



SECTION 01 0000 – Division 01 Table of Contents

01 0100	DIVISION 01 DESIGNER GUIDELINES
01 1000	SUMMARY
01 2300	ALTERNATES
01 2500	SUBSTITUTION PROCEDURES
01 2900	PAYMENT PROCEDURES
01 3100	PROJECT MANAGEMENT AND COORDINATION
01 3200	CONSTRUCTION PROGRESS DOCUMENTATION
01 3300	SUBMITTAL PROCEDURES
01 5000	TEMPORARY FACILITIES AND CONTROLS
01 7700	CLOSEOUT PROCEDURES
01 7823	OPERATION AND MAINTENANCE DATA
01 7839	PROJECT RECORD DOCUMENTS
01 9113	GENERAL COMMISSIONING REQUIREMENTS
01 9119.43	EXTERIOR ENCLOSURE COMMISSIONING



SECTION 01 0100 - Division 01 Designer Guidelines

As part of our sustainability mission, Western Michigan University strives to limit the amount of paper that we use. As such, any documents that are transmitted to WMU personnel shall be done in electronic format as much as possible. This includes shop drawings/submittals, substitution requests, RFIs, and other similar documents. The Design Professional shall incorporate this mission into all specification sections. Any deviations shall be discussed with the WMU Project Manager.

As a general rule, WMU prefers the use of AIA Documents for change management, payment applications, etc. Deviation from this preference requires written permission from the WMU Project Manager.

The Design Professional shall translate the terms of the *General Conditions of Contract for Construction* into project specifications. These guidelines call out several specific instances where coordination is required, but are not inclusive of all requirements.

The Design Professional shall incorporate WMU's *Facility Life Cycle Design Guidelines* into project drawings and specifications. See WMU Design Guidelines General Appendices for link to same.

The Design Professional shall discuss any desired mock-ups with WMU, and whether they shall be reviewed in situ or in a separate setting.



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and Drawing conventions.
14. Miscellaneous provisions.

1.2 PROJECT INFORMATION

A. Project Identification: **<Insert Project identifier such as Project name and number>**.

1. Project Location: **<Insert Project location (street address, city, and state)>**.

B. Owner: **<Insert name and address of Owner>**.

1. Owner's Representative: **<Insert name and contact information for Owner's representative>**.

C. Architect: **<Insert name and contact information for Architect>**.

D. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. **<Insert title of design discipline>**: **<Insert name and contact information for consultant>**.



WMU Design Guidelines

- E. Other Owner Consultants: Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
1. **<Insert title of design discipline>**: **<Insert name and contact information for consultant>**. **<Insert title of design discipline>** has prepared the following portions of the Contract Documents:
 - a. **<Insert description of scope of service for other Owner consultant>**.
- F. Contractor: **<Insert name and contact information for Contractor>** has been engaged as Contractor for this Project.
- G. Construction Manager: **<Insert name and contact information for Construction Manager>**.
1. Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for construction between Owner and **[each]** Contractor, according to a separate contract between Owner and Construction Manager.
 - a. Construction Manager also serves as Project coordinator as defined in Section 01 1200 "Multiple Contract Summary."
 2. Construction Manager for this Project is Project's constructor. The terms "Construction Manager" and "Contractor" are synonymous.
- H. Design-Builder: **<Insert name and contact information for Design-Builder>**.
1. Design-Builder has been engaged for this Project to provide architectural and engineering services and to serve as Project's constructor. The terms "Design-Builder" and "Contractor" are synonymous.
- I. Project Coordinator for Multiple Contracts: **<Insert name and contact information for Project coordinator>** has been engaged by Owner to serve as Project coordinator.
- J. Project Coordinator for Multiple Contracts: Owner shall serve as Project coordinator.
- K. Project Mechanical/Electrical Coordinator for Multiple Contracts:
1. **<Insert name and contact information for mechanical/electrical Project coordinator>** has been engaged by Owner to serve as Project coordinator.
 2. **[HVAC Contractor] [Electrical Contractor] [Plumbing Contractor] [Construction Manager] <Insert entity>** shall act as mechanical/electrical coordinator.
- L. Web-Based Project Software: Project software administered by ~~[Architect]~~**[Owner]** **[Construction Manager] [Contractor]** will be used for purposes of managing communication and documents during the construction stage.

Designer Note: Design Professional should refer to Section 01 3100 for additional requirements for the web-based project software.

1. See Section 01 3100 "Project Management and Coordination." for requirements for **[establishing] [administering] [and]** using web-based Project software.



1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. **<Insert a brief description of Project indicating the size, code classification for occupancy and construction type, and general description of major building assemblies>** and other Work indicated in the Contract Documents.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.
 - 2. Project will be constructed under coordinated, concurrent multiple contracts. See Section 01 1200 "Multiple Contract Summary" for a description of work included under each of the multiple contracts and for the responsibilities of Project coordinator. Contracts for this Project include the following:
 - a. **<Insert name of the Contract>**.

1.4 PHASED CONSTRUCTION

- A. The Work shall be conducted in **<Insert number>** phases, with each phase substantially complete as indicated.
 - 1. Phase **<Insert designation>**: **<Briefly describe work of this phase>** Work of this phase shall commence [**within <Insert number of days> after the Notice to Proceed**] [**by <Insert date>**] and be substantially complete and ready for occupancy [**within <Insert number of days>**] [**after the Notice to Proceed**] [**after commencement of construction of this phase**] [**by <Insert date>**].
 - 2. Phase **<Insert designation>**: The remaining Work shall be substantially complete and ready for occupancy at time of Substantial Completion for the Work.
- B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates, [**and move-out and -in dates of Owner's personnel**] for all phases of the Work.

1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
 - 1. **<Insert a brief description of work performed by Owner>**.
- C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
 - 1. **<Insert a brief description of work performed by Owner>**.



WMU Design Guidelines

- D. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.

- 1. **<Insert a brief description of work performed by Owner>.**

1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

- B. Preceding Work: Owner **[has awarded]** **[will award]** separate contract(s) for the following construction operations at Project site. Those operations are scheduled to be substantially complete before Work under this Contract begins.

- 1. **<Insert name of the Contract>: To <Insert name of separate Contractor> [to] [for] <Insert a brief description of work performed under separate contract>.**

- C. Concurrent Work: Owner **[has awarded]** **[will award]** **[and will assign to Contractor]** separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

- 1. **<Insert name of the Contract>: To <Insert name of separate Contractor> [to] [for] <Insert a brief description of work performed under separate contract>.**

- D. Subsequent Work: Owner **[has awarded]** **[will award]** separate contract(s) for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.

- 1. **<Insert name of the Contract>: To <Insert name of separate Contractor> [to] [for] <Insert a brief description of work performed under separate contract>.**

1.7 FUTURE WORK

- A. The Contract Documents include requirements that will allow Owner to carry out future work following completion of this Project; provide for the following future work:

- 1. **<Insert description of future work requiring consideration during construction of the Work of this Contract>.**

1.8 PURCHASE CONTRACTS

Designer Note: WMU has contracts in place with certain suppliers and may choose to utilize those on projects. Designer to facilitate a discussion with WMU during the design phases of the project to ascertain whether contracts have been/will be negotiated and utilized for the work.

- A. General: Owner has negotiated Purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these Purchase contracts to Contractor.



WMU Design Guidelines

Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum unless otherwise indicated.

1. Contractor's responsibilities are same as if Contractor had negotiated Purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.

B. Purchase Contracts Information:

1. **<Insert product name>**: See Section **<Insert Section number>** "**<Insert Section title>**."
 - a. Purchase Contract Firm and Representative: **<Insert name and contact information for Purchase contract firm and representative>**.
 - b. Purchase Contract Scope: **[Furnishing material] [Material and installation labor] <Insert description of contract>**.
 - c. Purchase Status: **[Price negotiated by Owner, to be incorporated into the Contract Sum by Contractor; see Section 01 2100 "Allowances" for cash allowance for Purchase contract] [Price negotiated and incorporated into the Contract Sum by Contractor] [Product reserved by Owner] [Order placed and deposit paid by Owner] [Order to be placed by Contractor] <Insert description of status of Purchase contract>**.
 - d. Quantity: **<Insert quantity ordered>**.
 - e. Other Requirements: **<Insert special requirements>**.

1.9 OWNER-FURNISHED PRODUCTS

Designer Note: The Design Professional shall facilitate a conversation with WMU regarding Owner-furnished items during the design phases of the project, and will be responsible for coordinating these items with the design documents.

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products **[and making building services connections]**.
- B. Owner-Furnished Products:
 1. **<Insert description, in separate subparagraphs, for each Owner-furnished product>**.

1.10 CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

Designer Note: The Design Professional shall facilitate a conversation with WMU regarding Contractor-furnished, Owner-installed items during the design phases of the project, and will be responsible for coordinating these items with the design documents.

- A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning them over to Owner at Project closeout.
- B. Contractor-Furnished, Owner-Installed Products:



WMU Design Guidelines

1. <Insert description, in separate subparagraphs, for each Contractor-furnished, Owner-installed product>.

1.11 ACCESS TO SITE

Designer Note: The Design Professional shall facilitate a discussion with the University during the design phases of the project regarding the specifics of site access and use. Discussion will include parking, site logistics, temporary signage, pedestrian access, utility impacts, existing building use, safety measures, etc.

- A. General: **[Each]** Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. General: **[Each]** Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- C. Use of Site: Limit use of Project site to **[Work in areas] [areas within the Contract limits]** indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits: Confine construction operations to **<Insert description of areas where work is permitted>**.

Designer Note: For projects seeking LEED certification, include sustainable design submittals as required.

2. <Double click to insert sustainable design text for site disturbance.>
3. Driveways, Walkways and Entrances: Keep driveways, **[parking garage,] [loading areas,]** and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- E. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.12 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and **[existing] [adjacent]** building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.



WMU Design Guidelines

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Notify Owner not less than [72] <Insert number> hours in advance of activities that will affect Owner's operations.
- B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 2. Provide not less than [72] <Insert number> hours' notice to Owner of activities that will affect Owner's operations.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.13 WORK RESTRICTIONS

Designer Note: The Design Professional shall engage the University in a conversation around work restrictions during the design phases of the project, which are influenced by the academic calendar, building use, etc.

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of <Insert time> a.m. to <Insert time> p.m., Monday through Friday, unless otherwise indicated.
1. Weekend Hours: <Insert restrictions on times permitted for weekend work>.
 2. Early Morning Hours: <Insert restrictions or references to regulations by authorities having jurisdiction for restrictions on noisy work>.
 3. Hours for Utility Shutdowns: <Insert Owner's restrictions>.
 4. Hours for [Core Drilling] <Insert noisy activity>: <Insert Owner's restrictions>.



WMU Design Guidelines

- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify **[Architect]** **[Construction Manager]** **[Owner]** not less than **[two]** **<Insert number>** days in advance of proposed utility interruptions.
 - 2. Obtain **[Architect's]** **[Construction Manager's]** **[Owner's]** written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify **[Architect]** **[Construction Manager]** **[Owner]** not less than **[two]** **<Insert number>** days in advance of proposed disruptive operations.
 - 2. Obtain **[Architect's]** **[Construction Manager's]** **[Owner's]** written permission before proceeding with disruptive operations.
- E. <Double click to insert sustainable design text for nonsmoking buildings.>
- F. Restricted Substances: Use of tobacco products and other controlled substances ~~[within the existing building]~~ ~~[on Project site]~~ on WMU's campus is not permitted. See WMU's Tobacco Free Policy here: <https://wmich.edu/tobaccofree>.
- G. Employee Identification: **[Provide]** **[Owner will provide]** identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

Designer Note: Coordinate requirements of employee screening with the *General Conditions of Contract for Construction – Construction Manager*, Section 10.15 Drug Testing and *General Conditions of Contract for Construction – General Contractor*, Section 10.16 Drug Testing.

- H. Employee Screening: Comply with Owner's requirements for **[drug]** **[and]** **[background]** screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.
- I. Employee Dress Code: Workers on the job site may not wear clothing that promotes non-WMU universities and colleges.

1.14 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.



- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations [**published as part of the U.S. National CAD Standard**] [**and**] [**scheduled on Drawings**].
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.15 MISCELLANEOUS PROVISIONS

- A. **<Insert miscellaneous provisions>**.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000



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SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.



WMU Design Guidelines

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Warranty Period.

1. Alternate: For those Project items requiring a two-year warranty, provide a one-year warranty instead.

B. Alternate No. <Insert number>: <Insert title of alternate>.

1. Base Bid: <Insert brief description of base-bid requirement> [as indicated on Drawing <Insert title of Drawing>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]]
2. Alternate: <Insert brief description of alternate requirement> [as indicated on Drawing <Insert title of Drawing>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]]

END OF SECTION 01 2300



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SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit ~~three copies~~ **one copy** of each request for consideration **in PDF electronic format**. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific



WMU Design Guidelines

- d. features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - e. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - f. Samples, where applicable or requested.
 - g. Certificates and qualification data, where applicable or requested.
 - h. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - i. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - j. Research reports evidencing compliance with building code in effect for Project, from **[ICC-ES] <Insert applicable code organization>**.
 - k. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - l. Cost information, including a proposal of change, if any, in the Contract Sum.
 - m. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - n. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **[seven] <Insert number>** days of receipt of a request for substitution. Architect will notify Contractor **[through Construction Manager]** of acceptance or rejection of proposed substitution within **[15] <Insert number>** days of receipt of request, or **[seven] <Insert number>** days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
- 1.4 QUALITY ASSURANCE
- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.
- 1.5 PROCEDURES
- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.



1.6 SUBSTITUTIONS

Designer Note: WMU prefers that all substitutions occur during the bidding period and for cause. Substitutions for convenience requested after the bids are submitted require written permission from the WMU Project Manager. Substitutions as part of the submittal process will not be allowed.

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than [15] <Insert number> days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

Designer Note: For projects seeking LEED certification, include sustainable design submittals as required.

- b. <Double click to insert sustainable design text for requested substitution.>
- c. Substitution request is fully documented and properly submitted.
- d. Requested substitution will not adversely affect Contractor's construction schedule.
- e. Requested substitution has received necessary approvals of authorities having jurisdiction.
- f. Requested substitution is compatible with other portions of the Work.
- g. Requested substitution has been coordinated with other portions of the Work.
- h. Requested substitution provides specified warranty.
- i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

~~B. Substitutions for Convenience: Not allowed [unless otherwise indicated].~~

~~C. Substitutions for Convenience: Architect will consider requests for substitution if received within [60] <Insert number> days after [commencement of the Work] [the Notice to Proceed] [the Notice of Award]. Requests received after that time may be considered or rejected at discretion of Architect.~~

1. Conditions: Architect will consider Contractor's request for substitution **during the bidding period if all of** the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

Designer Note: For projects seeking LEED certification, include sustainable design submittals as required.



WMU Design Guidelines

- d. <Double click to insert sustainable design text for requested substitution.>
- e. Substitution request is fully documented and properly submitted.
- f. Requested substitution will not adversely affect Contractor's construction schedule.
- g. Requested substitution has received necessary approvals of authorities having jurisdiction.
- h. Requested substitution is compatible with other portions of the Work.
- i. Requested substitution has been coordinated with other portions of the Work.
- j. Requested substitution provides specified warranty.
- k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500



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SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. **[Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.]**
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.

Designer Note: Coordinate submittal of schedule of values with *General Conditions of Contract for Construction*, Section 8.00. As of the date of the publication of these guidelines, the schedule of values must be submitted within 15 calendar days after the date of commencement of Work given in the Notice to Proceed.

- 2. Submit the schedule of values to Architect **[through Construction Manager]** at earliest possible date, but no later than **[seven]** <Insert number> days before the date scheduled for submittal of initial Applications for Payment.
- 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
- 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 01 1000 "Summary."



WMU Design Guidelines

- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's Project number.
 - d. [WMU Project number](#).
 - e. Contractor's name and address.
 - f. Date of submittal.
 2. Arrange schedule of values consistent with format of [AIA Document G703 \[EJCDC Document C-620\]](#) ~~<Insert name and designation of standard form>~~.
 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of **[five]** ~~<Insert number>~~ percent of the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 7. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
 8. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
 9. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.



WMU Design Guidelines

10. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling **[five]** <Insert number> percent of the Contract Sum and subcontract amount.
11. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect **[and Construction Manager]** and paid for by Owner.

Designer Note: Coordinate Payment Application times with *General Conditions of Contract for Construction*, Section 8.00. As of the date of publication of these guidelines, payment requests shall be submitted on the 20th of the month. WMU prefers that the period covered be one month, ending on the same date each month.

- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the <Insert day> of the month. The period covered by each Application for Payment is one month, ending on the **[last day of the month]** <Insert specific day of the month>.
 1. Submit draft copy of Application for Payment **[seven]** <Insert number> days prior to due date for review by Architect.
- D. Application for Payment Forms: Use [AIA Document G702](#) and [AIA Document G703](#) [~~AIA Document G732 and AIA Document G703~~] [~~EJCDC Document C-620~~] <Insert name and designation of standard form> as form for Applications for Payment.
 1. Other Application for Payment forms proposed by the Contractor shall be acceptable to **[Architect]** **[Construction Manager]** and Owner. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. **[Architect]** **[Construction Manager]** will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.



WMU Design Guidelines

- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.

Designer Note: Refer to *General Conditions of Contract for Construction*, Section 8.01.2, for additional requirements around payment for off-site materials. As of the date of publication of these guidelines, WMU requires that payment requests be accompanied by paid invoices or bills of sale.

2. Provide supporting documentation that verifies amount requested, such as paid invoices or bills of sale. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit ~~three~~ ~~<insert number>~~ one signed and notarized original ~~copies~~ copy of each Application for Payment to **[Architect] [Construction Manager]** in PDF electronic format ~~by a method ensuring receipt [within 24 hours]~~. ~~One copy shall~~ Include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from **[entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment]** **[subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application]**.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).



6. Sustainable design action plans, including preliminary project materials cost data.
 7. Schedule of unit prices.
 8. Submittal schedule (preliminary if not final).
 9. List of Contractor's staff assignments.
 10. List of Contractor's principal consultants.
 11. Copies of building permits.
 12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 13. Initial progress report.
 14. Report of preconstruction conference.
 15. Certificates of insurance and insurance policies.
 16. Performance and payment bonds.
 17. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements as outlined in Section 01 7700 CLOSEOUT PROCEDURES.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706.
 5. AIA Document G706A.
 6. AIA Document G707.
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.
 10. Issuance of Final Payment shall be conditional on certification of Substantial Completion, certification of Punchlist completion and written acceptance of closeout documents by the Design Professional and the University.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2900



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.2 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, **[Construction Manager]**, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. **Subcontract List:** Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. **Key Personnel Names:** Within **[15] <Insert number>** days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses,



WMU Design Guidelines

and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, [**in web-based Project software directory**] and in prominent location in [**each**] built facility. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall [**cooperate with Project coordinator who shall**] coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities [**and scheduled activities of other contractors**] [**and direction of Project coordinator**] to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.



7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

Designer Note: Refer to the latest version of WMU's *BIM Project Execution and Standards Guide* for additional requirements for coordination drawings.

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings [**by multiple contractors**] in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling, [**raised access floor,**] and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.



WMU Design Guidelines

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 3300 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Preparation Format: **[DWG] [DXF] [DGN]**, Version **<Insert designation>**, operating in **[Microsoft Windows] [Apple Macintosh]** operating system.
 3. File Submittal Format: Submit or post coordination drawing files using **[format same as file preparation format] [PDF format]**.
 4. BIM File Incorporation: **[Develop and incorporate] [Construction Manager will incorporate Contractor's]** coordination drawing files into BIM established for Project.
 - a. **[Perform] [Construction Manager will perform]** three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
 5. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.



- a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
- b. Digital Data Software Program: Drawings are available in **<Insert name and version of digital data software program and operating system>**.
- c. Contractor shall execute a data licensing agreement in the form of **[AIA Document C106] [Agreement included in this Project Manual] [Agreement form acceptable to Owner and Architect]**.

1.6 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect **[and Construction Manager]**.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: **[AIA Document G716] [Form bound in Project Manual] [Software-generated form with substantially the same content as indicated above, acceptable to Architect]**.
 1. **RFIs shall be submitted in PDF electronic format.**

Designer Note: Coordinate timetable in 1.6.D with the *Agreement for Construction Management Services / Agreement for Construction General Contracting*, Paragraph 3.04.2.9.

- D. Architect's **[and Construction Manager's]** Action: Architect **[and Construction Manager]** will review each RFI, determine action required, and respond. Allow **[seven]** **<Insert number>** working days for Architect's response for each RFI. RFIs received by Architect **[or**



WMU Design Guidelines

Construction Manager] after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect [**or Construction Manager]** of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect[**and Construction Manager]** in writing within [**10**] ~~<Insert number>~~ days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. ~~Submit log [weekly] <Insert time>.~~ Use software log that is part of web-based Project software. Include the following: ~~[Software log with not less than the following:]~~
1. Project name.
 2. WMU project number.
 3. Name and address of Contractor.
 4. Name and address of Architect [**and Construction Manager]**.
 5. RFI number including RFIs that were returned without action or withdrawn.
 6. RFI description.
 7. Date the RFI was submitted.
 8. Date Architect's [**and Construction Manager's]** response was received.
 9. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 10. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
 11. RFIs shall be named according to WMU's naming convention. See link under 'Facility Records' heading at bottom of this webpage: <http://www.fm.wmich.edu/intranet/forms> for requirements.
 12. A final RFI log and all RFIs shall be submitted to WMU as individual electronic PDFs as part of the closeout process.
- F. On receipt of Architect's [**and Construction Manager's]** action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect [**and Construction Manager]** within [**seven**] ~~<Insert number>~~ days if Contractor disagrees with response.



1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

~~A. Architect's Data Files Not Available: Architect will not provide Architect's [BIM model] [CAD drawing] digital data files for Contractor's use during construction.~~

Designer Note: Refer to WMU's *BIM Project Execution and Standards Guide* for requirements around use of Architect's digital data files in order to edit paragraph 1.7.B.

B. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model and CAD drawings will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project ~~refer~~ As-built Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in **<Insert name and version of digital drawing software program and operating system>**.
4. Contractor shall execute a data licensing agreement in the form of **[AIA Document C106 Digital Data Licensing Agreement] [Agreement included in Project Manual] [Agreement form acceptable to Owner and Architect]**.
 - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of **[AIA Document C106] [Agreement included in this Project Manual] [Agreement acceptable to Owner and Architect]**.
5. **<Insert additional conditions on which digital data drawing files will be made available>**.
6. The following digital data files will be furnished for each appropriate discipline:
 - a. Floor plans.
 - b. Reflected ceiling plans.
 - c. **<Insert name of digital data file>**.

C. Web-Based Project Software: Provide, administer, and use ~~[Use Architect's] [Use Owner's] [Use Construction Manager's]~~ web-based Project software site for purposes of hosting and managing Project communication and documentation ~~until Final Completion~~.

1. Web-based Project software site includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.



WMU Design Guidelines

- g. Processing and tracking of payment applications.
- h. Processing and tracking of contract modifications.
- i. Creating and distributing meeting minutes.
- j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
- k. Management of construction progress photographs.
- l. Mobile device compatibility, including smartphones and tablets.
- m. **<Insert description of software feature>**.

Designer Note: It is WMU's expectation that all core team members and other WMU personnel (as designated) shall have access to the web-based platform. The Contractor will be required to provide training for the various individuals at the start of the construction period.

- 2. Provide up to **[seven]** **<Insert number>** web-based Project software user licenses for use of Owner, **[Owner's Commissioning Authority]** [, **Construction Manager]**, Architect, and Architect's consultants. Provide **[eight]** **<Insert number>** hours of software training at Architect's office for web-based Project software users.
 - 3. ~~At Substantial Completion of Project,~~ provide digital archive in format that is readable by common desktop software applications in format acceptable to **Owner and Architect**. Provide data in locked format to prevent further changes.
 - a. Project web platform to remain active throughout the warranty period.
 - 4. Provide **[one of]** the following web-based Project software packages under their current published licensing agreements:
 - a. Autodesk; ~~Buzzsaw~~ **[Constructware]** **[BIM 360]**.
 - b. Corecon Technologies, Inc.
 - c. Meridian Systems; Prolog.
 - d. Newforma, Inc.
 - e. Procore Technologies, Inc.
 - f. Viewpoint, Inc.; Viewpoint for Project Collaboration.
 - g. **<Insert name of hosting company and product>**.
- D. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
- 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Name file according to WMU's naming convention. See link under 'Facility Records' heading at bottom of this webpage: <http://www.fm.wmich.edu/intranet/forms> for requirements.
 - 4. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

- A. General: **[Schedule and conduct]** **[Construction Manager will schedule and conduct]** meetings and conferences at Project site unless otherwise indicated.



WMU Design Guidelines

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, [**Construction Manager,**] and Architect, within [**three**] <Insert number> days of the meeting.
- B. Preconstruction Conference: [**Architect will schedule and conduct**] [**Construction Manager will schedule and conduct**] [**Schedule and conduct**] a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than [**15**] <Insert number> days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, [**Owner's Commissioning Authority,**] [**Construction Manager,**] Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises [**and existing building**].
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.



WMU Design Guidelines

Designer Note: For projects seeking LEED certification, include a sustainable design coordination conference as required.

- C. Sustainable Design Requirements Coordination Conference: **[Owner will schedule and conduct] [Construction Manager will schedule and conduct]** a sustainable design coordination conference before starting construction, at a time convenient to Owner, **[Construction Manager,]** Architect, and Contractor.
1. Attendees: Authorized representatives of Owner, **[Owner's Commissioning Authority,]** **[Construction Manager,]** Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect meeting sustainable design requirements, including the following:
 - a. Sustainable design Project checklist.
 - b. General requirements for sustainable design-related procurement and documentation.
 - c. Project closeout requirements and sustainable design certification procedures.
 - d. Role of sustainable design coordinator.
 - e. Construction waste management.
 - f. Construction operations and sustainable design requirements and restrictions.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, **[Construction Manager] [, and Owner's Commissioning Authority]** of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.



- o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

Designer Note: The process of project closeout should be discussed at the start of construction as well as at the end, and should be a standard agenda item for OAC meetings, specifically as it relates to close-out documentation required by the University.

- E. Project Closeout Conference: **[Schedule and conduct] [Construction Manager will schedule and conduct]** a project closeout conference, at a time convenient to Owner and Architect, but no later than **[90] <Insert number>** days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, **[Owner's Commissioning Authority,] [Construction Manager,]** Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record and As-built Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.

Designer Note: For projects seeking LEED certification, include sustainable design documentation as required.

- e. Requirements for completing sustainable design documentation.
- f. Requirements for preparing operations and maintenance data.
- g. Requirements for delivery of material samples, attic stock, and spare parts.
- h. Requirements for demonstration and training.
- i. Preparation of Contractor's punch list.
- j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.



WMU Design Guidelines

- k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: **[Conduct] [Construction Manager will conduct]** progress meetings at **[weekly] [biweekly] [monthly] [regular] <Insert appropriate interval>** intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, **[Owner's Commissioning Authority] [, Construction Manager,]** and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Status of sustainable design documentation.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Access.
 - 9) Site use.
 - 10) Temporary facilities and controls.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of RFIs.
 - 16) Status of Proposal Requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.



WMU Design Guidelines

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

- G. Coordination Meetings: **[Conduct] [Construction Manager will conduct] [Project Coordinator will conduct]** Project coordination meetings at **[weekly] [biweekly] [monthly] [regular] <Insert appropriate interval>** intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 1. Attendees: In addition to representatives of Owner, **[Owner's Commissioning Authority] [, Construction Manager,]** and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Status of RFIs.
 - 15) Proposal Requests.
 - 16) Change Orders.
 - 17) Pending changes.



WMU Design Guidelines

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Startup construction schedule.
 2. Contractor's Construction Schedule.
 3. Construction schedule updating reports.
 4. Daily construction reports.
 5. Material location reports.
 6. Site condition reports.
 7. Unusual event reports.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 2. Predecessor Activity: An activity that precedes another activity in the network.
 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.



WMU Design Guidelines

Designer Note: See *General Conditions of Contract for Construction*, Section 4.09.4 for information on float time. As of the date of the publication of these guidelines, float time shall be as indicated below.

1. Float time ~~[belongs to Owner]~~ is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. ~~[Two] <Insert number> paper copies, of sufficient size to display entire period or schedule, as required.~~

- B. Startup construction schedule.

1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from **[commencement of the Work] [the Notice to Proceed]** until most recent Application for Payment.

- F. Construction Schedule Updating Reports: Submit with Applications for Payment.



- G. Daily Construction Reports: Submit at [**weekly**] [**monthly**] intervals.
- H. Material Location Reports: Submit at [**weekly**] [**monthly**] intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.4 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including [**phasing**] [**work stages**] [**area separations**] [**interim milestones**] [**and**] [**partial Owner occupancy**].
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review submittal requirements and procedures.
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for Project closeout and Owner startup procedures[, **including commissioning activities**].
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review procedures for updating schedule.

1.5 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values,[**list of subcontracts**,] submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.



WMU Design Guidelines

- 1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL
- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
1. Use [**Microsoft Project,**] [**Primavera,**] [**Meridian Prolog,**] [**Scheduling component of Project website software specified in Section 01 3100 "Project Management and Coordination,"**] <Insert name of specific software,> for current [**Windows**] [**Macintosh**] operating system.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for [**commencement of the Work**] [**the Notice of Award**] [**the Notice to Proceed**] to date of [**Substantial Completion**] [**final completion**].
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than [**20**] <Insert number> days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. <Insert list of major items or pieces of equipment>.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 4. Project Closeout Conference(s): Identify target date for conference(s).
 5. Startup and Testing Time: Include no fewer than [**15**] <Insert number> days for startup and testing.
 6. Commissioning Time: Include no fewer than [**15**] <Insert number> days for commissioning.
 7. Close-out Documentation: Include target date for Contractor to submit all close-out documentation.
 8. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's [**and Construction Manager's**] administrative procedures necessary for certification of Substantial Completion.
 9. As-built Drawings: Include target date for Contractor to hand off as-built drawings to the Owner and Architect.



WMU Design Guidelines

10. Punch List and Final Completion: Include not more than [30] <Insert number> days for completion of punch list items and final completion.

Designer Note: See *Agreement for Professional Services* between Architect and Owner for timeline and requirements to submit record documents. As of the date of the publication of these guidelines, record documents must be submitted within 4 weeks of receiving mark-ups from the Contractor.

11. Record Documents: Include target date for Architect to submit record documents to Owner.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 1000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:



WMU Design Guidelines

- a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
9. Other Constraints: **<Insert constraints not indicated elsewhere>**.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion[.], **and the following interim milestones:**
1. Temporary enclosure and space conditioning.
 2. **<Insert milestones not indicated elsewhere>**.
- G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 01 2900 "Payment Procedures" for cost reporting and payment procedures.
- H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- I. Contractor's Construction Schedule Updating: At [**monthly**] **<Insert time>** intervals, update schedule to reflect actual construction progress and activities. Issue schedule [**one week**] **<Insert time>** before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- J. Recovery Schedule: When periodic update indicates the Work is [**14**] **<Insert number>** or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- K. Distribution: Distribute copies of approved schedule to Architect[, **Construction Manager,**] Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.



2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.7 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within **[seven]** <Insert number> days of date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first **[90]** <Insert number> days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within **[30]** <Insert number> days of date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**.
 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in **[10]** <Insert number> percent increments within time bar.

1.9 CPM SCHEDULE REQUIREMENTS

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within **[14]** <Insert number> days of date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**. Outline significant construction activities for the first **[90]** <Insert number> days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a **[cost- and resource-loaded,]** time-scaled CPM network analysis diagram for the Work.
 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than **[60]** <Insert number> days after date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**.



WMU Design Guidelines

- a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Commissioning.
 - k. Punch list and final completion.
 - l. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
 5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, **[sustainable design documentation]**, and demonstration and training (if applicable), in the amount of **[5]** **<Insert number>** percent of the Contract Sum.
 - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.



- b. Total cost assigned to activities shall equal the total Contract Sum.
 - E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
 - F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 - 1. Contractor or subcontractor and the Work or activity.
 - 2. Description of activity.
 - 3. Main events of activity.
 - 4. Immediate preceding and succeeding activities.
 - 5. Early and late start dates.
 - 6. Early and late finish dates.
 - 7. Activity duration in workdays.
 - 8. Total float or slack time.
 - 9. Average size of workforce.
 - 10. Dollar value of activity (coordinated with the schedule of values).
 - G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.
 - H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
 - 1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 - 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 - 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 - 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts [**one week**] <Insert time> before each regularly scheduled progress meeting.
- 1.10 REPORTS
- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:



WMU Design Guidelines

1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Testing and inspection.
 8. Accidents.
 9. Meetings and significant decisions.
 10. Unusual events.
 11. Stoppages, delays, shortages, and losses.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Orders and requests of authorities having jurisdiction.
 15. Change Orders received and implemented.
 16. **[Construction] [Work]** Change Directives received and implemented.
 17. Services connected and disconnected.
 18. Equipment or system tests and startups.
 19. Partial completions and occupancies.
 20. Substantial Completions authorized.
- B. Material Location Reports: At **[weekly]** **[monthly]** intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within **[one]** **<Insert number>** day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.



PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3200



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's **[and Construction Manager's]** responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's **[and Construction Manager's]** responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

Designer Note: The Design Professional shall review time frame for receiving the submittal schedule with the Owner. WMU requires that the schedule include initial submittal date and final due date, and shall identify the party(s) responsible for review. Time for resubmittals shall be built into the process. In addition, all closeout submittals shall be identified.

- A. **Submittal Schedule:** Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect **[and Construction Manager]** and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. WMU will circulate this list to internal constituents (include the Commissioning Authority, if applicable) to identify any additional reviewers that may be required.



WMU Design Standards

3. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
4. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
5. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's **[and Construction Manager's]** final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. WMU project number.
4. Name of Architect.
5. Name of Construction Manager.
6. Name of Contractor.
7. Name of firm or entity that prepared submittal.
8. Names of subcontractor, manufacturer, and supplier.
9. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
10. Category and type of submittal.
11. Submittal purpose and description.
12. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
13. Drawing number and detail references, as appropriate.
14. Indication of full or partial submittal.
15. Location(s) where product is to be installed, as appropriate.
16. Other necessary identification.
17. Remarks.
18. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.



- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect **[and Construction Manager]** on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

~~D. Paper Submittals:~~

- ~~1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.~~
- ~~2. Provide a space approximately [6 by 8 inches] <Insert dimensions> on label or beside title block to record Contractor's review and approval markings and action taken by Architect[and Construction Manager].~~
- ~~3. Action Submittals: Submit [three] <Insert number> paper copies of each submittal unless otherwise indicated. Architect[, through Construction Manager,] will return [two] <Insert number> copies.~~
- ~~4. Informational Submittals: Submit [two] <Insert number> paper copies of each submittal unless otherwise indicated. Architect[and Construction Manager] will not return copies.~~
- ~~5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect[or Construction Manager] observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.~~
- ~~6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using [AIA Document G810] [facsimile of sample form included in Project Manual] transmittal form.~~

- E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1. Submittals shall be named according to WMU's naming convention. See link under 'Facility Records' heading at bottom of this webpage: <http://www.fm.wmich.edu/intranet/forms> for requirements.
2. PDFs shall be OCR compatible.

- F. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect, **[through Construction Manager,]** will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
2. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
3. ~~Paper: Prepare submittals in paper form, and deliver to Architect.~~



WMU Design Standards

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. **[Architect reserves] [Architect and Construction Manager reserve]** the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on **[Architect's] [Construction Manager's]** receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow **[15] <Insert number>** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. **[Architect] [Construction Manager]** will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow **[15] <Insert number>** days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow **[21] <Insert number>** days for initial review of each submittal.
 - a. **<Insert list of Specification Sections requiring sequential review>**.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow **[15] <Insert number>** days for review of each submittal. Submittal will be returned to **[Architect] [Construction Manager, through Architect,]** before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect **[and Construction Manager]**.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's **[and Construction Manager's]** action stamp.



- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's [**and Construction Manager's**] action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. ~~Printed~~ Performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data [**unless submittal based on Architect's digital data drawing files is otherwise permitted**].
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.



WMU Design Standards

2. ~~Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least [8 1/2 by 11 inches, but no larger than 30 by 42 inches] <Insert dimensions>.~~
 - a. ~~[Two] opaque (bond) copies of each submittal. Architect[, through Construction Manager,] will return [one] <Insert number> copy(ies).~~
 - b. ~~[Three] <Insert number> opaque copies of each submittal. Architect[and Construction Manager] will retain [two] <Insert number> copies; remainder will be returned.~~

Designer Note: Refer to the latest version of WMU's *BIM Project Execution and Standards Guide* for requirements around BIM incorporation.

3. BIM Incorporation: **[Develop and incorporate] [Construction Manager will incorporate Contractor's]** Shop Drawing files into BIM established for Project.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
 4. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 5. ~~Paper Transmittal: Include paper transmittal including complete submittal information indicated.~~
 6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 7. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit **[one] <Insert number>** full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected



from manufacturer's product line. Architect, **[through Construction Manager,]** will return submittal with options selected.

8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit **[three]** <Insert number> sets of Samples. Architect **[and Construction Manager]** will retain **[two]** <Insert number> Sample sets; remainder will be returned. **[Mark up and retain one returned Sample set as a project record Sample.]**
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **[three]** <Insert number> sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.



WMU Design Standards

3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.7 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.



WMU Design Standards

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit **[digitally signed PDF file]** ~~[and] [three]~~ ~~<Insert number>~~ ~~paper copies of certificate~~, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

Designer Note: Refer to the latest version of WMU's *BIM Project Execution and Standards Guide* for requirements around BIM incorporation.

- C. BIM Incorporation: **[Incorporate]** **[Construction Manager will incorporate]** delegated-design drawing and data files into BIM established for Project.
1. Prepare delegated-design drawings in the following format: **[Same digital data software program, version, and operating system as original Drawings]** ~~<Insert software name and version>~~.

1.8 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect [
- B. **and Construction Manager]**.
- C. Contractor's Approval: Indicate Contractor's approval for each submittal with **[a uniform approval stamp]** **[indication in web-based Project software]**. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
1. Architect **[and Construction Manager]** will not review submittals received from Contractor that do not have Contractor's review and approval.

Designer Note: WMU will also review certain submittals, as outlined in 1.3.A.2 above. Design Professional shall include language in the specification accordingly.

1.9 ARCHITECT'S **[AND CONSTRUCTION MANAGER'S]** REVIEW

- A. Action Submittals: Architect **[and Construction Manager]** will review each submittal, indicate corrections or revisions required, **[and return it]**.
1. PDF Submittals: Architect **[and Construction Manager]** will indicate, via markup on each submittal, the appropriate action[.], **as follows:**
 - a. ~~<Insert description of each action indicated on Architect's (and Construction Manager's) stamp>~~.
 2. ~~Paper Submittals: Architect [and Construction Manager] will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action[.], as follows:~~



WMU Design Standards

- a. ~~<Insert description of each action indicated on Architect's (and Construction Manager's) stamp>.~~
- 3. Submittals by Web-Based Project Software: Architect **[and Construction Manager]** will indicate, on Project software website, the appropriate action.
 - a. Actions taken by indication on Project software website have the following meanings:
 - 1) **<Insert description of each action indicated on Architect's (and Construction Manager's) stamp>.**
 - B. Informational Submittals: Architect **[and Construction Manager]** will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect **[and Construction Manager]** will forward each submittal to appropriate party.
 - C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect **[and Construction Manager]**.
 - D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
 - E. Architect **[and Construction Manager]** will **[return without review]** **[discard]** submittals received from sources other than Contractor.
 - F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3300



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

Designer Note: Design Professional is to meet with WMU during the design phases of the project to discuss the requirements of this section.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

Designer Note: WMU may want to track certain utilities using separate metering. To be discussed during the design phases of the project.

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, **Owner's construction forces,** Architect, **occupants of Project,** testing agencies, and authorities having jurisdiction.
- B. Sewer Service: **[Pay] [Owner will pay]** sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: **[Pay] [Owner will pay]** water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: **[Pay] [Owner will pay]** electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- G. Sewer, Water, and Electric Power Service: Use charges are specified in Section 01 1200 "Multiple Contract Summary."



WMU Design Standards

1.3 INFORMATIONAL SUBMITTALS

Designer Note: The Design Professional shall review the site utilization plan with WMU (and the Construction Manager) during the design stages of the project. Provisions shall be made for pedestrian routes, parking lot revisions, temporary directional signage and other items that will affect the immediate area as well as the larger campus context.

- A. **Site Utilization Plan:** Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. **Implementation and Termination Schedule:** Within [15] <Insert number> days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. **Project Identification and Temporary Signs:** Show fabrication and installation details, including plans, elevations, details, layouts, timesteps, graphic elements, and message content.
- D. <Double click to insert sustainable design text for erosion- and sedimentation-control plan.>
- E. **Fire-Safety Program:** Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- F. **Moisture- and Mold-Protection Plan:** Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
- G. **Dust- and HVAC-Control Plan:** Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.

1.4 QUALITY ASSURANCE

- A. **Electric Service:** Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. **Tests and Inspections:** Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. **Accessible Temporary Egress:** Comply with applicable provisions in [the United States Access Board's ADA-ABA Accessibility Guidelines] [and] [ICC/ANSI A117.1].

1.5 PROJECT CONDITIONS

- A. **Temporary Use of Permanent Facilities:** Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its



use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

Designer Note: As a rule, WMU requires that site fencing enclose the entire construction site, be a minimum of 6'-0" in height, be able to be secured and able to withstand lateral wind loads.

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts [, **with 1-5/8-inch-OD top rails**] [, **with galvanized barbed-wire top strand**].
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide [**concrete**] [**galvanized-steel**] bases for supporting posts.
- C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.
- D. Wood Enclosure Fence: Plywood, [**6 feet**] [**8 feet**] high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.
- E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E84 and passing NFPA 701 Test Method 2.
- F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.
- G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Field Offices, General: Owner will provide conditioned interior space for field offices [**for duration of Project**] [**upon completion of demolition and enclosure**].

Designer Note: Field office should be of sufficient size to accommodate project teams, and furnished appropriately for same. Further, it should have the technology required to support meetings, including conference phones, projection capability, etc.

- C. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, [**Construction Manager**], and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:



WMU Design Standards

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 2. Conference room of sufficient size to accommodate meetings of [10] <Insert number> individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
 3. Drinking water and private toilet.
 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.
- ### 2.3 EQUIPMENT
- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of [8] <Insert number> at each return-air grille in system and remove at end of construction[.][**and clean HVAC system as required in Section 01 7700 "Closeout Procedures."**]
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.



3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 01 1000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to **[municipal system]** **[private system indicated]** as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed **[according to coordination drawings]**.



WMU Design Standards

- a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Install electric power service [**overhead**] [**underground**] unless otherwise indicated.
 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install [**WiFi cell phone access equipment**] [**and**] [**one**] <Insert number> land-based telephone line(s) for each field office.
1. Provide additional telephone lines for the following:
 - a. Provide [**one**] <Insert number> telephone line(s) for Owner's use.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. [**Construction Manager's home office.**]
 - g. Engineers' offices.
 - h. Owner's office.
 - i. Principal subcontractors' field and home offices.

Designer Note: While a desktop computer for the Owner and Architect's use is not required, WMU does expect full connectivity from the field office for the construction team to access e-mail, the web-based document management platform and all other electronic documents as well as to make telephone calls, etc.



- L. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
1. Processor: Intel Core i5 or i7.
 2. Memory: [4] <Insert number> gigabyte.
 3. Disk Storage: [500] <Insert number> gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
 4. Display: 24-inch LCD monitor with 256-Mb dedicated video RAM.
 5. Full-size keyboard and mouse.
 6. Network Connectivity: [10/100BaseT Ethernet] [Gigabit].
 7. Operating System: Microsoft Windows 7 Professional.
 8. Productivity Software:
 - a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
 - b. Adobe Reader 11.0 or higher.
 - c. WinZip 7.0 or higher.
 9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum [1.0] <Insert number> Mbps upload and [15] <Insert number> Mbps download speeds at each computer.
 11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
 12. Backup: External hard drive, minimum [2] <Insert number> terabyte, with automated backup software providing daily backups.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas **[as indicated]** **[within construction limits indicated]** on Drawings.
1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
 2. Keep all roadways outside of construction area clear of tracked soils and mud.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary



WMU Design Standards

roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 2000 "Earth Moving."
 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 1216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Temporary Use of Campus Roads: If, at any time, any campus road or sidewalk outside the construction area will be blocked or otherwise compromised:
1. Develop a traffic plan that is acceptable to Owner for re-routing traffic.
 2. Provide Owner no less than 72 hours' notice.
- F. Parking: **[Provide temporary] [Use designated areas of Owner's existing]** parking areas for construction personnel.
- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touch up signs so they are legible at all times.
 4. **WMU does not allow subcontractors to affix signage to construction fencing.**
- I. Waste Disposal Facilities: Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."
- J. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 7300 "Execution."



- K. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

 - L. Temporary Elevator Use: **[Use of elevators is not permitted.] [See] [Section 14 2100 "Electric Traction Elevators"] [Section 14 2113 "Electric Traction Freight Elevators"] [Section 14 2123.16 "Machine Room-Less Electric Traction Passenger Elevators"] [Section 14 2400 "Hydraulic Elevators"] [Section 14 2413 "Hydraulic Freight Elevators"] [Section 14 2600 "Limited-Use/Limited-Application Elevators"] [for temporary use of new elevators].**

 - M. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
 - 1. Do not load elevators beyond their rated weight capacity.
 - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
 - 3. [Prior to existing elevator use, Owner and Contractor to document current conditions, which shall be used during punchlist walk-throughs to assess any damages. Contractor shall be responsible for the cost of repairing any damage caused by construction activities.](#)

 - N. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

 - O. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

 - P. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
- 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.



WMU Design Standards

- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01 1000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with **[requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and]** requirements specified in Section 31 1000 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to **[erosion- and sedimentation-control Drawings] [requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent]**.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Comply with requirements specified in Section 01 5639 "Temporary Tree and Plant Protection."
- G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- I. Site Enclosure Fence: ~~Before construction operations begin [Prior to commencing earthwork],~~ furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: ~~As required to enclose entire Project site or portion determined sufficient to accommodate construction operations [As indicated on Drawings].~~
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. **[Furnish one set of keys to Owner.]**



WMU Design Standards

- J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- M. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction [**and requirements indicated on Drawings**].
 - 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 2. Paint and maintain appearance of walkway for duration of the Work.
- N. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- O. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by [**Owner**] [**and**] [**tenants**] from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
 - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 4. Insulate partitions to control noise transmission to occupied areas.
 - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 6. Protect air-handling equipment.
 - 7. Provide walk-off mats at each entrance through temporary partition.
- P. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.



WMU Design Standards

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.



2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for [48] <Insert time period> hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for [48] <Insert time period> hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within [48] <Insert time period> hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 7700 - CLOSEOUT PROCEDURES

Designer Note: The Design Professional shall translate the terms of the *Agreement for Construction Management Services* or the *Agreement for Construction General Contracting*, including the *General Conditions of Contract for Construction* into this section.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items (Punchlist): Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.



WMU Design Guidelines

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
 - 1. Include Owner's Commissioning Authority's deficiency report with Contractor's list of incomplete items.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of [10] <Insert number> days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project as-built record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

Designer Note: The Design Professional shall facilitate a conversation with WMU during the design phases of the project regarding where attic stock shall be delivered and stored. The outcome shall be noted in 1.5.B.4.

- 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by [Architect] [Construction Manager]. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain [Architect's] [Construction Manager's] [Owner's] signature for receipt of submittals.

- 5. Submit testing, adjusting, and balancing records.

Designer Note: For projects seeking LEED certification, include sustainable design submittals as required.

- 6. Submit sustainable design submittals not previously submitted.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
-
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of [10] <Insert number> days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.



5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
 11. [Submit final RFI log and RFIs in individual PDF format as outlined in Section 01 3100 "Project Management and Coordination".](#)
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of [10] **<Insert number>** days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect **[and Construction Manager]** will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.
- E. [Maintenance Activities: Contractor to keep a log of any maintenance activities that occur between Substantial Completion and Final Completion to WMU's Facilities Management Department. This will be submitted as part of the final close-out documents.](#)

1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
 2. [Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected \(punch list\), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.](#)
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
 5. Submit final completion photographic documentation.
 6. [Submit maintenance log referenced in 1.5.E above.](#)
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect **[and Construction Manager]** will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment



WMU Design Guidelines

after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

Designer Note: Design Professional to include a general item on the punchlist referencing the requirement for Contractor to submit all closeout documentation.

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, **[starting with exterior areas first] [and] [proceeding from lowest floor to highest floor]**.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect **[and Construction Manager]**.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect, **[through Construction Manager,]** will return annotated file.
 - b. PDF electronic file. Architect, **[through Construction Manager,]** will return annotated file.
 - c. Web-based project software upload. Utilize software feature for creating and updating list of incomplete items (punch list).
 - d. ~~[Three] <Insert number> paper copies. Architect [, through Construction Manager,] will return [two] <Insert number> copies.~~

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
1. ~~Warranties shall include both a start date and an end date for warranty items.~~
- B. Partial Occupancy: Submit properly executed warranties within **[15] <Insert number>** days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.



WMU Design Guidelines

- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit **[on digital media acceptable to Architect] [by uploading to web-based project software site] [by email to Architect]**.

~~E. Warranties in Paper Form:~~

- ~~1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 1/2 by 11 inch paper.~~
- ~~2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.~~
- ~~3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.~~

- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:



WMU Design Guidelines

- a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, **[elevator equipment,]** and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with **[NADCA ACR.] [Section 23 0130.52 "Existing HVAC Air-Distribution System Cleaning.]"** Provide written report on completion of cleaning.
 - p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 5000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in **[Section 01 5000 "Temporary Facilities and Controls.]" [Section 01 7419 "Construction Waste Management and Disposal.]"**
- ### 3.2 REPAIR OF THE WORK
- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.



- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect, **Owner [and Commissioning Authority]** will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
 - 3. Operation and maintenance manuals shall be named according to WMU's naming convention. See link under 'Facility Records' heading at bottom of this webpage: <http://www.fm.wmich.edu/intranet/forms> for requirements.
 - 4. Refer to the latest version of WMU's *BIM Project Execution and Standards Guide* for requirements for linking O & M manuals to the BIM model.



WMU Design Guidelines

- B. Format: Submit operation and maintenance manuals in the following format:
1. Submit **[on digital media acceptable to Architect] [by uploading to web-based project software site] [by email to Architect]**. Enable reviewer comments on draft submittals.
 2. ~~Submit [three] <Insert number> paper copies. Architect[, through Construction Manager,] will return [two] <Insert number> copies.~~

Designer Note: WMU will also want to review and comment on the initial manual submittals.

- C. Initial Manual Submittal: Submit draft copy of each manual at least **[30] <Insert number>** days before commencing demonstration and training. Architect **[and Commissioning Authority]** will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **[15] <Insert number>** days before commencing demonstration and training. Architect **[and Commissioning Authority]** will return copy with comments.
1. Correct or revise each manual to comply with Architect's **[and Commissioning Authority's]** comments. Submit copies of each corrected manual within **[15] <Insert number>** days of receipt of Architect's **[and Commissioning Authority's]** comments and prior to commencing demonstration and training.
- E. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - a. Where scanning is required, final PDF to be OCR compatible.
 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- ~~B. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.~~
1. ~~Binders: Heavy duty, three ring, vinyl covered, [loose leaf] [post type] binders, in thickness necessary to accommodate contents, sized to hold 8 1/2 by 11 inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.~~



- a. ~~If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.~~
 - b. ~~Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, [and] subject matter of contents, and indicate Specification Section number on bottom of spine]. Indicate volume number for multiple volume sets.~~
2. ~~Dividers: Heavy paper dividers with plastic covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross referenced to Specification Section number and title of Project Manual.~~
 3. ~~Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.~~
 4. ~~Supplementary Text: Prepared on 8 1/2 by 11 inch white bond paper.~~
 5. ~~Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.~~
 - a. ~~If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.~~
 - b. ~~If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.~~

1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 - a. Include contact information for Owner's Project Manager.
 4. WMU Project number.
 5. Date of submittal.
 6. Name and contact information for Contractor.
 7. Name and contact information for Construction Manager.
 8. Name and contact information for Architect.
 9. Name and contact information for Commissioning Authority.
 10. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.



WMU Design Guidelines

11. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
 - D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."
- 1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL
- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 1.7 EMERGENCY MANUALS
- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
 - B. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
 - C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.



4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

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

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

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

1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. **Systems and Equipment Operation Manual:** Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

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

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

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.



WMU Design Guidelines

5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

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

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

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

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

1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. **Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.**

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. **Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.**

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

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

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:



WMU Design Guidelines

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.



WMU Design Guidelines

1.10 PRODUCT MAINTENANCE MANUALS

- A. **Product Maintenance Manual:** Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. **Content:** Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. **Source Information:** List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. **Product Information:** Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- E. **Maintenance Procedures:** Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F. **Repair Materials and Sources:** Include lists of materials and local sources of materials and related services.
- G. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 7823



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 7839 - PROJECT ~~RECORD~~ AS-BUILT DOCUMENTS

Designer Note: For close-out procedures, WMU distinguishes between As-built and Record documents as follows: As-built documents are the marked-up copies of the contract documents, created by the Contractor, that reflect actual built conditions. These are given over to the Design Professional at Substantial Completion and are used by the Design Professional to create the Record documents. This section has been edited to reflect that language.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project ~~record~~ as-built documents, including the following:
1. ~~Record~~ As-built Drawings.
 2. ~~Record~~ As-built Specifications.
 3. ~~Record~~ As-built Product Data.
 4. Miscellaneous ~~Record~~ As-built submittals.

1.2 CLOSEOUT SUBMITTALS

Designer Note: WMU requires PDF versions of the as-built documents, either published from the software they were marked up in (ideally) or scanned versions of marked-up physical copies of same. Design Professional may desire something in addition to this—edit accordingly.

- A. ~~Record~~ As-built Drawings: Comply with the following:
1. ~~Number of Copies: Submit one <Insert number> set(s) of marked-up record as-built prints.~~
 2. Number of Copies: Submit copies of ~~record~~ as-built Drawings as follows:
 - a. Initial Submittal:
 - 1) ~~Submit [one] <Insert number> paper copy set(s) of marked-up record prints.~~
 - 2) Submit PDF electronic files of scanned ~~record~~ as-built prints and ~~[one] <Insert number> set(s) of file prints.~~
 - 3) Submit ~~record~~ as-built digital data files and [one] <Insert number> set(s) of plots.
 - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.



WMU Design Guidelines

b. Final Submittal:

- 1) ~~Submit [three] <Insert number> paper copy set(s) of marked-up record prints.~~
- 2) Submit PDF electronic files of ~~scanned record~~ as-built prints and ~~[three] <Insert number> set(s) of prints.~~
- 3) Print each drawing, whether or not changes and additional information were recorded.

c. Final Submittal:

- ~~1) Submit [one] <Insert number> paper copy set(s) of marked-up record prints.~~
- 2) Submit ~~record~~ as-built digital data files and ~~[three] <Insert number> set(s) of record as-built digital data file plots.~~
- 3) Plot each drawing file, whether or not changes and additional information were recorded.

B. ~~Record~~ As-built Specifications: Submit ~~[one paper copy] [<Insert number> paper copies]~~ annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. ~~Record~~ As-built Product Data: Submit ~~[one paper copy] [<Insert number> paper copies]~~ annotated PDF electronic files and directories of each submittal.

1. Where ~~record~~ as-built Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous ~~Record~~ As-built Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit ~~[one paper copy] [<Insert number> paper copies]~~ annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report [**weekly**] indicating items incorporated into project ~~record~~ as-built documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.3 RECORD AS-BUILT DRAWINGS

Designer Note: WMU requires fully marked-up as-built drawings depicting actual installation of all elements and systems, to be turned over to the Design Professional to create final record documents. Again, Design Professional may desire something in addition to this—edit accordingly.

A. ~~Record~~ As-built Prints: Maintain one set of marked-up ~~paper~~ copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark ~~record~~ as-built prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained ~~record~~ as-built data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up ~~record~~ as-built prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.



WMU Design Guidelines

- c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference ~~record~~ as-built prints to corresponding photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or [**Construction**] [**Work**] Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up ~~record~~ as-built prints.
 4. Mark ~~record~~ as-built sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. ~~Record~~ As-built Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up ~~record~~ as-built prints with Architect [**and Construction Manager**]. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Format: [**DWG**] [**DXF**] [**DGN**], Version <Insert designation>, [**Microsoft Windows**] [**Apple Macintosh**] operating system.
 3. Format: Annotated PDF electronic file [**with comment function enabled**].
 4. Incorporate changes and additional information previously marked on ~~record~~ as-built prints. Delete, redraw, and add details and notations where applicable.
 5. Refer instances of uncertainty to Architect [**through Construction Manager**] for resolution.
 6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 3100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.



WMU Design Guidelines

- C. Format: Identify and date each **record as-built** Drawing; include the designation "PROJECT **RECORD AS-BUILT** DRAWING" in a prominent location.
1. **Record As-built** Prints: Organize **record as-built** prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. **Format: Annotated PDF electronic file [with comment function enabled]**.
 3. **Record As-built** Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. **Identification: As follows:**
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT **RECORD AS-BUILT** DRAWINGS."
 - d. Name of Architect **[and Construction Manager]**.
 - e. Name of Contractor.

1.4 **RECORD AS-BUILT SPECIFICATIONS**

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether **record as-built** Product Data has been submitted in operation and maintenance manuals instead of submitted as **record as-built** Product Data.
 5. Note related Change Orders, **[record as-built Product Data,]** and **record as-built** Drawings where applicable.

Designer Note: Either annotated PDF files OR scanned PDF files of marked-up paper copy of Specifications are acceptable to WMU.

- B. Format: Submit **record as-built** Specifications as **[annotated PDF electronic file] [~~paper copy~~] [scanned PDF electronic file(s) of marked-up paper copy of Specifications]**.

1.5 **RECORD AS-BUILT PRODUCT DATA**

- A. Recording: Maintain one copy of each submittal during the construction period for project **record as-built** document purposes. Post changes and revisions to project **record as-built** documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.



WMU Design Guidelines

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, [~~record as-built Specifications,~~] and ~~record as-built Drawings~~ where applicable.

Designer Note: Either annotated PDF files OR scanned PDF files of marked-up paper copy of Product Data are acceptable to WMU.

- C. Format: Submit ~~record as-built~~ Product Data as [**annotated PDF electronic file**] [~~paper copy~~] [**scanned PDF electronic file(s) of marked-up paper copy of Product Data**].
 1. Include ~~record as-built~~ Product Data directory organized by Specification Section number and title, electronically linked to each item of ~~record as-built~~ Product Data.

1.6 MISCELLANEOUS ~~RECORD AS-BUILT~~ SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous ~~record as-built~~ submittals as [**PDF electronic file**] [~~paper copy~~] [**scanned PDF electronic file(s) of marked-up miscellaneous record submittals**].
 1. Include miscellaneous ~~record as-built~~ submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous ~~record as-built~~ submittals.

1.7 MAINTENANCE OF ~~RECORD AS-BUILT~~ DOCUMENTS

- A. Maintenance of ~~Record As-built~~ Documents: Store ~~record as-built~~ documents in the field office apart from the Contract Documents used for construction. Do not use project ~~record as-built~~ documents for construction purposes. Maintain ~~record as-built~~ documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project ~~record as-built~~ documents for Architect's [**and Construction Manager's**] reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 01 7839



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 9113 - GENERAL COMMISSIONING REQUIREMENTS

Designer Note: The Design Professional shall work with the Commissioning Authority to edit this section.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning activities.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of commissioning process test equipment, instrumentation, and tools.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

- B. Western Michigan University has retained the services of **[Commissioning Authority]** to serve as the project Commissioning Authority (CxA). **[Commissioning Authority]** will perform the items specified under Commissioning Authority responsibilities.

Designer Note: Regardless of whether the project is pursuing LEED certification, WMU projects shall follow the LEED guidelines with regard to commissioning activities.

- C. Green Building Design and Construction; LEED Reference Guide for Green Building Design and Construction, published by the U.S. Green Building Council.

1. Fundamental Commissioning and Verification.
2. Enhanced Commissioning.
 - a. Monitoring-based Commissioning.

1.2 ALLOWANCES

- A. Labor and management costs for the performance of commissioning process.



WMU Design Guidelines

- B. The following are excluded from the commissioning allowance:
1. Equipment and systems installation, startup, and field quality-control testing indicated in the Contract Documents.
 2. Test equipment, instrumentation, and tools (including, but not limited to, proprietary test equipment, instrumentation, and tools) required to perform tests.
 3. Work to correct commissioning issues.
 4. Work to repeat tests when equipment and systems fail acceptance criteria.
 5. **<Insert requirements>**.

1.3 UNIT PRICES

- A. Commissioning allowance may be adjusted up or down by the "List of Unit Prices" Article in Section 01 2200 "Unit Prices" when actual labor hours are computed at the end of commissioning process. See Section 01 2100 "Allowances" for commissioning allowance.
- B. The following are excluded from the computation for the adjustment of the commissioning allowance for technician labor hours:
1. Work to correct commissioning issues.
 2. Work to repeat tests when equipment and systems fail acceptance criteria.

1.4 DEFINITIONS

- A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- B. Basis-of-Design Document: A document prepared by Architect that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.
- C. Commissioning Authority: An entity engaged by Owner, and identified in Section 01 1000 "Summary," to evaluate Commissioning-Process Work.
- D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation of commissioning requirements.
- E. Commissioning: A quality-focused process for verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, and tested to comply with Owner's Project Requirements. The requirements specified here are limited to the construction phase commissioning activities. The scope of the commissioning process is defined in **[Section 01 1000 "Summary. "] [Section 01 1200 "Multiple Contract Summary. "]**
- F. Construction-Phase Commissioning-Process Completion: The stage of completion and acceptance of commissioning process when resolution of deficient conditions and issues discovered during commissioning process and retesting until acceptable results are obtained has been accomplished. Owner will establish in writing the date construction-phase



WMU Design Guidelines

commissioning-process completion is achieved. See Section 01 7700 "Closeout Procedures" for Certificate of Construction-Phase Commissioning Process Completion submittal requirements.

1. Commissioning process is complete when the Work specified of this Section and related Sections has been completed and accepted, including, but not limited to, the following:
 - a. Completion of tests and acceptance of test results.
 - b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.
 - c. Comply with requirements in Section 01 7900 "Demonstration and Training."
 - d. Completion and acceptance of submittals and reports.
- G. Owner's Project Requirements: A document that details the functional requirements of a project and the expectations of how it will be used and operated, including Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. This document is prepared either by the Owner or for the Owner by the Architect or Commissioning Authority.
- H. Owner's Witness: Commissioning Authority, Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.
- I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.
- J. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- K. Sampling Procedures and Tables for Inspection by Attributes: As defined in ASQ Z1.4.

1.5 ABBREVIATIONS

- A. The following industry standard abbreviations are used by WMU and their Commissioning Authority:
 1. A/E: Architect/Engineer
 2. AOR: Architect of Record
 3. BOD: Basis of Design
 4. CM: Construction Manager
 5. CxA: Commissioning Authority
 6. Cx: Commissioning
 7. EOR: Engineer of Record
 8. FPT: Functional Performance Test
 9. FTS: Functional (Performance) Test Script
 10. GC: General Contractor
 11. O&M: Operations and Maintenance
 12. OPR: Owner's Project Requirements
 13. PFC: Pre-Functional Checklist
 14. SOR: Site Observation Report
 15. TAB: Testing, Adjusting, and Balancing
 16. TS: Technical Specifications



WMU Design Guidelines

1.6 COMPENSATION

- A. If Architect, Commissioning Authority, other Owner's witness, or Owner's staff perform additional services or incur additional expenses due to actions of Contractor listed below, compensate Owner for such additional services and expenses.
 - 1. Failure to provide timely notice of commissioning activities schedule changes.
 - 2. Failure to meet acceptance criteria for test demonstrations.

- B. Contractor shall compensate Owner for such additional services and expenses at the rate of **<Insert billing rate>** per labor hour, plus **<Insert rate>** per round trip for personnel travelling more than **[200] <Insert distance>** miles, plus per diem allowances for meals and lodging according to current U.S. General Services Administration (GSA) Per Diem Rates.

1.7 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s):
 - 1. Commissioning Coordinator: A person or entity employed by Contractor to manage, schedule, and coordinate commissioning process.
 - 2. Project superintendent and other employees that Contractor may deem appropriate for a particular portion of the commissioning process.
 - 3. Subcontractors, installers, suppliers, and specialists that Contractor may deem appropriate for a particular portion of the commissioning process. **Appropriate entities may include, but are not limited to, representatives of the following:**
 - a. Fire suppression.
 - b. Plumbing.
 - c. HVAC sheet metal.
 - d. HVAC piping.
 - e. Test and balance.
 - f. Direct digital controls.
 - g. Electrical.
 - h. Fire alarm.
 - i. Refrigeration.
 - j. Food service.
 - 4. Appointed team members shall have the authority to act on behalf of the entity they represent.

- B. Members Appointed by Owner:
 - 1. Commissioning Authority, plus consultants that Commissioning Authority may deem appropriate for a particular portion of the commissioning process.
 - 2. Owner representative(s), facility operations and maintenance personnel, plus other employees, separate contractors, and consultants that Owner may deem appropriate for a particular portion of the commissioning process.
 - 3. Architect, plus employees and consultants that Architect may deem appropriate for a particular portion of the commissioning process.
 - 4. **[Construction Manager][General Contractor], plus employees and subcontractors that the [Construction Manager][General Contractor] may deem appropriate for a particular portion of the commissioning process.**



1.8 INFORMATIONAL SUBMITTALS

- A. Comply with requirements in Section 01 3300 "Submittal Procedures" for submittal procedure general requirements for commissioning process.
- B. Commissioning Plan Information:
 - 1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors performing the various commissioning requirements.
 - 2. Schedule of commissioning activities, integrated with the Construction Schedule. Comply with requirements in Section 01 3200 "Construction Progress Documentation" for the Construction Schedule general requirements for commissioning process.
 - 3. Contractor personnel and subcontractors participating in each test.
 - 4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.
- C. Commissioning schedule.
- D. Two-week look-ahead schedules.
- E. Commissioning Coordinator Letter of Authority:
 - 1. Within 10 days after approval of Commissioning Coordinator qualifications, submit a letter of authority for Commissioning Coordinator, signed by a principal of Contractor's firm. Letter shall authorize Commissioning Coordinator to do the following:
 - a. Make inspections required for commissioning process.
 - b. Coordinate, schedule, and manage commissioning process of Contractor, subcontractors, and suppliers.
 - c. Obtain documentation required for commissioning process from Contractor, subcontractors, and suppliers.
 - d. Report issues, delayed resolution of issues, schedule conflicts, and lack of cooperation or expertise on the part of members of the commissioning team.
- F. Commissioning Coordinator Qualification Data: For entity coordinating Contractor's commissioning activities to demonstrate their capabilities and experience.
 - 1. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of **[five]** **<Insert number>** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- G. List test instrumentation, equipment, and monitoring devices. Include the following information:
 - 1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.
 - 2. Brief description of intended use.
 - 3. Calibration record showing the following:
 - a. Calibration agency, including name and contact information.
 - b. Last date of calibration.
 - c. Range of values for which calibration is valid.
 - d. Certification of accuracy.



WMU Design Guidelines

- e. Certification for calibration equipment traceable to NIST.
- f. Due date of the next calibration.

H. Test Reports:

- 1. Pre-Startup Report: Prior to startup of equipment or a system, submit signed, completed construction checklists.
- 2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed.
- 3. Commissioning Issue Reports: Daily, at the end of each day in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
- 4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
- 5. Data Trend Logs: Submit data trend logs at the end of the trend log period.
- 6. System Alarm Logs: Daily, at the start of days following a day in which tests were performed, submit printout of log of alarms that occurred since the last log was printed.

I. Construction Checklists:

- 1. Material checks.
- 2. Installation checks.
- 3. Startup procedures, where required.

1.9 CLOSEOUT SUBMITTALS

A. Commissioning Report:

- 1. At Construction-Phase Commissioning Completion, include the following:
 - a. Pre-startup reports.
 - b. Approved test procedures.
 - c. Test data forms, completed and signed.
 - d. Progress reports.
 - e. Commissioning issue report log.
 - f. Commissioning issue reports showing resolution of issues.
 - g. Correspondence or other documents related to resolution of issues.
 - h. Other reports required by commissioning process.
 - i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction-Phase Commissioning Completion.
 - j. Report shall include commissioning work of Contractor.

B. Request for Certificate of Construction-Phase Commissioning Process Completion.

C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

1.10 QUALITY ASSURANCE

A. [ASHRAE Guidelines: The latest version of ASHRAE Guideline 1.1 and ASHRAE Guideline 0.](#)



- B. Commissioning Coordinator Qualifications:
 - 1. Documented experience commissioning systems of similar complexity to those contained in these documents on at least [three] <Insert number> projects of similar scope and complexity.
 - 2. Certification of commissioning-process expertise. The following certifications are acceptable. Owner reserves the right to accept or reject certifications as evidence of qualification.
 - a. Certified Commissioning Authority, by AABC Commissioning Group (ACG).
 - b. Commissioning-Process Management Professional or Building Commissioning Professional, by American Society of Heating, Refrigerating and Air-Conditioning Engineers.
 - c. Certified Commissioning Professional, by Building Commissioning Association.
 - d. Accredited Commissioning-Process Authority Professional, by University of Wisconsin.
 - e. Accredited Commissioning-Process Manager, by University of Wisconsin.
 - f. Accredited Green Commissioning-Process Provider, by University of Wisconsin.
- C. Calibration Agency Qualifications: Certified by The American Association for Laboratory Accreditation that the calibration agency complies with minimum requirements of ISO/IEC 17025.
- D. Inter-National Testing Association: The latest version of NETA Acceptance Testing Specifications (ATS).
- E. Instructor Qualifications: Factory authorized service representatives, experienced in training, operation and maintenance procedures for installed systems, subsystems and equipment.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

- A. Test equipment and instrumentation required to perform the commissioning process shall remain the property of Contractor unless otherwise indicated.
- B. Test equipment and instrumentation required to perform commissioning process shall comply with the following criteria:
 - 1. Be manufactured for the purpose of testing and measuring tests for which they are being used and have an accuracy to test and measure system performance within the tolerances required to determine acceptable performance.
 - 2. Calibrated and certified.
 - a. Calibration performed and documented by a qualified calibration agency according to national standards applicable to the tools and instrumentation being calibrated. Calibration shall be current according to national standards or within test equipment and instrumentation manufacturer's recommended intervals, whichever



WMU Design Guidelines

- is more frequent, but not less than within six months of initial use on Project. Calibration tags shall be permanently affixed.
 - b. Repair and recalibrate test equipment and instrumentation if dismantled, dropped, or damaged since last calibrated.
 - c. If not otherwise noted, the following minimum requirements apply: temperature sensors and digital thermometers shall have a certified calibration to NIST traceable standards to an accuracy of 0.5 deg F and a resolution of plus or minus 0.1 deg F. Pressure sensors shall have an accuracy of plus or minus 2.0% of the value range being measured (not full range of the meter).
- 3. Maintain test equipment and instrumentation.
 - 4. Use test equipment and instrumentation only for testing or monitoring Work for which they are designed.

2.2 PROPRIETARY TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

- A. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate, or perform work on its equipment.
 - 1. Identify proprietary test equipment, instrumentation, and tools required in the test equipment identification list submittal.
 - 2. Proprietary test equipment, instrumentation, and tools shall become the property of Owner at Substantial Completion.

2.3 REPORT FORMAT AND ORGANIZATION

- A. General Format and Organization:
 - 1. Bind report in three-ring binders.
 - 2. Label the front cover and spine of each binder with the report title, volume number, project name, Contractor's name, and date of report.
 - 3. Record report on compact disk.
 - 4. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.
- B. Commissioning Report:
 - 1. Include a table of contents and an index to each test.
 - 2. Include major tabs for each Specification Section.
 - 3. Include minor tabs for each test.
 - 4. Within each minor tab, include the following:
 - a. Test specification.
 - b. Pre-startup reports.
 - c. Approved test procedures.
 - d. Test data forms, completed and signed.
 - e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation



related to resolution of issues for each test repetition together within the minor tab, in reverse chronological order (most recent on top).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Review preliminary construction checklists and preliminary test procedures and data forms.

3.2 CONSTRUCTION CHECKLISTS

- A. Construction checklists cannot modify or conflict with the Contract Documents.
- B. Create construction checklists based on actual systems and equipment to be included in Project.
- C. Material Checks: Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment if applicable.
 - 1. Service connection requirements, including configuration, size, location, and other pertinent characteristics.
 - 2. Included optional features.
 - 3. Delivery Receipt Check: Inspect and record physical condition of materials and equipment on delivery to Project site, including agreement with approved submittals, cleanliness, and lack of damage.
 - 4. Installation Checks:
 - a. Location according to Drawings and approved Shop Drawings.
 - b. Configuration.
 - c. Compliance with manufacturers' written installation instructions.
 - d. Attachment to structure.
 - e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
 - f. Utility connections are of the correct characteristics, as applicable.
 - g. Correct labeling and identification.
 - h. Startup Checks: Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.
- D. Startup: Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, at minimum.
- E. Performance Tests:
 - 1. Static Tests: As specified elsewhere, including, but not limited to, duct and pipe leakage tests, insulation-resistance tests, and water-penetration tests.



WMU Design Guidelines

2. Component Performance Tests: Tests evaluate the performance of an input or output of components under a full range of operating conditions.
 3. Equipment and Assembly Performance Tests: Test and evaluate performance of equipment and assemblies under a full range of operating conditions and loads.
 4. System Performance Tests: Test and evaluate performance of systems under a full range of operating conditions and loads.
 5. Intersystem Performance Tests: Test and evaluate the interface of different systems under a full range of operating conditions and loads.
- F. Deferred Construction Checklists: Obtain Owner approval of proposed deferral of construction checklists, including proposed schedule of completion of each deferred construction checklist, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. When approved, deferred construction checklists may be completed after date of Construction-Phase Commissioning Completion. Include the following in a request for Certificate of Construction-Phase Commissioning Process Completion:
1. Identify deferred construction checklists by number and title.
 2. Provide a target schedule for completion of deferred construction checklists.
 3. Written approval of proposed deferred construction checklists, including approved schedule of completion of each deferred construction checklist.
- G. Delayed Construction Checklists: Obtain Owner approval of proposed delayed construction checklists, including proposed schedule of completion of each delayed construction checklist, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. When approved, delayed construction checklists may be completed after date of Construction-Phase Commissioning Completion. Include the following in a request for Certificate of Construction-Phase Commissioning Process Completion:
1. Identify delayed construction checklist by construction checklist number and title.
 2. Provide a target schedule for completion of delayed construction checklists.
 3. Written approval of proposed delayed construction checklists, including approved schedule of completion of each delayed construction checklist.

3.3 GENERAL EXECUTION REQUIREMENTS

- A. Schedule and coordinate commissioning process with the Construction Schedule.
- B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.
- C. Perform test demonstrations for Owner's witness. Unless otherwise indicated, demonstrate tests for 100 percent of work to which the test applies. In some instances, demonstration of a random sample of other than 100 percent of the results of a test is specified.
1. Where sampling is specified, the sampling plan and procedure for the test demonstration shall be determined using ASQ Z1.4.
 - a. General Inspection: [Level I] [Level II] [Level III] <Insert level>.
 - b. Special Inspection: [Level S-1] [Level S-2] [Level S-3] [Level S-4] <Insert level>.
 - c. Acceptance Quality Limit (AQL) of [1.5] <Insert AQL>.



2. The "lot size" in ASQ Z1.4 is the sum of the number of items to which the test demonstration applies, as described in the scope subparagraph of each test.
 3. On determination of the sample size, the samples shall be selected randomly by Owner's witness at the time of the test demonstration.
 4. Include in the Commissioning Plan a detailed list of the test demonstrations with lot and sample quantities for each test.
- D. Report test data and commissioning issue resolutions.
- E. Schedule personnel to participate in and perform Commissioning-Process Work.
- F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:
1. Operating the equipment and systems they install during tests.
 2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

3.4 COMMISSIONING COORDINATOR RESPONSIBILITIES

- A. Management and Coordination: Manage, schedule, and coordinate commissioning process, including, but not limited to, the following:
1. Coordinate with subcontractors on their commissioning responsibilities and activities.
 2. Obtain, assemble, and submit commissioning documentation.
 3. **[Attend] [Conduct]** periodic on-site commissioning meetings. Comply with requirements in Section 01 3100 "Project Management and Coordination."
 4. Develop and maintain the commissioning schedule. Integrate commissioning schedule into the Construction Schedule. Update Construction Schedule at specified intervals.
 5. Review and comment on preliminary test procedures and data forms.
 6. Report inconsistencies and issues in system operations.
 7. Verify that tests have been completed and results comply with acceptance criteria, and that equipment and systems are ready before scheduling test demonstrations.
 8. Direct and coordinate test demonstrations.
 9. Coordinate witnessing of test demonstrations by Owner's witness.
 10. Coordinate and manage training. Be present during training sessions to direct video recording, present training, and direct the training presentations of others. Comply with requirements in Section 01 7900 "Demonstration and Training."
 11. Prepare and submit specified commissioning reports.
 12. Track commissioning issues until resolution and retesting is successfully completed.
 13. Retain original records of Commissioning-Process Work, organized as required for the commissioning report. Provide Owner's representative access to these records on request.
 14. Assemble and submit commissioning report.

3.5 COMMISSIONING TESTING

- A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.



WMU Design Guidelines

- B. Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations. Owner's project manager will coordinate attendance by Owner's witness with Contractor's published Commissioning Schedule. Owner's witness will provide no labor or materials in the commissioning work. The only function of Owner's witness will be to observe and comment on the progress and results of commissioning process.

- C. Construction Checklists:
 - 1. Complete construction checklists as Work is completed.
 - 2. Distribute construction checklists to installing contractors before they start work.
 - 3. Installers:
 - a. Verify installation using approved construction checklists as Work proceeds.
 - b. Complete and sign construction checklists **[daily] [weekly] <Insert frequency>** for work performed during the preceding **[day] [week] <Insert time period>**.
 - 4. Provide Commissioning Authority access to construction checklists.

- D. Installation Compliance Issues: Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.

- E. Pre-Startup Audit: Prior to executing startup procedures, review completed installation checks to determine readiness for startup and operation. Report conditions, which, if left uncorrected, adversely impact the ability of systems or equipment to operate satisfactorily or to comply with acceptance criteria. Prepare pre-startup report for each system.

- F. Test Procedures and Test Data Forms:
 - 1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
 - 2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
 - 3. Completed test data forms are the official records of the test results.
 - 4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
 - 5. Review preliminary test procedures and test data forms, and provide comments within 14 days of receipt from Commissioning Authority. Review shall address the following:
 - a. Equipment protection and warranty issues, including, but not limited to, manufacturers' installation and startup recommendations, and operation and maintenance instructions.
 - b. Applicability of the procedure to the specific software, equipment, and systems approved for installation.
 - 6. After Contractor has reviewed and commented on the preliminary test procedures and test data forms, Commissioning Authority will revise and reissue the approved revised test procedures and test data forms marked "Approved for Testing."



7. Use only approved test procedures and test data forms marked "Approved for Testing" to perform and document tests and test demonstrations.

G. Performance of Tests:

1. The sampling rate for tests is 100 percent. The sampling rate for test demonstrations is 100 percent unless otherwise indicated.
2. Perform and complete each step of the approved test procedures in the order listed.
3. Record data observed during performance of tests on approved data forms at the time of test performance and when the results are observed.
4. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures and data forms according to the "Commissioning Compliance Issues" Paragraph in this Article.
5. On completion of a test, sign the completed test procedure and data form. Tests for which test procedures and data forms are incomplete, not signed, or which indicate performance that does not comply with acceptance criteria will be rejected. Tests for which test procedures and data forms are rejected shall be repeated and results resubmitted.

H. Performance of Test Demonstration:

1. Perform test demonstrations on a sample of tests after test data submittals are approved. The sampling rate for test demonstrations shall be **[100] <Insert number>** percent unless otherwise indicated in the individual test specification.
2. Notify Owner's witness at least **[three days] <Insert alternative time>** in advance of each test demonstration.
3. Perform and complete each step of the approved test procedures in the order listed.
4. Record data observed during performance of test demonstrations on approved data forms at the time of demonstration and when the results are observed.
5. Provide full access to Owner's witness to directly observe the performance of all aspects of system response during the test demonstration. On completion of a test demonstration, sign the completed data form and obtain signature of Owner's witness at the time of the test to authenticate the reported results.
6. Test demonstration data forms not signed by Contractor and Owner's witness at the time of the completion of the procedure will be rejected. Test demonstrations for which data forms are rejected shall be repeated and results shall be resubmitted.
 - a. Exception for Failure of Owner's Witness to Attend: Failure of Owner's witness to be present for agreed-on schedule of test demonstration shall not delay Contractor. If Owner's witness fails to attend a scheduled test, Contractor shall proceed with the scheduled test. On completion, Contractor shall sign the data form for Contractor and for Owner's witness, and shall note the absence of Owner's witness at the scheduled time and place.
7. False load test requirements are specified in related sections.
 - a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work shall not be used to create the false load without Architect's written approval.



WMU Design Guidelines

I. Deferred Tests:

1. Deferred Test List: Identify, in the request for Certificate of Construction-Phase Commissioning Process Completion, proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction-Phase Commissioning Completion. Identify proposed deferred tests in the request for Certificate of Construction-Phase Commissioning Process Completion as follows:
 - a. Identify deferred tests by number and title.
 - b. Provide a target schedule for completion of deferred tests.
2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. Notify Architect and Commissioning Authority at least [**three working days**] <Insert alternative time> (minimum) in advance of tests.
3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

J. Delayed Tests:

1. Delayed Test List: Identify, in the request for Certificate of Construction-Phase Commissioning Process Completion, proposed delayed tests. Obtain Owner approval of proposed delayed tests, including proposed schedule of completion of each delayed test, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. Include the following in the request for Certificate of Construction-Phase Commissioning Process Completion:
 - a. Identify delayed tests by test number and title.
 - b. Written approval of proposed delayed tests, including approved schedule of completion of delayed tests.
2. Schedule and coordinate delayed tests. Schedule delayed tests when conditions that caused the delay have been rectified. Notify Architect and Commissioning Authority at least [**three working days**] <Insert alternative time> (minimum) in advance of tests.
3. Where delayed tests are approved, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule delayed tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

K. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. Direct timely resolution of issue and then repeat the demonstration. If a test demonstration must be repeated due to failure caused by Contractor work or materials, reimburse Owner for billed costs for the participation in the repeated demonstration.
4. Test Results: If a test demonstration fails to meet the acceptance criteria, perform the following:



WMU Design Guidelines

- a. Complete a commissioning compliance issue report form promptly on discovery of test results that do not comply with acceptance criteria.
 - b. Submit commissioning compliance issue report form within **[24 hours]** <Insert **alternative time**> of the test.
 - c. Determine the cause of the failure.
 - d. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.
5. Commissioning Compliance Issue Report: Provide a commissioning compliance issue report for each issue. Do not report multiple issues on the same commissioning compliance issue report.
- a. Exception: If an entire class of devices is determined to exhibit the identical issue, they may be reported on a single commissioning compliance issue report. (For example, if all return-air damper actuators that are specified to fail to the open position are found to fail to the closed position, they may be reported on a single commissioning issue report. If a single commissioning issue report is used for multiple commissioning compliance issues, each device shall be identified in the report, and the total number of devices at issue shall be identified.
 - b. Complete and submit Part 1 of the commissioning compliance issue report immediately when the condition is observed.
 - c. Record the commissioning compliance issue report number and describe the deficient condition on the data form.
 - d. Resolve commissioning compliance issues promptly. Complete and submit Part 2 of the commissioning compliance issue report when issues are resolved.
6. Diagnose and correct failed test demonstrations as follows:
- a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
 - b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
 - c. Record the results of each step of the diagnostic procedure.
 - d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
 - e. Determine and record corrective measures.
 - f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.
7. Retest:
- a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Obtain signature of Owner's witness on retest data forms. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.
 - b. For each repeated test demonstration, submit a new test data form, marked "Retest."
8. Do not correct commissioning compliance issues during test demonstrations.



WMU Design Guidelines

- a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than [five] <Insert number> minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

3.6 COMMISSIONING MEETINGS

- A. **[Schedule and conduct] [Commissioning Authority will schedule and conduct]** commissioning meetings. Comply with requirements in Section 01 3100 "Project Management and Coordination."

3.7 SEQUENCING

- A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:
 - 1. Construction Checklists:
 - a. Material checks.
 - b. Installation checks.
 - c. Startup, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.
 - d. Performance Tests:
 - 1) Static tests, as appropriate.
 - 2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
 - 3) Equipment and assembly performance tests.
 - 4) System performance tests.
 - 5) Intersystem performance tests.
 - 2. Commissioning tests.
- B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.
- C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. Notify Architect if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.
- D. Commence tests as soon as installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.



3.8 SCHEDULING

- A. Commence commissioning process as early in the construction period as possible.
- B. Commissioning Schedule: Integrate commissioning activities into Construction Schedule. See Section 01 3200 "Construction Progress Documentation."
 - 1. Include detailed commissioning activities in monthly updated Construction Schedule and short-interval schedule submittals.
 - 2. Schedule the start date and duration for the following commissioning activities:
 - a. Submittals.
 - b. Preliminary operation and maintenance manual submittals.
 - c. Installation checks.
 - d. Startup, where required.
 - e. Performance tests.
 - f. Performance test demonstrations.
 - g. Commissioning tests.
 - h. Commissioning test demonstrations.
 - 3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.
 - 4. Determine milestones and prerequisites for commissioning process. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short-interval schedule submittals.
- C. Two-Week Look-Ahead Commissioning Schedule:
 - 1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning process.
 - 2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
 - 3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.
- D. Owner's Witness Coordination:
 - 1. Coordinate Owner's witness participation via Architect.
 - 2. Notify Architect of commissioning schedule changes at least **[two]** <Insert number> work days in advance for activities requiring the participation of Owner's witness.

3.9 COMMISSIONING REPORTS

- A. Test Reports:
 - 1. Pre-startup reports include observations of the conditions of installation, organized into the following sections:
 - a. Equipment Model Verification: Compare contract requirements, approved submittals, and provided equipment. Note inconsistencies.



WMU Design Guidelines

- b. Preinstallation Physical Condition Checks: Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
 - c. Preinstallation Component Verification Checks: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
 - d. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
 - e. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.
2. Test data reports include the following:
- a. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
 - b. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
 - c. Signatures of individuals performing and witnessing tests.
 - d. Data trend logs accumulated overnight from the previous day of testing.
3. Commissioning Compliance Issue Reports: Report as commissioning compliance issues results of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Use sequentially numbered facsimiles of commissioning compliance issue report form included in this Section, or other form approved by Owner. Distribute commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:
- a. Commissioning compliance issue report number. Assign unique, sequential numbers to individual commissioning compliance issue reports when they are created, to be used for tracking.
 - b. Action distribution list.
 - c. Report date.
 - d. Test number and description.
 - e. Equipment identification and location.
 - f. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
 - g. Diagnostic procedure or plan to determine the cause (include in initial submittal)
 - h. Diagnosis of fundamental cause of issues as specified below (include in resubmittal).
 - i. Fundamental cause of unacceptable performance as determined by diagnostic tests and activities.
 - j. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
 - k. Schedule for retesting.



4. Weekly progress reports include information for tests conducted since the preceding report and the following:
 - a. Completed data forms.
 - b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
 - c. Activities scheduled but not conducted per schedule.
 - d. Commissioning compliance issue report log.
 - e. Schedule changes for remaining Commissioning-Process Work, if any.
5. Data trend logs shall be initiated and running prior to the time scheduled for the test demonstration.
 - a. Trend log data format shall be multiple data series graphs. Where multiple data series are trend logged concurrently, present the data on a common horizontal time axis. Individual data series may be presented on a segmented vertical axis to avoid interference of one data series with another, and to accommodate different axis scale values. Graphs shall be sufficiently clear to interpret data within the accuracy required by the acceptance criteria.
 - b. Attach to the data form printed trend log data collected during the test or test demonstration.
 - c. Record, print out, and attach to the data form operator activity during the time the trend log is running. During the time the trend log is running, operator intervention not directed by the test procedure invalidates the test results.
6. System Alarm Logs: Record and print out a log of alarms that occurred since the last log was printed. Evaluate alarms to determine if the previous day's work resulted in any conditions that are not considered "normal operation."
 - a. Conditions that are not considered "normal operation" shall be reported on a commissioning issue report attached to the alarm log. Resolve as necessary. The intent of this requirement is to discover control system points or sequences left in manual or disabled conditions, equipment left disconnected, set points left with abnormal values, or similar conditions that may have resulted from failure to fully restore systems to normal, automatic control after test completion.

3.10 CERTIFICATE OF CONSTRUCTION-PHASE COMMISSIONING PROCESS COMPLETION

- A. When Contractor considers that construction-phase commissioning process, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority through Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to complete commissioning process.
- B. On receipt of Contractor's list, Commissioning Authority will make an inspection to determine whether the construction-phase commissioning process or designated portion thereof is complete. If Commissioning Authority's inspection discloses items, whether included on Contractor's list, which is not sufficiently complete as defined in "Construction-Phase Commissioning Process Completion" Paragraph in the "Definitions" Article, Contractor shall, before issuance of the Certificate of Construction-Phase Commissioning Process Completion, complete or correct such items on notification by Commissioning Authority. In such case,



WMU Design Guidelines

Contractor shall then submit a request for another inspection by Commissioning Authority to determine construction-phase commissioning process completion.

- C. Contractor shall promptly correct deficient conditions and issues discovered during commissioning process. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Architect's and Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.
- D. When construction-phase commissioning process or designated portion is complete, Commissioning Authority will prepare a Certificate of Construction-Phase Commissioning Process Completion that shall establish the date of completion of construction-phase commissioning process. Certificate of Construction-Phase Commissioning Process Completion shall be submitted prior to requesting inspection for determining date of Substantial Completion.

3.11 OPERATION AND MAINTENANCE MANUALS

- A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.
- B. Each Division shall compile and prepare documentation for all equipment and systems covered in that Division and deliver this documentation to the **[Construction Manager] [General Contractor]** for inclusion in the O&M manuals.
 - 1. Field checkout sheets and logs should be provided to the Owner's Commissioning Authority.
 - 2. All documentation shall be made specific to this project by permanently marking "generic" manufacturer's O&M manuals to indicate exactly which models and options are included in the Work of this project.
- C. Deliver the O&M manuals to the Owner's Commissioning Authority for review within 60 days of final review of the submittals of the equipment.
- D. Review and Approvals: Review of the commissioning-related sections of the O&M manuals shall be made by the Design Professional and by the Owner's Commissioning Authority.

3.12 TRAINING OF OWNER PERSONNEL

- A. Coordinate and schedule training for Owner's designated personnel.
 - 1. Facilitate a sign-in process and submit sign-in sheet to CxA.
- B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.
- C. Prepare a training outline and submit to Owner's Commissioning Authority for comment and approval. Provide training of the Owner's personnel.

END OF SECTION 01 9113



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 01 9119.43 - EXTERIOR ENCLOSURE COMMISSIONING

Designer Note: The Design Professional shall work with the Building Enclosure Commissioning Authority to edit this section.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes building enclosure Cx process requirements for the above- and below-grade systems and assemblies:
 - 1. Horizontal and vertical waterproofing.
 - 2. Opaque walls.
 - 3. Roofs.
 - 4. Openings.
 - 5. Interfaces.

- B. Western Michigan University has retained the services of **[Building Enclosure Commissioning Authority]** to serve as the project Building Enclosure Commissioning Authority (BECxA). **[Building Enclosure Commissioning Authority]** will perform the items specified under Building Enclosure Commissioning Authority responsibilities.
 - 1. WMU may arrange and pay for the services of an Enclosure Testing Agency, which may be affiliated with or independent from the BECxA, to perform building enclosure component testing. Refer to the BECxA plan.

- C. Building enclosure commissioning is a systematic process of verifying that the building skin, window, and roof systems are designed and installed to perform according to the design intent and the Owner's Project Requirements.
 - 1. The BECx Process: There is a clearly defined process that involves the actions of a BECxA, the **[Construction Manager][General Contractor]**, and other members of the team. BECx involves the following specific steps:
 - a. Review of the Design Professional's drawings and specifications during design development and construction document phases.
 - b. Review of submittals related to the building enclosure.
 - c. Field of the proper installation of components and assemblies.
 - d. Field testing of components and systems.
 - e. Observation of training of Owner personnel.

 - f. Creation of a Systems Manual for ongoing reference.



WMU Design Guidelines

- D. The building enclosure commissioning process requires the active involvement of the **[General Contractor][Construction Manager]** and assigns Work and responsibilities that are specified here.
- E. This section refers to activities performed by others. In the absence of a clear statement identifying the responsible party, it shall be understood that the activity being described shall be performed by the **[General Contractor] [Construction Manager]**.

Designer Note: Regardless of whether the project is pursuing LEED certification, WMU projects shall follow the LEED guidelines with regard to commissioning activities

- F. Green Building Design and Construction; LEED Reference Guide for Green Building Design and Construction, published by the U.S. Green Building Council.
 - 1. Envelope Commissioning.

1.2 DEFINITIONS

- A. As-built Drawings: Fully dimensioned, to-scale drawings that present an accurate representation of the components and assemblies as they exist in the built Work; when in compliance with other Division 01 sections specifying record documents, these can be legible hand-written marks on hard copies of drawings kept on the job site.
- B. Basis of Design: A document developed by the design team that technically details assumptions made during the creation of the construction documents in order to meet the Owner's Project Requirements to the greatest degree possible.
- C. Building Enclosure: Materials, components, systems, and assemblies intended to provide shelter and environmental separation between interior and exterior, or between two or more environmentally distinct interior spaces in a building or structure. The building enclosure includes, but is not limited to, exterior walls, above and below grade, and roof assemblies.
- D. Commissioning Team: The members of the commissioning team include the Owner, the Building Enclosure Commissioning Authority (BECxA), the **[General Contractor] [Construction Manager]**, the subcontractors and suppliers for the components to be commissioned, the Design Professional and the Enclosure Testing Agency, if different from the BECxA.
- E. Corrective Action: An activity intended to correct a non-conforming item or action, or to prevent further recurrences of non-conformities.
- F. Cx: Commissioning, as defined in Section 01 9113 "General Commissioning Requirements."
- G. CxA: Commissioning Authority, as defined in Section 01 9113 "General Commissioning Requirements."
- H. Deficient or Non-Conforming: At variance with, or likely to become at variance with, any one of the following:
 - 1. Owner's Project Requirements.
 - 2. Contract Documents.
 - 3. Referenced Standards.
 - 4. Governing Codes.



WMU Design Guidelines

- I. First-Installation Mockups: Initial installation of specific enclosure materials, components, systems, and assemblies that are part of Work.
- J. Integrated Exterior Mockups: Integrated mockups of the exterior enclosure erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
- K. Issue: An identified condition or component that is deficient or likely to become deficient.
- L. Laboratory Mockups: Full-size physical assemblies constructed at testing facility.
- M. OPR: Owner's Project Requirements, as defined in Section 01 9113 "General Commissioning Requirements."
 - 1. The portion of the OPR that relates to the building enclosure is considered to be a "living document" for the building enclosure commissioning process and outlines the objectives upon which the pre-design, design and construction phases are evaluated.
- N. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.
- O. Water Penetration: Visible evidence of uncontrolled water penetration on or adjacent to the test specimen in a location not intended to collect and drain water to the building exterior.

1.3 ABBREVIATIONS

- A. In addition to the abbreviations defined in Section 01 9113 "General Commissioning Requirements", the following industry standard abbreviations are used by WMU and their Building Enclosure Commissioning Authority:
 - 1. BECxA: Building Enclosure Commissioning Authority
 - 2. BECx: Building Enclosure Commissioning
 - 3. BECx Plan: Building Enclosure Commissioning Plan

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Construction Checklists: Draft Construction Checklists will be created by CxA for Contractor review.
- C. Construction Checklists: Include the following and comply with requirements in Section 01 9113 "General Commissioning Requirements" for Construction Checklists:
 - 1. **<Insert checklist>**.
- D. Cx Process Submittals:
 - 1. Shop Drawings: For mockups, including elevations, plans, sections, and full-size details. Show interface conditions, interconnections, and terminations.



WMU Design Guidelines

2. Testing Program: Developed specifically for Project.
3. Test Reports: Prepared by a qualified testing agency for each test.
4. Record Drawings: As-built drawings of mockups showing changes made during testing.

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For building envelope systems and components to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. **ASHRAE Guidelines:** The latest version of ASHRAE Guideline 1.1 and ASHRAE Guideline 0.

B. **National Institute of Building Science (NIBS) Guideline 3-2012 Building Enclosure Commissioning Process BECx.**

C. **Testing Agency Qualifications:** Qualified according to ASTM E699 for testing indicated **[and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025]**.

D. Build mockups to evaluate constructability and performance, and demonstrate the coordination of trades and sequencing of work necessary to ensure functional and integrated performance of materials, components, systems, assemblies, and interfaces.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Notify Architect and CxA **[seven]** **<Insert number>** days in advance of the dates and times when mockups will be constructed and tested.

E. Laboratory Mockups: Build at testing agency facility; use personnel, products, and methods of construction that will be used at Project site.

F. Integrated Exterior Mockups: Build at Project site on site at locations **[indicated on Drawings]** **[as directed by Architect]**.

G. First Installation Mockups: Prepare each major exterior enclosure system for testing when first installed and before proceeding with construction of additional similar assemblies. If in compliance, Work may remain as part of the completed construction.

1. Wall Mockups: Extend one full structural bay wide by one full story high plus additional height to connect to assemblies below and above. Include a typical wall to interior floor slab connections.
 - a. Minimum Size: **[100 sq. ft.] <Insert size>**.
2. Roof Mockups: Include parapet or roof edge conditions, flashings, and typical pipe, dunnage, and similar penetrations.



- a. Minimum Size: **[100 sq. ft.] <Insert size>**.
 3. Horizontal Below-Grade Waterproofing and Slab-on-Grade Mockups: Include edge conditions and typical penetrations.
 - a. Minimum Size: **[100 sq. ft.] <Insert size>**.
 4. Vertical Below-Grade Waterproofing Mockups: Include edge, termination, and penetrations.
 5. Building Expansion Joint Mockups: Include starting point at foundation and extend up vertical surfaces, across horizontal waterproofed surfaces and roofs and return to foundation. Include each type of corner, intersection, transition, and termination.
- H. Mockups specified for quality assurance and control in the following sections may be combined with Cx mockups for testing purposes.
1. Section 03 3300 "Architectural Concrete."
 2. Section 03 4500 "Precast Architectural Concrete."
 3. Section 04 2000 "Unit Masonry."
 4. Section 04 4200 "Exterior Stone Cladding."
 5. Section 07 2726 "Fluid-Applied Membrane Air Barriers."
 6. Section 07 6100 "Sheet Metal Roofing."
 7. Section 08 4413 "Glazed Aluminum Curtain Walls."
 8. **<Insert section number and title>**

PART 2 - PRODUCTS (~~Not Used~~)

2.1 EQUIPMENT AND ACCESS

- A. Provide means, including lifts and lift operators, for the Building Envelope Commissioning Authority to access, observe, touch and visually confirm proper installation of components. These means shall be in compliance with all OSHA and job-site safety regulations.

PART 3 - EXECUTION

3.1 CONSTRUCTION CHECKLISTS

- A. Prepare detailed Construction Checklists for exterior enclosure Cx systems, subsystems, equipment, and components. Complete and submit Construction Checklists.

3.2 CONSTRUCTION CHECKLIST REVIEW

- A. Review and provide written comments on draft Construction Checklists. CxA will create required draft Construction Checklists and provide them to Contractor.
- B. Return draft Construction Checklist review comments within **[10] <Insert number>** days of receipt.



WMU Design Guidelines

- C. When review comments have been resolved, CxA will provide final Construction Checklists, marked "Approved for Use, (date)."
- D. Use only Construction Checklists, marked "Approved for Use, (date)."

3.3 GENERAL RESPONSIBILITIES OF THE [Construction Manager][General Contractor]

- A. Become familiar with these specifications and the BECx Plan. Comply with the BECx Plan. In the event of a conflict between the BECx Plan and these specifications, these specifications shall govern.
- B. Cooperate with the BECxA. Provide site access, samples, certifications, reports, equipment, storage and general assistance as requested.
- C. Designate a representative who shall attend a commissioning kickoff meeting and other necessary meetings scheduled by the BECxA to facilitate the commissioning process.
- D. In concert with the BECxA, identify and integrate all commissioning activities into the Master Project Schedule. Identify milestones related to the BECx process, including but not limited to field visits and testing activities.
- E. In each purchase order or subcontract written, include the requirements for submittal data, O&M data, commissioning tasks, and training specified in this and related sections.
- F. Ensure that subcontractors perform their commissioning responsibilities according to the Contract Documents and schedule.
- G. Maintain a section of the project construction meeting minutes and agenda devoted to commissioning activities and issues. Remain familiar with the issues log produced by the BECxA and ensure that open issues are reviewed at appropriate intervals in the construction meetings.
- H. Submit "for-construction" drawings and specifications to BECxA, and submit any revisions to these documents as they become available. Furnish a copy of all construction documents, addenda, RFI's, change orders, and approved submittals related to the commissioned components to the BECxA.
- I. Schedule and host preconstruction conferences for all major building enclosure components and ensure they are attended by supplying and installing subcontractors and the [Construction Manager's][General Contractor's] quality assurance personnel. Minimum agenda:
 - 1. Review of submittal status.
 - 2. Schedule.
 - 3. Design intent.
 - 4. Any outstanding BECx issues for these or related adjacent components.
 - 5. Review installation sequence for related or adjacent components.
- J. Coordinate construction, inspection, and field testing of mock-ups of building enclosure components where specified.



WMU Design Guidelines

1. Allow ample time (as coordinated in advance with the BECxA) between informing the BECxA of testing activities and the actual testing date, to allow the BECxA to arrange travel time to the testing site.

Designer Note: In general, WMU is willing to pay the reimbursable expenses incurred by the BECxA to travel to and from the testing site for the initial test and one failure. This should be discussed with WMU during the development of these specifications.

2. **Cost of Testing:** Work with the Owner and BECxA to define the monetary responsibilities of each party in the event of a testing failure that results in additional trips to the site. Identify who will pay for reimbursable expenses and or labor associated with same.
- K. Ensure adequate monitoring of compliance with surface preparation and environmental installation requirements for all enclosure components. Submit to the BECxA and AOR any proposed deviations from manufacturer's official installation techniques, complete with signed acknowledgment and certification of continued warranty by the company involved.
 - L. Correct Work identified as deficient by the BECxA, in accordance with the Contract Documents and code requirements.
 - M. Complete all commissioning-related activities specified here and included in the BECx Plan prior to building occupancy.

3.4 BUILDING ENCLOSURE COMMISSIONING AUTHORITY RESPONSIBILITIES

Designer Note: This section may be irrelevant by the time the specifications are ready for issue, as the BECxA may have been on board for some time and the roles may already be spelled out in the BECxA plan. Design Professional to edit accordingly.

- A. The primary role of the BECxA is to develop and coordinate the execution of a commissioning plan, observe and document component installation / performance, and note when systems are not present in accordance with the documented OPR or in accordance with the Contract Documents. The BECxA is not responsible for design concepts, design criteria, compliance with codes, design or general construction scheduling, cost, or construction management.
- B. The BECxA may assist with problem-solving of deficiencies but ultimately the responsibility to clarify the design intent lies with the A/E or EOR. The responsibility to solve non-conformance with the Contract Documents resides with the **[Construction Manager][General Contractor]**.
- C. The BECxA verify compliance of components through submittal reviews, field observations, and testing (when so directed by the Owner).
- D. Limits to the responsibility of the BECxA:
 1. Nothing stated in this section shall be construed to transfer responsibility for the design of the building to the BECxA, nor to relieve the AOR or A/E of responsibility for the design.
 2. Nothing stated in this section shall be construed to relieve the **[Construction Manager][General Contractor]** of responsibility for the means and methods of construction, project costs, scheduling and coordination of construction activities, and on-the-job safety.
- E. The Commissioning Plan (BECx Plan): The BECx Plan is prepared by the BECxA and expands and makes more specific the information contained here. The BECx Plan is issued at or prior to a commissioning kickoff meeting.



WMU Design Guidelines

3.5 TRACKING OF ISSUES

- A. Issues can be created at any time during design, construction, and occupancy. Any member of the commissioning team may raise an Issue. The BECxA will create and maintain a log of issues [in **CxAlloy**], an on-line website, or other means, allowing all members of the team to:
 - 1. View the issues and related photos and documents.
 - 2. Read any responses.
 - 3. Write responses when the issue is assigned to them.
- B. All issues will be assigned to a member (or members) of the team by the BECxA in a way that will allow them to respond in writing to the Issue and provide photos and documents as part of their response.
- C. For those issues assigned to the [**Construction Manager**][**General Contractor**] or to a sub-contracting entity:
 - 1. Respond in writing to the issue, as a minimum, within ten (10) working days of its published date or the date of any subsequent comment by the BECxA.
 - 2. If work on resolving an issue is in progress, indicate this in writing.
 - 3. Ensure the subcontractors provide information required to solve the issue.
 - 4. Mark issues “ready for verification” when components are installed, complete and ready for the BECxA to verify.
- D. Periodically, all issues that are open and have not been responded to within 10 working days will be submitted to the Owner as delinquent.
- E. The BECxA reserves final discretion in determining the status of issues as “Open”, “Ready for Verification”, or “Closed”. The BECxA may also opt to finalize an issue as “For Record Only”, which denotes that the issue has been terminated without further action or definitive resolution.
- F. The Owner reserves the right to hold retainage for subcontractors with an unacceptable number of open issues where responses are not up-to-date.
- G. The final BECx Report will contain a copy of the issues log identifying the status of all issues.

3.6 GENERAL TESTING REQUIREMENTS

- A. If tests cannot be completed because of a deficiency outside the scope of the building enclosure systems, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.
- B. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.
- C. Coordinate schedule with, and perform Cx activities at the direction of the CxA.

3.7 LABORATORY MOCKUP TESTING

- A. Laboratory Mockup Testing Service: [**Owner will engage**] [**Engage**] a qualified testing agency to perform testing on laboratory mockups.



- B. Laboratory Mockup Testing Program: Perform the tests listed below in the following order.
1. Structural: ASTM E330 at 50 percent of positive test load for not less than **[10] <Insert number>** seconds.
 - a. No evidence of deflection exceeding specified limits.
 2. Air Infiltration: ASTM E283 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.
 3. Water Penetration under Static Pressure: ASTM E331 at minimum static-air-pressure differential of **[20 percent] <Insert differential>** of positive wind-load design pressure, but not less than **[6.24 lbf/sq. ft.] [10 lbf/sq. ft.] [15 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 4. Water Penetration under Dynamic Pressure: AAMA 501.1 at minimum air-pressure differential of **[20 percent] <Insert differential>** of positive wind-load design pressure, but not less than **[6.24 lbf/sq. ft.] [10 lbf/sq. ft.] [15 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 5. Structural: ASTM E330 at 100 percent of positive and negative test loads for not less than **[10] <Insert number>** seconds.
 - a. No evidence of deflection exceeding specified limits.
 6. Air Infiltration: ASTM E283 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.
 7. Water Penetration under Static Pressure: ASTM E331 at minimum static-air-pressure differential of **[20 percent] <Insert differential>** of positive wind-load design pressure, but not less than **[6.24 lbf/sq. ft.] [10 lbf/sq. ft.] [15 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 8. Water Penetration under Dynamic Pressure: AAMA 501.1 at minimum air-pressure differential of **[20 percent] <Insert differential>** of positive wind-load design pressure, but not less than **[6.24 lbf/sq. ft.] [10 lbf/sq. ft.] [15 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 9. Thermal Cycling: AAMA 501.5.
 10. Air Infiltration: ASTM E283 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.



WMU Design Guidelines

11. Water Penetration under Static Pressure: ASTM E331 at minimum static-air-pressure differential of **[20 percent]** <Insert differential> of positive wind-load design pressure, but not less than **[6.24 lbf/sq. ft.] [10 lbf/sq. ft.] [15 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
12. Structural: ASTM E330 at 150 percent of positive and negative test loads.
 - a. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding **[0.2]** <Insert number> percent of span.
 - b. Test Durations: As required by design wind velocity, but not less than **[10]** <Insert number> seconds.

3.8 INTEGRATED EXTERIOR MOCKUP TESTING

- A. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to perform tests and inspections.
- B. Integrated Exterior Mockup Testing Program: Perform the following tests in the following order:
 1. Smoke Testing: ASTM E1186 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] <Insert value>**.
 2. Opaque Wall Air Infiltration: ASTM E783 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of <Insert value>.
 3. Window Air Infiltration: ASTM E783 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of <Insert value>.
 4. Water Penetration under Static Pressure: ASTM E1105 with minimum **[uniform]** **[and]** **[cyclic]** static-air-pressure differential of **[6.24 lbf/sq. ft.] [8.0 lbf/sq.ft.] [10 lbf/sq. ft.] [12 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 5. Water Penetration under Dynamic Pressure: AAMA 501.1 at a test pressure of **[6.24 lbf/sq. ft.] [8.0 lbf/sq.ft.] [10 lbf/sq. ft.] [12 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 6. Pull-off Strength of Adhered Air Barriers: ASTM D4541 as modified by ABAA.
 - a. Minimum **[16 lbf/sq. in.] <Insert value>** adhesion to substrate.
 7. Pull Test for EIFS: ASTM E2359.
 - a. <Insert value>.



8. Sealant Durability: ASTM C794.
 - a. **<Insert peel strength>**.
9. Outdoor-Indoor, Sound-Transmission Loss: ASTM E966.
 - a. **<Insert value>**.
10. Outdoor A-Weighted Sound Levels: ASTM E1014.
 - a. **<Insert value>**.
11. Outdoor Sound Measurements Using Digital Statistical Sound Analysis: ASTM E1503.
 - a. **<Insert value>**.

3.9 FIRST-INSTALLATION MOCKUP TESTING

- A. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.
- B. Wall Mockups: Perform the following tests in the following order:
 1. Smoke Testing: ASTM E1186 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] <Insert value>**.
 2. Opaque Wall Air Infiltration: ASTM E783 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.
 3. Window Air Infiltration: ASTM E783 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.
 4. Water Penetration under Static Pressure: ASTM E1105 with minimum **[uniform] [and] [cyclic]** static-air-pressure differential of **[6.24 lbf/sq. ft.] [8.0 lbf/sq.ft. (384 Pa)] [10 lbf/sq. ft.] [12 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 5. Water Penetration under Dynamic Pressure: AAMA 501.1 at a test pressure of **[6.24 lbf/sq. ft.] [8.0 lbf/sq.ft.] [10 lbf/sq. ft.] [12 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
 6. Pull-off Strength of Adhered Air Barriers: ASTM D4541.
 - a. **<Insert value>**.
 7. Pull Test for EIFS: ASTM E2359.



WMU Design Guidelines

- a. **<Insert value>**.
 8. Sealant Durability: ASTM C794.
 - a. **<Insert peel strength>**
 9. Outdoor-Indoor, Sound-Transmission Loss: Per ASTM E1332, determined by testing according to ASTM E966.
 - a. **<Insert OITC value>**.
 10. Outdoor A-Weighted Sound Levels: ASTM E1014.
 - a. **<Insert value>**.
 11. Outdoor Sound Measurements Using Digital Statistical Sound Analysis: ASTM E1503.
 - a. **<Insert value>**.
- C. Roof Mockup: Perform the following tests in the following order:
1. Air Leakage Site Detection: ASTM E1186.
 - a. No evidence of air penetration.
 2. Flood Testing of Horizontal Waterproofing: ASTM D5957.
 - a. No evidence of water penetration for a minimum 48 hours.
 3. Water-Spray Test: AAMA 501.2.
 - a. No evidence of water penetration.
 4. Electronic Leak Detection:
 - a. No evidence of water penetration.
- D. Horizontal Below-Grade Waterproofing and Slab-on-Grade Mockups: Perform the following tests in the following order:
1. Water Penetration: ASTM D5957.
 - a. No evidence of water penetration.
 2. Water-Spray Test: AAMA 501.2 for terminations and interface conditions.
 - a. No evidence of water penetration.
 3. Electronic Leak Detection.
 - a. No evidence of water penetration.
- E. Vertical Below-Grade Waterproofing Mockups: Perform the following tests in the following order:



1. Water Penetration: ASTM E1105 without air-pressure differential.
 - a. No evidence of water penetration.
 2. Water-Spray Test: AAMA 501.2.
 - a. No evidence of water penetration.
- F. Building Expansion Joint Mockups: Perform the following tests in the following order:
1. Water Penetration under Static Pressure: ASTM E1105 with minimum **[uniform] [and] [cyclic]** static-air-pressure differential specified for laboratory testing, but not less than 6.24 lbf/sq. ft..
 - a. No evidence of water penetration.
 2. Water-Spray Test: AAMA 501.2.
 - a. No evidence of water penetration.
- 3.10 BUILDING ENCLOSURE TESTING
- A. Building Enclosure Testing: Perform testing before installation of interior finishes unless otherwise indicated.
- B. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.
- C. **<Insert Type>** Building Enclosure Testing: Perform the following tests in the following order:
1. Smoke Testing: ASTM E1186 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] <Insert value>**.
 2. Opaque Wall Air Infiltration: ASTM E783 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.
 3. Window Air Infiltration: ASTM E783 at a static-air-pressure differential of **[1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.] <Insert value>**.
 - a. Maximum air leakage of **<Insert value>**.
 - b. Perform a minimum of two tests.
 4. Air Leakage Site Detection: ASTM E1186.
 - a. Maximum air leakage of **<Insert value>**.
 5. Water Penetration under Static Pressure: ASTM E1105 with minimum **[uniform] [and] [cyclic]** static-air-pressure differential of **[6.24 lbf/sq. ft.] [8.0 lbf/sq.ft.] [10 lbf/sq. ft.] [12 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.



WMU Design Guidelines

6. Water Penetration under Dynamic Pressure: AAMA 501.1 at a minimum air-pressure differential of **[6.24 lbf/sq. ft.] [8.0 lbf/sq.ft.] [10 lbf/sq. ft.] [12 lbf/sq. ft.] <Insert value>**.
 - a. No evidence of water penetration.
7. Water-Spray Test: AAMA 501.2.
 - a. No evidence of water penetration.
8. Flood Testing of Horizontal Waterproofing: ASTM D5957 on all exterior horizontal surfaces.
 - a. No evidence of water penetration.
9. Location of Wet Insulation in Roofing Systems: ASTM C1153.
 - a. No wet insulation.
10. Pull-off Strength of Adhered Air Barriers: ASTM D4541 as modified by ABAA.
 - a. Minimum **[16 lbf/sq. in.] <Insert value>** adhesion to substrate.
11. Anchor Pull-Out: ASTM E488/E488M.
 - a. **<Insert value>**.
12. Pull Test for EIFS: ASTM E2359.
 - a. **<Insert value>**.
13. Sealant Durability: ASTM C794.
 - a. **<Insert peel strength>**.
 - b. Perform a minimum of three tests.
14. Whole Building Air Leakage Rate by Fan Pressurization: ASTM E779.
 - a. Maximum Air Leakage Rate: **<Insert value>**.
15. Whole Building Air Tightness Using an Orifice Blower Door: ASTM E1827.
 - a. Maximum Air Leakage Rate: **<Insert value>**.

3.11 RECORD DOCUMENTS

- A. For building enclosure components, and in accordance with the related sections, provide the final version of the following to the BECxA for information:
 1. Operation and Maintenance manuals.
 2. Spare parts and extra stock materials lists, where required.
 3. Warranty forms executed for this project.



4. As-built drawings and specifications
- B. Make corrections, clarifications, and updates to these documents recommended by the C.
- C. Provide revised copies for inclusion in a systems manual to be prepared by the BECxA.

3.12 TRAINING OF OWNER PERSONNEL

- A. Coordinate and schedule training for Owner's designated personnel.
 1. Facilitate a sign-in process and submit sign-in sheet to BECxA.
- B. The BECxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.
- C. Prepare a training outline and submit to BECxA for comment and approval. Provide training of the Owner's personnel.
- D. Coordinate and schedule training, and ensure that training is completed, for those systems identified for training in the commissioning plan.
- E. Prepare a training agenda with scheduled dates, and submit to Building Enclosure Commissioning Authority for information. Make changes to the agenda recommended by the Building Enclosure Commissioning Authority. Make provision for Building Enclosure Commissioning Authority to attend training. Provide training for the personnel identified by the Owner in accordance with related sections.

3.13 POST OCCUPANCY RESPONSIBILITIES

- A. During Warranty Period:
 1. Coordinate with system and material manufacturers to determine specific requirements necessary to maintain the validity of the warranty.
 2. Execute seasonal or deferred functional performance testing, witnessed by the BECxA, when specified as part of the commissioning process.
 3. Correct issues of non-compliance. Make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.
 4. Provide all requested submittal data, including specific responsibilities of the Owner to keep warranties in force.

3.14 BUILDING ENCLOSURE TESTING SCHEDULE

END OF SECTION 01 9119.43