN PROCEDURE

- A. The shutdown procedure included in 01 35 35 Exhibit A shall be followed.
- B. Approval of the proposed shutdown must be received by Contractor before beginning work.
- C. Copy of approved shutdown notice shall be kept with construction personnel at the location of work.

END OF SECTION

Dig Permit

This Form is Required Each Day Digging Occurs On or Around the MRMC Campus

Project: _____ Date: _____
GC Project Manager: _____ GC Project Superintendent: _____
Subcontractor : _____ Sub Competent Person: _____
Excavation Contractor: _____ Operator: _____

IDENTIFY LOCATION OF EXCAVATION (ATTACH PLANS) Reference As-Built Dated: _____

DO I NEED A REFRESH?

- Has the crew/operator changed? Yes / No
- Have markings been compromised? Yes / No

If the answer to either of these questions is "YES", you must contact Digger's Hotline and/or private utility locators for a refresh.

PUBLIC UTILITIES PRESENT IN AND AROUND EXCAVATION:

Digger's Hotline Ticket #: _____ Ticket Type: ____3-Day ____1-Day ____1-Hour
Requested By: _____ Date/Time Requested: _____
Date/Time Ticket Cleared: _____

| Utility In Work Area Per As-Builts | Are Markings Present? | | Do Markings Match As-Builts? | | | If "No" Who Has Been Contacted? | Condition Corrected? |
|---------------------------------------|--------------------------|--------------------------|---------------------------------|--------------------------|--------------------------|---------------------------------------|--------------------------|
| | Yes | No | Yes | No | No As-Builts | | |
| <input type="checkbox"/> Gas | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Electric | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Sewer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Fiber | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |

PRIVATE UTILITIES PRESENT IN AND AROUND EXCAVATION:

Private Locator Ticket #: _____ Ticket Type: ____3-Day ____1-Day ____1-Hour
Requested By: _____ Date/Time Requested: _____
Date/Time Ticket Cleared: _____

| Utility In Work Area Per As-Builts | Are Markings Present? | | Do Markings Match As-Builts? | | | If "No" Who Has Been Contacted? | Condition Corrected? |
|---|--------------------------|--------------------------|---------------------------------|--------------------------|--------------------------|---------------------------------------|--------------------------|
| | Yes | No | Yes | No | No As-Builts | | |
| <input type="checkbox"/> Electric | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Lighting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Steam | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Chilled Water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Sanitary Sewer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Storm Sewer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Irrigation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Fiber | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Phone | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Internet/Cable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |

Dig Permit

Take Pictures of Completed Markings

PRE-WORK CHECKLIST

- Current Utility Drawings have been reviewed to identify utilities in the work area Yes / No
- Current Utility Drawings verified against Hotline markings Yes / No
- Visual Inspection performed for unmarked utilities Yes / No
- A Crew Onsite Refresh requested if any markings are missing Yes / No / NA
 - If marking missing, contact Project Owner, Project Manager, and Utility
- Any overhead hazards present? Yes / No
- Hand digging and visual observation of utilities at all utility crossings Yes / No / NA
- Confirm utilities are abandoned prior to removing Yes / No / NA
- Hazard Analysis prepared and reviewed Yes / No
- Protection for the public is in place Yes / No / NA
- All Crew Members briefed on this plan Yes / No
- Pictures have been taken to document completed markings, pictures taken by: _____

Subcontractor Competent Person: _____

Print

Signature

Project Supervisor: _____

Print

Signature

CONTACT LIST OF LOCATORS ASSIGNED TO THE PROJECT AND THEIR SUPERVISOR

Section to be completed by Project Management at Pre-Construction Meeting.

Olameter Contacts (We Energies facilities locating)

Electrical & Natural Gas

Primary - Matt Frittitta
Damage Prevention
Technician
Cell: 424-403-6284

Secondary - Zac Hein
Operations Manager
O: 704-321-3781
Cell: 218-252-3235

We Energies Main Contacts

Primary - Garrett Nyman
Sr. Service Manager
O: 414-449-3018
Cell: 414-333-6340

Secondary - Andrew LaTona
Sr. Operations Supervisor
O: 414-944-5649
Cell: 414-315-1895

Private Lines

Primary - Mark
Cell: 414-313-2328

Secondary -
Cell:

Adesta

Primary – Larry Lucero
Locator
Cell: 715-919-0079

Secondary – Alexander Clark
Superintendent
Cell: 815-378-4759

USIC

(AT&T and TWC)

Primary - Robert
Cell: 262-219-9105

Secondary - Ed
Cell: 414-788-5361

Ever-Green Energy

Primary – Mark Whitaker
Cell: 414-837-7107

Secondary -
Cell:

Dig Permit

This Form is Required Each Day Digging Occurs On or Around the MRMC Campus

Project: _____ Date: _____
GC Project Manager: _____ GC Project Superintendent: _____
Subcontractor : _____ Sub Competent Person: _____
Excavation Contractor: _____ Operator: _____

IDENTIFY LOCATION OF EXCAVATION (ATTACH PLANS) Reference As-Built Dated: _____

DO I NEED A REFRESH?

- Has the crew/operator changed? Yes / No
- Have markings been compromised? Yes / No

If the answer to either of these questions is "YES", you must contact Digger's Hotline and/or private utility locators for a refresh.

PUBLIC UTILITIES PRESENT IN AND AROUND EXCAVATION:

Digger's Hotline Ticket #: _____ Ticket Type: ____3-Day ____1-Day ____1-Hour
Requested By: _____ Date/Time Requested: _____
Date/Time Ticket Cleared: _____

| Utility In Work Area Per As-Builts | Are Markings Present? | | Do Markings Match As-Builts? | | | If "No" Who Has Been Contacted? | Condition Corrected? |
|---------------------------------------|--------------------------|--------------------------|---------------------------------|--------------------------|--------------------------|---------------------------------------|--------------------------|
| | Yes | No | Yes | No | No As-Builts | | |
| <input type="checkbox"/> Gas | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Electric | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Sewer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Fiber | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |

PRIVATE UTILITIES PRESENT IN AND AROUND EXCAVATION:

Private Locator Ticket #: _____ Ticket Type: ____3-Day ____1-Day ____1-Hour
Requested By: _____ Date/Time Requested: _____
Date/Time Ticket Cleared: _____

| Utility In Work Area Per As-Builts | Are Markings Present? | | Do Markings Match As-Builts? | | | If "No" Who Has Been Contacted? | Condition Corrected? |
|---|--------------------------|--------------------------|---------------------------------|--------------------------|--------------------------|---------------------------------------|--------------------------|
| | Yes | No | Yes | No | No As-Builts | | |
| <input type="checkbox"/> Electric | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Lighting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Steam | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Chilled Water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Sanitary Sewer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Storm Sewer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Irrigation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Fiber | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Phone | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |
| <input type="checkbox"/> Internet/Cable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> |

Dig Permit

Take Pictures of Completed Markings

PRE-WORK CHECKLIST

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- Current Utility Drawings verified against Hotline markings Yes / No
- Visual Inspection performed for unmarked utilities Yes / No
- A Crew Onsite Refresh requested if any markings are missing Yes / No / NA
 - If marking missing, contact Project Owner, Project Manager, and Utility
- Any overhead hazards present? Yes / No
- Hand digging and visual observation of utilities at all utility crossings Yes / No / NA
- Confirm utilities are abandoned prior to removing Yes / No / NA
- Hazard Analysis prepared and reviewed Yes / No
- Protection for the public is in place Yes / No / NA
- All Crew Members briefed on this plan Yes / No
- Pictures have been taken to document completed markings, pictures taken by: _____

| | | |
|---------------------------------|-------|-----------|
| Subcontractor Competent Person: | _____ | _____ |
| | Print | Signature |
| Project Supervisor: | _____ | _____ |
| | Print | Signature |
| Project Supervisor: | _____ | _____ |
| | Print | Signature |
| Project Supervisor: | _____ | _____ |
| | Print | Signature |

CONTACT LIST OF LOCATORS ASSIGNED TO THE PROJECT AND THEIR SUPERVISOR

Section to be completed by Project Management at Pre-Construction Meeting.

| | | |
|--|---|---|
| Olameter Contacts (We Energies facilities locating) Electrical & Natural Gas | Primary - Matt Frittitta Damage Prevention Technician Cell: 424-403-6284 | Secondary - Zac Hein Operations Manager O: 704-321-3781 Cell: 218-252-3235 |
| We Energies Main Contacts | Primary - Garrett Nyman Sr. Service Manager O: 414-449-3018 Cell: 414-333-6340 | Secondary - Andrew LaTona Sr. Operations Supervisor O: 414-944-5649 Cell: 414-315-1895 |
| Private Lines | Primary - Mark Cell: 414-313-2328 | Secondary - Cell: |
| Adesta | Primary – Larry Lucero Locator Cell: 715-919-0079 | Secondary – Alexander Clark Superintendent Cell: 815-378-4759 |
| USIC (AT&T and TWC) | Primary - Robert Cell: 262-219-9105 | Secondary - Ed Cell: 414-788-5361 |
| Ever-Green Energy | Primary – Mark Whitaker Cell: 414-837-7107 | Secondary - Cell: |

PROJECT NAME
PROJECT NO.

DATE

EQUIPMENT RESPONSIBILITY MATRIX

| NO. | ITEM DESCRIPTION & CATEGORY | ARCHITECT CONTRACTOR FROEDTERT | | | CONTRACTOR VENDOR FROEDTERT DELIVERY DATE | | | | CONTRACTOR VENDOR FROEDTERT INSTALL DATE | | | | COMMENTS | |
|------------------------------------|--|--------------------------------------|--|--|--|--|--|--|---|--|--|--|----------|--|
| | | PLAN | | | FURNISH | | | | INSTALL | | | | | |
| 0.00 MAJOR MEDICAL EQUIPMENT | | | | | | | | | | | | | | |
| 0.01 | Removal of Existing Medical Equipment | | | | | | | | | | | | | |
| 0.02 | Ceiling Mounted Supports | | | | | | | | | | | | | |
| 0.03 | Major Medical Equipment - Piece #1 | | | | | | | | | | | | | |
| 0.04 | Major Medical Equipment - Piece #2 | | | | | | | | | | | | | |
| 0.05 | Major Medical Equipment - Piece #3 | | | | | | | | | | | | | |
| 0.06 | Major Medical Equipment - Piece #4 | | | | | | | | | | | | | |
| 0.07 | Major Medical Equipment - Piece #5 | | | | | | | | | | | | | |
| 0.08 | Major Medical Equipment - Piece #6 | | | | | | | | | | | | | |
| 0.09 | Major Medical Equipment - Piece #7 | | | | | | | | | | | | | |
| 0.10 | Major Medical Equipment - Piece #8 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 1.00 MINOR MEDICAL EQUIPMENT | | | | | | | | | | | | | | |
| 1.01 | Patient Beds / Stretchers | | | | | | | | | | | | | |
| 1.02 | Over Bed Tables | | | | | | | | | | | | | |
| 1.03 | Crash Carts | | | | | | | | | | | | | |
| 1.04 | U/C Refrigerator (in PPO) | | | | | | | | | | | | | |
| 1.05 | Blanket Warmer | | | | | | | | | | | | | |
| 1.06 | Acudose Meds Dispenser | | | | | | | | | | | | | |
| 1.07 | Televisions | | | | | | | | | | | | | |
| 1.08 | TV Mounting Brackets | | | | | | | | | | | | | |
| 1.09 | Computers on Wheels (C.O.Ws) | | | | | | | | | | | | | |
| 1.10 | Waste receptacles (clinical, non-clinical) | | | | | | | | | | | | | |
| 1.11 | Chart Racks (mounted) | | | | | | | | | | | | | |
| 1.12 | Nurse Server | | | | | | | | | | | | | |
| 1.13 | IV Pole(s) | | | | | | | | | | | | | |
| 1.14 | Linen Hamper | | | | | | | | | | | | | |
| 1.15 | Office equipment (fax, copiers, printers) | | | | | | | | | | | | | |
| 1.16 | Ice & Water Dispenser | | | | | | | | | | | | | |
| 1.17 | Microwave Oven | | | | | | | | | | | | | |
| 1.18 | Visitor Chair(s) | | | | | | | | | | | | | |
| 1.19 | Projection Screens, Motorized | | | | | | | | | | | | | |
| 1.20 | Projection Screens, Manual Pull-down | | | | | | | | | | | | | |
| 1.21 | Tracker Boards | | | | | | | | | | | | | |
| 1.22 | Signage / Wayfinding / Graphics | | | | | | | | | | | | | |
| 1.23 | Room Numbers (on door frames) | | | | | | | | | | | | | |
| 1.24 | Wall Artwork | | | | | | | | | | | | | |
| 1.25 | View Boxes/Illuminators | | | | | | | | | | | | | |
| 1.26 | Lead Apron Racks (free-standing) | | | | | | | | | | | | | |
| 1.27 | Lead Apron Racks (wall-mounted) | | | | | | | | | | | | | |
| 1.28 | Full Height Storage Cabinets | | | | | | | | | | | | | |
| 1.29 | Wall Mounted Computer Stations | | | | | | | | | | | | | |
| 1.30 | | | | | | | | | | | | | | |
| 2.00 SPECIALTIES & ANCILLARY ITEMS | | | | | | | | | | | | | | |
| 2.01 | Toilet Paper Dispensers | | | | | | | | | | | | | |
| 2.02 | Paper Towel Dispensers | | | | | | | | | | | | | |
| 2.03 | Alcohol Dispensers | | | | | | | | | | | | | |
| 2.04 | Cubicle Curtain Tracks | | | | | | | | | | | | | |
| 2.05 | Cubicle Curtains | | | | | | | | | | | | | |
| 2.06 | Bed Pan Holders | | | | | | | | | | | | | |

PROJECT NAME

PROJECT NO.

DATE

EQUIPMENT RESPONSIBILITY MATRIX

| NO. | | ITEM DESCRIPTION & CATEGORY | | ARCHITECT CONTRACTOR FROEDTERT | | | CONTRACTOR VENDOR FROEDTERT DELIVERY DATE | | | | CONTRACTOR VENDOR FROEDTERT INSTALL DATE | | | | COMMENTS |
|------|------------------------------|-----------------------------|--|--------------------------------------|--|--|--|--|--|--|---|--|--|--|----------|
| | | | | PLAN | | | FURNISH | | | | INSTALL | | | | |
| 2.07 | Coat Hooks | | | | | | | | | | | | | | |
| 2.08 | Grab Bars | | | | | | | | | | | | | | |
| 2.09 | Whiteboard(s) | | | | | | | | | | | | | | |
| 2.10 | Tack Boards | | | | | | | | | | | | | | |
| 2.11 | Mirrors | | | | | | | | | | | | | | |
| 2.12 | Mop Holders | | | | | | | | | | | | | | |
| 2.13 | Sharps Containers | | | | | | | | | | | | | | |
| 2.14 | Gloves Containers | | | | | | | | | | | | | | |
| 2.15 | Welch / Allen Wall Equipment | | | | | | | | | | | | | | |
| 2.16 | Phones (RN & Anesthesia) | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

3.00 OTHER SYSTEMS

| | | | | | | | | | | | | | |
|------|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 3.01 | Nurse Call Devices | | | | | | | | | | | | |
| 3.02 | Nurse Call Rough-In | | | | | | | | | | | | |
| 3.03 | EPIC equipment (computers etc.) | | | | | | | | | | | | |
| 3.04 | EPIC system back boxes / wiring | | | | | | | | | | | | |
| 3.05 | Workstation Computer(s) | | | | | | | | | | | | |
| 3.06 | Telephone/Data (Equipment) | | | | | | | | | | | | |
| 3.07 | Telephone/Data (Wiring) | | | | | | | | | | | | |
| 3.08 | Telephone raceways / cable tray / boxes/ wiring | | | | | | | | | | | | |
| 3.09 | HVAC Controls | | | | | | | | | | | | |
| 3.10 | Fire Alarm Systems | | | | | | | | | | | | |
| 3.11 | CATV System (back box, cable) | | | | | | | | | | | | |
| 3.12 | PACS Equipment | | | | | | | | | | | | |
| 3.13 | PACS Wiring / Back Boxes | | | | | | | | | | | | |
| 3.14 | Card Readers / Security | | | | | | | | | | | | |
| 3.15 | Dual Level Uplights | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

4.00 NOTES & UPDATES

03/01/2012: Log Created

SECTION 01 43 00

QUALITY ASSURANCE REQUIREMENTS FOR CONTRACTORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for implementing, maintaining, and managing a site specific quality program through the duration of the project including:
 - a. Site Specific Quality Program
 - b. Preconstruction Requirements
 - c. Construction Requirements
 - d. Closeout Requirements

1.2 RELATED SECTIONS

- A. Reference Section 01 45 23 – Testing & Inspection Services

PART 2 PRODUCTS

- A. Not used.

PART 3 EXECUTION

3.1 SITE-SPECIFIC QUALITY PROGRAM

- A. Contractor shall implement and maintain a project specific quality program for the duration of the project. Contents of the Site Specific Quality Program include, but are not limited to:
 - 1. Quality Documentation – written policies, procedures, instructions, and programs for use during the project.
 - 2. Quality Inspections - Copies quality inspections shall be made available to Owner upon request.
- B. Contractor shall document the site specific quality plan and provide a copy to Owner for review and comment prior to starting work.

3.2 PRECONSTRUCTION REQUIREMENTS

- A. Contractor shall complete pre-installation meetings with certain work scopes prior to starting of the work scope on-site:
 - 1. Sitework
 - 2. Cast-In-Place Concrete
 - 3. Precast Concrete
 - 4. Structural Steel
 - 5. Masonry
 - 6. Glass & Glazing, Glazed window systems
 - 7. Drywall & Gypsum Board Assemblies
 - 8. Roofing and/or Waterproofing
 - 9. Fireproofing
 - 10. MEP Systems
 - 11. Other areas as appropriate
- B. Contractor shall review contract documents, specifications, details, schedule, general project requirements and guidelines, etc. during the pre-installation meeting. Minutes should be kept of the meetings and made available to Owner's designated representative upon request.

3.3 CONSTRUCTION REQUIREMENTS

- A. Contractor shall be required to implement the following quality assurance requirements during the construction phase:
 - 1. Compliance with all inspection and quality control requirements set forth in the technical specifications or testing agency(ies)
 - 2. Compliance with all field inspections conducted by Architect, Owner, or Engineer(s)
 - 3. Facilitate and perform periodic quality-related inspections to ensure all quality control requirements are met. Inspections will should documented on scope-specific checklists and forms.
 - 4. Correct any deficiencies timely, and verify acceptance with Architect and Owner.
- B. At a minimum, inspections during construction shall be performed on the following work scopes:
 - 1. Cast-In-Place Concrete
 - 2. Backfilling
 - 3. Underslab Waterproofing Systems
 - 4. Vapor Barriers
 - 5. Roofing
 - 6. Building Enclosure Systems (specific to project)
 - 7. In-wall inspections for Drywall (prior to closing walls)
 - 8. Above-ceiling inspections (prior to closing up ceilings)
 - 9. MEP Systems
 - 10. Scopes that will eventually be covered by other work and cannot be readily visible
 - 11. Other areas as appropriate

3.4 CLOSEOUT REQUIREMENTS

- A. Contractor shall comply with the following quality assurance requirements during the project closeout phase:
 - 1. Perform startup & testing of provided equipment
 - 2. Cleanup
 - 3. Punchlist completion and closeout
 - 4. Submission of all required closeout documentation
 - 5. Other requirements as set forth in Division 01, contract documents, technical specifications, and/or request of Owner's designated representative.

END OF SECTION

SECTION 01 56 15

AIRBORNE CONTAMINANT CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hospital airborne contaminants control policy and procedures ;
 - 2. Performance Requirements;
 - 3. Inspection Procedures;
 - 4. Containment Considerations;
 - 5. Protection;
 - 6. Airborne Contaminant Control Enclosures and Barriers ; and
 - 7. Ceiling Access Control of Airborne Contaminants.

1.2 DEFINITIONS

- A. Contaminant-Producing Activities include, but are not limited to:
 - 1. Demolition and removal of walls, floors, ceilings, and other finish materials ;
 - 2. Demolition of plumbing, mechanical and electrical systems and equipment;
 - 3. Finishing operations such as sanding, painting, and application of special surface coatings ;
 - 4. Routine construction activities which can generate dust; and
 - 5. Site-work operations.
- B. Containment Areas: As determined by Owner and/or Owner's Representative and as shown on drawings. Includes area of construction, adjacent staging and storage areas, and passage areas for contractors, supplies and waste; includes ceiling spaces above and adjacent to construction, if appropriate.
- C. Protection Areas: As determined by Owner and/or Owner's Representative and as shown on drawings as Protection Areas which include hospital areas adjacent to Containment Area, either occupied or used for passage, as well as areas connected to construction area by mechanical system air intake, exhaust and ductwork.
- D. "Minor ceiling access" is defined as visual observation or minor adjustments or other activity that does not disturb dust. Acoustical panels shall be replaced or access panel shall be closed immediately prior to the contractor leaving the work area.
- E. "Major ceiling access" describes any other access not defined as "minor ceiling access".
- F. "Thorough" cleaning of surfaces which were potentially exposed to dust shall be accomplished by use of a HEPA-filtered vacuum followed by wet wiping and then a final round of HEPA-filtered vacuuming.
- G. Negative Air Machine: HEPA-filtered portable mechanical unit used to create negative air pressure in the Containment Area(s), as specified in this Section. Negative air machines used to exhaust air into occupied spaces need to be tested and labeled prior to use. Refer to section 2.1.A. for more information.

1.3 RELATED SECTIONS:

- 1. 01 51 00 -Temporary Facilities, Utilities, & Controls
- 2. 01 77 00 – Owner Closeout Requirements

1.4 POLICY

- A. Fungal spores such as *Alternaria*, *Aspergillus*, *Cladosporium*, *Penicillium*, *Stachybotrys atra* or *S. chartarum*, and any other biological organisms that produce or may produce mycotoxins, cause disease (referred to collectively as “spores”) or otherwise may negatively affect patients or other building occupants must be properly controlled.
- B. Inhalation of these spores and other toxins released by construction activity can cause nosocomial fungal infections in immune-compromised patients.
- C. *Aspergillus* and other spores are known to be present in construction dust, debris and earthwork excavation dust. Control of construction dust, debris and excavation dust is imperative to help prevent or minimize the risk of outbreaks of aspergillosis or other nosocomial fungal infections in immunocompromised patients.
 - 1. *Aspergillus* and other related spores are present in the natural environment and are generally not a risk to otherwise healthy individuals exposed to typical outdoor ambient concentrations.
 - 2. Workers are required to attend an orientation session. Refer to Article 1.7.A.
- D. Control of airborne contaminants including spores is critical for ensuring a safe hospital environment. Limit distribution and transport of airborne contaminants produced by construction-related activities in order to protect immuno-compromised and otherwise healthy patients, staff, diagnostic operations, or sensitive procedures or equipment from possible undesirable effects of exposure to such contaminants.
 - 1. Dust in ceilings and construction debris may contain fungal spores. Construction activities causing disturbance of existing dust, creating new dust, or causing the release of other airborne contaminants must be conducted in airtight enclosures to prevent migration of particulate matter into hospital-occupied areas.
 - 2. Ceilings and walls in Protection Areas and other areas in the Hospital as indicated on drawings must be secure at all times. If access into the ceiling in occupied areas is required, procedures as described in this Section shall be followed.

1.5 PERFORMANCE REQUIREMENTS

- A. Owner Representative's Responsibilities
 - 1. Determine the Containment and Protection Areas as well as identify the standard of limitations of the Contractor's responsibilities required for the project.
 - 2. Statement of Requirements: Describe in graphic and written form as required to communicate the requirements listed above, based on evaluation of the construction area and the impact of the project on patient care.
- B. Owner's Responsibilities
 - 1. Assist Owner's Representative in determining Containment and Protection Areas.
 - 2. Perform testing and monitoring as specified as indicated in Section 01 35 43.
- C. Contractor's Responsibilities
 - 1. Comply with applicable regulatory codes and referenced controls and to use installation procedures and methods which satisfy applicable code requirements and referenced controls and procedures.
 - 2. Implement means and methods necessary for achieving and maintaining control of airborne contaminants during construction.
 - 3. Provide a proposed work plan and procedures for control of airborne contaminants, as noted below.
 - 4. Plan Certification: Contractor's plan shall be signed and accepted in writing by Owner and/or Owner's Representative.
 - 5. Notification: Notify Owner and/or Owner's Representative a minimum of 48 hours prior to starting construction activity which might be expected to increase levels of airborne contaminants in containment area so that additional precautions may be implemented.

6. Provide all dustproof enclosures, warning signs and warning lights to protect the patients, hospital staff, visitors, the existing building, storage areas, materials and equipment. Enclosures shall be approved by Owner and/or Owner's Representative.

1.6 PROTECTION

- A. If work is being done above a lay-in ceiling tile system and if work must be performed while the space below is occupied, provide temporary work surfaces to provide a safe working platform and protect the ceiling and the spaces below from falling objects and materials. Take all necessary precautions to protect the people and spaces below from injury due to the Contractor's work activities.
- B. Exercise caution when handling fluids, particularly the heating water, in the interstitial space. When working with fluids, provide a watertight barrier beneath the work area to catch and retain all spillage before it reaches the ceiling below.
- C. Notify the Owner and/or Owner's Representative at least 48 hours, or more if requested by the Owner and/or Owner's Representative, prior to commencing work in ceiling or interstitial spaces above occupied areas to allow at-risk patients to be relocated or otherwise protected.
- D. Contractor is to maintain a log showing all persons who enter the interstitial space. At a minimum, the log must document the person's name, company, date, and time of entry in and exit from the interstitial space.

1.7 SUBMITTALS

- A. Progress Schedules: Submit work areas and procedure schedules for containment of airborne contaminants.
- B. Work Plan: Drawings and details of construction of necessary temporary barriers and description of procedures to be used to achieve and maintain control of construction-related airborne contaminants.
- C. Certification: Submit Contractor's plan certification as specified.

1.8 GENERAL CEILING ACCESS

- A. Notify Owner and/or Owner's Representative that work requiring access to the ceilings outside the Containment Area at least 48 hours before work is to begin.
- B. The Contractor shall report to Owner's designated office and fill out a ceiling access form. An approved work tag must be attached to the ceiling access enclosure before work will be allowed to proceed.
- C. Work Tag:
 1. The Contractor shall attach a completed and approved work tag on the ceiling access enclosure before work can proceed.
 2. The work tag can be removed only after the work is done and cleanup is completed.
 3. All tags issued from Owner and/or Owner's Representative shall be returned the same day to the office at which it was issued after work and cleanup for the day has been completed.
- D. Spray top of ceiling panels to be removed and surrounding affected panels with a fine mist of a dilute bleach solution to prevent the release of settled dust prior to removal. Spray in a manner which does not saturate the underlying ceiling tile.
- E. All above ceiling work is to be coordinated with the Enterprise Facility Services Planning, Design and Construction or Operations departments who will notify the department manager of the work being performed. Doors in critical areas should be maintained in the closed position to prevent the spread of airborne contaminants.

- F. Owner and/or Owner's Representative shall be contacted for all ceiling access problems.

1.9 QUALITY CONTROL

- A. Preconstruction Meeting: Before any onsite construction begins, Contractor and Subcontractors are required to attend a preconstruction orientation session held by Owner and/or Owner's Representative for training and instruction on precautions to be taken. Training will include the following topics:
 - 1. How the project work activities may affect patient care.
 - 2. How to protect patients and staff from hazards and contaminants associated with the project.
 - 3. The types and nature of diseases associated with patients in airborne isolation infection (All) treatment rooms.
- B. A written report from the Owner's qualified air balancer will be submitted confirming specified air velocity whenever enclosure is erected or modified in designated Protection Area. Negative air machines shall be connected to emergency power and run continuously in such areas.
- C. Contractor must provide at least 48-hours notification to Owner and/or Owner's Representative prior to initiating construction activities which could potentially create or distribute airborne contaminants in a Protection Area. Schedule work in ceiling spaces above occupied rooms in advance and during non-business days/times if possible.
- D. Comply with requirements in Section 01 32 16 - Progress Schedules and Reports.

1.10 TESTING

- A. Airborne Particulate Matter Monitoring: The Contract, Owner or Owner's Representative will coordinate baseline monitoring for airborne particulate matter prior to initiating any construction work. Periodic performance monitoring for airborne particulate matter in Protection Areas will be performed during construction to monitor effectiveness of dust containment measures.
- B. Differential Air Pressure Monitoring: Contractor to monitor pressure differential between the construction area and surrounding areas using a digital monitoring device. Monitor the pressure differential between the construction containment and the adjacent occupied areas on a continuous basis. Depending on the size and location of the containment, multiple differential pressure monitoring devices may be required to monitor and document negative pressure. Verify with the Owner and/or Owner's Representative how many monitoring devices will be required. Setup the manometer to alarm if the pressure differential is below 0.010 inches water column for more than five one minutes. Notify the Infection Prevention and Control Department if negative pressure has been lost for more than five minutes in order to assess whether patients are at risk.
- C. Provide any and all recorded data to Owner and/or Owner's Representative at the end of the project and as otherwise requested.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Negative Air Machines: Micro Trap MT-C Negative Air Filtration Units by Micro-Trap, Inc., 38 North Pine Avenue, Maple Shade, New Jersey, 08052, or CRSI 2000 by Control Resource System Incorporated, 670 Marine Drive, Michigan City, Indiana, 46360, 1-800-418-1264 or equivalent.
 - 1. Units shall include prefilters, final HEPA filters and filter static pressure gauges.
 - 2. HEPA filters shall be 99.97% efficient at removing 0.3 micron particles.

3. If exhausting air from the construction containment directly outdoors cannot be achieved, authorization must be granted by the Owner and/or Owner's Representative to exhaust air from the construction containment into hospital-occupied areas using a HEPA-filtered negative air machine.
 - a. Contractor must coordinate testing the performance of the negative air machine by measuring particulate matter from the exhaust prior to discharging inside the facility. Verify that the negative air machine is achieving HEPA filter performance (i.e. 99.97% removal of 0.3 micron particulate matter). Document and maintain test records of the ambient and HEPA-filtered negative air machine unit discharge particulate matter levels. Provide performance testing documentation to the Owner or Owner's Representative if requested.
 - b. Replace the pre-filter and primary HEPA filter as recommended by the filter and/or negative air machine manufacturer. Test the performance of the negative air machine by measuring particulate matter from the exhaust each time the primary HEPA filter is replaced and before the air is exhausted inside the facility. Verify that the negative air machine is achieving HEPA filter performance (i.e. 99.97% removal of 0.3 micron particulate matter). Document and maintain test records of the ambient and HEPA-filtered negative air machine unit discharge particulate matter levels. Follow the manufacturer's suggested maintenance schedule and procedures. Provide performance testing documentation to the Owner or Owner's Representative if requested.

- B. Carpets or Mats: Provide carpets or mats at enclosure entrances, vacuumed or changed as often as necessary to prevent accumulation of dust. At Owner and/or Owner Representative's request, Contractor may also be required to provide adhesive faced contamination control mats with disposable sheets in addition to or in lieu of vacuumed mats. Use sticky walk-off mats such as Tacky Mat by Liberty Industries, 133 Commerce Street, East Berlin, Connecticut, 06023, 1-800-828-5656, or equivalent. All vacuuming outside areas not under negative pressure shall be conducted using a certified HEPA-filtered vacuum.

- C. Dust Caps: Block off all existing ventilation ducts including air supply and return air grills within the construction and anteroom areas. Method of capping ducts shall be airtight and withstand airflow.

- D. Temporary Prefabricated Partition for Work in Sterile Corridors: Kontrol Kube, including Adjustable Aluminum Frame #6440; Vinyl Enclosure #6442; Wheel Base Platform #6443; by Fiberlock Technologies, Inc., P.O Box 432, Cambridge, MA. (617) 876-8020 or equivalent as approved by the Owner and/or Owner's Representative. Provide with inspection window and pressure differential port hole. Include Nilfisk 87 cfm vacuum device and manometer or equivalent.

- E. Fire-rated Partitions for Temporary Enclosure: Provide rated gypsum board wall construction meeting requirements of local jurisdiction for use as temporary enclosure.

- F. Polyethylene: Fire-resistant, UL-labeled tarpaulins with flame spread rating of 15 or less. Provide translucent, nylon-reinforced laminated polyethylene or polyvinyl chloride, fire-retardant sheet certified as conforming to test results of test method 2 contained in NFPA 701, entitled Standard Method of fire Tests for Flame Propagation of Textiles and Films, unless local jurisdiction accepts test method 1 of NFPA 701 or requires other materials.
 1. Portable Enclosures: Whenever work is done outside existing enclosed work areas, provide portable polyethylene enclosure, enclosing ladder and sealing off opening fitted tight to ceiling, or provide prefabricated unit.

PART 3 EXECUTION

INSPECTION

- A. Before any demolition or construction begins, complete a field review of all Protection Areas (airborne contaminant control areas) and policies and revise the work plan if required.

- B. Contractor shall inspect containment areas daily and record inspection results on the Infection Control Daily Checklist. Reference 01 56 15 Exhibit A. Provide copies of the Infection Control Daily Checklist at the completion of the project and as requested by the Owner and/or Owner's Representative.

SCHEDULE OF REQUIREMENTS

- A. Baseline airborne particulate matter levels in Protection Areas in or adjacent to the work area(s) will be established based upon review of historical monitoring data or determined by performing particulate matter monitoring prior to the start of the project.
- B. Owner will monitor airborne particulate matter levels and if appropriate for the project, airborne biological activity levels in and around the vicinity of the project and in adjacent Protection Areas. Such areas are determined by Owner and may include but not be limited to the following: surgery department; ICUs; inpatient units; sterile processing department; and other patient care areas. Whenever baseline or otherwise acceptable particulate matter and/or airborne biological activity as determined by the Owner and/or Owner's Representative are exceeded or deficiencies related to dust containment, material handling, or cleaning are identified, Contractor will be notified and instructed to correct conditions immediately to avoid potential fines and work stoppage.
1. Work shall be stopped on the project whenever a potentially hazardous airborne contaminant control deficiency exists in or immediately adjacent to hospital-occupied areas.
 2. Take immediate action to correct all deficiencies.
 3. Verify with the Owner and/or Owner's Representative that the deficiencies have been corrected prior to resuming work.
- C. Before any demolition or construction begins in occupied areas, review all airborne contaminant control policies. Complete a checklist with the Froedtert Health Project Manager and/or Owner's Representative, an Infection Prevention Specialist and the Contractor to confirm that the area is ready for work to begin.

CONTAINMENT

- A. Requirement: Maintain acceptable levels of airborne contaminants within limits as defined.
- B. Negative air machines as described herein shall provide a minimum of four air exchanges per hour and at least 0.01 inches water column negative pressure at all enclosure entrances and at all spaces adjacent to critical containment barriers.
- C. Air Quality Contaminant Control: Fasten windows shut, ventilate barricaded construction areas by use of negative air machines exhausted through filters to the outside of building, or to Owner and/or Owner's Representative designated areas inside the building.
1. Provide a minimum of two negative air machines. Vent negative air machines to outside by removing existing windows and replacing them with vented sheet metal, plywood panels and/or other approved system having fittings for exhaust holes. Window and/or wall opening must be weather-tight to prevent moisture infiltration and entry by other unwanted objects. Provide added local exhaust during welding or brazing operations. Any deviation from this requirement must have prior written approval from the Owner and/or Owner's Representative.
 2. Change filters as frequently as necessary for duration of the project in order to maintain the required air exchanges and negative pressure inside the Containment Area.
 3. Negative air machines shall be DOP tested or equivalent and certified prior to being placed in service, after a HEPA filter change, and when dropped, damaged, stored or moved extensively.

- D. An anteroom may be required to contain dust/debris, maintain negative pressure or to don and doff PPE such as in sterile processing, the surgery department or other patient-sensitive areas. If required, install an anteroom sufficient in size to allow placement of a HEPA-filtered negative air machine, a HEPA vacuum, a wet or sticky walk-off mat, and the ability to transport materials into and out of the construction area. Contractor to verify with Owner and/or Owner's Representative whether an anteroom is required.

PROTECTION

- A. General: Provide and maintain all barriers, filters, ventilation, and cleaning and removal procedures as detailed in work plan.
- B. Sealing of Openings: Use duct tape or other impenetrable sealant to seal barrier wall seams, cracks around window and doorframes, exhaust system ductwork, pipes, joints and ducts.
- C. Dust Control: Take appropriate steps throughout the duration of the Project to prevent airborne dust due to work under this contract. No chemical palliatives shall be used without written permission of the Owner and/or Owner's Representative.
1. Hard surface floors in work area, adjacent hallways and passage areas require vacuuming with HEPA-filtered vacuum cleaners and frequent wet mopping during demolition and construction. Protect adjacent carpeted areas with plastic and plywood and vacuum with a HEPA-filtered vacuum cleaner as needed.
 2. At a minimum, vacuum carpet or fabric walk-off mats daily. Remove the individual sticky-film sheets as needed to provide a tacky surface.
 3. Execute work by using means and methods intended to minimize dust generation from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere and migrating into hospital-occupied areas.
- D. Airborne contaminant enclosures or infection control enclosures shall be airtight. Any dust tracked outside of the enclosure shall be removed/cleaned immediately. All cleaning outside the enclosure should be performed using a HEPA-filtered vacuum or other method approved by the Owner and/or Owner's Representatives.
- E. The following procedure shall be implemented when construction personnel are required to pass through a Protected Area to enter the Containment Area:
1. Provide airlock entry vestibules in dustproof enclosures when shown on drawings or required by Owner and/or Owner's Representative.
 2. Personnel shall wear protective clothing as required and provided by the Owner and/or Owner's Representative while passing through Protected Areas.
 3. Protective clothing shall be removed in the airlock vestibule prior to entering the Containment Area.
 4. When exiting the Containment Area, the personnel shall re-don the protective clothing before reentering the Protected Area.
- F. Contractor Personnel: Instruct personnel to refrain from tracking dust into adjacent hospital areas or opening windows or doors that would allow airborne contaminants into adjacent hospital areas.
- G. Exterior Work: Direct exhaust from equipment away from building air intakes; ensure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants.
- H. Any ceiling access panels opened for investigation beyond sealed areas shall be replaced immediately when unattended.
1. Whenever access panels are opened in occupied areas for work above ceilings, provide portable enclosure enclosing ladder and sealing off opening, fitted tight to ceiling as specified. Create negative pressure within the portable enclosure by using a HEPA-filtered vacuum or equivalent.

- I. Provide thorough cleaning of existing surfaces which were potentially exposed to dust prior to occupancy by the Owner.
- J. Removal of construction barriers and ceiling protection shall be done in a manner which minimizes dust generation and performed, if possible, outside of normal hours of occupancy. HEPA vacuum and clean all surfaces after the removal of construction barriers.
- K. All vacuuming outside areas not under negative pressure shall be performed using a certified, Owner approved, HEPA-filtered vacuum.

AIRBORNE CONTAMINANT CONTROL ENCLOSURES AND BARRIERS

- A. Install dustproof enclosures for work as indicated and when required to protect areas occupied by the Owner from dust, debris and damage.
 - 1. Construction must be conducted in airtight enclosures which prevent the migration of dust particles into hospital-occupied areas.
- B. The Contractor must confirm with the Owner and/or Owner's Representative whether or not a dustproof enclosure is required to protect any adjoining areas.
- C. Airborne Contaminant Control General Requirements: Floor to structure, airtight enclosures, drywall barriers, using tape and foam padding.
 - 1. Traffic between Containment Areas and open areas shall be kept to a minimum. Keep door to such areas closed at all times. Transport materials and refuse into an area from an external site without violating patient care areas by transporting in covered containers.
 - 2. Provide negative pressure in construction area as specified herein.
 - 3. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
- D. Dustproof Enclosures for projects lasting longer than 2 weeks or as specified in the "Preconstruction Risk Assessment"
 - 1. Full height, noncombustible construction, with minimum 1/2 inch gypsum board both sides with 3-1/2 inch R-11 insulation batts to reduce noise. Use 3-inch wide duct tape or equivalent to tightly seal top, bottom, and all seams, to prevent spread of dust to occupied areas, including above ceiling.
 - 2. Enclosure Doors: 4'-0" minimum width, unless shown otherwise, solid core wood with metal frame and hardware, including closer, tightly weather-stripped to prevent dust migration. Locate as directed and swing into construction area. Keep enclosures locked outside of working hours. Three keys for emergency access shall be furnished to the Owner. Alternatively, install a keypad passage handle and provide the code to the Owner and Owner's Representative.
 - 3. Obtain Owner's and/or Owner Representative's approval of exact location and details of enclosure construction. Materials for enclosure shall be pre-cut in unoccupied areas. No explosive or pneumatic driven fasteners allowed. Provide entrance vestibules as detailed. Provide carpet and/or sticky walk-off mat inside vestibule and inside enclosures at door to vestibule. At a minimum, vacuum carpet daily and remove individual sticky film sheets as necessary to provide and maintain a tacky surface.
 - 4. Install dust containment barrier from floor to ceiling deck. Dust containment barriers must be constructed in a manner as to provide an airtight barrier using a material suitable for preventing punctures, breeches and other damage.
 - 5. Contractor must get prior written approval from Owner and/or Owner's Representative to deviate from any requirement described above.
- E. Dustproof Enclosures for projects lasting 2 weeks or less or as specified in the "Preconstruction Construction Risk Assessment"
 - 1. Install dust containment barrier from floor to ceiling deck. Dust containment barriers must be constructed in a manner as to provide an airtight barrier using a material suitable for preventing punctures, breeches and other damage.

2. If plastic critical barriers are used, install a zippered entrance into the dust containment. The entrance must be suitable for entry and exit of personnel, equipment and materials.
 3. Prior to construction, obtain Owner's and/or Owner Representative's approval for the exact location and details of enclosure construction. Provide entrance vestibules as detailed. Provide carpet and/or sticky walk-off mat inside vestibule and inside enclosures at door to vestibule. At a minimum, vacuum carpet daily and remove individual sticky film sheets as necessary to provide and maintain a tacky surface.
 4. Contractor must get prior approval from Owner and/or Owner's Representative to deviate from any requirement described above.
- F. Containment above the ceiling inside or adjacent to patient care areas should be appropriately constructed and sealed using either a hard-wall or plastic-wall barrier to eliminate the risk of spreading dust above the ceilings of patient care areas. Regardless of the type of barrier used, the dust containment system (i.e. floor level and above ceiling) must be completely sealed and checked daily for damage or other defects which may allow migration of dust/debris into hospital-occupied spaces. Contractor is responsible for verifying with the Owner and/or Owner's Representative whether a hard-wall or plastic-wall partition is required for dust containment above the ceiling.
- G. Seal containment barriers (wall-wall, wall-floor, wall-ceiling and penetrations) by using taped seams or similar as appropriate depending on the type of dust containment.
- H. Enclosure outside of work area (including spaces above furred ceilings): Whenever work is necessary outside of the construction enclosures, the space where work is being done, including ladders, shall be contained within a full height portable enclosure as specified herein. Contractor option: may use prefabricated unit specified herein.
1. Work performed outside the construction enclosure shown on drawings, including all work in corridors and lobbies, shall be performed outside of normal working and/or occupancy hours and shall be scheduled in advance with Owner except where specified otherwise.
 2. At no time shall any construction equipment or material be stored outside the construction enclosure.
 3. Dust tracked outside of the construction area shall be cleaned up immediately. Contractor shall have the necessary work force and equipment (HEPA vacuum, dust and wet mops, brooms, buckets and clean wiping rags) to keep adjacent occupied areas clean at all times.
 4. Hospital Ceiling Access Procedures: Comply with hospital's access and notification policy as specified in this Section and note information on associated fines for lack of compliance.
- I. Power and Lighting: Provide sufficient temporary lighting and power ventilating equipment to ensure proper workmanship and safety within the construction area.
- J. Access Provisions: Provide ramps, stairs, ladders and similar temporary access elements as reasonably required to perform the work and facilitate inspection during installation. Comply with all OSHA health and safety regulations and refer to Section 011419 for access to site.
- K. Where work occurs in occupied areas, the Contractor is responsible for providing access openings through existing plaster, gypsum board walls, and/or acoustical ceilings and for restoring walls and ceilings to original condition after work is complete and for insuring dust control within access areas.
1. Provide temporary plywood panels anchored to existing steel ceiling support grid for support of workers crawling above ceiling. Panel thickness shall suit spans between existing steel supports.
 2. Work conducted outside the construction enclosures shown on drawings, including all work in corridors in occupied areas, shall be performed outside of normal working and/or occupancy hours as described in Section 011419 – Use of the Premises.

- L. Remodeling work in certain rooms which serve other rooms, shall be coordinated with the phasing of the remodeled rooms if required, so that at no time are both rooms simultaneously inoperative. Any downtime necessitated by the remodeling work shall be fully discussed and coordinated with the Owner and/or Owner's Representative in advance of the shutdown.
1. Dust: Generation of significant quantities of airborne dust will not be tolerated. Clean prior to starting work as necessary to minimize existing dust which may become airborne during construction. Provide drop cloths and dust partitions as necessary to contain dust and debris generated by the work.
 2. Demolition material, dust and other debris shall be removed in tightly sealed, covered, rubber tired plastic dump carts. Containers shall be fitted with clean polyethylene covers, completely sealed at perimeter by wire tying or taping. Before leaving area all containers shall be wiped clean to prevent tracking or release of dust/debris. Place carpet or sticky walk-off mats inside barrier entrance, keep them clean or changed daily. Provide debris chutes if required as specified in Section 01 74 20 – Construction Waste Disposal and Recycling.
 3. Hot Processes: Hot processes, particularly welding, brazing and flame cutting which generate significant quantities of smoke, pose a special concern. These processes have the potential of setting off the building fire alarm system which automatically calls the Fire Department as well as disrupts normal hospital operations. Therefore, all work involving hot processes shall be performed while the Owner's system deactivated. Follow all life-safety provisions and shutdown processes including but not limited to fire watch, portable fire control equipment and training.
 4. Portable vinyl tunnel or a polyethylene enclosure shall be used for a single ceiling access. The enclosure opening shall have a 3-foot overlap of plastic to decrease risk of airborne dust migration into hospital-occupied areas.
- M. The portable vinyl tunnel or portable enclosure if specified shall remain in place until the ceiling is secured (all accesses closed). A HEPA vacuum or similar should be used to create negative pressure in the enclosure.
1. If the access is larger than the vinyl tunnel, a portable polyethylene enclosure also enclosing the ladder shall be used. The enclosure opening shall have a 2-foot overlap of plastic to decrease risk of airborne dust migration into hospital-occupied areas.
 2. Polyethylene enclosures/barriers must be adhered to walls and floor with the use of suitable tape. The seam on the ceiling shall be reinforced with a frame and flat head screws. All polyethylene shall be fire retardant type.
 3. If the Contractor must work in a chase or crawl space to access pipes, ducts, or other building infrastructure to investigate a condition, use Additional Procedures (i.e. wear a dust mask, put on disposable white coverall and disposable shoe covers) before going into the access. Afterwards, take off the coverall, and shoe covers carefully, turning the coverall "inside-out", and deposit the mask, coverall, and shoe covers into a plastic trash bag inside the enclosure. This plastic trash bag shall be secured (tied off) and be discarded as directed by Owner and/or Owner's Representative and may not be discarded within any patient care area.
 4. When the Contractor leaves the work site, the access, especially at ceiling, shall either be completely closed or protected by an appropriate barrier.
 5. In patient care areas, the apparatus (tunnel or enclosure) shall be dismantled, and access, (ceiling panels), or remodeling of access completed at the end of each day.
 6. Thorough cleaning of surfaces which are potentially exposed to dust shall be performed prior to leaving the job site. The cleaning can be accomplished by the use of either a HEPA-filtered vacuum cleaner or damp mop.
- N. Comply with applicable requirements specified in the Mechanical and Electrical Divisions.

ENFORCEMENT AND FINES

- A. Process: Failure to maintain containment areas can result in issuance of written warning; if situation is not corrected within eight (8) hours of receipt of warning, Owner will have cause to stop the work as provided in Article 2.3 of the General Conditions.

1. Failure of Contractor to correct deficiencies in containment will result in corrective action taken by the Owner and deducting all associated costs to resolve the matter from the Contractor.
- B. The following will be performed by Owner and/or Owner's Representative:
1. Periodic Rounds - a photograph(s) will be taken to document each violation.
 2. Contractor/Department information will be extracted from the PCRA, ILSM and/or ceiling work tag.
 3. A record of all infection control and/or health and safety violations will be maintained, whether they occurred in occupied or unoccupied areas.

END OF SECTION

SECTION 01 56 20 CONSTRUCTION NOISE CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Methods and procedures to protect building occupants and surrounding area from excessive noise associated with construction work.
- B. Related Sections:
 - 1. Section 01 56 15 – Airborne Contaminants Control: Additional Requirements.

1.2 DEFINITION

- A. A-Weighting: A standard of frequency weighting which is commonly employed to measure the loudness or “noisiness of sounds. A-weighting filters the microphone signal in a manner which correlates better with the sensation of the human ear.
- B. A-Weighting is required by regulation promulgated by the U.S. EPA, and others. A 10 db increase in sound level is perceived by people to be twice as loud. All noise data herein are A-weighted. Usually the unit of A-weighted sound level is written as dBA.

1.3 QUALITY ASSURANCE

- A. References:
 - 1. San Francisco Noise Ordinance which prohibits the operation of equipment that emits noise in excess of 85 dBA when measured at a distance of 100 feet.
- B. Enforcement:
 - 1. Monitor noise levels through measurements to establish levels in excess of 85 dBA at 50 feet, and implementing additional mitigation procedures based on recommendations of acoustical consultant.

1.4 SCHEDULING

- A. Contractor shall schedule construction work generating sever levels of noise in advance, and set times as required and determined acceptable by Owner's designated representative.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 MITIGATION

- A. Contractor shall implement the following construction noise mitigation measures on this project:
 - 1. Equip internal combustion engine-driven construction equipment with good condition best available mufflers. Use quiet electric-powered compressors and generators.
 - 2. Use welded rather than T.C. bolted steel connections when possible to minimize use of impact wrenches.
 - 3. Erect barriers around noise generating operations.
 - 4. Turn off engines and compressors when not in operation; no idling.

5. Limit noise generating construction activities to times between 7:30 AM and 3:30 PM, or as directed by Owner's designated representative.
 6. Blasting is not permitted. Use ball and crane demolition techniques, or deconstruction
 7. Define truck routes to confine noisy trucks to streets that currently have the heaviest traffic. Develop a truck staging area away from acoustically sensitive areas.
 8. Use electric-powered cranes in lieu of diesel-powered cranes when possible.
 9. Use steel structural frames in lieu of concrete structural frames to yield a much shorter assembly time.
 10. Pre-cut metal decks and metal studs off-site to minimize on-site sawing.
 11. For excavations, used drilled pier soldier piles with wood lagging instead of sheet pile driving techniques where possible. Avoid impact pile driving.
 12. Retain an acoustical consultant to provide assistance with developing additional noise attenuation techniques where needed.
 13. Chemically demolish concrete where possible.
 14. Avoid hammer drilling; use coring bits instead. Avoid using powder-actuated fasteners; use concrete screws instead. Avoid sand blasting when possible.
 15. Avoid sheet metal debris chutes; use plastic chutes instead.
- B. Contractor is responsible for site supervision of potential sources of noise (e.g. material delivery, shouting, debris box pick-up and delivery) for all trades. Maintain awareness among trades of noise sensitivity of project.
- C. At any point during noise producing activities, Owner maintains the authority to stop all construction work due to noise violations or general noise concerns.

3.2 FIELD QUALITY CONTROL

- A. Enforcement of Noise Control Policy:
1. Measurements will be taken on an unscheduled basis to document noise levels.
 2. Information will be noted and transmitted to Contractor.
 3. A record of noise violations will be maintained by Contractor.

END OF SECTION

SECTION 01 74 20 CONSTRUCTION WASTE DISPOSAL AND RECYCLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete and Masonry: Clean concrete, brick, rock, and masonry.
 - 2. Metals: Metal scrap including iron, steel copper brass, and aluminum including piping, fasteners, wiring, ductwork and sheet metal goods.
 - 3. Untreated Wood: Unpainted, untreated dimensional lumber, timber beams, engineered wood products, plywood, oriented strand board, Masonite, particleboard, wood shipping pallets, and crates.
 - 4. Gypsum wallboard Scrap: Excess drywall construction materials including cuttings, other scrap, and excess materials.
 - 5. Paper and Cardboard: Discarded office refuse including unwanted files, correspondence, etc. Clean corrugated cardboard used for packaging, etc.
- B. Non-Recyclable Waste: Collect and segregate non-recyclable waste for delivery to a permitted landfill site.
 - 1. Mixed Solid Waste: Solid waste commonly collected as a municipal service, exclusive of waste materials listed above.

1.2 DEFINITIONS

- A. Waste Materials are defined as large and small pieces of listed materials which are excess to contract requirements and generally include materials to be recycled and/or recovered from existing construction and items of trimmings, cuttings and damaged goods resulting from new installations, which cannot be effectively used in the work.
- B. Recycling is defined as the process of collecting and preparing recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials in a manner that precludes further use.
- C. Recovery is defined as any process that reclaims materials, substances, energy, or other products contained within or derived from waste on-site. It includes waste-to-energy, composting, and other processes.

1.3 SUBMITTALS

- A. Construction Waste Management Plan: Before start of construction, Contractor shall submit a construction waste management plan for approval of Owner's designated representative indicating how Contractor proposes to collect, segregate, recycle, and recover construction wastes and debris generated by the Work.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable requirements of the State of Wisconsin and applicable local ordinances and regulations concerning management of construction, demolition, land clearing, inert, and yard trash debris and subsequent modifications and amendments to same.
- B. Disposal sites, Recyclers, and waste materials processors: Use only facilities properly permitted by the State of Wisconsin and by local authorities where applicable.

- C. Pre-Construction Waste Management Conference: Prior to beginning work at the site, schedule a conference to review Construction Waste Management Plan and discuss procedures, schedules and specific requirements for waste materials recycling and disposal. Contractor shall record minutes of the meeting, identify conclusions reached, and matters requiring further attention. Maintain waste management as an agenda item at future construction meetings.
 - 1. Attendees: Contractor and related personnel, Architect, personnel in charge of waste management program, and Owner's designated representative
 - 2. Plan Revision: Contractor shall make revisions to the Construction Waste Management Plan consistent with discussions in the conference.
- D. Implementation: Contractor shall designate and on-site party responsible for instructing workers and implementing the Construction Waste Management Plan. Copies of the plan shall be distributed to each subcontractor and trade on-site. Contractor shall provide on-site instruction on separation, handling, recycling, and recovery methods to be used by all parties.

1.5 STORAGE HANDLING

- A. Site Storage: Remove materials for recycling and recovery from the work location to approved containers or storage areas as required.
- B. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on-site, Contractor shall provide separate collection containers or storage areas for not less than the following materials.
 - 1. Concrete and masonry.
 - 2. Metals
 - 3. Untreated lumber.
 - 4. Gypsum wallboard scrap
 - 5. Paper and cardboard.
- C. Contractor shall change-out loaded containers for empty containers as demand requires.
- D. Handling: Deposit indicated recyclable and recoverable materials in storage areas or containing in a clean (no mud, adhesives, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Transport recyclable and recoverable waste materials from the work area to containers and carefully deposit in the containers without excess noise and interference with other activities, to minimize noise and dust.
 - 1. Do not place recyclable waste materials on the ground adjacent to a container.
- B. Existing Conditions: Contractor shall coordinate these requirements with "Instructions to Bidders" and "Supplementary Conditions".

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 WASTE MANAGEMENT

- A. General: Implement waste management procedures in accordance with approved Construction Waste Management Plan.

- B. Source Separation On- or Off-Site: Either separate, store, protect, and handle at the project site all identified recyclable and recoverable waste products to prevent contamination of materials and maximize recyclability and recoverability of materials. Or, mix all identified recyclable and recoverable waste products for separation off-site.
- C. Contractor shall arrange for regular collection, transport from site, and delivery to respective recycling centers of indicated recyclable waste materials. Maintain records accessible to the Architect for verification of recycling and recovery.
- D. Delivery Receipts: Arrange for timely pickups from the site or deliveries to approved recycling facilities of designated waste materials to keep construction site clear and prevent contamination of materials.

3.2 RECYCLABLE WASTE MATERIALS HANDLING

- A. General: The following supplements handling requirements for various materials identified for classification and recycling listed in Part 1 "Summary" article above.
- B. Concrete and Masonry: Free of metals, woods, and other contaminants. If possible during demolition, crush existing concrete and concrete masonry units on-site into aggregate size. Store crushed materials on-site in clean area to avoid contamination from other materials or building processes. Reuse on-site crushed material for fill, for stabilizing soils, or as base and subbase materials. If crushing on-site is impractical, store material during demolition processes on-site in clean uncontaminated area. Transport concrete and masonry materials to a certified concrete recycler as needed.
- C. Metals: Cut items to lengths and sizes to fit within the container provided when necessary. Where there is sufficient quantity of a specific recyclable waste item (for example; salvaged metal roofing or duct work), Contractor shall make special arrangements for items to be bundled, banded or tied, and stack in designated location for a special pick-up.
- D. Untreated Wood: Salvaged wood materials to be free from metals, concrete, gypsum wallboard, insulation, and other contaminating materials. Stack dimensional lumber into like piles. Reuse lumber on-site as backing, blocking, or other uses where appropriate.
- E. Gypsum Wallboard Scrap: Separate gypsum wallboard from other wastes. Dispose of waste gypsum wallboard off-site at gypsum reclamation or recycling facility.
- F. Paper and Cardboard: Classify and handle waste paper goods as follows:
 - 1. Bond Paper: General office quality paper used for specifications, correspondence, copies, PC laser printers, and Fax machines. Collect in separate container at each workstation and deposit loose in appropriate recycle container as required.
 - 2. Newsprint: Newspapers and tabloid style advertising shall be collected in single location and deposit as required in appropriate containers.
 - 3. Drawings: Setup single location for collection. Roll together to minimize space. Deposit as required in appropriate recycle container.
 - 4. Cardboard and Paperboard Cartons and Boxes: Knock-down, fold flat, and deposit in recycling container.
- G. Contractor is required to coordinate with Owner for all recycled material opportunities to verify if Owner wishes to take ownership of the material in lieu of recycling or salvaging. Owner has the option to accept the material should they choose. If material is determined to be recycled or salvaged or scraped, Contractor shall coordinate it's disposal and removal on behalf of Owner. Should material have a salvage value, Contractor shall pass along all savings and/or money to Owner.

3.3 RECORD KEEPING & SIGNAGE

- A. Contractor shall keep, prepare, and update waste management and recycling logs for the project documenting the following:

1. Number of loads of waste and recycled material
 2. Date, Time, and location of disposal (if existing dumpsters are used)
 3. General description of disposed material
 4. Name of worker who disposed of the material.
 5. % of recycled material(s).
- B. Contractor has the option of relying on an outside service for this record keeping if they so choose.
- C. All dumpsters and recycling bins/containers shall be clearly labeled with appropriate signage.
- D. Application for Progress Payments: The Contractor shall submit with each Application for Progress Payment a Summary of Waste generated by the Project. Failure to submit this information shall render the Application for Payment incomplete and shall delay Progress Payment. The Summary shall be submitted on a form acceptable to the Owner and shall contain the following information:
1. The amount (in tons) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid, transportation costs (if separate) and the total disposal cost. Include manifests, weight tickets, receipt, and invoices.
 2. For each material recycled, reused, or salvaged from the Project, the amount (in tons or cubic yards), the date removed from the jobsite, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling each material. Attach manifests, weight tickets, receipts, and invoices.

END OF SECTION

SECTION 01 77 00 ASSET TAGS

PART 1 GENERAL

1.1 RATIONALE

- A. Asset tags are an essential component of the Owner's Preventative Maintenance (PM) program on this project.
- B. Devices requiring asset tag include all devices/equipment that requires maintenance, service, inspection, and/or exercise on a regularly scheduled basis.
- C. Installation of asset tags during the construction phase of the project by the contractor while they are prior to final installation of devices is most efficient.
- D. Electronic logs (spreadsheets) provided by Commissioning Provider (CxP) and completed by the installing contractor allows for standardized importation into the owner's PM program.

1.2 SCOPE OF WORK

- A. Contractor shall identify each piece of contractor provided relevant equipment. The contractor installing owner supplied devices will assume responsibility for asset tagging those devices specified by the owner (see section 3.1 for examples).
- B. Contractor shall populate provided electronic logs with all required supporting data for all equipment. Typically there are two (2) spreadsheets:
 - 1. Spreadsheet for all identifying information for the device (i.e. description, areas served, model and serial numbers, warranty information, etc.). Initial spreadsheet to be turned over upon start of construction (indicating equipment identifiers only) and final spreadsheet to be turned over upon completion of spreadsheet (all asset tags are in place and spreadsheet is filled in).
 - 2. Spreadsheet for routine (preventative) maintenance information (i.e. service requirements and intervals, etc.). Spreadsheet to be turned over early in construction.
- C. Contractor shall affix an owner provided, barcoded or numbered, self-adhesive, asset tag to each piece of equipment. It is the expectation that all asset tags will stay adhered and visible throughout the usable life of the device.
- D. Contractor shall identify and tag any existing piece of relevant equipment (as outlined in section 3.1) located within the physical confines of the project which will remain and is not already tagged. These additional pieces of equipment shall be included in the contractor's spreadsheets (identified by type and location); however, the contractor is not responsible for providing any other information about the device.
- E. Contractor shall provide a construction drawing identifying the area(s) being renovated to Plant Operations. Plant Operations will generate a list of assets for the area that exist in their Computerized Maintenance Management System for the contractor to identify and report (as described in section 3.4) all existing equipment with tags which will be decommissioned.

1.3 SUBMITTALS

- A. Final and complete electronic log will be submitted to CxP prior to importation into owner's PM program.
- B. While contractor is responsible for making their own backups of electronic log throughout the tagging process, CxP recommends sending progress backups for review of compliance and for redundancy in case of data management mishaps.

1.4 SEQUENCING AND SCHEDULING

- A. Contractor shall coordinate work with CxP and other contractors (as needed) to ensure tagging is completed by date of substantial completion.

PART 2 PRODUCTS

2.1 ASSET TAGS

- A. Owner provided barcoded or numbered, self-adhesive, asset tag for each piece of equipment.
- B. In addition to owner provided asset tags, Contractor shall provide labeling indicating device number / type on ACT grid for all asset tagged equipment and any other equipment, valves, etc. located above ceiling.

2.2 PREVENTATIVE MAINTENANCE (PM) SPREADSHEETS

- A. CxP provided electronic spreadsheets for recording required data for each piece of equipment / system, including all manufacturers' recommendations from the equipment O&M manuals.

PART 3 EXECUTION

3.1 INCLUDED DEVICES

- A. Any contractor provided piece of equipment that requires maintenance/service such as: lubrication, filter changing, aligning would be tagged.
- B. Any item requiring inspection such as: pressure monitors, fire/smoke dampers, fire dampers, fire rated door assemblies, smoke rated door assemblies would be tagged.
- C. Owner provided equipment set in place by the contractor such as: televisions and microwave ovens located in break rooms, Fume Hoods shall be tagged.
- D. In addition, items that would require regular exercise such as: floor main isolation valves for HVAC, Plumbing, and Fire Protection would be tagged.
- E. Examples of items that require tagging are listed in the table below (this list is not all inclusive).

EXAMPLES OF ITEMS TO BE ASSET TAGGED BY CONTRACTORS

| <u>GC/CM</u> | <u>HVAC</u> | <u>Plumbing</u> | <u>Electrical</u> | <u>Fire Protection</u> | <u>Miscellaneous</u> |
|--|---|--|---|-----------------------------------|---|
| Fire rated doors | Humidifiers | Isolation valves | ATS for generator | Isolation valves | Communication |
| Fire extinguishers and cabinets | Filter housings (not inside of AHU or A/C unit) | RPBPs | Generator | RPBPs | Anything related to infection control or life support |
| Smoke doors (installed in any smoke walls) | Negative isolation room controllers on walls (separate - not tied in to other components) | Water heaters/heat exchangers | Switchboards (not individual breakers / components on it) | Kitchen exhaust hood fire systems | Anything to maintain or inspect for code compliance or equipment that depreciates over time |
| Warming Cabinets | Isolation valves | Medical gas panels Medical gas outlets (on booms and in panels) | * Speakers | Fire pump | |
| Televisions | VAV box (includes entire assembly) | Remote monitor panels | UPS systems (not the batteries) | Jockey pump | |

EXAMPLES OF ITEMS TO BE ASSET TAGGED BY CONTRACTORS

| <u>GC/CM</u> | <u>HVAC</u> | <u>Plumbing</u> | <u>Electrical</u> | <u>Fire Protection</u> | <u>Miscellaneous</u> |
|--|----------------------------------|----------------------------------|---------------------------------------|------------------------|----------------------|
| Refrigerators (all) | Heat Exchangers | Water filters | * Strobes | Test and drain valves | |
| Fume hoods | Pumps | Plaster grease trap | FA panel | Dry pipe valves | |
| Beds | Chemical feeders | Pumps | Batteries | Air compressors | |
| Gurnees | Air handling units | Eye wash stations | Battery Back-up Emergency lighting | Tamper switches | |
| Ice machines | Exhaust fans | Grease traps | * Exit signs | | |
| Commercial grade food service equipment | Unit heaters | Plaster traps | Exit lights | | |
| Freezers | Heat pumps | Compressors | * Smoke detectors | | |
| Pneumatic tube system blowers, diverters, stations | Stairwell pressurization fans | Steam pressure reducing stations | * Duct detectors | | |
| Walk in coolers or freezers | Air conditioning units | Emergency shower | * Pull stations | | |
| Surgical lights | Carbon monoxide detectors | Water softeners | | | |
| Automatic doors | Fan powered VAVs | Vacuum pumps | | | |
| Dock levelers | Airflow monitoring stations | Refrigerated drinking fountains | | | |
| Roll down fire doors | Furnaces | | | | |
| Stairwell doors | Fan coil units | | | | |
| WON doors | Smoke dampers | | | | |
| Overbed tables | Fire dampers | | | | |
| | Combination fire / smoke dampers | | | | |
| | Air curtains | | | | |

* Indicates alternate tagging system (spreadsheet and tags provided by Froedtert Fire Alarm representative).

3.2 EXCLUDED DEVICES

- A. Owner provided furniture is an example of an item contractors do not have to tag (will be done by owner).
- B. Bio-Medical items such as infusion devices, Bio Safety Cabinets, do not have to be tagged by the contractors (will be done by owner).
- C. Owner provided equipment set in place by the owner does not have to be tagged by the contractor (will be done by owner).
- D. Examples of items that do not require tagging are listed in the table below (this list is not all inclusive).

EXAMPLES OF ITEMS NOT TO BE ASSET TAGGED BY CONTRACTORS

| <u>GC/CM</u> | <u>HVAC</u> | <u>Plumbing</u> | <u>Electrical</u> |
|------------------|---|-------------------|-------------------------|
| Infusion devices | HW valve for VAV box (part of assembly) | Plumbing fixtures | VFDs (part of assembly) |

EXAMPLES OF ITEMS NOT TO BE ASSET TAGGED BY CONTRACTORS

| GC/CM | HVAC | Plumbing | Electrical |
|---------------------|--------------------------------|-----------------|-----------------------------|
| Bio safety cabinets | Thermostats (part of assembly) | | Starters (part of assembly) |
| Telephones | | | Occupancy sensors |
| Furniture | | | Lights |
| Water coolers | | | |
| Coffee makers | | | |
| Toasters | | | |
| Scales | | | |
| Clocks | | | |
| Glove box holders | | | |
| Mask dispensers | | | |
| Sharps containers | | | |
| Flow meters | | | |
| Carts | | | |
| Suction regulators | | | |
| SPHYGMOMANOMETER | | | |
| Garbage cans | | | |
| Microwave ovens | | | |

3.3 INSTALLATION

- A. Asset tags shall be obtained either directly from the owner or through Construction Manager (CM) and/or CxP.
- B. Asset tags shall be placed in a logical and visible location on the device, mounted to a permanent part of the device. Do not adhere label to a removable service panel.
- C. If device will be located in an area seen by the general public, label should be discretely placed.
- D. Proper preparation of surfaces to ensure proper adhesion is required.
- E. Asset tags must be protected from over spray if they are attached before finish and/or insulation is applied.

3.4 DECOMMISSIONING OF TAGS FOR REMOVED ASSETS

- A. A list identifying number and equipment type for assets which are being removed from service shall be supplied to Plant Operations for removal from the Computerized Maintenance Management System.

END OF SECTION

FROEDTERT OPERATIONS NEW SPACE REVIEW REPORT

| | | | | |
|--------------------------------------|-----------------------|-----------------|--------------------------------|---------------------------------|
| Area/Department Checked | | | | |
| Date | | | | |
| Completed By | | | | |
| | | | | |
| Area Aspect | Pass/ Fail | Comments | Facilities Approval | Contractor Completed |
| Plumbing | | | | |
| HVAC | | | | |
| Medical Gas | | | | |
| Electrical | | | | |
| Fire Protection | | | | |
| Room Ceiling | | | | |
| Room Walls | | | | |
| Room Floors | | | | |
| | | | | |
| OTHER OBSERVATIONS: | | | | |
| | | | | |
| Operations Management Approval | | | | |
| Date | | | | |

PROJECT CLOSEOUT DOCUMENTATION DELIVERY SCHEDULE

[illegible]

New Asset Information Form RE: Froedtert Front End Document 017800 Section 1.40

| AssetNumber | Description | ManufacturerName | ModelNumber | Serial# | Building Name | Floor Level | Room# | Locations Served | Warranty StartDate | Warranty End Date | Warranty Company | Contact Person | Phone# |
|-------------------------------|-------------------|------------------|-------------|-------------------|---------------|-------------|-----------|------------------|--------------------|-------------------|--------------------|----------------|----------------|
| <u>EXAMPLE:</u> 3000-17760 | Exhaust Fan EF1-1 | Barry Blower | 222 ESI CW | 12-02-406779-10-1 | EACC | 1ST-EACC | 1921-EACC | | 11/14/2014 | 11/14/2015 | Contractor Name | Name | (414) 342-3829 |

EXAMPLES OF ITEMS TO BE ASSET TAGGED BY CONTRACTORS

| GC/CM | HVAC | Plumbing | Electrical | Fire Protection | Miscellaneous |
|--|---|--|---|-----------------------------------|---|
| Fire rated doors | Humidifiers | Isolation valves | ATS for generator | Isolation valves | Communication |
| Fire extinguishers and cabinets | Filter housings (not inside of AHU or A/C unit) | RPBPs | Generator | RPBPs | Anything related to infection control or life support |
| Smoke doors (installed in any smoke walls) | Negative isolation room controllers on walls (separate - not tied in to other components) | Water heaters/heat exchangers | Switchboards (not individual breakers / components on it) | Kitchen exhaust hood fire systems | Anything to maintain or inspect for code compliance or equipment that depreciates over time |
| Warming Cabinets | Isolation valves | Medical gas panels Medical gas outlets (on booms and in panels) | * Speakers | Fire pump | |
| Televisions | VAV box (includes entire assembly) | Remote monitor panels | UPS systems (not the batteries) | Jockey pump | |
| Refrigerators (all) | Heat Exchangers | Water filters | * Strobes | Test and drain valves | |
| Fume hoods | Pumps | Plaster grease trap | FA panel | Dry pipe valves | |
| Beds | Chemical feeders | Pumps | Batteries | Air compressors | |
| Gurnees | Air handling units | Eye wash stations | Battery Back-up Emergency lighting | Tamper switches | |
| Ice machines | Exhaust fans | trap Grease traps | * Exit signs | | |
| Commercial grade food service equipment | Unit heaters | Plaster traps | Exit lights | | |
| Freezers | Heat pumps | Compressors | * Smoke detectors | | |
| Pneumatic tube system blowers, diverters, stations | Stairwell pressurization fans | Steam pressure reducing stations | *Duct detectors | | |
| Walk in coolers or freezers | Air conditioning units | Emergency shower | *Pull stations | | |
| Surgical lights | Carbon monoxide detectors | Water softeners | | | |
| Automatic doors | Fan powered VAVs | Vacuum pumps | | | |
| Dock levelers | Airflow monitoring stations | Refrigerated drinking fountains | | | |
| Roll down fire doors | Furnaces | | | | |
| Stairwell doors | Fan coil units | | | | |
| WON doors | Smoke dampers | | | | |
| Overbed tables | Fire dampers | | | | |
| | Combination fire / smoke dampers | | | | |
| | Air curtains | | | | |

. * Indicates alternate tagging system (spreadsheet and tags provided by Froedtert Fire Alarm representative).

EXAMPLES OF ITEMS **NOT** TO BE ASSET TAGGED BY CONTRACTORS

| GC/CM | HVAC | Plumbing | Electrical | Fire Protection | Miscellaneous |
|---------------------|---|-------------------|-----------------------------|-----------------|---------------|
| Infusion devices | HW valve for VAV box (part of assembly) | Plumbing fixtures | VFDs (part of assembly) | | |
| Bio safety cabinets | Thermostats (part of assembly) | | Starters (part of assembly) | | |
| Telephones | | | Occupancy sensors | | |
| Furniture | | | Lights | | |
| Water coolers | | | Pull stations | | |
| coffee makers | | | | | |
| toasters | | | | | |
| scales | | | | | |
| clocks | | | | | |
| glove box holders | | | | | |
| mask dispensers | | | | | |
| sharps containers | | | | | |
| flow meters | | | | | |
| carts | | | | | |
| suction regulators | | | | | |
| SPHYGMOMANOMETER | | | | | |
| garbage cans | | | | | |



WARRANTY STATEMENT

SUBCONTRACTOR:

Contact Name:

Address:

Phone Number:

Fax Number:

PROJECT NAME:

Project Address:

Contractor Project Number:

Contractor Contact:

WARRANTY FOR:

Date of Substantial Completion:

In accordance with the Specification Sections of Division 01, _____
warrants the completed construction at the project referenced above for a period of _____ years commencing
on the date of Substantial Completion.

(Printed Name and Title)

(Signature)

(Date)

SECTION 019119 – BUILDING ENCLOSURE COMMISSIONING

PART 1 - GENERAL

1.1 SCOPE

- A. The purpose of this section is to specify the Divisions 03 thru 10 responsibilities and participation in the enclosure commissioning process.
- B. Commissioning is a comprehensive and systematic process to verify that the building systems perform as designed to meet the Owner's requirements. Commissioning during the construction, acceptance, and warranty phases is intended to achieve the following specific objectives:
 - 1. Verify and document that enclosure components and assemblies are installed per manufacturer's recommendations and to industry accepted minimum standards.
 - 2. Verify and document that assemblies receive complete quality control checkout by installing contractors.
 - 3. Verify and document enclosure system performance.
 - 4. Verify the completeness of operations and maintenance materials.
 - 5. Confirm that the Owner's operating personnel are adequately trained on the operation and maintenance of building enclosure .
- C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
- D. The purpose of this section is to specify the responsibilities and participation in the commissioning process for the following:
 - 1. Division 03 – Concrete
 - 2. Division 04 – Masonry
 - 3. Division 07 – Thermal and Moisture Protection
 - 4. Division 08 – Openings
- E. General Commissioning Requirements responsibilities are located in section 019113

1.2 REFERENCE

- A. Applicable provisions of Division 1 govern work under this section.
- B. Specific performance requirements are given in the following sections of these specifications:
 - 1. Division 01 Section "Project Management and Coordination"
 - 2. Division 01 Section "Submittal Procedures"
 - 3. Division 01 Section "Sustainability Certification Project Requirements"
 - 4. Division 01 Section "Quality Requirements"
 - 5. Division 01 Section "Mockups"
 - 6. Division 01 Section "Closeout Procedures"
 - 7. Division 01 Section "Closeout Submittals"
 - 8. Division 01 Section "Demonstration and Training"
 - 9. Division 01 Section "Facility Shell Performance Requirements"
 - 10. Division 03 Section "Common Work Results for Concrete"
 - 11. Division 03 Section "Insulating Concrete Forming"
 - 12. Division 03 Section "Waterstops"
 - 13. Division 04 Section "Common Work Results for Masonry"
 - 14. Division 04 Section "Masonry Anchorage and Reinforcing"
 - 15. Division 07 Section "Common Work Results for Thermal and Moisture Protection"
 - 16. Division 07 Section "Dampproofing and Waterproofing"
 - 17. Division 07 Section "Thermal Protection"
 - 18. Division 07 Section "Weather Barriers"

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- 19. Division 07 Section "Roofing and Siding Panels"
 - 20. Division 07 Section "Membrane Roofing"
 - 21. Division 07 Section "Flashing and Sheetmetal"
 - 22. Division 07 Section "Roof and Wall Specialties and Accessories"
 - 23. Division 07 Section "Joint Protection"
 - 24. Division 08 Section "Common Work Results for Openings"
 - 25. Division 08 Section "Entrances, Storefronts, and Curtain Walls"
 - 26. Division 08 Section "Windows"
 - 27. Division 08 Section "Roof Windows and Skylights"
 - 28. Division 08 Section "Glazing"
 - 29. Division 08 Section "Louvers and Vents"
 - 30. Division 10 Section "Exterior Specialties"
- C. Sustainable Design Intent: Comply with project requirements to meet the applicable commissioning prerequisites and credits pursued for the LEED Green Building Rating System, of the US Green Building Council.

1.3 DEFINITIONS

- A. Commissioning (Cx): The process of ensuring that systems are designed, installed, functionally tested and performing in conformity with Owners Project Requirements (OPR) the design intent (Basis of Design BoD)) and that the building operator has received complete equipment and systems documentation and training.
- B. Building Enclosure Commissioning Provider (BECxP): The entity identified to lead, monitor, coordinate and report on project commissioning activities.
- C. Commissioning Plan: A detailed plan of the organization, schedule, allocation of resources, procedures and documentation requirements of the commissioning process.
- D. Construction Verification (CV): A quality control verification process performed by the installer as building assemblies, components, equipment and systems are being installed which documents that the materials, installation procedures, interfaces with other trades, start-up, testing and operation are correct, complete and in compliance with contract documents and manufacturer's recommendations and are ready for functional performance testing.
- E. Functional Performance Tests (FPT): Contractor testing of installed building assemblies, components, equipment, systems and interfaces which confirms correct performance through all operating modes and compliance with contract documents and manufacturer's recommendations.
- F. Commissioning Report: A document that records the activities and results of the commissioning process.

1.4 COORDINATION

- A. Building Enclosure Commissioning Team: The members of the commissioning team consist of the Building Enclosure Commissioning Provider (BECxP), the Owner's Project Manager (OPM), the Construction Manager or General Contractor (CM or GC), the design Architect and Engineers (A/E), the Masonry contractor, the Window contractor, the Waterproofing contractor, the Roofing contractor, and any other installing subcontractors or suppliers of materials.
- B. Management: The general contractor that is awarded the project shall not include the cost of the Commissioning Provider in their price. The general contractor (and their sub-contractors) shall include cost for their involvement in the commissioning process as described in this section and other related commissioning sections, including completion of construction verification checklists, demonstration of installed equipment to the commissioning team members during the functional performance testing portion of the project.
- C. Scheduling: The CM/GC shall integrate all commissioning activities into the master construction schedule. A timeline determined by the commissioning agent will be dedicated for system commissioning. The MEP Contractors shall coordinate their commissioning schedule needs

with CM prior to the start of construction to ensure inclusion into the overall construction schedule. The CxP will work with the OPM and CM/GC to schedule commissioning activities. All parties will address scheduling issues in a timely manner in order to expedite the commissioning process.

- D. Tracking Contractor Required Testing: Each contractor is responsible for completing various tests per their associated specifications. Each contractor will forward a list of their associated tests to the CxP, who will generate an overall list for tracking purposes.

1.5 COMMISSIONING PROCESS

- A. The following activities describe the commissioning tasks and the general order in which they occur. The CxP coordinates all activities.
 - 1. Scoping Meeting: All members of the design and construction team that will be involved in the commissioning process meet and agree on the scope of work, tasks, schedules, deliverables, and responsibilities for implementation of the Commissioning Plan.
 - 2. Commissioning Plan: The Commissioning Plan developed by the CxP provides guidance in the execution of the commissioning process. The Specifications take precedence over the Commissioning Plan.
 - 3. Submittals: Contractor submittals, including detailed start-up procedures, applicable to systems being commissioned is submitted to the CxP to be reviewed concurrent with the A/E's review. The CxP will review contractor submittals for compliance with OPR and BoD.
 - 4. Site Visits: Commissioning is a team effort requiring the cooperation of all parties. Contractors are to proactively carry out their commissioning responsibilities and are to assist the CxP during site visits in performing commissioning tasks. This includes providing access to and demonstrating the installation, operation and testing of commissioned systems; responding to CxP requests for information; carrying out proactive and corrective actions; and accurate reporting on system status and conditions.
 - 5. Start-Up/Construction Verification Checklists: The CxP works with the Subcontractors to develop startup plans and documentation formats, including providing the Subcontractors with construction verification checklists to be completed prior to the acceptance testing process.
 - 6. Functional Performance Testing: The CxP develops specific equipment and system functional performance test procedures. The Subcontractors review the procedures. The procedures are executed by the Subcontractors, under the direction of, and documented by the CxP.
 - 7. Deficiencies and Resolution: The CxP documents items of non-compliance in materials, installation or operation in an Issues Log. The items are corrected at the Sub's expense and the equipment or systems are retested. Each contractor is responsible for completing action items in a timely manner that are noted in the Issues Log as their responsibility. Timely response and successful completion are a requirement to avoid withholding of payment. The CM/GC will be responsible for any cost associated with the CxP for retesting.
 - 8. Operations and Maintenance Documentation: The CxP reviews the Operation and Maintenance documentation provided by the Subcontractors for completeness.
 - 9. Training: The CxP reviews the training provided by the Subcontractors and verifies that it is completed.
 - 10. Seasonal Testing: Deferred or seasonal testing is conducted, as required.
 - 11. Warranty Review: The CxP will review status of warranty and building performance issues with the OPM, A/E, CM/GC roughly 10 months after occupancy.

1.6 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process are provided in this section. Note that the services for the Owner's Project Manager, Design Team, and Commissioning Provider are not included in this contract. The Contractor is not responsible for providing their services. Their responsibilities are listed here to clarify the commissioning process.

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- B. Commissioning Provider (CxP): The CxP is not responsible for design concept, design criteria, code compliance, general construction scheduling, cost estimating, or construction management. The CxP may assist with problem-solving deficiencies, but ultimately that responsibility resides with the General Contractor and the A/E. The primary role of the CxP is to develop and coordinate the execution of a testing plan to verify and document that systems are functioning in accordance with the design intent and the Construction Documents.
1. Construction and Acceptance Phase:
 - a. Coordinates and directs all commissioning activities. Work with the CM/GC and OPM to confirm that commissioning activities are scheduled.
 - b. Maintain an up-to-date Commissioning Plan.
 - c. Plan and conduct the commissioning scoping meeting.
 - d. Request and review additional information required to perform commissioning tasks, including Operation and Maintenance materials, contractor start-up and checkout procedures, and sequences of operation.
 - e. Review Contractor submittals applicable to commissioned systems.
 - f. Assist Subcontractors with the development of start-up and checkout plans.
 - g. Write and distribute construction verification checklists to be completed by the responsible Subcontractor.
 - h. Perform site visits, as necessary, to observe component and system installations. Attend construction job-site meetings, as necessary, to monitor construction and commissioning progress.
 - i. Review completed construction verification checklist and start-up reports.
 - j. Assist with coordination of start-up requirements with TAB requirements.
 - k. Write functional performance test procedures for equipment and systems.
 - l. Coordinate, witness, and document functional performance tests completed by installing contractors. Coordinate retesting as necessary until satisfactory performance is verified.
 - m. Maintain a master deficiency and resolution record. Provide the OPM with written progress reports and test results with recommended actions.
 - n. Review the training proposed by the contractors for the Owner's operating personnel.
 - o. Review the Operation and Maintenance manuals.
 - p. Prepare a final commissioning report.
 2. Warranty Period:
 - a. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
 - b. Assist in the development of a preventative maintenance plan and review as-built documentation.
- C. Design Team (A/E):
1. Construction and Acceptance Phase:
 - a. Attend commissioning scoping meeting and additional meetings, as necessary.
 - b. Provide design intent and sequence of operation documentation as required by the BECxP.
 - c. Assist in resolution of system deficiencies identified during commissioning.
 - d. Review and approve the operations and maintenance manuals.
 2. Warranty Period:
 - a. Assist in resolution of system deficiencies identified during warranty period commissioning.
 - b. Attend the end-of-warranty review walkthrough to assist in identifying issues requiring resolution and the action plan to do so.

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- D. Owner's Project Manager (OPM):
 - 1. Construction and Acceptance Phase:
 - a. Manage the contract of the BECxP.
 - b. Attend commissioning scoping meeting and additional meetings, as necessary.
 - c. Arrange for facility operating and maintenance personnel to participate in commissioning activities and training sessions.
 - d. Provide final approval for the completion of the commissioning work.
 - 2. Warranty Period:
 - a. Ensure that any seasonal or deferred testing and any deficiency issues are addressed.
 - b. Attend the end-of-warranty review.
- E. General Contractor or Construction Manager (CM or GC):
 - 1. Construction and Acceptance Phase:
 - a. Facilitate the coordination of the commissioning work by the BECxP.
 - b. Attend commissioning scoping meeting and additional meetings, as necessary.
 - c. Furnish copies of construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the BECxP.
 - d. Confirm that Subcontractors execute their quality assurance and commissioning responsibilities according to the Specifications and Commissioning Plan.
 - e. Ensure BECxP access to observe and witness equipment system installation and operation.
 - f. Coordinate the training of Owner personnel, according to the Specifications.
 - g. Prepare Operation and Maintenance manuals, according to the Specifications, including updating original sequences of operation to as-built conditions.
 - h. Attend regularly scheduled commissioning meetings.
 - 2. Warranty Period:
 - a. Confirm that Subcontractors execute required seasonal or deferred functional performance testing.
 - b. Confirm that Subcontractors correct deficiencies and make necessary adjustments to Operation and Maintenance manuals and as-built drawings for issues identified during the warranty period.
 - c. Attend the end-of-warranty review.
- F. Material Suppliers:
 - 1. Provide requested submittal data, including detailed installation and maintenance procedures and specific responsibilities of the Owner to keep warranties in effect.
 - 2. Provide information requested by BECxP regarding material and testing procedures.
 - 3. Assist in equipment testing and training per agreements with Subcontractors.
- G. Building Envelope Contractors – Window, Waterproofing, Sealants
 - 1. Attend commissioning kick-off meeting and additional meetings, as necessary.
 - 2. Provide additional requested documentation, prior to normal O&M manual submittals, to CxA.
 - 3. Develop a quality control checkout documentation plan for all windows and submit to CxA as completed.
 - 4. Provide suitable access to the enclosure testing firm for selected areas including mobilized lift, scaffolding, power and water.
 - 5. Resolve deficiencies identified during AAMA and ASTM testing and retest as required to verify modified performance.
 - 6. Prepare O&M manuals according to the Specifications, including updating original sequences of operation to as-built conditions.

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7. Provide training of the Owner's operating personnel as specified.
8. Coordinate with material manufacturers to determine requirements to maintain the validity of warranties.
9. Refer to applicable quality assurance and commissioning sections as noted in Section 1.2 for additional responsibilities.

1.7 COMMISSIONING SCOPE

- A. The following checked equipment shall be commissioned for this project.
- B. Reference Division 01 Section "Facility Shell Performance Requirements"

| Building Area / Component | |
|------------------------------|--|
| | |
| Below Grade Foundation Walls | |
| Slab on Grade | |
| Masonry Walls | |
| Wall Assemblies | |
| Windows | |
| Storefronts | |
| Curtain Walls | |
| Louvers | |
| Doors | |
| Air Vapor Barrier | |
| Insulation Thermal Barrier | |
| Roof Systems | |
| Joint Sealants | |
| Expansion Joints | |
| Whole Building | |

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MEETINGS

- A. Pre-Construction Scoping Meeting: The BECxP will schedule, plan and conduct a pre-construction scoping meeting with the entire commissioning team in attendance. The CM/GC will ensure all relevant Subcontractors attend. The BECxP will present an overview of the project's commissioning process and the commissioning team members will be identified and their responsibilities reviewed.
- B. Miscellaneous Meetings: Other meetings will be planned and conducted by the BECxP as construction progresses. Each contractor is required to attend all meetings related to commissioning (pre-construction, construction progress, commissioning meetings, etc.) and to have personnel requested by BECxP in attendance to facilitate quality control and coordinate commissioning efforts. Contractors are to provide a review of project progress, a report on the status of issues, commissioning tasks and scheduling for future commissioning tasks.
- C. Warranty Review Meeting: Within 10 months of substantial completion and prior to completion of the warranty period, BECxP will coordinate and facilitate a review meeting. The intent of the meeting will be to review the project design, construction, turnover, operation and warranty issues. Contractor is required to have key project personnel in attendance and participating in the review for the purposes of making future project delivery improvements.
- D. The BECxP will distribute meeting minutes to all parties.

3.2 REPORTING

- A. The CM/GC shall include the BECxP on all OAC construction meeting minutes distribution.
- B. The CM/GC shall include the BECxP on all Requests For Information (RFI) and Change Order Requests (COR) related to commissioned equipment and systems.
- C. The BECxP will regularly communicate with all members of the commissioning team, apprising them of commissioning progress and scheduling changes through memos, progress reports, etc.
- D. The CM/GC will respond to the BECxP's deficiency record with resolution updates
- E. The CM/GC will provide documentation as required for the BECxP to compile a final Commissioning Report which summarizes all of the tasks, findings, and documentation of the commissioning process. The report addresses the actual performance of the building systems in reference to the design intent and contract documents. The report includes a summary of commissioning activities, contact and warranty information, completed construction verification checklists, functional performance testing records, diagnostic monitoring results, identified deficiencies, recommendations for warranty review meeting and ongoing commissioning effort.

3.3 SUBMITTALS

- A. Refer to Division 01 General Requirements and Section "Submittals" and relevant Division sections for requirements.
- B. The CM/GC shall provide the BECxP submittals related to the commissioned equipment to review for conformance to the Construction Documents as it relates to the commissioning process. The review is intended primarily to aid in the development of functional performance test procedures.
- C. The CM/GC shall respond to request for additional information from the BECxP as needed to facilitate the commissioning process.
- D. The BECxP may request additional design and operations narrative from the design team and Controls Contractor regarding sequences of operations.

3.4 CONSTRUCTION VERIFICATION CHECKLISTS

The following procedures apply to all equipment to be commissioned, according to Section 1.7, Commissioning Scope.

- A. Construction Verification Checklists:
 - 1. The construction verification checklists are a formalized means to provide individual workers the criteria for a successful installation, adherence to the construction documents and to easily track construction progress.
 - 2. Each assembly, component, equipment, system and interface to be commissioned shall be verified by the installer at the site while work is underway and documented on the construction verification checklists. The contractor is responsible for successfully completing installations, documenting this on the construction verification checklist forms and correcting all deficiencies.
 - 3. Construction verification checklists are developed by the BECxP for all major equipment and systems being commissioned. The checklist documents all equipment components are installed and functional and confirms the as-built status of the equipment or system. These checklists also assist in confirming that the systems are complete and operational, so that the functional performance testing can be scheduled.
 - 4. Construction verification checklists will be electronic and available via a web-based program. It is the contractor's responsibility to have an electronic means of entering this data from on site.
 - 5. Construction verification checklists shall be filled out and signed by the installing subcontractor for each piece of equipment. Only individuals who have completed or witnessed the line item task shall complete and sign the checklists

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6. Contractor shall periodically review the construction verification checklist schedule with the CxP allowing advance notice of activities of 5 business days so that the BECxP may witness as deemed necessary.
 7. Calibration of all sensors shall be included as part of the construction verification checklists performed by the Contractors
- B. Deficiencies, Non-Conformance, and Approval in Checklists and Startup:
1. The Subcontractors shall clearly list any items of the start-up and construction verification procedures not successfully completed at the bottom of the form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the BECxP within two days of test completion.
 2. The BECxP will verify the accuracy of the completed start-up forms and construction checklists compared with actual field installation and recommends approval to the OPM.
 3. If BECxP identifies more than a 10% discrepancy rate during confirmation of construction verification checklists, the contractor shall correct all deficiencies and revalidate all items covered by that checklist and resubmit new checklists
 4. **The cost of reconfirmation of construction verification checklists due to equipment or construction deficiencies is the responsibility of the contractor and subject to deductive change order at owner's/construction manager's discretion. Correction of deficiencies and revalidation are the responsibility of the contractor and are not subject to time extensions or delay claims.**

3.5 FUNCTIONAL PERFORMANCE TESTING

- A. Functional performance testing for each system in the commissioning scope shall be executed by the sub-contractor responsible for the startup and operational checkout of the system.
- B. The following procedures apply to all equipment to be commissioned, according to Section 1.7, Commissioning Scope. This sub-section applies to all commissioning functional performance testing for all divisions.
- C. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Construction Documents. Functional performance testing comprises a full range of tests to verify that all components, equipment, systems, and interfaces between systems operate correctly. This includes all operating modes, interlocks, control sequences, and responses to emergency conditions. All verification procedures are directed, witnessed, and documented by the CxP.
- D. Development of Test Procedures: The BECxP develops specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Prior to execution, the CxP provides the test procedures to the Sub(s) who review the tests for feasibility, safety, equipment and warranty protection. The BECxP may submit the tests to the A/E team for review.
- E. Test Methods:
1. Setup: Each test procedure is performed under conditions that simulate normal operating conditions as closely as possible. The Sub executing the test provides all necessary system modifications to produce the specified conditions (flows, pressures, temperatures, etc) necessary to execute the test. At completion of the test, the Sub returns all affected building equipment and systems to their pre-test conditions.
 2. Sampling: The BECxP shall establish sampling protocol with approval of the OPM, and at the time of testing select sample test locations for identical components. Where simulation of conditions or altering of setpoints or values is required to achieve an operating or failure mode for testing, the contractor must receive BECxP approval. If, after three attempts at testing the specified sample percentage, failures are still present, then all remaining units are tested at the contractors' expense.
 3. Locations: Performance testing locations to be determined by A/E and BECxP.
- F. Coordination and Scheduling: Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.

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- G. Contractor shall coordinate functional performance testing with BECxP, the construction manager, and the owner and notify them 5 business days prior to testing so that they may witness and document the test results. All contractors involved with specific assemblies, components, equipment, systems and interfaces shall have qualified installers and technicians present at the same time working together to perform testing and demonstrate correct performance through all operating and failure modes and compliance with contract documents and manufacturer's recommendations.
- H. With Owner and CM oversight, the BECxP is responsible for witnessing functional performance testing and recording the results and deficiencies. The following sequential priorities are followed:
 - 1. Equipment is not "temporarily" started (for heating or cooling), until pre-start checklist items and all manufacturers' pre-start procedures are completed and moisture, dust and other environmental and building integrity issues have been addressed.
 - 2. Functional performance testing does not begin until construction verification, start-up, controls verification of installation (all sequences and points), and TAB is completed for a given system.
 - 3. The controls system and equipment it controls are not functionally tested until all points have been calibrated and construction verification checklists are completed.
- I. Contractors are responsible for completing and coordinating their work with all trades prior to testing, preplanning testing procedures, insuring necessary staff and resources are on hand and expediting testing.
- J. Problem Solving: The BECxP may recommend solutions to deficiencies identified during functional testing. However, the burden of responsibility to solve, correct and retest deficiencies is with the CM/GC, Subcontractors and A/E.

3.6 ADHESION TESTS:

- A. Arrange for field tests to take place with joint-sealant and adhered membrane manufacture's technical representative present. Field test sealant joints and self-adhering membranes for adhesion to substrates as follows:
- B. Test each type of sealant/membrane in each installation at every substrate indicated.
- C. Perform sealant tests in compliance with ASTM C1521 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints, Method A, ASTM C1193 X1-Method A, Guide for Use of Joint Sealants: Field-Applied Sealant Joint Hand Pull Tab, ASTM C794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants, and ASTM D4541 Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.
- D. For joints between dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
- E. For sealants that fail adhesively, retest until satisfactory adhesion is obtained. Do not use sealants that fail to adhere to joint substrates during testing.

3.7 FENESTRATION FIELD WATER TESTS:

- A. Test installed fenestration systems according to AAMA 501.2 "Field Check of Metal Storefronts, Curtain Walls and Sloped Glazing Systems For Water Leakage," and ASTM E-1105: Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Differential
- B. Complete testing prior to installation of interior insulation and gypsum board.
- C. Contractor to provide powered scaffold, hose, water supply, communication system and manpower to perform tests.

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- D. Contractor will work with the Test Engineer and CxA to determine necessity for additional test methods and for field chamber tests based upon evaluation of initial test results. The BECxP will interpret marginal results and adjust the test procedures as appropriate.
- E. Contractor to perform out-of-sequence work as required facilitating system tests.

3.8 FENESTRATION FIELD AIR AND WATER LEAKAGE TESTS:

- A. Test installed fenestration systems and interfaces with adjacent substrates according to ASTM E-783: Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors and ASTM E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
- B. Complete testing prior to installation of interior insulation, gypsum wall board and interior finishes or systems that may impede the completion of the tests.
- C. Test specimen to include the perimeter material substrate and the perimeter seals.
- D. Contractor to provide powered scaffold, hose, water supply, communication and manpower to perform tests.
- E. Contractor will work with the Test Engineer and BECxP to determine necessity for additional test methods and for field chamber tests based upon evaluation of initial test results. The CxP will interpret marginal results and re-write the test procedures as appropriate.
- F. Contractor to perform out-of-sequence work as required facilitating system tests. Contractor to install all air seals / dams concealed within the mullions to facilitate air tests at curtain wall assemblies.

3.9 AIR BARRIER FIELD AIR LEAKAGE TESTS:

- A. Test installed air barrier systems and interfaces with adjacent substrates according to ASTM E1186 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems and ASTM E-783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
- B. Complete testing prior to installation of interior insulation, gypsum wall board and interior finishes.
- C. Test specimen to include the perimeter material substrate and the perimeter seals.
- D. Provide powered scaffold, water, electric supply, communication and manpower to perform tests.
- E. Contractor will work with the Test Engineer and CxA to determine necessity for revised test methods and for field chamber tests based upon evaluation of initial test results. The BECxP will interpret marginal results and adjust the test procedures as appropriate.
- F. Contractor to perform out-of-sequence work as required facilitating system tests.

3.10 ROOF AND WATERPROOFING FIELD WATER AND AIR LEAKAGE TESTS:

- A. Test installed roofing systems and interfaces with adjacent substrates using high- or low-voltage electronic leak detection and ASTM C1153 Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging and Capacitance.
- B. Test installed roofing systems and interfaces with adjacent substrates according to ASTM E1186 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
- C. Test installed horizontal waterproofing systems and interfaces with adjacent substrates according to ASTM D5957 Guide for Floor Testing Horizontal Waterproofing Installations.

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- D. Complete testing prior to installation of interior insulation, gypsum wall board and interior ceiling finishes.
- E. Contractor will work with the Test Engineer and BECxP to determine necessity for revised or supplemental test methods. The BECxP will interpret marginal results and adjust the test procedures as appropriate.

3.11 CONCRETE MOISTURE TESTS:

- A. Test installed concrete that will serve as a substrate to coating systems, roofing materials, and associated flashings for moisture according to ASTM D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

3.12 Test requirements listed below apply as appropriate to the materials, components, and systems specified in each Technical Sections (Divisions 03-10).

- A. Number of test locations to be 5% of the total area of system but no less than 1.

| Test Description | Location / Component | Testing Standard | Criteria | Schedule / Number of Tests |
|----------------------------------|---|-------------------------|---|--|
| Field Air Leakage Testing | Aluminum Storefront | ASTM E783 | <0.09 cfm/sq.ft at 6.24 lbf/sq.ft. min-mum | Mock-Up and 90% completion. |
| | Curtain Wall | ASTM E783 | <0.09 cfm/sq.ft at 6.24 lbf/sq.ft. minimum | Mock-Up and 90% completion. |
| | Punch Window | ASTM E783 | <0.09 cfm/sq.ft at 6.24 lbf/sq.ft. minimum | Mock-Up and 90% completion. |
| | Air Barrier Transitions to adjacent systems, field of AB Penetrations | ASTM E783 | 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft | 10%, 20% and 50% completion / 3 tests |
| | Curtain Wall and window perimeter sealant tests | ASTM E1186 | No sign of visible leakage Sealant continuity using smoke test | 90% completion |
| | Air Barrier Transitions to adjacent systems, field of AB Penetrations | ASTM E1186 | No sign of visible leakage | Mock-up and 50% completion. |
| | Canopy and miscellaneous soffits | ASTM E1186 | No sign of visible leakage | 100% prior to cladding, including cladding attachments location) |
| | Vertical and | ASTM E1186 | | Completion of |

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| | | | | |
|------------------------------------|---|------------|--|---|
| | horizontal expansion joints, at each transitions / changes in plane in EJ cover | | | system |
| Field Water Leakage Testing | Curtain Wall (min chamber size to be determined) | ASTM E1105 | No water leaks at 2/3 specified design pressure or 20% of wind load) | Mock-Up and 90% completion. |
| | Curtain Wall and AB interface (min chamber size to be determined) | ASTM E1105 | No water leaks at 2/3 specified design pressure or 20% of wind load) | Mock-Up and 90% completion. |
| | Punch Window | ASTM E1105 | No water leaks | Mock-Up and 90% completion. |
| | Windows | ASTM E1105 | No water leaks at 2/3 specified design pressure or 20% of wind load) | Mock-Up and 90% completion. |
| | Air Barrier with Metal Panel Attachments in place (minimum area to be determined) | ASTM E1105 | No water leaks at zero pressure differential / 30 minute duration | 10% and 50% completion / 2 locations each – 4 total |
| | Louver – Perimeter of Louver and AB interface | AAMA 501.2 | No water leaks | 90% completion / 2 locations |
| | Storefront (minimum chamber size to be determined) | ASTM E1105 | No water leaks at 2/3 specified design pressure or 20% of wind load) | Mock-Up and 90% completion. |
| | Expansion Joints | AAMA 501.2 | No water leaks | 100% completion / 3 locations |
| | Roofing Membrane – Transition to Adjacent System | ASTM E1105 | No water leaks | 10 locations throughout construction |
| Adhesion Testing | Air Barrier to transition membrane to fenestration adhesion | ASTM C1521 | Manufacturer's Product Data | 10 locations throughout construction |
| | Joint sealants to | ASTM C1193 | Manufacturer's | 10 locations |

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| | | | | |
|---|---|-------------------------|--|--------------------------------------|
| | substrate | | Product Data | throughout construction |
| | Joint sealants to substrate | ASTM C794 | Manufacturer's Product Data | 10 locations throughout construction |
| | Coatings | ASTM D4541 | Manufacturer's Product Data | 10 locations throughout construction |
| Thermography Imaging | Roofing Systems | ASTM C1153 | Review with BECx Team | 100% |
| Flood Testing | Roofing Horizontal Waterproofing | ASTM D5957 | No leaks | 100% |
| Whole Building Air Leakage Testing | Whole building | ASTM E1827 or ASTM E729 | 0.25 cfm@75 Pascal for above grade enclosure | Complete construction |
| Concrete Moisture Testing | Concrete surfaces used for substrates for coatings, roofing and associated flashing | ASTM D4263 | Manufacturer's Product Data | Sample per standard |

3.13 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

A. Documentation:

1. The BECxP witnesses and documents the results of all functional performance tests using forms developed for that purpose. Prior to testing, these forms are provided to the OPM for review and approval.

B. Non-Conformance:

1. The BECxP records the results of the functional test on the procedure or test form. All deficiencies identified during the verification testing are documented on a standard Issues Log form and reported to the project manager, contractors, and sub-contractors. The deficiency report includes all details of the components or systems found to be non-compliant with the parameters of the test plans. The report details the adjustments or alterations required to correct system operation and identifies the responsible party.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the BECxP. In such cases the deficiency and resolution will be documented on the procedure form.
3. Deficiencies that cannot be corrected during testing will be documented on the Issues Log and subject to retest. Retesting will continue until no deficiencies remain or by Owner's request.
4. Retesting is required when testing cannot be successfully completed. Deficiencies requiring include:
 - a. Incomplete work and/or coordination with others.
 - b. Inadequate preparation of systems for testing.
 - c. Inadequate preplanning.
 - d. Inadequate staff, equipment, tools or resources for testing.
 - e. Material, equipment or construction deficiencies.
 - f. Incomplete or failed test due to reasons under the Contractor's responsibility.

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5. If there is a dispute about a deficiency or who is responsible:
 - a. The deficiency is documented on the Issues Log and a copy given to the OPM and CM/GC.
 - b. Resolutions are made at the lowest management level possible. Additional parties are brought into the discussions as needed. Final interpretive authority is with the A/E team. Final acceptance authority is with the Project Manager. The BECxP documents the resolution process.
 - c. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency and notifies the CxP that the equipment is ready to be retested.
 - d. The BECxP reschedules the test and the test is repeated until satisfactory performance is achieved.
 - C. Cost of Retesting:
 1. **The cost of retesting is the responsibility of the contractor and subject to deductive change order. Correction of deficiencies and retesting are the responsibility of the contractor and are not subject to time extensions or delay claims.**
 - D. Approval:
 1. The BECxP makes formal approval of the functional performance test after review. The CxP recommends acceptance of each test to the OPM. The OPM gives final approval on each test.
- 3.14 OWNER'S TRAINING
- A. Refer to Division 01 General Requirements and Section "Demonstration and Training" and relevant Division sections for requirements.
 - B. The Contractor is responsible for developing a cohesive training plan for all Divisions and Sections of work where training is specified. See technical sections for specified minimum training hours for each component and system.
 - C. The CM/GC shall provide the BECxP a preliminary training plan and schedule related to the commissioned equipment to review and finalize incorporating comments received. The plan should include agendas including topics and objectives to be covered for each section, the instructor's name and contact information, the anticipated duration and schedule for each session, a formal training record listing of attendees and a training evaluation form. Develop the training schedule including number of hours for each component or system in coordination with the BECxP and CM that complies with the owner's and BECxP's personnel availability.
 - D. The BECxP shall provide each trainee with a Training Evaluation Form and at completion of training collect forms for review. Based on evaluations and OPM training review, contractor shall repeat training sessions which were determined were inadequate or incomplete.
- 3.15 O&M DATA and CLOSEOUT SUBMITTALS
- A. Refer to Division 01 General Requirements and Section "Closeout Submittals" and relevant Division sections for requirements.
 - B. The CM/GC shall provide the BECxP closeout submittals related to the commissioned equipment to review and compile into a Recommissioning Systems Manual as required.
- 3.16 DEFERRED TESTING
- A. Unforeseen Deferred Tests: If any test cannot be completed due to the building structure, required occupancy condition, or other deficiency, the functional testing may be delayed upon approval of the OPM. These tests are conducted in the same manner as the seasonal tests as soon as possible.

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- B. Seasonal Testing: Seasonal variation in operations or control strategies may require additional testing during the opposite season to verify performance of the HVAC system and controls. During the warranty period, seasonal testing and other deferred testing is completed as required to fully test all sequences of operation. The BECxP coordinates these activities. Tests are executed and documented, with deficiencies corrected by the appropriate Subcontractors. Any final adjustments to the Operation and Maintenance manuals and as-builts due to the testing are also completed.

END OF SECTION 019119