2.1 PROJECT MANAGEMENT

2.1.1 GENERAL

The Design Team and Constructor will work primarily with the Project Manager from Mason Facilities. All input and coordination shall be conducted through the Project Manager. Input during design will be generated by various elements of the campus community, including Facilities and its allied departments.

At award of the construction contract, a representative from Facilities will oversee the contractor's work and administer the construction contract. Roles and responsibilities are defined in the CPSM and promulgated by the Bureau of Capital Outlay Management (BCOM).

Terms such as "George Mason University," "Mason," or "the university" used in the Design Manual refer to George Mason University Facilities (Project Manager), especially when approval permission or consultation is referenced.

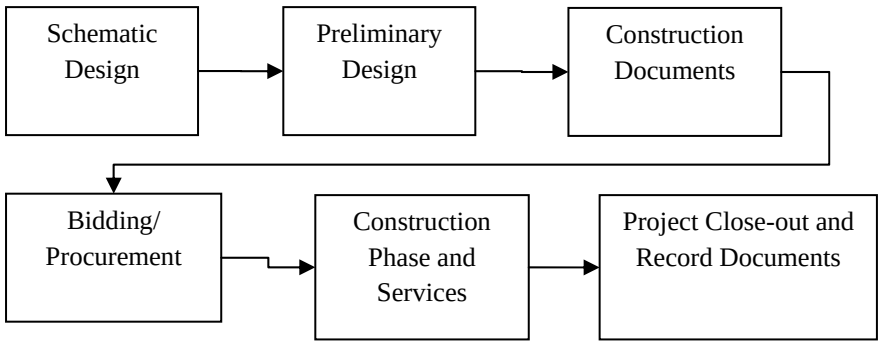
Refer to the chart below for the general flow of the Design Process at George Mason University.

2.1.2 COMMUNICATION PLAN AND PROCEDURES

George Mason University, as an agency of the Commonwealth of Virginia, follows the procedures for design as outlined in the CPSM.

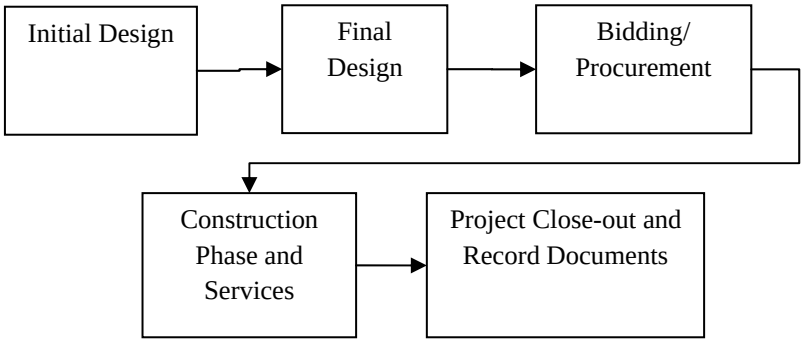
Prior to a project being formulated and assigned a project code by BCOM, often the university will develop a planning level package that develops scope, feasibility, and programming for a proposed effort. This effort is geared to aid in the submission of a project as a part of George Mason University's capital plan. Normally these efforts are spearheaded by a planner within Facilities. See also Pre-Design below.

For Capital Projects, the process involves 6 basic steps as outlined in the following diagram.

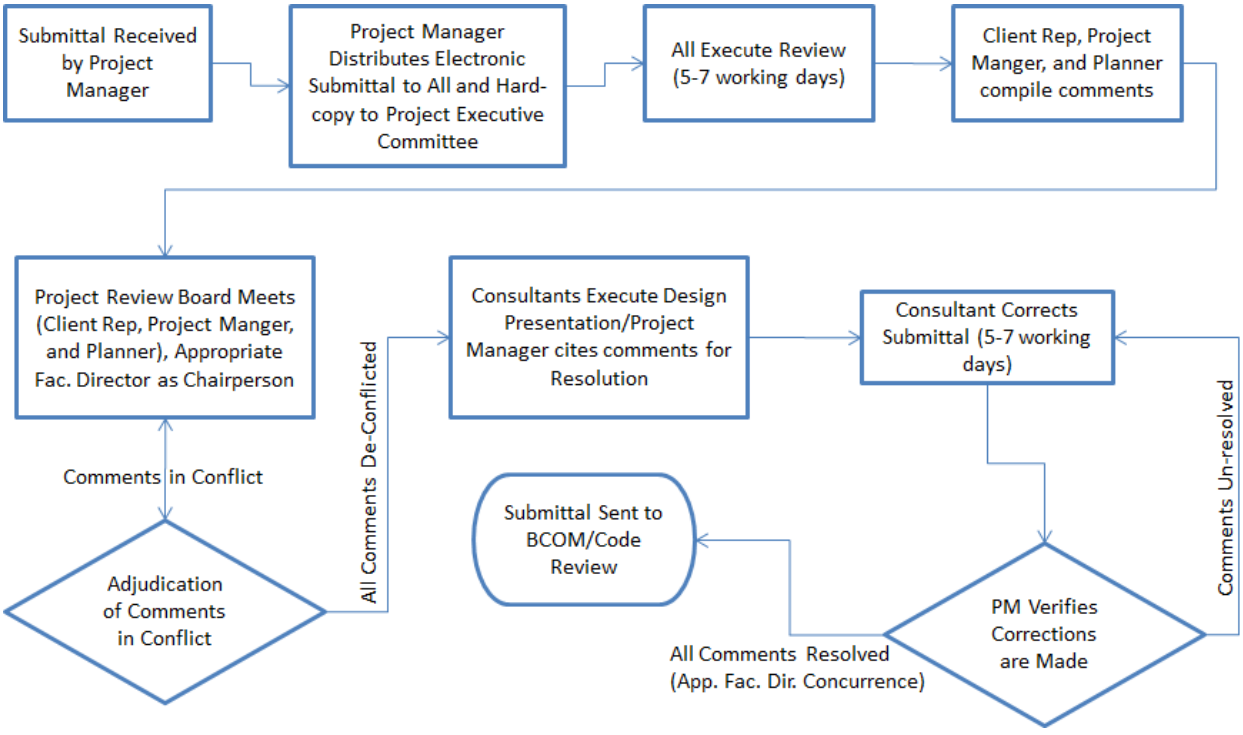


At each stage of the capital project development process, the State Review Agency and Authority Having Jurisdiction, BCOM, executes reviews of the project for code and state compliance requirements, while the university reviews the project for additional project requirements. The Project Manager will be the primary point of contact and shepherd the project thorough all stages of the project.

For all non-capital projects, this process is somewhat abbreviated. Unlike in capital projects, the state review agency, BCOM, does not require interim reviews of design submittals, and in some cases has delegated authority to the local agency for maintenance, minor renovation, and modification projects.



As noted above, at each stage the university will either review design submittals prior to sending them to BCOM or concurrently review design submittals while they are at BCOM. A process similar to the following flow chart will be followed and managed by the Project Manager. Typically, review by the university will take 21-28 days.



2.1.2.1 Meeting Minutes

The Design Team shall provide meeting minutes for all meetings during the design process. Typically, the project will maintain recurring monthly, bi-weekly, or weekly meeting, depending on the design development schedule. Some meetings may target particular topics, while the purpose of others will be general progress updates. Other meetings may take the form of workshops or design charettes. The Design Team shall make a record of meeting

participants and the items discussed. Meeting minutes shall be distributed primarily to the Project Manager, but may include others as requested. Minutes shall be provided in an editable electronic format, and saved for record in PDF format following a minimum 2 week commenting period. During the Construction Phase the Design Team must schedule bi-weekly (or semi-monthly) construction progress meetings in consultation with the Project Manager and Owner. The purpose of the meetings is to review progress of the work during the previous week, discuss anticipated progress during the following weeks, and review critical operations and potential issues. The Design Team shall conduct the meeting and is solely responsible for generating the written record or minutes of each progress meeting. The Design Team distributes progress meeting minutes in an electronic editable format to the Owner and the Contractor(s). All objections or corrections are noted as such at the next progress meeting or in writing to the Design Team. The Design Team is to be notified at the next progress meeting or in writing explaining the objection. The minutes of the next Progress Meeting shall reflect any objection or response from the Design Team. The Design Team may transmit the agenda and minutes for each progress meeting using electronic means as directed by Project Manager.

2.1.2.2 Decision-Making

Decision making as a part of the design process shall be facilitated by the Project Manager and the Planner assigned to the project. Ultimate authority for all decisions resides with the Vice President of Facilities, delegated and affirmed by the Directors of the various departments of the Facilities organization.

2.1.2.3 Day-to-Day Management of Project

References:

- Refer to the CPSM, Chapter 2.2 for definition of the Project Manager.

2.1.3 INVOICING

References:

- CPSM, Chapter 3.2.4 – Proportioning of the A/E Fee and Payments

2.1.3.1 Alternates

No deduction shall be made from the Design Team's fee for any penalty or liquidated damages charged to any contractor, excepting in Design-Build projects. No additional compensation shall be made for preparation of alternates, unless the Owner prior to execution of the work approves such additional compensation in writing.

2.1.3.2 Payments

During Pre-Design Activities (Programmatic Phase), Schematic Design, Design Development, and Contract Documents and Bidding, the university shall make monthly payments to the Design Team based on the progress of the work as outlined in the Commonwealth of Virginia's Construction and Professional Services Manual (Capital Outlay Manual). Such payments shall in no event exceed the fee limits for phases as set forth in the contract. These payments shall be limited in proportion to the Owner's estimate of progress and percentage completion of the work in the current phase. During Construction, the payments toward the fixed fee due for that phase shall be made to the Design Team in proportion to progress payments made to the Constructor for construction of the Project, as certified by the Design Team.

The Design Team shall use a format for payments as provided by the DEB.

2.1.3.3 Change Orders

The Design Team cannot proceed on change orders without the written authorization from Mason. Change orders cannot be billed without such authorization. Refer to the CPSM, Chapter 3.2.5.

All change orders shall be sequentially numbered when approved. The revised contract amount shall be shown on the invoice along with the original contract amount and the previous contract amount if more than one change order. Invoices shall follow the same format as previously described.

2.1.4 SCHEDULES

During the design phase (through completion of Working Drawings and permit issuance) the Design Team shall develop a project schedule that details all design deliverables, BCOM review periods, and periods of design effort. A minimum of 4 weeks—and an average of 6 weeks—should be allocated for the review of any design submittal by BCOM. Prior to submittal to BCOM or local code review authorities, the Design Team shall allow sufficient time for Mason's internal review. Annotations shall be made for critical meetings and design charette workshops. The Design Team shall coordinate closely with the Project Manager for the availability of Mason personnel and scheduling of other resources through the design phase of a project.

The following chart of meetings is provided as a reference for the meetings that are anticipated during throughout the project:

Meeting Name (one per phase unless otherwise noted)	Feasibility	Programming	Schematic Design	Preliminary Design	Working Drawings	Construction	Commissioning	Close-out	Warranty
Kick-off Meeting	x	w	w	w	w	x	x	w	x
Core Team Member Periodic Meeting (suggested every 2x weeks)	x	x	x	x	x	x	x	x	x
Core Team and Design Team Meeting (in conjunction with the above)	x	x	x	x	x	x	x	x	
Core Team and CM/DB/GC Pre-Construction Meeting (with the above)		w	w	x	x	o			
Design Meetings (numerous per phase, may be in periodic meetings)	w	x	x	x	x				
Core Team Member Internal Meeting (once monthly or as needed)	x	x	x	x	x	x	x	x	x
Interview with Users (as required)	x	x	x	w	o	o	o	o	o
Value Engineering			x	x	x				
Sustainability	x	x	x	x	w		x	x	o
Project Review (one per month)	x	x	x	x	x	x	x	x	x
Finishes Determination/Selection		o	x	x	x	o			
Architectural Design Review (one initial, until UA approved, per phase)		x	x	x	x	o			
ITU Meeting		o	x	x	x	o	x	w	
Facilities Management Shops Input Meeting - MEP Focus			x	x	x		x	x	x
Facilities Management Shops Input Meeting - Others (e.g. Recycling)			x	x	x		x	x	x
Pre-Survey Meeting			x						
Post-Survey Meeting			x						
Utilities Meeting (one per phase with each utility)			x	x	x				
EHS Meeting		x	x	x	x				

Meeting Name (one per phase unless otherwise noted)	Feasibility	Programming	Schematic Design	Preliminary Design	Working Drawings	Construction	Commissioning	Close-out	Warranty
Parking and Transportation Meeting		x	x	x	x				
Public Safety Meeting									
Space Administration Presentation		x	x		x				
ADA Compliance Meeting		x	x	x	x				
Auxiliary Enterprises (when not the primary client)			x	w	w				
Town hall Presentations			x	x	x				
Pre-Construction Meeting						x			
Construction Progress Meeting (every 2x weeks, with Core Team Meeting)						x	x	x	
Preparatory Meeting						x	x		
Punch-list Generation (at conclusion of each phase of construction)							x	x	
Punch-list Resolution (every 2x weeks)								x	
Turn-over Meeting (to FM)								x	x
Warranty Review (NLT 3 months prior to conclusion of gernal warranty)									x

Code Key:

x	Must Occur
w	Can be waived (Especially if similar meeting occurs in earlier phase, and no additional team members), but assumed to take place
o	Optional (Discretion of Team Leader, see Project Team Member Checklist)

2.1.4.1 Construction Phase

During the Construction Phase, the Design Team shall review and provide information related to the reasonableness of the Contractor/CM schedule for execution (in D-B this will be done as an independent analysis by the Design Team on behalf of the university). At the Bidding/Proposal/GMP stage, the Design Team is responsible for notifying the university if it feels it does not have adequate Construction Phase services coverage in terms of fee, personnel, or scope of services to cover the project as a part of the construction schedule review. The Design Team shall work with the Project Manager to account for any variations/contract modifications that may be required.

2.1.5 DELIVERABLES

2.1.5.1 General

References:

- CPSM: http://www.dgs.virginia.gov/DivisionofEngineeringandBuildings/BCOM/CPSM/2012CPSMRev1/tabid/1267/Default.aspx
- BCOM forms: http://www.dgs.virginia.gov/DivisionofEngineeringandBuildings/BCOM/Forms/tabid/406/Default.aspx
- Virginia Public Records Management Manual: http://www.lva.virginia.gov/agencies/records/manuals/vprmm.pdf
- VPRRM Retention Schedules: http://www.lva.virginia.gov/agencies/records/sched_state/index.htm
- Construction Operations Building Information Exchange: http://www.wbdg.org/resources/cobie.php

The Commonwealth DEB has strict requirements for reporting, and subsequent approval of updates at each stage of the project, and the CPSM does a thorough job of describing the submittal requirements for each phase of a project. Chapter 5 of the 2012 CPSM covers Project Submittal Standards and Requirements. Specifically:

- The CO-3a, Terms and Conditions of the A/E Contract, Sections 15 and 16, prescribe required documents to be provided to the Owner, at the completion of the Design Team's work.
- Refer to Chapter 5 of the CPSM for general requirements on all project submittals, specifically the requirement for all project documents, (drawings, specifications, contracts, invoices, correspondence, etc.), to be clearly marked with the 11 digit Project Identification Code.
- Refer to CPSM, Chapter 5.11 for Project Submission Requirements, specifically the Table for Required Submittal Copies by Phase for Capital Projects in Chapter 5.11.1 of the CPSM. The Design Team shall provide at a minimum the number indicated as required for review by BCOM and State Fire Marshall. Additional copies, "as appropriate for a particular project" shall be coordinated with the university. Refer to the Table for Required Submittal Copies by Phase for Non-Capital Projects in Chapter 5.11.2 of the CPSM. Coordinate with the university for additional copies that may be required.
- Refer to Chapter 5.2 of the CPSM for General Requirements for Drawings. These requirements generally pertain to a printed drawing, and the CPSM requires hardcopy drawings for submission to BCOM. Further clarification on the required format can be found in Section 2.2 of the Design Manual.

- Refer to Chapter 5.3 (specifically, Section 5.3.3) of the CPSM for information on Specification Standards. Note that submission to BCOM shall be hardcopy 8.5”x11” format. Chapter 7.24.4 of the CPSM states that, “These documents shall be provided to the Owner electronically in PDF format. The Owner may also request additional copies of the record documents in other formats at its discretion.”

Beyond the requirements of the CPSM, the university has submittal requirements in conjunction with the design phase of a project and the Construction Phase. These are detailed in the Design Manual and are partially indicated in the following checklist:

Mason Design Submittal Checklist

Item	Schematic Design	Schematic Re-Submit	Preliminary Design	Preliminary Re-Submit	Working Drawings	WD Re-Submit	Building Permit	Fire Alarm/ Sprinkler	FA/Sprink. Re-Submit
BCOM Required Items (see also CPSM)									
Basis of Design Narrative (with which Agency agrees)	X	X	X	X					
DPB Form S-1, Project Scope Profile (updated to reflect current scope)	X	X	X	X					
Cost Estimate provided by Architect/Engineer	X	X	X	X	X	X			
Soils Report with Boring Logs (provided by Agency)			X	X					
Calculations (1 copy for each discipline)			X	X	X	X	X	X	X
Drawings (WD and BP* Drawings must be sealed)	X	X	X	X	X	X	X		
Boring Logs (posted on drawings)					X	X	X		
Shop Drawings (provided by GC/CM/DB, with sealed review cover sheet)								X	X
Equipment Cut Sheets								X	X
Building Systems and Equipment Checklist			X	X					
Project Manual, including:									
Project-Specific IFB Notice					X	X	X		
Project-Specific Bid Form					X	X	X		
Form CO-7 (General Conditions, unedited)					X	X	X		
Form CO-7a (Instructions to Bidders, unedited)					X	X	X		
Other Standard Forms					X	X	X		
Project-Specific Technical Specification Sections					X	X	X		
Soils Report (copy bound in Project Manual)					X	X	X		

Mason Design Submittal Checklist

Item	Schematic Design	Schematic Re-Submit	Preliminary Design	Preliminary Re-Submit	Working Drawings	WD Re-Submit	Building Permit	Fire Alarm/ Sprinkler	FA/Sprink. Re-Submit
Other Items (list below):									
Stmt. of Struct. & Special Inspections (CO-6a & CO-6b)					X	X	X		
Independent Cost Estimate provided by Agency (CM Est. if CM, DB Contract if DB)			X	X					
V.E. Study & Recommendations (Report & VE-1)			X	X					
Application for Building Permit (CO-17a)							X		
Design Team Responses to BCOM Review		X		X		X			X
GMU Additional Required Items									
Prepped Form DGS-30-380_04-08_Transmittal_for_Review	X	X	X	X	X	X	X	X	X
Departure from the GMU Deisgn Manual Log/Matrix	X	X	X	X	X	X	X	X	X
Request for Code Modification Matrix	X	X	X	X	X	X	X	X	X
LEED or VEES Scorecard Update with Back-up Documentation	X	X	X	X	X	X			
Program Re-Confirmation (with DPB S-1 Form)	X	X	X	X	X	X			
Blocking and Stacking/Linkage-Adjacency Analysis	X		X						
Reference Master Plan Documentation Compliance Check	X		X		X		X		
AARB Approval (SD or PD and WD)	X		X		X				
Updated Building Systems and Equipment Checklist					X	X			
Owners Performance Requirements (OPR) (and revisions)	X	X	X		X	X			
BOD/Actual Equipment Cut Sheets			X		X		X	X	X

Mason Design Submittal Checklist

Item	Schematic Design	Schematic Re-Submit	Preliminary Design	Preliminary Re-Submit	Working Drawings	WD Re-Submit	Building Permit	Fire Alarm/ Sprinkler	FA/Sprink. Re-Submit
Engineering Analysis & Calculations									
Structural	X		X		X	X	X		
Civil	X		X		X	X	X		
Mechanical	X		X		X	X	X		
Plumbing	X		X		X	X	X		
Electrical	X		X		X	X	X		
Fire/Life Safety	X		X		X	X	X	X	X
Accoustics/AV	X		X		X	X	X		
Net/Telecom	X		X		X	X	X		
Load Letters/Utilities									
Electric LL (Per Dominion Power), Revised at PD	X		X						
Water Connection (Per City of Fairfax), Revised at WD			X		X				
Sanitary Fixture Count/DU Count (Per County of Fairfax), Revised at WD			X		X				
Gas (Per Washington Gas), Revised at WD			X		X				
Site Utility Routing Diagram (Revised at PD)	X		X						
Health Department (Food Service only)			X		X				
Detailed List of Owner Provided Items that Impact the Construction/Design (Includes FF&E required)			X	X	X	X			
Consolidiated Submittals List			X	X	X	X			
Consolidated Bench/Attic Stock List			X	X	X	X			
Consolidated Warrenty List					X	X			
Consolidated Training Requirements List					X	X			
Consolidated Planned/Designed Outages					X	X			

Mason Design Submittal Checklist

Item	Schematic Design	Schematic Re-Submit	Preliminary Design	Preliminary Re-Submit	Working Drawings	WD Re-Submit	Building Permit	Fire Alarm/ Sprinkler	FA/Sprink. Re-Submit
EIR			X						
SWPPP			X		X				
VSMP/NPDES/E&S Controls Permit Application			X		X				
HAZMAT Survey Disclosure (Survey by Agency)			X		X		X		
DEQ Form 7/AST Back-up			X		X		X		
Life Cycle Cost versus First Cost Analysis (CM/DB or A/E)	X		X		X				
Additive Bid Items List (with Priority and Order)			X		X	X	X		
CxA Issues Log and Status	X		X		X	X		X	X
ICE/CM: Schematic Estimates/DB: Proposal Cost	X								
CM/DB: Risk Analysis Matrix	X		X		X	X			
CM/DB: VE Items List/Log	X		X		X	X			
CM/DB: Design Review Comments/Log	X		X		X	X	X		
GC/CM/DB: Phasing/Logistics Plan (GC after Permit)			X		X	X	X		
CM/DB: Long Lead Item Matrix			X		X	X	X		
CM/DB: Construction Schedule	X		X		X	X	X		
CM/DB: Site Specific Safety Plan			X		X		X		
CM: GMP/ICE: Final Estimate							X		
GC: Notice of Intent to Award Construction Contract							X		

Note: Unless otherwise approved by the Project Manager or a GMU Form is provided, all parties shall utilize standard DGS or DPB Forms for all of the above tasks that pertain. These forms can be found at the following two links:

BCOM Forms Center or DPB Forms Center

2.1.5.2 Pre-Design

Pre-Design has two distinct meanings at Mason. The first refers to studies, efforts, and planning done in order to develop and round out the capital plan for submission to the Commonwealth; referred to Pre-Planning Studies. The second are activities that occur prior to the execution of the design of a particular project that has been approved/authorized by the Commonwealth and George Mason University for execution; Pre-Design Activities.

2.1.5.2.1 Pre-Planning Studies

The Director of Campus Planning leads the effort to construct the university's 6-year capital plan. On a Bi-annual basis this plan is developed and submitted to the Commonwealth for approval. In order to construct this plan, the first step is to refer to Mason's Master Plan Document(s). These can be found at http://facilities.gmu.edu/masterplans/index.htm. Master Plan documents are periodically updated as needed by the university in collaboration with consulting firms, under the direction of the Campus Planning portion of Facilities.

Pre-Planning Studies are executed to define the scope, schedule, and budget for a potential capital project at the university. Design firms are often procured for these studies through term contracts that the university already has established.

Deliverables for Pre-Planning Studies include:

- Project justification narrative
- Conceptual cost estimate
- Massing studies
- Review and validation of deferred maintenance (if applicable)
- Site analysis
- Utility coordination planning
- Phasing/sequencing/schedule plan

A Planner from the Campus Planning portion of Facilities will oversee and direct a pre-planning study. A specific scope, details and requirements will be developed for each study. Planning studies require the use of the Design Manual to ensure that the project developed and submitted into the capital plan accounts for all aspects of its eventual development.

2.1.5.2.2 Pre-Design Activities

References:

- Refer to the CPSM, Chapter 5.5 for details on the required pre-design conference. Agendas and meeting minutes from this conference shall be documented and kept in the permanent project record.

Prior to the start of design, the Design Team must furnish a planned design schedule, a proposed fee allocation and a clear understanding of the scope of services for the project. These are annotated and agreed upon based on a Memorandum of Understanding that becomes a part of the CO-3 A/E services contract.

The Design Team shall fully understand the program and other requirements through a review of the project authorization indicated on the CO-2 and project submission documentation that the university has used to define the project at the outset. These documents can be provided to the Design Team by the university. For the purpose of fee negotiations, Mason's anticipated fee amount may be withheld from the Design Team during this stage of the project.

As a part of the Pre-Design Phase, the Design Team shall provide the university with a report on the existing conditions, as well as any absent investigations that are to occur in subsequent phases. This report, to be delivered prior to the beginning of Schematic Design, shall include applicable narratives, diagrams, photographs, and other descriptive items. This report will require positive concurrence by the university prior to entering into Schematic Design. Refer to Section 2.3 – Existing Conditions in the Design Manual for additional requirements.

It is during this phase that the final design services contract is developed and finalized. The Design Team shall ensure that they have a full understanding of the various responsibilities and typical contract mechanisms used as it relates to specialty consultants. The following annotates some of those requirements:

- CxA Services: Mason typically acquires Commissioning Agent (CxA) services independently from the prime Design Team contract. If there is a CxA hired by Mason, the Design Team shall work closely with them to coordinate and assure responsibilities for design development and construction project commissioning are concluded and scoped correctly in the design documents. The Project Manager will facilitate the process of scope clarification for the various services. If Mason does not hire an independent CxA, they will direct the Design Team to hire such services, or opt to have the Design Team provide certain CxA services as Mason directs.

- Geotechnical Engineering Services: Mason typically acquires Geotechnical Engineering services independently from the prime Design Team contract. If there is a Geotechnical Engineer hired by Mason, the Design Team shall work closely with them to coordinate and develop the subsurface investigation plan during design. Likewise they will coordinate with the Geotechnical Engineer regarding foundation and other related design elements of the project during design development. Should it be necessary, Mason's Geotechnical Engineer may be brought in to aid with field issues as they occur during the construction phase of the project. The Design Team will ensure Boring Plans are adequately presented in the design documents per CPSM requirements. The Project Manager will facilitate the process of scope clarification for the various services. If Mason does not hire an independent Geotechnical Engineer, they will direct the Design Team to hire such services, or opt to have the Design Team provide certain Geotechnical Engineering services as Mason directs.

- Engineering and Materials Testing Services: Per CPSM requirements, Engineering and Materials Testing services must be independently procured by Mason for all capital and non-capital projects permitted through BCOM. The Design Team shall work closely with the Engineering and Materials Testing team to ensure that all quality assurance testing is timely, coordinated, and noted in the construction contract documents. Likewise they will coordinate with the Engineering and Materials Testing service regarding structural and other related design elements of the project during design development. The Engineering and Materials Testing team will be brought in to aid with field issues as they occur during the construction phase of the project. The Design Team will ensure that the testing plans are adequately presented in the design documents per CPSM requirements. The Project Manager will facilitate the process of scope clarification for the various services.

- AV Consultant: It is expected that the project design team will provide a qualified AV consultant (preferably possessing a InfoComm CAVSP Emerald Level or higher organizational certification) to

assist with AV infrastructure, Acoustics (a separate acoustical consultant is permissible) and AV drawings to be included in the construction documentation when one of the following scenarios exist: There are classrooms in the project; Specialty Classrooms or Labs (Discipline Specific Spaces); Experimental Classrooms; Classrooms with 150 seats or greater; or when more than 3 Classrooms are a part of the project scope. Outside of these scenarios, and when a project is outside of the ability of Mason's resources to execute the scope of the project (as determined by the university), the shall Design Team provide: a) A qualified AV consultant for AV infrastructure and AV Systems Design for any project where non-classroom spaces are to be equipped with AV equipment and b) Coordination among classroom & non-classroom space designs in order to consolidate purchasing, design, implementation, etc.

- Estimating Services: Mason will hire an independent cost estimator (ICE) on all projects (either independently, or through CM Pre-Construction Services, or by virtue of the Design-Build proposal price). For CM/Traditional General Contractor projects, the Design Team shall provide such assistance as is required to ensure the ICE/CM is able to adequately estimate the project at the various stages of the project. Likewise, the Design Team will work with the ICE/CM to execute estimate reconciliation at the direction of the university at each design phase/estimate.

- Mason Term Consultants: It is noted that Mason has several term consultants that it may opt to use or provide portions of design effort throughout the process. Several of these perform specialty services that enable better synchronization with overall campus systems and themes. The Project Manager will facilitate the process of scope clarification for the various services.

2.1.5.3 Schematic Design

References:

- Refer to CPSM, Chapter 5.6 for requirements for submittal to BCOM at the Schematic Design phase.

Note that this phase is also called "initial design" in non-capital projects.

In addition to these requirements, the Design Team shall provide the following items as a part of the Schematic Submittal (packaged separately from, but at the same time as the items above):

- A listing of any and all deviations from the Design Manual for approval by the university, if applicable. Such deviations require a narrative justification for each deviation provided by the Design Team.

- A listing of any and all deviations from the code for review by the university, if applicable. The Design Team shall prepare a justification in accordance with (IAW) the CPSM and the VUSBC for each deviation. If agreed upon by the university, the Design Team shall prepare a code waiver for submission to BCOM.

- Provide a LEED (or Envision) checklist for the project as it is understood with backup documentation.

- Provide a tabular program reconfirmation based upon the design as it is understood. Deviation from the program as it was established by the university prior to Schematic Design shall require a narrative or other justification on the part of the Design Team.

- Provide blocking/stacking and linkage/adjacency analysis information. The Design Team shall determine the best way to present this information in coordination with the university.

- Provide confirmation and reference information related to the applicable George Mason University Master Plan(s). The Design Team shall provide a narrative and/or depictions on how this project fits within the

larger context of the campus in terms of the Master Plan. It must be made clear that the Design Team has carefully analyzed the Master Plan and incorporated the applicable elements into the proposed design.

- Provide materials to support submission to the Art and Architecture Review Board (AARB). Based on direction from the university, the Design Team shall provide boards and other depictions and be prepared to present these to the AARB.

- Provide an annotated copy of the Owners Performance Requirements. This document shall follow a standard template (AASHRAE Guideline 0) and indicate the performance measures for the project. This document will be initially drafted by the independent CxA if there is one as a part of the project; otherwise, drafting of the document shall be done by the Design Team.

- Provide a copy of any and all calculations, by discipline, used in the design to this stage.

- Provide an Electrical Load letter in the format used by the applicable utility for the site/campus.

- Provide an annotated diagram that indicates desired utility routing on the site of construction.

- As directed by the university, provide life-cycle cost analysis for elements of the design. In D-B and CM projects this is to be done in conjunction with the construction execution portion of the team.

- Provide the CxA issues log and status report with annotations from the Design Team, when CxA services are provided for a project.

- Provide a reconciled copy of the estimate as executed by an independent cost estimator or the CM (in addition to the Design Team's reconciled cost estimate), if applicable.

- For CM/D-B projects provide a copy of the risk analysis matrix in coordination with the university at an order of magnitude level.

- Provide a VE Items listing using the applicable DEB form.

- For CM/D-B projects, provide a copy of the updated anticipated construction schedule.

2.1.5.4 Preliminary Design

References:

- Refer to the CPSM, Chapter 5.7 for requirements for submittal to BCOM at the Preliminary Design phase. Specific requirements for drawings are enumerated, and compliance with the NCS is strongly encouraged.

In addition to these requirements, the Design Team shall provide the following items as a part of the Preliminary Design Submittal (packaged separately from, but at the same time as the items above):

- A listing of any and all deviations indicated in the design, from this design manual for approval by the university, if applicable. Such deviations require a narrative justification for each deviation provided by the Design Team, beyond those previously approved.

- A listing of any and all deviations indicated in the design, from the code for review by the university, if applicable. The Design Team shall prepare a justification in accordance with (IAW) the CPSM and the VUSBC for each deviation. If agreed upon by the university, the Design Team shall prepare a code waiver for submission to BCOM, beyond those previously approved.

- Provide an annotated and updated copy of the design issues identified by the university and/or BCOM in prior design submissions, with locations to find resolutions within the design submittal. Comments and resolutions are to be segregated into resolved and unresolved issues in the log/comment sheet, as determined by the university.

- Provide a LEED (or Envision) checklist for the project, as it is understood, with backup documentation.

- Provide a tabular program reconfirmation based upon the design as it is understood. Deviation from the program as it was established by the university prior to Schematic Design shall require a narrative or other justification on the part of the Design Team.

- Provide blocking/stacking and linkage/adjacency analysis information. The Design Team shall determine the best way to present this information in coordination with the University.

- Provide confirmation and reference information related the applicable George Mason University Master Plan(s). The Design Team shall provide a narrative and/or depictions on how this project fits within the larger context of the campus in terms of the Master Plan. It must be made clear that the Design Team has carefully analyzed the Master Plan and incorporated the applicable elements into the proposed design.

- Provide materials to support submission to the Art and Architecture Review Board (AARB). Based on direction from the university, the Design Team shall provide boards and other depictions and be prepared to present these to the AARB, if the project has not previously garnered full approval from the AARB.

- Provide an updated and revised copy of the Owners Performance Requirements. This document shall follow a standard template (AASHRAE Guideline 0) and indicate the performance measures for the project.

- Provide a copy of information as it relates the Basis of Design of any major component. Items such as cut-sheets, standard details and drawings, and operations information shall be provided for review by the university.

- Provide an initial furniture design and layout. Such layouts and designs shall be closely coordinated and approved by the Mason Interior Design staff.

- Provide a copy of any and all calculations, by discipline, used in the design to this stage.

- Provide an Electrical Load letter in the format used by the applicable utility for the site/campus.

- Provide water connection information in the format used by the applicable utility for the site/campus.

- Provide a sanitary fixture count/housing unit count in the format used by the applicable utility for the site/campus.

- Provide a Gas Load letter in the format used by the applicable utility for the site/campus, if applicable.

- Provide a revised annotated diagram that indicates desired utility routing on the site of construction.

- Provide information for the Health Department in the format used by the applicable utility for the site/campus, if applicable.

- Provide a detailed listing, on behalf of the university, of the owner-provided items that affect the project. This includes but is not limited to the furnishing, fixtures and equipment to be provided.

- Provide a consolidated listing of all submittals indicated in the project manual in a format acceptable to the university.
- Provide a listing and indication of the anticipated bench/attic stock (if any) for the project.
- Provide an Environmental Impact Report in accordance with state and federal requirements.
- Provide a stormwater pollution prevention plan (if applicable) in accordance with state and federal requirements.
- Provide a Virginia Stormwater Management Program and Erosion and Sediment Control Permit application for the project.
- Provide a recommendation for the Hazardous Materials disclosure statement based upon the Hazardous Materials survey information provided by the university.
- Provide information to support air permitting by the university for any emitting device in the project and/or information to support storage tank permitting in accordance with state and federal law.
- As directed by the university, provide life-cycle cost analysis for elements of the design. In D-B and CM projects this is to be done in conjunction with the construction execution portion of the team.
- Provide a listing of proposed Additive Bid items in the design, with applicable priorities.
- Provide the CxA issues log and status report with annotations from the Design Team, when CxA services are provided for a project.
- Provide a reconciled copy of the estimate as executed by an independent cost estimator or the CM (in addition to the Design Team's reconciled cost estimate), if applicable.
- For CM/D-B projects provide a copy of the risk analysis matrix in coordination with the university. This risk should allow for an understanding of the impact in terms of weeks of time or in terms of the nearest thousand dollars of expense.
- Provide a VE Items listing using the applicable DEB form.
- For CM/D-B projects, provide a copy of the updated anticipated construction schedule.
- For CM/D-B projects, provide a copy of the phasing/site logistics plan created by the construction executor.
- Provide a listing of any long lead item (in excess of 10% of the anticipated construction duration) for the project. This listing shall include anticipated time for procurement, delivery and installation, as well as the latest date of order to meet the anticipated construction schedule critical path requirements.
- For CM/D-B projects, provide a copy the site specific safety plan for review.

2.1.5.5 Working Drawing Phase Documentation

References:

- Refer to CPSM, Chapter 5.8 for requirements for submittals to BCOM at the Working Drawings Phase (Construction Documents Phase). This phase is also referred to as "Final Design" in non-capital projects.

In addition to these requirements, the Design Team shall provide the following items as a part of the Working Drawing Submittal (packaged separately from, but at the same time as the items above):

- A listing of any and all deviations from the Design Manual for approval by the university, if applicable. Such deviations require a narrative justification for each deviation provided by the Design Team, beyond those previously approved.

- A listing of any and all deviations from the code for review by the university, if applicable. The Design Team shall prepare a justification in accordance with (IAW) the CPSM and the VUSBC for each deviation. If agreed upon by the university, the Design Team shall prepare a code waiver for submission to BCOM, beyond those previously approved.

- Provide an annotated and updated copy of the design issues identified by the university and/or BCOM in prior design submission, with locations to find resolutions within the design submittal. Comments and resolutions are to be segregated into resolved and unresolved issues in this log/comment sheet, as determined by the university.

- Provide a LEED (or Envision) checklist for the project as it is understood with backup documentation. In addition, demonstration of submission of the LEED design submittal credit approvals shall be provided.

- Provide a tabular program reconfirmation based upon the design as it is understood. Deviation from the program as it was established by the university prior to Schematic Design shall require a narrative or other justification on the part of the Design Team.

- Provide confirmation and reference information related to the applicable George Mason University Master Plan(s). The Design Team shall provide a narrative and/or depictions on how this project fits within the larger context of the campus in terms of the Master Plan. It must be made clear that the Design Team has carefully analyzed the Master Plan and incorporated the applicable elements of those plans in the design presented.

- Provide materials to support submission to the Art and Architecture Review Board (AARB). Based on direction from the university, the Design Team shall provide boards and other depictions and be prepared to present these to the AARB, if the project has not previously garnered full approval from the AARB.

- Provide an updated and revised copy of the Owners Performance Requirements. This document shall follow a standard template (AASHRAE Guideline 0) and indicate the performance measures for the project.

- Provide an updated copy of the Building Systems and Equipment Checklist as indicated in Chapter 5.7.2.2 of the CPSM.

- Provide a copy of information as it relates the Basis of Design of any major component. Items such as cut-sheets, standard details and drawings and operations information shall be provided for review by the university if not already provided.

- Provide air-flow drawings and diagrams for all mechanical systems.

- Provide a copy of any and all calculations, by discipline, used in the design to this stage.

- Provide an Electrical Load letter in the format used by the applicable utility for the site/campus, if not already provided at an earlier stage and not in need of revision.

- Provide water connection information in the format used by the applicable utility for the site/campus, if not already provided at an earlier stage and not in need of revision.
- Provide a sanitary fixture count/housing unit count in the format used by the applicable utility for the site/campus, if not already provided at an earlier stage and not in need of revision.
- Provide a Gas Load letter in the format used by the applicable utility for the site/campus, if applicable, if not already provided at an earlier stage and not in need of revision.
- Provide information for the Health Department in the format used by the applicable utility for the site/campus, if applicable.
- Provide a detailed listing, on behalf of the university, of the owner provided items that affect the project. This includes but is not limited to the furnishing, fixtures and equipment to be provided.
- Provide a consolidated listing of all submittals indicated in the project manual in a format acceptable to the university.
- Provide a listing and indication of the anticipated bench/attic stock (if any) for the project.
- Provide a listing of all warranties to be provided as a part of the project to the university.
- Provide a listing of all training to be provided as a part of the project to the university.
- Provide a listing of all required/planned/anticipated outages related to the construction of the project.
- Provide a storm water pollution prevention plan (if applicable) in accordance with state and federal requirements, if not already provided at an earlier stage.
- Provide a Virginia Stormwater Management Program and Erosion and Sediment Control Permit application for the project.
- Provide a recommendation for the Hazardous Materials disclosure statement based upon the Hazardous Materials survey information provided by the university.
- Provide information to support air permitting by the university for any emitting device in the project and/or information to support storage tank permitting in accordance with state and federal law.
- As directed by the university, provide life-cycle cost analysis for elements of the design. In D-B and CM projects this is to be done in conjunction with the construction execution portion of the team.
- Provide a listing of proposed Additive Bid items in the design, with applicable priorities.
- Provide the CxA issues log and status report with annotations from the Design Team, when CxA services are provided for a project.
- For CM/D-B projects provide a copy of the risk analysis matrix in coordination with the university. This risk should allow for an understanding of the impact in terms of days of time or in terms of the nearest hundred dollars of expense.
- Provide a VE Items listing using the applicable DEB form.

- For CM/D-B projects, provide a copy of the updated anticipated construction schedule.
- For CM/D-B projects, provide a copy of the phasing/site logistics plan created by the construction executor.
- Provide a listing of any long lead item (in excess of 10% of the anticipated construction duration) for the project. Such a listing shall include anticipated time for procurement, delivery and install, as well as the latest date of order to meet the anticipated construction schedule critical path requirements.
- For CM/D-B projects, provide a copy the site specific safety plan for review, if not already provided.

2.1.5.6 Permit Phase Documentation

References:

- Refer to Chapter 5.9 of the CPSM for requirements for Bid Forms and Procedures.

In addition to these requirements, the Design Team shall provide the following items as a part of the Permit Submittal (packaged separately from, but at the same time as the items above):

- A listing of any and all deviations from the Design Manual for approval by the university, if applicable. Such deviations require a narrative justification for each deviation provided by the Design Team, beyond those previously approved.
- A listing of any and all deviations from the code for review by the university, if applicable. The Design Team shall prepare a justification in accordance with (IAW) the CPSM and the VUSBC for each deviation. If agreed upon by the university, the Design Team shall prepare a code waiver for submission to BCOM, beyond those previously approved.
- Provide an annotated and updated copy of the design issues identified by the university and/or BCOM in prior design submissions, with locations to find resolutions within the design submittal. Comments and resolutions are to be segregated into resolved and unresolved issues in this log/comment sheet, as determined by the university.
- Provide confirmation and reference information related the applicable George Mason University Master Plan(s). The Design Team shall provide a narrative and or depictions on how this project fits within the larger context of the campus in terms of the Master Plan. It must be made clear that the Design Team team has carefully analyzed the Master Plan and incorporated the applicable elements of those plans in the design presented.
- Provide a copy of information as it relates the Basis of Design of any major component. Items such as cut-sheets, standard details and drawings, and operations information shall be provided for review by the university, if not already provided.
- Provide a copy of any and all calculations, by discipline, used in the design to this stage.
- Provide a recommendation for the Hazardous Materials disclosure statement based upon the Hazardous Materials survey information provided by the university.
- Provide information to support air permitting by the university for any emitting device in the project and/or information to support storage tank permitting in accordance with state and federal law.
- Provide a listing of proposed Additive Bid items in the design, with applicable priorities.

- For CM/D-B projects, provide a copy of the updated anticipated construction schedule.
- For CM/D-B projects, provide a copy of the phasing/site logistics plan created by the construction executor.
- Provide a listing of any long lead item (in excess of 10% of the anticipated construction duration) for the project. Such a listing shall include anticipated time for procurement, delivery and installation, as well as the latest date of order to meet the anticipated construction schedule critical path requirements.
- For CM/D-B projects, provide a copy the site specific safety plan for review, if not already provided.
- For CM Projects, a copy of the Guaranteed Maximum Price Proposal and acceptance by the university.
- For D-B/Design-Bid-Build/General Contracted projects, a copy of the Notice of Intent to Award.

2.1.5.7 Construction Phase Documentation

References:

- Refer to Chapter 2.1.5.8 of the Design Manual for information regarding Project Record Documentation.
- Refer to Chapters 7.10 through 7.17 of the CPSM for Requirements of the A/E during the Construction Phase. The university intends for the Design Team to provide all services both required and optional as indicated in Chapters 7.10.2 and 7.10.3 of the CPSM with the following exceptions:
    - The university does not want the Design Team to conduct the monthly pay meeting.
    - The university may opt to not have the Design Team certify pay requests and approve the CO-12 schedule of values.
    - The university does not want the Design Team to receive the contactors affidavit of claims.

During a project the Design Team shall maintain a record copy of the following items, to be provided to the university:

- Submittals, including shop drawings
- Change orders, Architects Supplemental Instructions, Bulletins, and similar documents.
- Testing records, abatement reports
- Documentation, including approved submittals, of project "piggy-back" contracts for Fixtures, Furnishings, and Equipment (CPSM, Chapter 3.2.2.7)
- All CM RFPs and responses
- Any and all inspection reports
- Meeting Minutes
- Bid process documents, contracts (as per state req.)
- Revisions to Drawings or Specifications and any addendums

- Environmental Impact Statements, Geotechnical Reports, Storm Water Management Plans, and Site utilities survey information

2.1.5.8 Project Record Documentation

References:

- Refer to Chapter 7.24 of the CPSM for the requirements for Record Drawings and Specifications.

Project Record Documentation includes the complete and formal documentation of the project. Of critical concern is the record drawings and specifications, but the documentation includes other items as well. The university requires that the Design Team shepherd this process to conclusion and deliver all Project Record Documentation, as indicated below, in a timely manner.

It is noted that the Design Team may or may not be the originator or primary caretaker of these documents, but it is still the responsibility of the Design Team to ensure that these documents are properly obtained, cataloged, collated, and provided.

Project Record Documentation shall be provided in electronic format in two manners (except as noted below). First, the documents shall be provided in an Adobe Portable Document Format (PDF), replicating the printed record derived directly from the software or source derived. If it is not possible to derive a PDF directly from the editable version, provide a scanned copy in PDF format. Secondly, the documents shall be provided in their original editable format; the original editable format must be compatible with Mason's software (see below). Editable files shall be "bundled" to include all external references and objects.

The Design Team shall prepare "record drawings" showing the "as-built" conditions, locations and dimensions based on the contractor's as-built set of drawings and specifications, and other data furnished by the contractor to the Design Team.

2.1.5.9 Record Drawings and Specifications

References:

- Refer to Chapter 7.24.1 of the CPSM. Note that this section of the CPSM does not account fully for current technology and records storage that is utilized by the university. It remains a requirement of the university to provide a hard-copy deliverable, which is stamped "Record Drawings"/"Record Specifications," and reconciled with the contractor's field information (see Chapter 7.18 of the CPSM). Additional university requirements for full project Record Drawings and Specifications are included in the Design Manual.

The following outlines the procedure that the university follows for the development of Project Record Drawings and Specifications:

- The Design Team shall obtain a copy of the contractor's "as-built" drawings from the field at substantial completion. Prior to developing the record drawings, the Design Team shall scan in the contractors "as-builts" into Adobe Portable Document Format (PDF), and catalog the drawings clearly. The A/E shall then provide two DVD/CD media copies of these drawing files to the university.

- Based on all of the project documentation collected in the Construction Phase and the contractor's "as-builts", the Design Team shall draft a set of project record drawings and specifications.

- Upon completion of draft record drawings and specifications by the Design Team, the Design Team shall provide two paper copies to the university for review.

- When the completed draft record drawings and specifications are returned to the university, the reviewer will either accept or reject them. If they are rejected, the unaccepted documents will be reported for additional revisions and returned to the Design Team for a second draft record drawings and specifications document release.

- Following university reviews, incorporating comments, and upon final acceptance by the university, provide:

    - Hard Copy: one signed and sealed copy of final Record Drawings on Mylar, one full size signed and sealed copy of final Record Drawings on standard white bond paper, one signed and sealed copy of final Record Specifications on standard white bond paper.

    - Electronic Copy: to CD/DVD media copies of : one set of files in an editable design software format that Mason uses (see below) and one in Adobe Portable Document Format (PDF), replicating the printed record drawings and specifications derived directly from the design software. All editable design files shall be "bundled" to include all external references and objects.

- The specific requirements of the accepted drawings and specifications for Mason's use are as mandated by the CPSM.

2.1.5.9.1 Additional Project Record Documentation

References:

- Virginia Records Management Manual.pdf: http://www.lva.virginia.gov/agencies/records/manuals/vprmm.pdf

- Infrastructure Update Worksheet – Infrastructure Value Worksheet.pdf

The Design Team shall ensure that in addition to the Project Record Drawings and Specifications, the following items are provided to the university:

- Provide the final approved and certified LEED (or Envision) checklist for the project with all backup documentation. Inclusive in this is a copy of any and all certification paperwork, certificates, or acknowledgements from the applicable rating agency.

- Project warranties manuals

- Project Operations and Maintenance (O&M) manuals

- A copy of all other records maintained by the Design Team during the Construction Phase in electronic format

All project submittal documentation shall be provided both electronically and in original format.

2.2 DOCUMENT ORGANIZATION AND FORMAT

2.2.1 GENERAL

References:

- CPSM, Chapter 5.2 – General Requirements for Drawings and CPSM, Chapter 5.3 – Specification Standards.

Project documents come in numerous formats. It is noted that these requirements primarily pertain to printed drawings and specifications. That said, this is the base point from which all project documentation must take its mark. It is also noted that the CPSM requires drawings submitted to BCOM to be submitted in hardcopy format.

2.2.2 DRAWING AND DOCUMENTATION STANDARDS

2.2.2.1 Drawing Format and Organization

References:

- CPSM, Chapter 5.2

It is the policy of George Mason University that the Design Team use Computer Assisted Drawing (CAD) or Building Information Modeling (BIM) software to develop drawings for all capital outlay building and infrastructure projects. For non-capital outlay projects, the primary means of developing drawings shall be CAD, but other methods may also be considered at the direction of the Project Manager.

Although Mason requires the use of CAD, it remains platform neutral, and supports the standards, guidelines, and recommendations found in the National CAD Standard. The current version can be found at http://www.nationalcadstandard.org/.

Furthermore, the university encourages the use of new technologies and collaborative efforts, and requires the use of BIM on all new capital outlay building projects and select renovation or infrastructure projects as determined by Facilities. For projects designed in BIM, Mason requires the use of the National BIM Standard and the use of the Construction Operations Building Information Exchange (COBie) format for the database support of BIM. These standards can be found at http://www.nationalbimstandard.org/ and http://www.wbdg.org/.

Mason strongly encourages and may mandate (as determined by the university) the design team to form a BIM Implementation Team, made of at least one representative from the Design Team, GC/CM/D-B Constructor, and the owner. Through the regular meetings thereof, develop and follow a BIM Execution Plan, in order to address the specific needs of the project and the developing technology and ability of the owner to utilize the data produced with BIM to support both the project, and the entire facility lifecycle.

The following formatting guidelines shall be followed in the preparation and delivery of drawings:

- When placed into a plan set (a bundle more than one sheet; whether electronic (PDF) or printed in hard copy format) all drawings shall be oriented uniformly (preferably landscape orientation). Likewise, plans shall be oriented so that the orientation of geographic north remains consistent throughout the plans (refer to Chapter 5.2.5 of the CPSM).

- Sheet Size: For capital outlay projects and non-capital outlay project submitted to BCOM for permit, 30”x42” (CPSM, Chapter5.2.3). All others shall be 22”x34”, 17”x22”, 11”x17”, or 8½” x 11”.

- Lettering: Refer to Chapter 5.2.4 of the CPSM. Fonts shall be as specified in Mason's Visual Identify Guide found at http://logo.gmu.edu/.

- Title Sheet: Shall conform to Chapter 5.2 of the CPSM. In addition, the title sheet shall include the Mason logo, as provided in Mason's Visual Identify Guide found at http://logo.gmu.edu/. The Logo shall be a maximum 3" high, minimum 2" high. The title sheet shall also contain the name, address, phone number, fax number, and email address of the Design Team and any consultants used on the project.

- Title Block: The Design Team may use their standard title block, provided it contains the following minimum information:

  - Primary Design Team firm name and sub-consultant Design Team, if applicable

  - Project name (shall match the title of the project on the CO-2)

  - Project number: cross-referenced to Project Code on the CO-2.

  - Geographic location (shall be the street address of the site)

  - Campus name (Abbreviations: ARL = Arlington Campus; FFX = Fairfax Campus; PWC = Prince William Campus, LDN = Loudon Campus, SMSC = Smithsonian-Mason School of Conservation, PSC = Potomac Science Center, POV = Point of View)

  - Date drawing was completed/approved/ready for bid (see Chapter 5.2.8 of the CPSM)

  - Revision block (indicate revision issue, revision made by, revision date, revision approved by, and revision description; block shall include at least 6 lines for revisions)

  - Scale of drawing, unless noted under each detail (refer to Chapter 5.2.14 of the CPSM)

  - Sheet number and drawing number (see below)

  - Building number, if provided by the university

  - Area large enough for Design Team's signature and seal

  - Approval block (for the signature of the university to approve the drawing)

2.2.2.2 Drawing Arrangement and Number

References:

- Refer to Chapter 5.2.6 of the CPSM for section/detail identification and section/detail numbering.

- The university's drawing numbering system must be used for all drawings. Details of Mason's drawing numbering system are included below:

- Drawings shall have the following first letter(s) indicator, in the following order (as they are applicable to the type of project): T - Title Sheet and Index, C - Plot and/or Site plans, C - Sanitary and Civil, U – Any Other Utilities, B - Boring logs, L – Landscaping, D – Demolition, A – Architectural, AI – Architectural Interiors (including Furniture Layouts), AL – Laboratory Furniture, Benches, Layouts, Details and Accessories, FS – Food Service Layouts and Details, S – Structural, FP- Fire Protection Information, SP-

Sprinkler Systems, Standpipes, and Accessories, P – Plumbing, M - Mechanical (heating, cooling, ventilation, etc.), E – Electrical, R - Asbestos Abatement.

- Each drawing shall have a unique number of the following format: First Letter Indicator (above) followed by a number in the format of XXX. The following provides further numbering information for drawings which is to be confirmed with the Project Manager for any project:
    - Indexes, reference diagrams, data, standard mountings, common terms, or narratives information shall be in the "zero series" (e.g. C001, M002, T001, etc.)
    - Plan information shall be in the "hundred series" (e.g. P101, E102, AI105, etc.)
    - Building or road cross-sections shall be in the "two hundred series" (e.g. C235, A203, etc.)
    - Details and profiles shall be in the "three hundred series" (e.g. U301, AI305, SP304, etc.)

2.2.2.3 Electronic Drawing Documents

References:

- Refer to Section 2.1.5.8 of the Design Manual for deliverable requirements for electronic documents.
- Design Team firms shall use National CAD Standards and The Uniform Drawing System, which includes the accepted CAD layer guidelines.
- If using BIM, the National BIM Standard must be used.

The university currently uses AutoCAD (current edition) as its editable drawing format. Additionally, ArcGIS is used for utility and boundary related information. The university uses Revit as its BIM software package. Mason requires that electronic drawing files must be in a format no older than two versions before the latest release (e.g. if the current software release date is 2012, the file format must be 2010 or later).

2.2.2.4 Bid Documents

References:

- Design Manual, Section 2.1.5.6 – Permit Phase Documentation

At the time of bid advertisement, provide one electronic copy on CD/DVD Media and 5 paper copies of bid drawings to the university.

2.2.2.5 Drawing Procedures

2.2.2.5.1 Drawing Release Procedure

- All fields in the title block area of the drawing are to be completed. A comprehensive description of the project and drawing title is mandatory for documentation and future reference.
- The university must sign all drawings to be released.

2.2.2.5.2 Drawing Revision Procedure

- Any changes shall be made to the original drawing; include a description of the revision in the revision area of the title block.

2.2.3 SPECIFICATION STANDARDS

2.2.3.1 Coordination

References:

- CPSM, Chapter 5.3 – Specification Standards

Specifications shall be coordinated so that issues are addressed only once, and conflicts are avoided. For instance, the engineering specifications shall not reiterate the number of shop drawings needed, or mention additions to the Bid Form. These problems often arise when the Designer of Record uses sub-consults. The prime Design Team is responsible for reviewing the other designers' specifications and coordinating such items. Specifications from consultants must be submitted to the prime Design Team with enough time to perform this review.

2.2.3.2 Format and Content

2.2.3.2.1 Format

The following guidelines must be adhered to in the formatting of project specifications:

- Use the Construction Specifications Institute (CSI) MasterFormat™, 2004 Edition, for all specifications. The format shall be consistent throughout the entire specification.
- The university currently uses Microsoft Office (current edition) as its editable specification format. Mason requires that electronic drawing files must be in a format no older than two versions before the latest release (e.g. if the current software release date is 2012, the file format must be 2010 or later).
- Specification documents shall be provided in electronic format in two manners (except as noted below). First, the documents shall be provided in an Adobe Portable Document Format (PDF), replicating the printed record derived directly from the software or source derived. Secondly, the documents shall be provided in their original editable format, in a form that is compatible with Mason’s software. Editable files shall be “bundled” to include all external references and objects.
- All articles, paragraphs and subparagraphs shall be numbered or lettered in outline form for easy reference.
- Section Number and Title shall be boldly indicated at top of first page of Section. The first Section of each Division shall also indicate the Division name and title.
- Each Section (each major CSI division shall be a separate section) shall end with "END OF SECTION XX XX XX” to indicate that this is the last page of the Section. Each page of the Section shall have the Section number and page number (sequentially numbered) centered at the bottom of the page. Reason: in the printing process it is possible to misplace a page or get pages in wrong order. The Contractor can easily determine that he has all proper pages by checking the sequential numbers and will know he has the last page with the "END OF SECTION" indication. All pages of the specification are to be sequentially numbered from page 1 to the end of the Division. This must be performed just prior to printing when the entire specification is complete and is most easily accomplished by using one of the large type numbering machines.

2.2.3.2.2 Proof Reading

The Design Team must ensure that all specifications are proofread. The omission of a simple word, such as "not," will completely change the meaning of a sentence.

2.2.3.2.3 Prohibited Language

References:

- CPSM, Chapter 5.3

The following words, phrases, and clauses are expressly prohibited:

- "Plumbing Contractor," "Food Service Contractor, etc. When writing specifications, the Design Team must be cognizant of the method of procurement of construction. For contracts using traditional Design-Bid-Build/prime Lump Sum General Contracts, the General Contractor is responsible for performing all work required. Therefore, it is the General Contractor's business decision as to how the work will be divided amongst their subcontracts (also refer to Chapter 5.3.13 of the CPSM). If the work is to be performed under Construction Management or Design-Build methodologies, and the Design Team has coordinated with the construction execution element, and upon agreement with the university, the specifications may make such an assignment. Aside from this caveat, **the only exceptions** are for automated building controls, building access systems, and chemical treatment of hydronic piping, where Mason uses specific manufacturers.

- The note "by others" or Not in Contract (NIC), unless agreed upon by the university. If there is work to be performed by others, or outside of the prime contract, name the specific contractor or agent to provide the item. Refer to Chapter 5.3.13 of the CPSM.

- The word~~s~~ "alternate" to indicate an "option". The word "alternate" shall be used only for alternate work which is specified in the technical sections of the specifications and must be included in the bidders' proposals. The word "option" shall be used to indicate items for which the contractor may make a choice without affecting the contract. All options must be approved by the university prior to construction/permit document preparation, in which case either the change will be done at no increase in cost to the project, as a credit or deduct (which the Design Team shall make clear in the appropriate specification).

- "Is," "are," or "will be." Use the word "shall," or put in imperative tense. This is particularly a problem when copying specifications provided by manufacturers which are used as a sales tool. Remove text which indicates the advantages for using this product, or other text unrelated to the nature of the material or its proper installation.

- Avoid abbreviations and symbols without clarification and consistency, such as #, @, &, and w/.

- When referring to George Mason University, use the terms "Owner" or "University". Do not use "Using Agency" or "State."

2.2.4 ROOM NUMBERING

2.2.4.1 General

The numbering of rooms at the inception of a project, through construction, and into commissioning of a building has a lasting effect on the building after construction has concluded. Room numbers are utilized to track the location of furnishings, space control, and the allocation of future program space by the Office of Space Management. Fire protection systems (inclusive of fire alarm layouts and programming), electrical systems (inclusive of panel schedules), and mechanical maintenance work must be coordinated using the appropriate room numbers. Punch-lists are developed based upon the room numbers that are provided in the plan set. Once in operation, general maintenance, energy management systems, housekeeping services, key control, housing room number assignments, telecommunications, and emergency response services depend upon an accurate room numbering system. Likewise, the registrar utilizes these numbers to enable the scheduling of classes and academic activities. Also, student life, recreation, athletic, and other activities depend upon the use of accurate and useful room numbers for the scheduling of the numerous activities that go on at George Mason University.

It is hoped that through this procedure Design Team firms will have enough guidance to anticipate these needs and assign proper room numbers as a matter of course. Note that this procedure is not all encompassing, but is intended to provide guidance in the development of the room numbering and applicable signage for any particular building that may be designed. Design Team firms are responsible for discussing, coordinating, and validating the room numbering of any particular building with the planning project manager through the design process.

2.2.4.2 Procedure

References:

- For signage related to room numbering, refer to Chapter 3.2 – Interior Space Standards in the Design Manual.

During the design phase, the Planning Project Manager will provide guidance to the Design Team regarding the assignment of room numbers. The Design Team shall review this document with the Project Manager and the Offices of Campus Planning and Space Management prior to the establishment of room numbers for the preliminary drawings.

The following are the particular guidelines to be used in numbering rooms in a building at George Mason University:

- Numbering shall be conducted by floor level.
    - The level of the building having the main entrance to the building shall be in the 1XXX series of numbers starting at 1001 and continuing through 1999. If doubt exists concerning what is to be considered as the main entrance of the building, the Planning Project Manager will make this determination in consultation with the Office of Space Management.
    - Floors above the main level shall be numbered in groupings of thousands, increasing sequentially (e.g. the level above the main level shall be 2XXX, the level above that shall be 3XXX, etc.).
    - Non-exposed floors below the main level shall be numbered in sequential hundred groupings starting with B1XX, then B2XX, etc.

- If there is an exposed level below the main entry level of the building (or between the main level and non-exposed floors below), this level shall be numbered using a thousand number grouping starting with L001 through L999. If there are multiple exposed levels below the main level of a building, coordinate a solution with the Planning Project Manager.

- In the event that the work involved requires an addition to the building that has an already established numbering system, the numbers shall be assigned by cardinal direction in relation to the existing building, and by the applicable floor level designator (e.g. a two-level east wing addition expanding the main level and the level above and below it would have room numbers for the main floor in the E1XX series, the floor above in the E2XX series, and the floor below with either ELXX or EBXX depending upon whether or not it was exposed).

- Note that there may be instances where floor levels do not easily fit into the schema indicated above (e.g. performing arts centers, arenas, etc.). In this case, the Design Team shall coordinate with the Planning Project Manager to schedule a meeting with the Offices of Space Management, Facilities Planning, Commissioning, and any other relevant parties to discuss the room numbering plan in detail. The goal, however, is to attempt to follow the guidance in the Design Manual to the maximum extent possible.

- Numbering by floor shall be conducted in a counter-clockwise fashion from the main entrance of the building (or from the entry to that floor closest to the main entrance of the building for floors above and below the main floor) flowing along the corridors to be provided. Rooms shall be numbered sequentially as their entrances are arrived at on either side of the hallway. Rooms do not need to be numbered odd on one side of the hall and even on the opposite side, but shall simply numbered in order of arrival. In the case that two rooms have their entrance doors aligned directly in front of one another, the exterior room shall be numbered ahead of the interior room.

- If a single room, or a pair of rooms, does not have direct access to a hallway/corridor, they shall be numbered following the number of the room immediately connected to the hallway/corridor.

- Multiple rooms not having direct access to hallways/corridors, such as suites or a series of multiply-connected rooms, shall have a 100 number separation from the previous room in the sequence. For instance, if an office suite has a central room off the corridor, the central room shall be assigned a number at the next century mark from the prior number room as indicated above (e.g. if the prior room was 1029 the first/central room would be 1100). The offices, in a manner of flow from one into another, or in a counter-clockwise fashion if no intervening rooms exist, shall be given numbers in singular sequence as designators for each room off the central room (e.g. 1101, 1102, 1103, etc.). Once the suites room numbers are complete, the next room shall be numbered in the next century interval (e.g. 1200 continuing the sequence above).

2.2.5 ADDENDA

References:

- CPSM, Chapter 7.3.2 – Addenda to the Bid Documents

2.3 EXISTING CONDITIONS

2.3.1 GENERAL

Sources of existing conditions documents include Mason Facilities Archives and Records, Mason Land Disturbance, George Mason University Libraries/Fenwick Library, the Facility Manager (if applicable).

The Design Team is responsible for verification and documentation of existing conditions. Any testing or verification of existing conditions beyond visual inspection will require review and approval by the Project Manager.

2.3.2 SITE CONDITIONS

2.3.2.1 Land Disturbance

References:

- CPSM, Chapters 4.17 – Erosion and Sediment Control Requirements and 6.2 – Civil and Sitework Design Standards
- Refer to the Mason Erosion and Sediment Control Standards How-to Manual: http://facilities.gmu.edu/LandDevelopment/erosion1.htm.

2.3.2.2 Site Permitting

References:

- Design Manual, Section 2.3.2.1 – Land Disturbance

2.3.2.3 Natural Features

2.3.2.3.1 Surface Investigation

2.3.2.3.1.1 Historical Concerns

- The Design Team shall ascertain any and all information required in order to determine any historical concerns of the project site or its nearby environs.

2.3.2.3.1.2 Environmental Concerns

- The Design Team shall execute such studies, surveys, assessments, and other discovery techniques to ascertain the environmental sensitivity of the project site and its environs inclusive of any implications of the Chesapeake Bay Protection Act, the provisions of the EPA, the requirements of Virginia DCR, sustainment goals of the university of the Commonwealth of Virginia, and all Environmental Impact Statements or Environmental Assessments that may have been or will be required to be executed for the site.

2.3.2.3.1.3 Survey of Existing Site Conditions

- The Design Team shall ascertain the existing topographic and on-site data as required for the actual pre-existing conditions, including existing storm and run-off structures and systems. If existing as-built data that may be provided by the university or term-contract consultants, does not represent the actual on-site conditions by simple observation, the Design Team is obligated to execute a site survey in

order to provide an accurate survey to the required precision for development within the framework of the project that the Design Team is retained for. Such a survey shall include: topographic survey of surface features, existing features mapping, an existing utility survey, a tree survey (both in plan and profile), and a soils survey. The Design Team shall execute digital photography of the site for any project.

2.3.2.3.2 Subsurface Investigation

References:

- CPSM, Chapter 6.2 – Civil and Sitework Design Standards

2.3.2.3.2.1 Geotechnical Data

- The Design Team shall review and provide feedback on provided archived Geotechnical reports. If after such a review, the A/E feels that geotechnical data is lacking, the Design Team shall make such recommendations and develop the required provisions and specifications for GMU to execute further geotechnical investigations as required for the project.

- At least two borings shall be required for parking lot areas and major roadways, in addition to the borings requested for the building itself. The minimum borings for a building shall be six with one boring for every 2,500 sq. ft. of built over area. Borings shall be to depth no less than the expected depth of excavation for the project.

- The Design Team shall show all boring results on the drawings.

- All horizontal structures within 10 feet of any proposed grade shall be investigated and identified on the drawings.

- All vertical structures within 30 feet of propose grade, at a location of refusal (e.g. bedrock) within 30 feet of proposed grades, or to a depth that is acceptable to the university that is less than these requirements, shall be investigated and identified on the drawings.

2.3.2.3.3 Storm Drainage

- During design, consider storm runoff from all areas surrounding the site in addition to storm runoff from the site and adjacent sites. Prepare calculations to support design. Calculations shall be submitted to the university.

2.3.2.4 Utilities Infrastructure

2.3.2.4.1 Utility Services

- The Design Team shall discover and assure knowledge of the locations of the various utilities feeding to or through the project site. This discovery shall require that contact be made with the applicable utility provider (Electrical: Dominion Virginia Power, NOVEC, etc.; Sewer: Fairfax County, Prince William County, etc.; Water: Fairfax City, Arlington County, etc.; Gas: Washington Gas) and be thoroughly familiar with that utility's connection and other requirements.

2.3.3 BUILDING CONDITIONS

2.3.3.1 Substructure

The Design Team shall full review and ascertain the conditions of foundations systems, substructures and nearby foundation system issues inclusive of water infiltration, uplift and differential settlement that may be evident.

2.3.3.2 Envelope

2.3.3.2.1 Existing Building As-built Conditions

- The Design Team shall execute a full review and acquire the fullest corpus possible of the as-built conditions and documents of any buildings adjoining or residing near the project site. To that end, the Design Team has the due diligence requirement to actually execute an on-site assessment of the existing architectural systems and buildings and be thoroughly familiar with the conditions and designs of those spaces. Likewise, it is expected that the Design Team shall execute such investigations as required to include inspection of cavities, hidden features, or access panels throughout the adjoining structures to be able to fully understand the as-built conditions and avoid any conflicts that may evolve pertaining to the connection to or placement near these features of the existing architecture.

2.3.3.3 Interiors

2.3.3.3.1 Hazardous Materials

- The Design Team shall execute such surveys, investigations, and discovery techniques required to ascertain the status of any and all Hazardous Materials that may be on or near the project site that may directly or indirectly effect the development and construction of the project.

2.3.3.4 Services

2.3.3.4.1 First Responder/Emergency Management

- The Design Team shall discover and ensure understanding of any applicable first responder or emergency management issues, concerns, or requirements as they pertain to the project.

2.3.3.4.2 Telecom and Security

- The Design Team shall work to understand and provide for the requirements of the George Mason University telecommunications, information technology and applicable security systems to be employed throughout the university as they pertain to this project.

2.3.3.4.3 Mechanical Systems

- The Design Team shall investigate, survey, assess and determine, as required, the conditions, balance, commissioning, and operation of any and all mechanical systems that may exist as they relate to the project. The Design Team has the obligation to ensure that such discovery enables the design team to provide a fully functioning mechanical system that maintains proper pressure balance, temperature settings, humidity control, energy management controls and other requirements seamlessly between any new and existing elements of the project.

2.3.3.4.4 Specifications

- The Design Team shall review all prior specifications, and such submittals as required, to understand the existing systems and their employment in and around the project site.

2.4 CALCULATION TEMPLATES

2.4.1 ESTIMATING STANDARDS

COMPLY WITH CPSM

2.4.2 AREA AND VOLUME CALCULATIONS

COMPLY WITH CPSM

2.4.3 ENERGY/LIFE CYCLE COSTS

RESERVED

2.5 SUSTAINABILITY QUALIFICATION

2.5.1 GENERAL

References:

- Refer to Chapter 1.5 in the Design Manual for additional information regarding Mason's approach to sustainability.

In 2007, Mason's Board of Visitors established that all new buildings and renovations must obtain, at minimum, the Leadership in Energy and Environmental Design (LEED) Silver certification level or its equivalent. Mason currently utilizes LEED, Virginia Energy Conservation and Environmental Standards (VEES), and Green Globes. Mason has a preference for LEED since it is a well-established, industry-recognized, third-party certified, progressive standard. It is the standard accepted and measured within STARS which provides Mason its sustainability rating. Thus, Mason requires use of the USGBC LEED Rating system for all building projects. For non-building projects, Mason will accept the use of the Envision rating system as an alternate to LEED.

2.5.2 COMMISSIONING

References:

- CPSM, Chapters 5.16 – Commissioning of HVAC Systems and 7.17.3 – Commissioning Inspection of HVAC Systems

- ASHRAE Guideline –0-2005, The Commissioning Process

- Design Manual, Section 3.4 – Environmental Standards

2.5.3 SUSTAINABILITY CERTIFICATION

References:

- CPSM, Chapter 6.1.3 – Special Construction Design Standards
- Design Manual, Section 3.4 – Environmental Standards

The decision regarding the minimum certification level to be obtained (LEED Silver or higher) and the requirements for certification will be part and parcel to the Preliminary Design approval. The Design Team is obligated to ensure that certification is executed and provided as part of the project record documentation.

2.5.4 LESSONS LEARNED

Following the project closeout, the Architect must lead an informational review with the university and the construction element to discuss "lessons learned" throughout the design and construction process. The purpose of this session is for Mason to gather and record knowledge that can be applied to future projects.

The "Lessons Learned" session shall include:

- Project Team
- Stakeholders/Steering Committee
- Executive Management
- Contractor/CM/D-B Construction Team
- Maintenance and Operations

Questions to address include:

- What worked well in the design and construction process?
- What would you do the same?
- Did the delivered product meet requirements and expectations?
- Were cost budgets met?
- Was the schedule met?
- Was the university's project management effective and successful?
- How could communication be improved?
- What could be done to improve the overall process?
- What obstacles were experienced, and how were they overcome?
- What procedures should be implemented in future projects?

- What changes would help to expedite future projects?

The recordation format for Lessons Learned sessions is described in the table below:

Item to Discuss	How it was handled	Recommendation for future projects	Who is affected	What can be done to improve the outcome
Communication	Example: Regular meetings were/were not held; meeting minutes were distributed to only part of the team, etc.	Example: Meeting minutes should be distributed to the entire project team, stakeholders and executive committee within X amount of time	Example: Project manager, project team	Example: Project manager will establish set dates for meetings; standards for meeting minutes (format, distribution, timeframe) will be established and enforced
Changes				
Schedule				