



Clarkson™

Construction Standards/Design Manual

Chapter 2

Design Procedures

Chapter 2

Design Procedures

2 DESIGN PROCESS AND PROCEDURES

TABLE OF CONTENTS

PAGE 2-

2	DESIGN PROCESS AND PROCEDURES	1
2.1	PROJECT MANAGEMENT	2
2.1.1	GENERAL.....	2
2.1.2	COMMUNICAITON PLAN AND PROCEEDURES	2
2.1.3	DESIGN SERVICES INVOICING	3
2.1.4	SCHEDULES	4
2.1.5	DESIGN DELIVERABLES	4
2.2	DOCUMENT ORGANIZATION AND FORMAT	18
2.2.1	GENERAL.....	18
2.2.2	DRAWING AND DOCUMENTATION STANDARDS.....	18
2.2.3	SPECIFICATION STANDARDS	21
2.2.4	ROOM NUMBERING	23
2.2.5	EQUIPMENT NAMING	26
2.2.6	ADDENDA	28
2.3	EXISTING CONDITIONS	28
2.3.1	GENERAL.....	28
2.3.2	SITE CONDITIONS.....	28
2.3.3	BUILDING CONDITIONS.....	29
2.4	CALCULATION TEMPLATES	30
2.4.1	ESTIMATING STANDARDS	30
2.4.2	AREA AND VOLUME CALCULATIONS	31
2.4.3	ENERGY/LIFE-CYCLE COSTS/TOTAL COST OF OWNERSHIP.....	31
2.5	SUSTAINABILITY QUALIFICATION	32
2.5.1	GENERAL.....	32
2.5.2	COMISSIONING	32
2.5.3	SUSTAINABILITY CERTIFICATION.....	32
2.5.4	LESSONS LEARNED	32
2.6	APPENDICES	34
2.6.1	APPENDIX A - NON-CAPTIAL PROJECT MANAGEMENT PROCESS (2.1.2)	34
2.6.2	APPENDIX B - DRAWING TYPE DESIGNATORS (2.2.2.2).....	34
2.6.3	APPENDIX C - BUILDING ACRONYMS (2.2.5.2).....	37
2.6.4	APPENDIX D - EQUIPMENT TYPE ACRONYMS (2.2.5.2).....	38

2.6.5	APPENDIX E - PRELIMINARY DRAWING/DESIGN DEVELOPMENT (PD) REQUIREMENTS (2.1.5.6).....	42
2.6.6	APPENDIX F - WORKING DRAWING (WD) DOCUMENTATION (2.1.5.7).....	47

2.1 PROJECT MANAGEMENT

2.1.1 GENERAL

The Design Team and Constructor will work primarily with the Project Manager from Clarkson 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 coordinate the administration of the construction contract. Roles and responsibilities are defined in the Construction Standards/Design Manual and promulgated by Facilities.

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

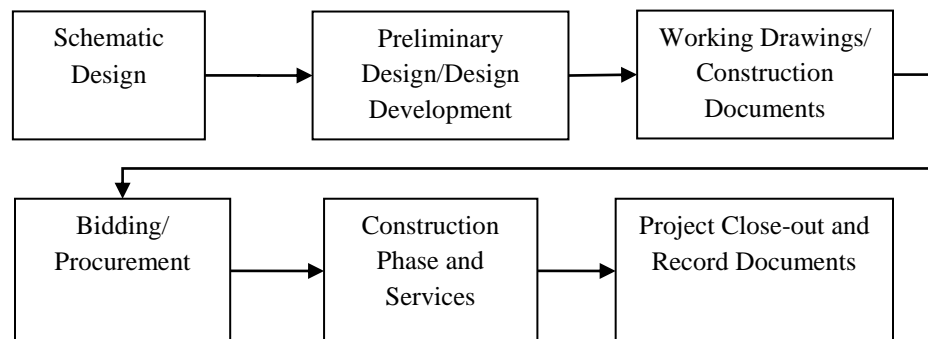
Refer to the chart below for the general flow of the Design Process at Clarkson University.

2.1.2 COMMUNICAITON PLAN AND PROCEDURES

Clarkson University follows the procedures for design as outlined in the Construction Standards/Design Manual.

Prior to a project being formulated and assigned a project number by Clarkson University, 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 Clarkson University's project planning. Normally these efforts are spearheaded by a manager within Facilities. See also Pre-Design below.

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



The Project Manager will be the primary point of contact and coordinate development through all stages of the project.

All non-capital projects will be executed per a prescribed management process. Refer to Appendix A.

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. Meeting minutes shall be distributed to all invitees, but may include others as requested. Minutes shall be provided in an editable electronic format, and saved for record in PDF format. During the Construction Phase the Design Team must schedule bi-weekly 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. All objections or corrections are noted as such at the next progress meeting or in writing to the Design Team. 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

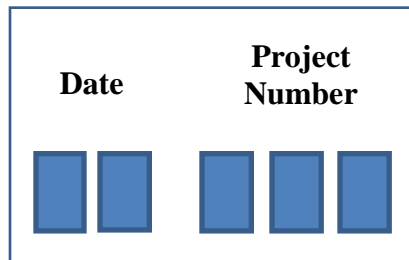
Decision making as a part of the design process shall be facilitated by the Project Manager and the Planner assigned to the project. Ultimate authority for all decisions resides with the Director of Facilities.

2.1.2.3 Day-to-Day Management of Project

The Project Manager provides all day to day management of the project.

2.1.2.4 Issuance of Project Number

A three (3) digit project number will be issued by Clarkson University. The project number will be preceded by the (2) two-digit year of the project's inception. The dated project number is to be used in all documentation (both written and electronic) and in the creation of the drawings electronic file numbers, see 2.2.2.3.



2.1.3 DESIGN SERVICES INVOICING

Proportioning of the A/E Fee and Payments shall be by phase and by deliverable. Invoicing shall occur as prescribed by the Project Manager

2.1.3.1 Alternates

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

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

2.1.3.3 Change Service/Orders

The Design Team cannot proceed on change service/orders without the written authorization from Clarkson. Change service/orders cannot be billed without such authorization.

All change service/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

The Design Team shall develop a project schedule that details all design deliverables.

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. The Design Team shall work with the Project Manager to account for any variations/contract modifications that may be required.

2.1.5 DESIGN DELIVERABLES

2.1.5.1 General

References:

- Construction Standards/Design Manual
- Local Governing Agency Documentation
- [Construction Operations Building Information Exchange](https://www.nibs.org/nbims/v3/cobie): <https://www.nibs.org/nbims/v3/cobie>
- Quantities of documentation will be determined by the project manager.
- Provide each document submission in an electronic format or as prescribed by the project manager

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

Clarkson 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
Village of Potsdam Required Items (see also Construction Standards/Design Manual)									
Basis of Design Narrative (with which University agrees)	X	X	X	X					
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 University)			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		
General Conditions					X	X	X		
Instructions to Bidders					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		
Other Items (list below):									
Stmnt. of Struct. & Special Inspections					X	X	X		

Clarkson 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
Independent Cost Estimate provided by University (CM Est. if CM, DB Contract if DB)			X	X					
V.E. Study & Recommendations (Report & VE-1)			X	X					
Application for Building Permit							X		
Design Team Responses to Village of Potsdam Review		X		X		X			X
Clarkson Additional Required Items									
Prepped Transmittal_for_Review	X	X	X	X	X	X	X	X	X
Departure from the Clarkson Construction Standards/Design 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 Envision Scorecard Update with Back-up Documentation	X	X	X	X	X	X			
Program Re-Confirmation (with Project Scope Profile)	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
Engineering Analysis & Calculations									
Structural	X		X		X	X	X		
Civil	X		X		X	X	X		

Clarkson 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
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 National Grid), Revised at PD	X		X						
Water Connection (Per Village of Potsdam), Revised at WD			X		X				
Sanitary Fixture Count/DU Count (Per Village of Potsdam), Revised at WD			X		X				
Gas (Per National Grid), 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			
Consolidated 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			
EIR			X						
SWPPP			X		X				
NYSMP/NPDES/E&S Controls Permit Application			X		X				

Clarkson 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
HAZMAT Survey Disclosure (Survey by University)			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		
<p>Note: Unless otherwise approved by the Project Manager or a Clarkson Form is provided, all parties shall utilize standard Village of Potsdam Forms for all of the above tasks that pertain. These forms can be found at the following two links:</p> <p style="text-align: center;"><u>Village of Potsdam Code Enforcement</u></p>									

2.1.5.2 Program Studies

Program Studies refers to studies, efforts, and planning done in order to develop and round out the university capital plan.

In order to construct this plan, the first step is to refer to Clarkson's Master Plan Document(s). 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.

Program 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 Program Studies include:

- Project description and justification narrative
- Massing/Scope studies including conceptual design depictions
- Review and validation of deferred maintenance (to be included in the project, if applicable)
- Site analysis
- Utility coordination planning
- Conceptual cost estimate
- Phasing/sequencing/schedule plan

The Campus Planning portion of Facilities will oversee and direct a program study. A specific scope, details and requirements will be developed for each study.

2.1.5.3 Pre-Design

Pre-design is the activities that occur prior to the execution of the design of a particular project that has been approved/authorized by the NYS and Clarkson University for execution.

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 part of the A/E services contract.

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. Refer to Section 2.3 – Existing Conditions in the Construction Standards/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. Clarkson may choose to acquire certain independent services as they apply to the project. These services may include but are not limited to;

- Commissioning Agent (CxA) Services, independent of the prime Design Team contract.
- Geotechnical Engineering Services
- Engineering and Materials Testing Services
- AV Consultant Services
- Estimating Services
- Clarkson Term Consultant Services

If Clarkson does not acquire those independent consultants they will direct the design team to do so or opt to have the Design Team provide those services, if applicable.

2.1.5.4 Program Verification

- The Program Verification Phase applies to all projects that are inferred by a program study.
- The A/E team shall review and clarify the accuracy and appropriateness of the findings outlined in the Program Study. Stake holders, user groups, and campus personnel shall be fully involved in this process.
- The final report will outline any changes in programmatic needs, test results, existing conditions, or intended use for all areas in the Program Study.

2.1.5.5 Schematic Design (SD)

Refer to the Appropriate Jurisdiction (Town, Village, etc.) for requirements for submittal of documentation at the Schematic Design phase.

The Design Team shall provide items as outlined in the Design Submittal Checklist, refer to 2.1.5., and those listed below as applicable;

- The A/E shall visit the site and ascertain pertinent local conditions which must be addressed in the design. As part of the required services, it is the A/E's responsibility to verify the configurations, locations, dimensions, sizes and conditions of all areas impacting design considerations. To minimize the risk during construction of uncovering conditions that are not as shown on the documents and delaying project progress, the University should consider and evaluate the advice of the A/E to conduct additional investigation, verifications or checks to verify existing conditions. See also section 2.3.
- Submit a revised Basis of Design Narrative included within a Fundamental Design Report. The narrative shall describe the project scope, the functional and operational criteria to be met, and the justification for the decisions or choices made.
- A listing of any and all deviations from the Construction Standards/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 the Construction Standards/Design Manual and the NYS Code for each deviation. If agreed upon by the university, the Design Team shall prepare a code waiver for submission to the appropriate jurisdiction (AHJ).
- Provide a LEED (or Envision) checklist for the project as it is understood with backup documentation.
- Provide a tabular program reconfirmation. 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.
- A drawing set that cover the following areas (the format of which and details are as :
 - General Requirements (including code compliance information)
 - Existing and Proposed Site Drawings
 - Demolition Drawings (as applicable)
 - Architectural Drawings
 - Structural/Foundation Drawings
 - Utility Routing Drawings

- Provide confirmation and reference information related to applicable areas of the Clarkson University Master Plan. 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 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 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.
- 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.
- For CM/D-B projects, provide a copy of the anticipated construction schedule.

2.1.5.6 Preliminary Design/Design Development (PD)

References:

- Refer to the local jurisdiction for submittal requirements if necessary at the Preliminary Design phase.

2.1.5.6.1 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):

- Submit a revised Basis of Design Narrative. The narrative shall describe the project scope, the functional and operational criteria to be met, the justification for the decisions or choices made, and any proposed deviations from the standards required by the Construction Standards/Design Manual.
- Complete the Building Systems and Equipment Checklist.
- The A/E shall prepare a preliminary design estimate in accordance with Section 5.4.
- Submit a value engineering study and agency recommendations.
- Submit a geotechnical report that includes boring logs, geotechnical analysis and foundation design recommendations.
- Submit one copy of calculations for each discipline. Indicate design criteria, loadings, assumptions, evaluations and comparisons of alternative systems, cost factors and other considerations which support the systems selected and shown on the drawings.
- Preliminary drawings shall include, but not be limited to, the following information unless such information is not applicable to the project. (See Appendix E, section 2.6.5 for sheet details)
 - General Requirements
 - Site Drawings
 - Demolition Drawings
 - Architectural Drawings
 - Furnishing/Equipment Drawings
 - Structural Drawings

- Fire Protection Information Plan and Calculations. Provide the following as a minimum to demonstrate compliance with the code
- Plumbing Drawings
- Mechanical (HVAC) Drawings
- Electrical Drawings (Power and lighting plans may be combined if submittal clearly conveys required information.)

2.1.5.6.2 Additional Requirements of the Preliminary Design

- A listing of any and all deviations indicated in the design, from this Construction Standards/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 Construction Standards/Design Manual and the NYS Code for each deviation. If agreed upon by the university, the Design Team shall prepare a code waiver for submission to the AHJ, beyond those previously approved.
- Provide an annotated and updated copy of the design issues identified by the university and/or Village of Potsdam 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. In addition, demonstration of LEED (or Envision) registration.
- 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 Clarkson 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 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 Clarkson 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 NYS 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 hundred dollars of expense.
- Provide a VE Items listing using the applicable 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.

2.1.5.7 Working Drawings/Construction Drawings (WD)

References:

- Refer to the local jurisdiction for submittal requirements if necessary at the Working Drawings phase.

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

- Calculations: Provide a copy of the completed design calculations of each discipline to the Clarkson Facilities. (See Appendix F, section 2.6.6.1 for calculations details). Calculations should include but are not limited to:
 - Structural Calculations.
 - Plumbing Calculations.
 - Fuel Gas Calculations.
 - HVAC Calculations.
 - Energy Conservation Calculations.

- Electrical Calculations.
- Submit Working Drawings: Working drawings shall include but not be limited to the following information. (See Appendix F, section 2.6.6.2 for sheet details)
 - General Requirements.
 - Title Sheet(s)
 - Site Drawings
 - Site/improvement plan & composite utility plan minimum for new construction and additions; shall be based on an approved comprehensive Master Plan.
 - Demolition Drawings
 - Furnishing/Equipment Plans
 - Structural Drawings
 - Fire Protection Information Plan and Calculations.
 - Access Control Systems (Security).
 - Plumbing Drawings (including maintenance drawings)
 - Mechanical (HVAC) Drawings (including maintenance drawings)
 - Electrical Drawings (including maintenance drawings)
 - Control Systems

In addition to the requirements listed above, the Working Drawing Documentation will include all documentation required in the Preliminary Design 2.1.5.6.2, as required, as well as but not limited to:

- Provide confirmation and reference information related to the applicable Clarkson 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 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.
- Demonstration of submission of the LEED (or Envision) design submittal credit approvals shall be provided. Inclusive in this is a copy of any and all certification paperwork, certificates, or acknowledgements from the applicable rating agency.
- Provide an updated copy of the Building Systems and Equipment Checklist as provided by Clarkson.
- 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 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.

2.1.5.8 Construction Documentation

References:

- Refer to Chapter 2.1.5.9 of the Construction Standards/Design Manual for information regarding Project Record Documentation.

The following services, described in the General Conditions of the Construction Contract, shall be provided by the A/E of record and shall not be delegated to others unless specifically approved by the Director of Facilities:

- - Attend preconstruction meeting
- - Make design changes required by uncovered hidden conditions
- Interpret plans & specifications
- Where the documents specify or show a means, method, sequence, technique or procedure, determine acceptability of substitute means, methods, sequence, techniques or procedures proposed by the Contractor
- Provide additional details as necessary to clearly describe what is required to be constructed
- Prepare and issue or validate all Field Orders and all University directed and/or authorized Change Orders involving any matters or items of technical nature which affect the integrity of the exterior architectural, structural or fire safety systems or which affect the integrity or operation of the mechanical, plumbing, or electrical systems.
- Clarify discrepancies in documents
- Review and approve submittals
- Reject non-conforming submittals including Sprinkler Shop Drawings & Submittals.
- Furnish approved copies of Sprinkler submittals to the Regional Fire Marshal's Office.
- Verify conformance of submittals with Plans and Specifications
- Approve or reject alternate or substitute materials proposed by Contractor
- Approve or reject equipment and materials proposed by Contractor
- Resolve conflicts between manufacturer installation instructions vs. Plans and Specifications
- Advise on acceptable procedures where installation instructions are not provided
- Approve or reject Contractor's proposed modifications to structural and other building systems
- Advise Owner on technical matters related to the project
- Conduct preconstruction meeting
- Confirm in writing, all verbal orders given by the A/E to the Contractor and/or Project Inspector
- Transmit Owner's Orders to Contractor
- Review Contractor's Schedule of Values, continuation sheets, and approve for acceptable level of breakdown, acceptable allocation of costs, proper listing of 'Unit Price' work shown on the Bid Form, and separate listing of Change Order costs.
- Verify quantities of unit price work and prepare Change Orders as appropriate for quantities actually performed or incorporated in the Work. See elsewhere in this manual for Change Order procedures.
- Review proposed work plan & schedule
- Review schedule for adequate time to review submittals
- Review/recommend approval of project CPM schedule per the General Conditions of the Construction Contract
- Report on Contractor adherence to schedule
- Review/approve progress graph
- Approve Contractor's proposed type of temporary heat as it may affect protection of construction
- Advise Owner on construction matters related to the project

- Make site visits and provide written report
- Determine progress and quality of the Work
- Recommend suspension of Work
- Inspect/spot check Work for conformance with the Contract Documents and the codes and installation / workmanship standards therein. (e.g. reinforcing clearances and laps per ACI; ductwork conforming to SMACNA; wiring conforming to NEC; etc.)
- Note and report defects and deviations in the Work
- Identify to Project Inspector any specific checks or inspections to be made as the Work progresses including what to look for
- Require defective Work to be removed and redone
- Reject inferior or poor workmanship
- Reject Work which does not conform to Contract Documents requirements
- Require Contractor to make repairs or changes deemed necessary
- With Owner's approval, suspend Work which depends on non-conforming Work until an acceptable correction or replacement is provided by the Contractor
- Approve repair/restoration of damaged work
- Inspect roof and advise when ready for roof survey
- Approve Schedule of Values format, content and breakdown.
- Review Schedule of Values pay request vs. work done & materials stored & certify amount.
- Certify monthly pay requests. The university, at its sole discretion, may opt to not have the Design Team certify pay requests and approve the schedule of values
- Review Contractor requests/claims for extension of time
- Review Contractor claims for extras
- Verify Project is ready for substantial completion inspection prior to actual inspection
- Conduct Substantial Completion Inspection and prepare punchlist
- Complete and sign Certificate of Substantial Completion
- Conduct Final Completion Inspection
- Complete and sign Certificate of Completion
- Coordinate Operation & Maintenance Manuals and other project closeout documents & submit to Owner
- Prepare Record Drawings

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 (Construction Standards/Design Manual, 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

2.1.5.9 Project Record Documentation

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 Clarkson'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.

2.1.5.10 Record Drawings and Specifications

References:

- Note that this section of the Construction Standards/Design Manual 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. Additional university requirements for full project Record Drawings and Specifications are included in the Construction Standards/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 PDF, and catalog the drawings clearly. The A/E shall then provide two Thumb Drive/Memory Stick media copies of these drawing files to the university. These shall not be a replacement for Final Record Drawings to be provided in AutoCAD and/or Autodesk Revit format.
- 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 full size signed and sealed copy of final Record Drawings on standard white bond paper and,
 - one signed and sealed copy of final Record Specifications on standard white bond paper.
- Electronic Copy: two (2) thumb drive/memory stick media copies of:
 - one set of files in an editable design software format that Clarkson uses (see below) and,
 - one in Adobe PDF, replicating the printed record drawings and specifications derived directly from the design software (AutoCAD and/or Autodesk Revit). All editable design files shall be “bundled” to include all external references and objects.
- The specific requirements of the accepted drawings and specifications for Clarkson's use are as mandated by the Construction Standards/Design Manual.

2.1.5.10.1 Additional Project Record Documentation

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 (for both design and construction submissions), 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

Project documents come in numerous formats. It is noted that these requirements primarily pertain to printed drawings and specifications or their corollaries as produced in electronic portable document format (PDF).

2.2.2 DRAWING AND DOCUMENTATION STANDARDS

2.2.2.1 Drawing Format and Organization

It is the policy of Clarkson 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.

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

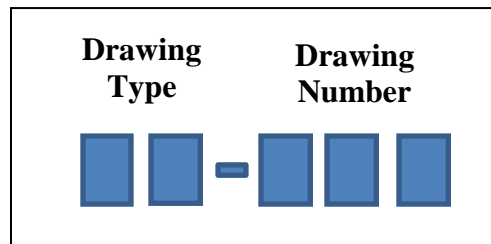
- Drawing Sets shall be landscape layout oriented so that the orientation of geographic north remains consistent throughout the plans.

- Sheet Size: Preferred sheet size is 24” x 36”
- Title Sheet: The title sheet shall include the Clarkson logo, as provided in [Clarkson’s Graphic Identity Manual](https://www.clarkson.edu/about/clarkson-brand) found at <https://www.clarkson.edu/about/clarkson-brand>. 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 Project Authorization)
 - Clarkson Project number: as issued by Clarkson.
 - Geographic location (shall be the street address of the site)
 - Campus name (Abbreviations: HILL - Hill Campus; DWTN - Downtown Campus; BECN - Beacon Institute; TRUD – Trudeau Institute; CUCR – Clarkson University Capital Region Campus)
 - Date drawing was completed/approved/ready for bid.
 - 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
 - Sheet number and drawing number (see below)
 - Building Acronym, see Appendix C (2.6.3)
 - Area large enough for Design Team’s signature and seal

2.2.2.2 Drawing Arrangement and Number

References:

The university’s drawing numbering system must be used for all drawings. Details of Clarkson’s drawing numbering systems are included below:



Each Proposed and Working Drawing Sheet will have a unique four (4) or five (5) character number containing one (1) or two (2) letters for the drawing type and three (3) digits for the drawing number with a dash in between.

- The Drawing type will have the following Level1 or Level1 & 2 discipline designators (as they are applicable to the type of project). (source; National CAD Code). Drawing Types will be arranged in the order listed below by their level 1 Designator and subsequent Level 2 Designator:

Level 1 Designator			Example of Level 1 & 2 Designator	
G	General		A	All Architectural
H	Hazardous Materials		AS	Architectural Site
V	Survey/Mapping		AD	Architectural Demolition
C	Civil		AE	Architectural Elements

L	Landscape		AI	Architectural Interiors
S	Structural		AF	Architectural Finishes
A	Architectural		AG	Architectural Graphics
I	Interiors			
Q	Equipment			
F	Fire Protection			
P	Plumbing			
M	Mechanical			
E	Electrical			
W	Distributed Energy			
T	Telecommunications			
R	Resource			
X	Other Disciplines			
Z	Contractor/Shop Drawings			
O	Operations			

For complete list of Level 1 and 2 Designators refer to Appendix B (2.6.2)

- The Drawing Number is the three-digit page or sheet number (source; National CAD Code).

000 series	General (symbols legend, notes, etc.), without exception “indexes” will start with “000”
100 series	Plans (horizontal views)
200 series	Elevations (vertical views)
300 series	Sections (sectional views, wall sections)
400 series	Large-Scale Views (plans, elevations, stair sections, or sections that are not details)
500 series	Details
600 series	Schedules and Diagrams
700 series	User Defined (for types that do not fall in other categories, including typical detail sheets and single line diagram sheets)
800 series	User Defined (for types that do not fall in other categories)
900 series	3D Representations (isometrics, perspectives, photographs)

2.2.2.3 Electronic Drawing Documents

References:

- Refer to Section 2.1.5 of the Construction Standards/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. Clarkson 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 2022, the file format must be 2020 or later).

2.2.2.4 Bid Documents

References:

- Construction Standards/Design Manual, Section 2.1.5.
- At the time of bid advertisement, provide one electronic copy on Thumb Drive/Memory Stick Media and 2 paper copies of bid drawings and project manual 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.

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

Specifications shall be coordinated so that issues are mitigated and conflicts are avoided.

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.
- Specification documents shall be provided in electronic format in two manners (except as noted below). First, the documents shall be provided in an Adobe PDF. Secondly, the documents shall be provided in their original editable format, in a form that is compatible with Clarkson's software. Editable files shall be "bundled" to include all external references and objects.
- 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.

2.2.3.2.2 Prohibited Language

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

- 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.

When referring to Clarkson University, use of the terms "Owner", "University", or "Clarkson" are acceptable.

2.2.3.2.3 Specifications

Specifications shall be on 8 1/2" by 11" sheets with bid sets preferably printed on both sides of the sheet. Font size shall be suitable for microfilming or scanning and shall not be smaller than 10-point font size. The table of contents pages shall be dated with the same date as the drawings and shall be sealed and signed. The Project Manual shall include:

- Table of Contents
- Notice of Invitation to Bid
- Instructions to Bidders
- Prebid Question Form
- Bid Form
- Standard Bid Bond Form above the level determined by Clarkson
- General Conditions of the Construction Contract
- Supplemental General Conditions, if applicable
- Contract Between Owner and Contractor
- Workers Compensation Insurance Certificate
- Standard Performance Bond
- Standard Labor and Material Payment Bond
- Change Order blank
- Schedule of Values
- Existing Testing and Inspection Reports
- List of Drawings
- Structural and Special Inspections List
- Division 1 - General Requirements, Special Conditions, etc.
- Technical Specifications
 - Technical Specification Sections should, where possible, be subdivided into the Part I - General, Part II - Products, Part III - Execution format.

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 Project Manager and/or Clarkson University Representative. 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 Clarkson University.

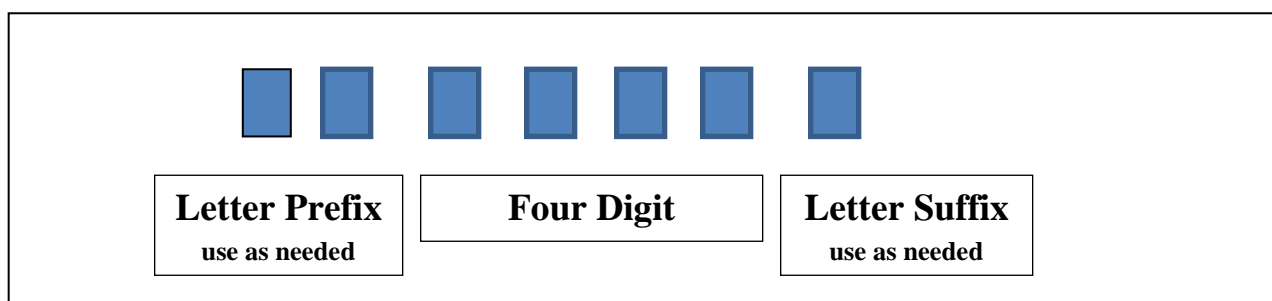
It is hoped that through this procedure Design Team firms will have enough guidance to anticipate these needs and assign proper room numbers as a matter of course. Note that this procedure is not all encompassing, but is intended to provide guidance in the development of the room numbering and applicable 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 Construction Standards/Design Manual.

During the design phase, the 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/or Clarkson University Representative prior to the establishment of room numbers for the preliminary drawings. Room numbers will consist of (4) four numbers, with a single letter prefix and/or a single letter suffix when required, as indicated in the diagram below.



2.2.4.3 Room Numbers in New Building/Area Construction

Room numbers in new building/area construction will consist of (4) four numbers, with a single letter prefix and/or a single letter suffix when required, as indicated below.

- The prefix will be a letter indicating the room/area type in Public and Facilities & Services areas, reference chart 2.2.4.8 Room/Area Prefix Chart. If no prefix is needed leave blank. Do not use “I” or “O” to avoid confusion with one and zero.
- The first number of the 4-digit number will indicate the building floor or level.
- The second number of the 4-digit number will indicate the building area; the “building area” may reference sections, wings, or special use areas within or areas related to the project. The building area will be determined by the Project Manager and/or Clarkson University Representative prior to the establishment of room numbers.
- The third and fourth numbers of the 4-digit number will indicate the room.
- The suffix will be a letter indicating rooms adjacent to or part of common areas or rooms, for example separate bedrooms within an apartment or smaller offices within one larger office area (suite). When needed, suffixes will be assigned beginning with “A” and continue around the area from left to right beginning at the entrance. If no suffix is needed leave blank. Do not use “I” or “O” to avoid confusion with one and zero. Please see section 2.2.4.8 *Room/Area Prefix Chart*.
- Roofs will use the designator “RF” (with the “F” Prefix) followed by the floor level of the roof, for example FRF4

2.2.4.4 Room Numbers in Apartment/Housing Complexes with Multi-Sectional Buildings

Room numbers in apartment/housing complexes with more than one multi-sectional building with the same or similar names, for example Woodstock Village Apartments, will consist of (4) four numbers, with a single letter prefix and/or a single letter suffix when required, as indicated below.

- The prefix will be a letter indicating the room/area type in Public and Facilities & Services areas, reference chart 2.2.4.8 Room/Area Prefix Chart. If no prefix is needed leave blank. Do not use “I” or “O” to avoid confusion with one and zero.
- The first number of the 4-digit number will indicate the building number.
- The second number of the 4-digit number will indicate the building area; the “building area” may reference sections, wings, or special use areas within, or areas related to, the project. The building area will be determined by the Project Manager and/or Clarkson University Representative prior to the establishment of room numbers.
- The third number of the 4-digit number will indicate the floor.
- The fourth number of the 4-digit number will indicate the room.
- The suffix will be a letter indicating rooms adjacent to or part of common areas or rooms, for example separate bedrooms within an apartment or smaller offices within one larger office area. When needed suffixes will be assigned beginning with “A” and continue from left to right beginning at the entrance. If no suffix is needed leave blank. Do not use “I” or “O” to avoid confusion with one and zero.
- Roofs will use the designator “RF” (with the “F” Prefix) followed by the floor level of the roof, for example FRF4.

2.2.4.5 Room Numbers in Apartment/Housing Complexes without Multi-Sectional Buildings

Room numbers in apartment/housing complexes, without multi-sectional buildings, with more than one building with the same or similar names, for example Theme Houses, will consist of (4) four numbers, with a single letter prefix and/or a single letter suffix when required, as indicated below.

- The prefix will be a letter indicating the room/area type in Public and Facilities & Services areas, reference chart 2.2.4.8 Room/Area Prefix Chart. If no prefix is needed leave blank. Do not use “i” or “o” to avoid confusion with one and zero.
- The first number of the 4-digit number will indicate the building number.
- The second number of the 4-digit number will indicate the floor
- The third and fourth number of the 4-digit number will indicate the room.
- The suffix will be a letter indicating rooms adjacent to or part of common areas or rooms, for example separate bedrooms within an apartment or smaller offices within one larger office area. When needed suffixes will be assigned beginning with “A” and continue from left to right beginning at the entrance. If no suffix is needed leave blank. Do not use “I” or “O” to avoid confusion with one and zero.
- Roofs will use the designator “RF” (with the “F” Prefix) followed by the floor level of the roof, for example FRF4

2.2.4.6 Room Number Assignments in Partial Building/Area Renovations

Room number assignment in partial building/area renovations will follow the current schema of that building/area unless otherwise agreed upon by the Design Team and the Project Manager. New suite style areas in an existing building will reference 2.2.4.3.

2.2.4.7 Designators for Roads, Walkways, and other Exteriors.

- Roads will use the prefix “RD” followed by the road number and road section letter, for example RD1A. Equipment Naming will use the road number for the Building Code and the section letter for area, ex “RD1-B-“.
- Walkways (sidewalks) will use the prefix “WW” followed by a grid designation (refer to ARCGIS campus mapping) followed by the appropriate 2-digit number within the grid, example WW5G03. Equipment Naming will use the grid designation for the Building Code and the walkway number for area, ex “WW4G-22-“.
- General Exterior Areas will use the prefix “FX” (Facilities Exterior), followed by the direction from the building being referenced (N, S, E, or W), for example SC-FXN refers to the North side exterior of Science Center. Parking Lots will use the prefix “PL” followed by the lot number, for example PL12

2.2.4.8 Room/Area Prefix Chart

Room/Area Type	Prefix
Corridors Areaways Vestibules Entrances	C
Boiler Rooms Crawl Spaces Custodial Closet/Rooms Custodial Storage Rooms Electrical Closets Mechanical Rooms	F
Fire Protection/Control Rooms Hazardous Waste Storage	H
Miscellaneous Storage	M
Public Restrooms	R
OIT/Telecommunication Closets	T
Stairs	S
Exterior Stairs	XS
Elevator	E
Roads	RD
Walkways	WW
Facilities Exteriors	FX
Parking Lots	PL

2.2.5 EQUIPMENT NAMING

2.2.5.1 General

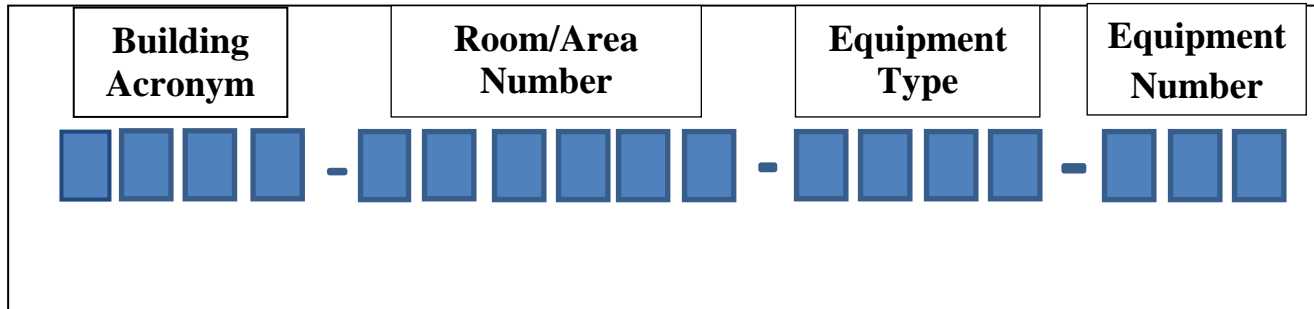
This Section identifies equipment naming conventions and acronyms for both new equipment and existing equipment currently in service.

- All new equipment will be assigned a name under the naming convention by the Design Team or Project Manager.
- Any existing equipment that is part of a renovation or improvement project that has not been assigned an equipment name under the new naming convention will be assigned one by the Design Team or Project Manager.
- The Equipment Numbering Standard will be used on all mechanical, electrical, and plumbing equipment as well as any building components that can be classified as equipment, i.e. doors, windows, furniture, etc.
- Equipment subcomponents will be named with reference to this naming convention; refer to 2.2.5.3 Equipment Subcomponent naming.

2.2.5.2 Procedure

2.2.5.2.1 Standard Equipment Naming

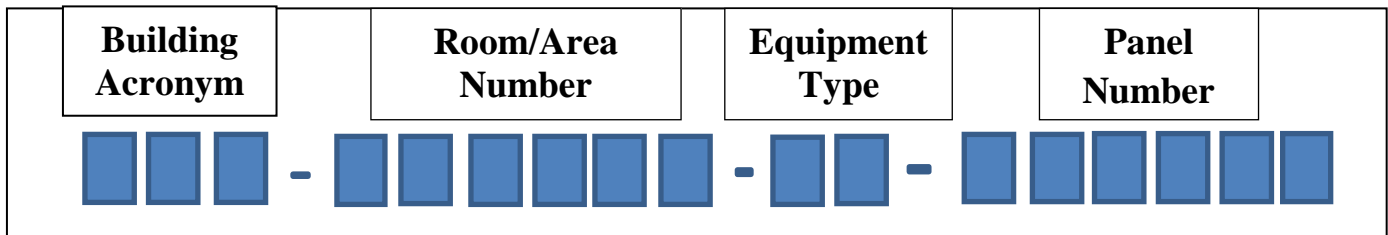
The Equipment Name will use ten to sixteen characters divided into four sections separated by a dash as outlined below.



- The first section of the equipment name will contain the 2-4 character building acronym; refer to Appendix C (section 2.6.3) Building Acronyms or section 2.2.4.7 Designators for Roads, Walkways, and other Exteriors. For buildings or areas that do not have an acronym the Design Team will consult with the Project Manager and Clarkson to determine the appropriate designation.
- The second section of the equipment name will contain the 3 to 6-digit room/area number; refer to section 2.2.4 Room Numbering. For areas that do not have a room number the Design Team will consult with the Project Manager and Clarkson to determine the appropriate number.
- The third section of the equipment name will contain the 2 to 4-character Equipment Type Acronym; refer to Appendix D (section 2.6.4) Equipment Type Acronyms. For equipment that is not listed in Appendix D the Design Team will consult with the Project Manager and Clarkson to determine the appropriate designation and the list will be updated.
- The fourth section of the equipment name will contain a 3-digit number referencing the specific piece of equipment. Use 0s to fill in numbers less than 3-digits, ex. 002, 032.

2.2.5.2.2 Equipment Naming Exceptions, Electrical Panels

- Electrical Panels and Subpanels will use the following naming format in GIS and work order management system to include the Building Acronym, Room Number, and Panel Number (which may contain up to 6 characters).
- Creation of the Panel Number will follow the Electrical Panel Naming Standard as outlined in Chapter 3, 3.3.2 Electrical Design Criteria.
- A label containing the full equipment name will be placed on the corner of the panel cover in such a way that it will not be confused with the Panel Number label.



2.2.5.3 Equipment Subcomponent Naming TBD

2.2.6 ADDENDA

TBP

2.3 EXISTING CONDITIONS

2.3.1 GENERAL

Sources of existing conditions documents include Clarkson Facilities Archives and Records, the Project 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:

- Refer to the Applicable Governing Agency regulations

2.3.2.2 Site Permitting

References:

- See Applicable Local Code for Compliance.

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 EPA, the requirements of NYS DEC, sustainment goals of the university, 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

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 Clarkson to execute further geotechnical investigations as required for the project.
- 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 determined by site location and conditions. 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 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.

2.3.3 BUILDING CONDITIONS

2.3.3.1 Substructure

The Design Team shall 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 as-built conditions and documents of any buildings adjoining or residing near the project site.

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.

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 Clarkson 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

- The A/E's Estimate should be prepared and reviewed carefully to reflect as realistically and accurately as possible the expected costs of the work at the time of receipt of bids.
- The A/E should establish consistent and compatible procedures for the preparation, review, and updating of estimates.

- The unit prices used for estimates, and corresponding actual unit bid prices when available, for the preceding 12 months should be reviewed to determine if changes in estimated unit prices are needed to reflect any trends that have occurred.
- The estimate should reflect prices that are realistic for the areas, times, and characteristics of the work to be done (regional adjustment and seasonal adjustment are especially important).
- Incentive/disincentive or escalation clauses should be considered in determining the estimated unit costs since such clauses may affect the estimate considerably.
- Other factors that can affect the estimated cost of a project such as labor rates, equipment rates, interest rates, time to complete, competition levels, and material shortages should be considered and estimated costs adjusted as necessary.
- Bid price data bases should be current at the time of estimate preparation and should be current (within 4 weeks) at the time of advertisement.
- Estimates should include a number of descriptions of the item, estimated quantity, unit, and price (words and numerals) for each proposed item of work.

2.4.2 AREA AND VOLUME CALCULATIONS

Utilize the Clarkson Provided Area Calculation Worksheet.

2.4.3 ENERGY/LIFE-CYCLE COSTS/TOTAL COST OF OWNERSHIP

- Where applicable, life cycle cost analysis shall be used as a design tool to ensure that the design provides the best value to Clarkson University. Evaluate investment cost (first cost), utility costs (energy, water use, wastewater disposal), operation and maintenance costs, and periodic replacement costs.
 - Evaluate options that create a high performance building envelope including insulation (beyond code required levels), high performance glazing, overhangs for sun control, etc. Evaluate savings in energy consumption and potential reductions in the cost of mechanical systems resulting from these options. Also consider maintenance and replacement costs.
 - Evaluate options that utilize energy efficient lighting, daylighting, occupancy lighting controls, etc. Evaluate savings in energy consumption and potential reductions in the cost of mechanical systems resulting from these options. Also consider maintenance and replacement costs.
 - Evaluate a minimum of three different mechanical system options to determine the relationship between first cost and life cycle value. Consider operating costs, maintenance and periodic replacement costs.
- For any project that exceeds \$5M in construction cost, the A/E shall provide an analysis of the Total Cost of Ownership utilizing APPA/ANSI Standard 1000-1/2 for at least a 50-year life horizon.

2.5 SUSTAINABILITY QUALIFICATION

2.5.1 GENERAL

References:

- Refer to Chapter 1.5 in the Construction Standards/Design Manual for additional information regarding Clarkson's approach to sustainability.

2.5.2 COMISSIONING

References:

- ASHRAE Guideline –0-2005, The Commissioning Process
- Construction Standards/Design Manual, Section 3.4 – Environmental Standards

2.5.3 SUSTAINABILITY CERTIFICATION

References:

- Construction Standards/Design Manual, Section 3.4 – Environmental Standards

Where applicable, the decision regarding the minimum certification level to be obtained (LEED or Envision Silver or higher) and the requirements for certification will be part of the Preliminary Design/Design Development 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 Clarkson 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?

2.6 APPENDICES

2.6.1 APPENDIX A - NON-CAPTIAL PROJECT MANAGEMENT PROCESS (2.1.2)

TBP

2.6.2 APPENDIX B - DRAWING TYPE DESIGNATORS (2.2.2.2)

Level 1 and 2 discipline designators used to designate drawing type (source; National CAD Code).

- G-** All General, All or any portion of subjects in the following Level 2 Designators
 - GI-** General Informational, Drawing index, code summary, symbol legend, orientation maps
 - GC-** General Contractual, Phasing, schedules, contractor staging areas, fencing, haul routes, erosion control, temporary and special requirements
 - GR** General Resource Photographs, soil borings
- H-** All Hazardous Materials, All or any portion of subjects in the following Level 2 Designators
 - HA-** Asbestos, Asbestos abatement, identification, or containment
 - HC-** Chemicals, Toxic chemicals handling, removal or storage
 - HL-** Lead, Lead piping or paint removal
 - HP-** PCB, PCB containment and removal
 - HR** Refrigerants, Ozone depleting refrigerants
- V-** All Survey/Mapping All or any portion of subjects in the following Level 2 Designators
 - VA-** Aerial Survey
 - VF-** Field Survey
 - VH***- Hydrographic Survey
 - VI-** Digital Survey
 - VU-** Combined Utilities
- B-** All Geotechnical, All or any portion of subjects in the following Level 2 Designators
- C-** All Civil All or any portion of subjects in the following Level 2 Designators
 - CD-** Civil Demolition Structure removal and site clearing
 - CE***- Civil Ecosystem Restoration, Environmental restoration
 - CF***- Civil Flood Control, Levees, spillways, pump stations
 - CG-** Civil Grading Excavation, grading, drainage, erosion control, retention ponds
 - CI-** Civil Improvements, Pavers, flagstone, exterior tile, furnishings, retaining walls, and water features
 - CO***- Civil Operation and Maintenance, Repair and upgrade to O&M structures
 - CP-** Civil Paving, Roads, driveways, parking lots
 - CR***- Civil Recreation, Recreation facilities
 - CS-** Civil Site, Plans, topographic, dimension control
 - CX***- Civil Security, Security-related work

- CT- Civil Transportation, Waterways, trams, railways, airfields, and people movers
- CU- Civil Utilities
- L- All Landscape, All or any portion of subjects in the following Level 2Designators
 - LD- Landscape Demolition, Protection and removal of existing landscape
 - LI- Landscape Irrigation
 - LP- Landscape Planting
- S- All Structural, All or any portion of subjects in the following Level 2Designators
 - SD- Structural Demolition, Protection and removal
 - SS- Structural Site
 - SB- Structural Substructure, Foundations, piers, slabs, and retaining walls
 - SF- Structural Framing, Floors and roofs
- A- All Architectural All or any portion of subjects in the following Level 2Designators
 - AS- Architectural Site
 - AD- Architectural Demolition, Protection and removal
 - AE- Architectural Elements, General architectural
 - AI- Architectural Interiors
 - AF- Architectural Finishes
 - AG- Architectural Graphics
- I- All Interiors All or any portion of subjects in the following Level 2Designators
 - ID- Interior Demolition
 - IN- Interior Design
 - IF- Interior Furnishings Interiors
 - IG- Interior Graphics, Murals and visuals
- Q- All Equipment, All or any portion of subjects in the following Level 2Designators
 - QA- Athletic Equipment, Gymnasium, exercise, aquatic, and recreational
 - QB- Bank Equipment, Vaults, teller units, ATMs, drive-through
 - QC- Dry Cleaning Equipment, Washers, dryers, ironing, and dry cleaning
 - QD- Detention Equipment, Prisons and jails
 - QE- Educational Equipment, Chalkboards, library
 - QF- Food Service Equipment, Kitchen, bar, service, storage, and processing
 - QH- Hospital Equipment, Medical, exam, and treatment
 - QL- Laboratory Equipment, Science labs, planetariums, observatories
 - QM- Maintenance Equipment, Housekeeping, window washing, and vehicle servicing
 - QP- Parking Lot Equipment, Gates, ticket, and card access
 - QR- Retail Equipment, Display, vending, and cash register
 - QS- Site Equipment, Bicycle racks, benches, playgrounds
 - QT- Theatrical Equipment, Stage, movie, rigging systems
 - QV- Video/Photographic Equipment, Television, darkroom, and studio equipment
 - QY- Security Equipment, Access control and monitoring, surveillance
- F- All Fire Protection, All or any portion of subjects in the following Level 2Designators
 - FA- Fire Detection and Alarm, Fire Protection
 - FX- Fire Suppression, Fire extinguishing systems and equipment
- P- All Plumbing, All or any portion of subjects in the following Level 2Designators
 - PS- Plumbing Site, Extensions and connections to Civil Utilities
 - PD- Plumbing Demolition, Protection, termination, and removal
 - PP- Plumbing Piping, Piping, valves, and insulation
 - PQ- Plumbing Equipment, Pumps and tanks
 - PL- Plumbing, Domestic water, sanitary and storm drainage, fixtures
 - PM- Plumbing Maintenance

- D-** All Process, All or any portion of subjects in the following Level 2 Designators
 - DS-** Process Site, Extension and connection to civil utilities
 - DD-** Process Demolition, Protection, termination, and removal
 - DL-** Process Liquids, Liquid process systems
 - DG-** Process Gases, Gaseous process systems
 - DP-** Process Piping, Piping, valves, insulation, tanks, pumps, etc
 - DQ-** Process Equipment, Systems and equipment for industrial processes
 - DE-** Process Electrical, Electrical exclusively associated with a process and not the facility
 - DI-** Process Instrumentation, measurement devices and controllers (electrical and mechanical)
- M-** All Mechanical, All or any portion of subjects in the following Level 2 Designators
 - MS-** Mechanical Site, Utility tunnels and piping between facilities
 - MD-** Mechanical Demolition, Protection, termination, and removal
 - MH-** Mechanical HVAC Ductwork, air devices, and equipment
 - MP-** Mechanical Piping, Chilled and heating water, steam
 - MI-** Mechanical Instrumentation, Instrumentation and controls
 - MM-** Mechanical Maintenance, Maintenance plan for filter, motor changes, etc.
- E-** All Electrical, All or any portion of subjects in the following Level 2 Designators
 - ES-** Electrical Site, Exterior electrical systems (power, lighting, auxiliary)
 - EC*-** Electrical Cathodic, Cathodic Protection systems
 - EG*-** Electrical Grounding, lightning protection devices
 - ED-** Electrical Demolition, Protection, termination, and removal
 - EP-** Electrical Interior Power, Interior power
 - EL-** Electrical Interior Lighting, Interior lighting
 - EI-** Electrical Instrumentation Controls, relays, instrumentation, and measurement devices
 - EY-** Electrical Interior Auxiliary Systems, Alarms, security, CCTV
 - EM-** Electrical Maintenance
- T-** All Telecommunications, All or any portion of subjects in the following Level 2 Designators
 - TD*-** Telecommunications, Demolition Protection, termination, and removal
 - TA-** Audio Visual Cable, music, and CCTV systems
 - TC-** Clock and Program, Time generators and bell program systems
 - TI-** Intercom, Intercom and public address systems
 - TM-** Monitoring, Monitoring and alarm systems
 - TN-** Data Networks, Network cabling and equipment
 - TS*-** SCADA, Supervisory Control and Data Acquisition (SCADA) systems and equipment
 - TT-** Telephone, Telephone systems, wiring, and equipment
 - TY-** Security Access, control and alarm systems
- R-** All Resource, All or any portion of subjects in the following Level 2 Designators
 - RC-** Resource Civil, Surveyor's information and existing civil drawings
 - RS-** Resource Structural, Existing facility structural drawings
 - RA-** Resource Architectural, Existing facility architectural drawings
 - RM-** Resource Mechanical, Existing facility mechanical drawings
 - RE-** Resource Electrical, Existing facility electrical drawings
- X-** Other Disciplines
- Z-** Contractor/Shop Drawings
- O** Operations

*- not part of NAC

2.6.3 APPENDIX C - BUILDING ACRONYMS (2.2.5.2)

Acronym	Building Name	Acronym	Building Name	Acronym	Building Name
AG	Alumni Gym	IR	Indoor Recreation Cent.	T1	Theme House 1
AH	Anton House	LH	Lewis House	T2	Theme House 2
AL	Adirondack Lodge	LS	Liberal Studies Center	T3	Theme House 3
AS	Auto Shop	MC	Clarkson University	T4	Theme House 4
BF	Bagdad Field	MR	Moore House	T5	Theme House 5
BG	Bus Garage	MT	Microturbine Building	T6	Theme House 6
BH	Boat House	NW	Newell	T7	Theme House 7
BN	Boat House Norwood	OB	Observatory	T8	Theme House 8
BQ	Barbeque Pit	OL	Olson	T9	Theme House 9
BR	Brooks	OM	Old Main Bldg	TC	TAC
C1	Craig House No. 1	OR	Ormsby	TH	Townhouse Aptmts
C2	Craig House No. 2	OS	Offsite Building	TH1	Town House Build 1
CA	Camp Building Annex	PH	Peyton Hall	TH2	Town House Build 2
CB	CAMP Building	PP	Physical Plant & Service	TH3	Town House Build 3
CC	Cheel Campus Center	PR	Price Hall	TH4	Town House Build 4
CD	Chem. Waste Disp. Fac	PW	Powers	TH5	Town House Build 5
CG	Congdon	PZ	President's House	TM	Thomas
CH	Clarkson Hall	QU	Quad Center	TR	Trinity House (ROTC)
CI	Clarkson Inn	RA	Riverside Apts	UB	University Bookstore
CL	Downtown Snell Hall	RA1	Riverside Building 1	VN	VanNote
CP	Cheeseman Property	RA2	Riverside Building 2	WC	Walker Center,Arena
CS	Carpenter Shop	RA3	Riverside Building 3	WE	Weston
CU	Cubley	RA4	Riverside Building 4	WH	Walker Heating Plant
DH	Damon Hall	RA5	Riverside Building 5	WI	Wilson
DO	Donahue	RA6	Riverside Building 6	WL	Woodstock Lodge
DS	Downtown Snell Hall	RL	Rowley Lab	WV	Woodstock Village
ER	Educational Res Ctr	RO	Ross	WV0	Woodstock Villag 10
FC	Fitness Center	RS	Research Solar Test Bldg	WV1	Woodstock Village 1
FH	Foster House	RY	Reynolds	WV2	Woodstock Village 2
FR	Farrisee	SB	Storage Building - Ground	WV3	Woodstock Village 3
GH	Graham Hall	SC	Science Center	WV4	Woodstock Village 4
HF	Hantz Field	SF	Snell Field Grandstand	WV5	Woodstock Village 5
HM	Hamlin	SN	Bertrand H. Snell Hall	WV6	Woodstock Village 6
HO	Holcroft House	SU	Student Union	WV7	Woodstock Village 7
HP	Hamlin-Powers			WV8	Woodstock Village 8
HT	Heating Plant			WV9	Woodstock Village 9

2.6.4 APPENDIX D - EQUIPMENT TYPE ACRONYMS (2.2.5.2)

Acronym	Equipment	Acronym	Equipment
ACCU	Air Cooled Condensing Unit	GDU	Garbage Disposal
ACMP	Air Compressor	GEN	Electrical Generator
ACU	Air Conditioning Unit	GEX	GENERALEXHAUST
ACUR	AIR CURTAIN	GM	Gas Meter
ADO	AUTOMATIC DOOR OPENER	GUH	Gas Unit Heater
AHU	Air Handling Unit	GWH	Water Heater , Gas
ATS	Automatic Transfer Switch	HC	Coil, Heating
GEV	Air Valve General Exhaust	HCP	Heating Coil Pump
HEV	Air Valve Hood Exhaust	HCT	Heat Coil Temperature
SAV	Air Valve Supply	HCV	Heating Coil Valve
AWO	AUTOMATIC WINDOW OPENER	HDD	Hot Deck Damper
AWP	PUMP, ACID WASTE	HEPA	HEPA FILTER
AWT	Acid Waste Neutral Treat	HEX	Steam or Hot Water Heat Exchanger
BF	Booster Fan	HPP	Heat Pump Circulation Pump
BFP	BACK FLOW PREVENTER	HPU	Heat Pump Unit
BLFP	Pump, Boiler Feed	HRC	Coil, Heat Recovery
BLR	Boiler	HRV	Heat Recovery Unit
BPV	Bypass Valve	HST	Hoist
BSC	BIOSAFETY CABINET	HTD	High Temp Detector
BSP	Building Static Pressure	HUH	Hot Water Unit Heater
BTU	British Thermal Units	HUM	Humidifier
BYP	Bypass Contactor	HUO	Humidifier Value Output
CAD	Combustion Air Damper	HUS	Humidity Set point
CAS	COMPRESSED AIR SYSTEM	HUV	Humidity Valve
CAV	CONSTANT AIR VOLUME BOX	HVT	Transformer, High Voltage
CC	Coil, Cooling	HW	Hot Water
CCP	Cooling Coil Pump	HWB	Hot Water Boiler
CCV	Cooling Coil Valve	HWC	Coil, Hot Water
CDD	Cold Deck Damper	HWP	Pump, Hot Water
CDT	Cold Deck Temperature	HWT	HOT WATER TANK
CF	Circulation Fan	HX	Heat Exchanger

CH	Chiller	ICE	Ice Machine
CHW	Chill Water	ICS	Instrument Cooling System
CHWP	Pump, Chill Water	ILV	Inlet Vane
CLG	Cooling	INCB	INCUBATOR
CMF	Chemical Feeder	INTK	INTAKE AIR PLENUM
CMP	Compressor	IRH	Infrared Heater
CNT	Count	ISD	Isolation Damper
COP	Copier	ISV	Isolation Valve
CRAC	Computer Room AC Unit	IU	INDUCTION UNIT
CRYO	CRYOGENICS FREEZER	IUCB	INDUCTION UNIT CHILLED BEAM
CS	CARD SWIPE	JP	JOCKEY PUMP
CSG	CLEAN STEAM GENERATOR	KEF	Kitchen Exhaust fan
CTB	Constant Temp Room/Box	KW	Kilowatts
CTD	COOLING TOWER DAMPER	KWH	Kilowatt Hours
CTK	Compression Tank	LFH	Lab Fume Hood
CTL	Control	LHEF	Lab Fume Hood Exhaust Fan
CW	Condensor Water	LNT	Liquid Nitrogen Tank/Freezer
CWC	Coil, Chill Water	LTD	Low Temp Detector
CWP	Condenser Water Pump	LTF	LIGHT FIXTURE
CWT	Cooling Water Tower	LVL	Level Sensor
CWV	Condensor Water Valve	LVP	LAB VACUUM PUMP
DBS	Dead Band Switch	MAD	Mixed Air Damper
DCTDT	DUCT DETECTOR	MCC	Motor Control Center
DEW	Dew point	MOD	Mode
DF	Drinking Fountain	MOT	Motion Sensor
DH	DEHUMIDIFIER	MS	Sink, Mop sink
DHP	DEHUMIDIFIER PUMP	MSG	Main Switch Gear
DHWH	DOMESTIC HOT WATER HEATER	MUA	Make Up Air Unit
DHWP	DOMESTIC HOT WATER PUMP	OAD	Outside Air Damper
DHWX	Dom Hot Water Heat Exchanger	PACU	Packaged Air Conditioning Unit
DIS	DISCHARGE	PHC	Coil, Preheat
DISC	Disconnect	PHO	Photocell

DLK	Magnetic Door Lock	PHX	PHOENIX/VENTURI VALVE
DMP	Damper	PMP	Pump
DOR	Door	PPCT	Paper Cutter
DPM	DIFFERENTIAL PRESSURE MONITOR	PRT	Pressure Tank
DPS	DIFFERENTIAL PRESSURE SWITCH	RAE	Return Air Enthalpy
DPT	Differential Pressure Transmitter	RAF	Return Fan
DRFF	Door, fire frame	RBB	Radiant Baseboard
DRFL	Door, Fire Left	RCF	Return CFM
DRFR	Door, Fire Right	RCH	Radiant Cabinet Heater
DRFS	Door, Fire Single	RCV	REHEAT COIL VALVE
DRH	Door, Handicap	REF	Refrigerator
DRKL	Door, smoke Left	RF	Return fan
DRKR	Door, smoke right	RH	Range Hood
DRKS	Door, smoke single	RHC	REHEAT COIL
DRL	Door, Left	RIC	REACH IN COOLER
DRO	Door, Rolling/Overhead	RIUL	REACH IN ULTRA LOW FREEZER
DROT	Door, other (Elevator, Pocket)	RO	Reverse Osmosis
DRR	Door, Right	RP	Radiant panel
DRS	Door, Single	RSD	Return Smoke Detector
DWBP	Domestic Water Booster Pump	RTM	Run Time
DWP	DOMESTIC WATER PUMP	RVD	Return VFD or Return Vane
DWRP	Domestic Water Recirculating Pump	SAD	Supply Air Damper
DWS	DISSTILLED WATER STILL	SAF	Supply Air Fan
DWSS	Domestic Water Superstore	SC	Steam Coil
DXU	Direct Exchange Condensing Unit	SCF	Supply CFM
EAD	Exhaust Damper	SCP	Pump, Steam Condensate
EAH	EXHAUST AIR HUMIDITY	SDMP	SMOKE DAMPER
EBH	Electric Base Board Heater	SEA	Season
EF	Exhaust Fan	SEP	Sewage Ejector Pump
EFS	EXHAUST SYSTEM	SF	Supply Fan
EG	Emergency Generator	SFD	Smoke/Fire Damper
EGS	Emergency Generator Transfer Switch	SH	Shower

EHC	Coil, Electric Heating	SK	Sink
EHD	EXHAUST HOOD	SKD	Sink Drain
ELBL	Emerg/Life Safety Electrical Blue Light	SMKPUR	SMOKE PURGE EQUIPMENT
ELV	Elevator	SMS	SNOW MELT SYSTEM
EP	Electrical Panel	SP	Sump Pump
ERU	Energy Recovery Unit	SPC	SPACE
ESH	Emergency Shower	SPFP	SWIMMING POOL FILTER (PUMP)
ESP	Exhaust Static Pressure	SPS	SUMP & SEWAGE PUMP SYSTEM
ETK	Expansion Tank	SSD	Supply Smoke Detector
EUH	Electric Unit Heater	SSEW	SAFETY SHOWER/EYE WASH STATION
EVD	Exhaust Variable Drive	SSR	SAFETY SHOWER
EVP	Exhaust Velocity Pressure	STRB	Strobe
EWB	Water Heater , Electric	STB	Steam Boiler
EYW	Eye Wash	STR	Motor Starter
FAP	FIRE ALARM PANEL	SWT	SYSTM WEATER TREATMENT TANK
FBD	Face Bypass Damper	TOI	Toilet
FBL	Fire Blanket	TX	Transformer
FCU	Fan Coil Unit	UH	Unit Heater
FCV	Flow Control Valve	UPS	Uninterrupted Power System
FDC	Fire Department Connection	UR	Urinal
FDMP	FIRE DAMPER	VAC	Vacuum Pump
FEX	Fire Extinguisher	VAV	Variable Air Volume Terminal Unit
FFC	Forced Flow Cabinet	VAVD	VAV Terminal Unit Duel Duct
FHC	Fire Hose Cabinet	VAVF	Fan Powered Variable/Air Volume Unit
FHS	FUME HOOD SYSTEM	VFD	Variable Frequency Drive
FIRE	Fire Alarm	VLV	VALVE
FLM	Flow Meter	WCS	WATER COOLING SYSTEM
FLOW	System Flow	WH	Water Heater
FLS	Floor Sink	WIC	WALK IN COOLER
FLTR	AIR FILTER	WIN	Window
FNT	Fountain	WLD	Welder

FOCH	Food Chopper	WM	Water Meter
FOOV	Food Oven	WS	Water Softener
FOSL	Food Slicer	WTK	Water Storage Tank
FOST	Food Steamer	WTS	WATER TREATMENT SYSTEM
FPWP	Fire Protection Water Pump		
FRN	Furnace		
FRZ	Freezer		
FSD	Fire/Smoke Damper		
FSS	Fire Suppression System		

2.6.5 APPENDIX E - PRELIMINARY DRAWING/DESIGN DEVELOPMENT (PD) REQUIREMENTS (2.1.5.6)

- Preliminary drawings shall include the following information unless such information is not applicable to the project:
 - General Requirements
 1. Project Identification: University, project code, appropriation act number.
 2. Edition and Part (I or II) of the NYS Code on which the design is based with code review summary.
 3. NYS Code Construction Type
 4. (Use) Group(s) per NYS Code.
 5. Other major code(s) used as a basis for design.
 6. Maximum NYS Code occupancy for each level and total for the building.
 7. Location and vicinity maps noted to show project location.
 8. Tabulation of floor areas in SF (new and renovated), total area, total building volume.
 9. Tabulation of units: number of parking spaces, auditorium seats, bedrooms etc.
 10. Listing of applicable codes with dates.
 11. Building purpose / occupancy.
 12. Design occupant load for each level and total for the building.
 13. Index of drawings.
 14. Phasing Plans
 15. The uniform date of the completed documents.
 16. Required Fire Rated construction plans and separation areas
 - Site Drawings: Submit a site/improvement plan & composite utility plan for new construction and additions. The site plan shall be based upon an approved comprehensive Master Plan.
 1. Plan scale and north arrow.
 2. New and existing elevation contours affected by the work.
 3. Floor and contour elevations.
 4. Applicable boundaries with survey computations.

5. Dimensioned relationship of new work to boundaries and existing structures.
 6. Location of test borings.
 7. Location and quantities of general and accessible parking spaces.
 8. Accessible routes
 9. Pedestrian traffic routes.
 10. Items to be demolished: structures, walks, utilities, trees, etc.
 11. Proposed landscaping (planting materials).
 12. Existing and new utilities: storm drainage, sanitary sewers, water distribution, fuel gas distribution, building utility distribution pipes and tunnels, electric and telephone poles and lines, hydrant locations, and data on fire flow test, etc.
 13. Site improvements such as fencing, lighting, etc.
 14. Typical paving section for proposed types/thicknesses.
 15. Identify/show special earthwork recommended and construction considerations noted in geotechnical report.
- Demolition Drawings
 1. For interior demolition:
 - a. Identify items to be removed;
 - b. Asbestos Disclosure Statement
 - c. Lead Disclosure Statement
 2. For total building demolition:
 - a. Floor plans showing building size;
 - b. Description of existing material /construction to be removed;
 - c. Elevation (drawn or photographic) of building;
 - d. Asbestos Disclosure Statement
 - e. Lead Disclosure Statement
 - Architectural Drawings
 1. Floor Plans (for each floor)
 - a. Plans of each floor
 - b. Overall dimensions
 - c. Space names and numbers
 - d. Relationship of new work to existing spaces
 - e. Identification of new work versus existing construction
 - f. Locations of asbestos regardless of who removes it or how it is removed
 - g. Identification of openings, entrances, delivery areas
 - h. Identification of accessible routes and Areas of Refuge
 - i. Plan scale and north arrow
 2. Roof Plan
 - a. Proposed and existing primary and emergency roof drains
 - b. Roof slope: 1/4" per 1'-0" to drain minimum for all low-slope roof areas
 - c. Slope (high to low) with direction arrows
 - d. New and existing equipment
 - e. Roof penetrations and structures
 - f. Identification of materials on existing roofs
 - g. Typical roofing section identifying materials
 - h. Access to roof and roof mounted equipment
 3. Exterior Elevations
 - a. Openings: windows (including operable notation), doors, louvers, vents
 - b. Percentage of glass vs. gross wall area (per elevation and/or exposure)
 - c. Floor elevations

- d. Identification of all major finishes
 - e. Stairs, ramps, and railings
 - f. Rooftop equipment and structures
 - g. Expansion and control joints
 - h. Grade at the face of the building wall
 - i. Subsurface construction (dotted in)
 - j. Identification of new work versus existing construction
- 4. Building Scale Sections
 - a. One longitudinal and one transverse section, minimum
 - b. Floor elevations
 - c. Indication of ceilings in relation to floors
 - d. Method and extent of insulation of exterior envelope
- 5. Wall Sections
 - a) One section for each type of wall construction
 - b) Identification of materials and components
 - c) Identification of insulation type including “R” value
 - d) Identification of air barrier and vapor barrier
- 6. Finish Schedule
 - a. May be included in the Basis of Design narrative or on drawing. Indicate proposed finishes for all spaces. Note those existing finishes to remain.
 - b. Give ceiling heights of interior spaces.
- Furnishing/Equipment Drawings
 - 1. Show equipment to approximate scale.
 - 2. Show built-in furnishings to scale.
 - 3. Label all furnishing according as “in the contract” or “owner provide”
- Structural Drawings
 - 1. Provide Live Loads, Snow Loads, Wind Loads, and Seismic Criteria used for structural design. Refer to NYS Code Chapter 16.
 - 2. Show design bearing / support capacity (soil bearing, pile capacity, caisson capacity) for foundation system.
 - 3. Provide the design lateral active and at-rest earth pressures, where applicable.
 - 4. Provide Foundation Plan and Details indicating type & tentative sizes.
 - 5. Provide Floor and Roof Framing Plans for all levels indicating type of system and tentative member sizes/depths and column spacing.
 - 6. Provide Typical Section(s) of framing identifying materials, thicknesses, and depths.
 - 7. Provide Details of connections to existing buildings.
 - 8. Identify elements of proposed lateral force resisting system.
- Fire Protection Information Plan and Calculations. Provide the following as a minimum to demonstrate compliance with the code
 - 1. Applicable edition and Parts of NYS Code and other applicable codes, including accessibility standards.
 - 2. Indicate extent of fire protection sprinkler system and fire detection/fire alarm systems.
 - 3. Tabulation of square footage per floor and total building area including new SF, existing SF to be renovated, other existing SF and total building volume (cubic feet).
 - 4. Tabulation of units: Number of auditorium seats, bedrooms, etc.
 - 5. Design occupant load(s), including the number of occupants to be accommodated in each space.

6. Indicate paths of means of egress, paths of exit access, travel distances and common paths of travel. Indicate specific locations where access controls or security locking systems will be provided within means of egress paths.
 7. For projects that will have partial, phased-in occupancy, indicate locations and construction of temporary barriers, fire resistance ratings of temporary barriers, locations of temporary exit signage, locations of temporary means of egress emergency lighting and the temporary exit access patterns at each floor for each substantially completed phase.
 8. Indicate rating of all fire resistance-rated assemblies, including smoke barriers.
 9. With reference symbols, completely show routes of all fire walls, fire barriers (including exit access corridor walls), and smoke partitions to illustrate continuity of fire-resistance ratings.
 10. With reference symbols, identify the extent of all fire-rated floor/ceiling and roof/ceiling assemblies. Distinguish new walls from existing walls and new construction from existing construction.
 11. Indicate locations of all portable fire extinguisher cabinets.
 12. Provide drawings including typical that clearly define the locations and extent of the application of applied fire resistant materials.
 13. Define the UL design assemblies specific to the respective locations and application of applied fire resistant materials.
 14. Define the validation tests required for Special Inspections of applied fire resistant materials in the project.
 15. Indicate whether the building is designated as an “essential facility” for purposes of compliance with seismic and snow provisions in NYS Code Chapter 16.
 16. Indicate the seismic design category.
 17. Calculations in support of the indicated Construction Type, based on Group, allowable height and allowable area, and permitted or required height and area modifications.
 18. Calculations to support the indicated design occupant load on a space by space and floor by floor basis.
 19. Calculations to demonstrate and support the indicated capacity of the egress components throughout the building.
 20. Provide a matrix that defines the “fire-resistance rating requirements” for building elements (NYS Code Table 601) including exterior walls, fire walls, fire barriers, shaft enclosures, fire partitions, smoke barriers and horizontal assemblies. Matrix shall indicate the listed design assemblies proposed to achieve the required fire resistance ratings.
- Plumbing Drawings
 1. Provide plans of each floor noting fixture locations and types. Indicate routing of main distribution lines with tentative sizes.
 2. Provide riser diagrams for all piping systems.
 3. Provide location of water supply and distribution, sanitary drainage, storm drainage, and sprinkler services to the building.
 4. Provide plumbing fixture schedule.
 5. Provide location, sizes and types of water heaters/ heat exchangers, Storage Tanks, flues, etc.
 6. Provide fuel gas piping layout and connected load, if applicable.
 - Mechanical (HVAC) Drawings
 1. Provide plans of each floor showing single line duct layouts, tentative air (supply, return, exhaust) quantities, equipment locations, and layouts and general routing of heating/cooling piping.
 2. Provide equipment schedules with tentative sizes, capacities, ID #, features, etc.
 3. Indicate locations and sizes of fans, pumps, compressors, air handling equipment, dampers, etc.

4. Provide preliminary layout and elevation of equipment room and/or central system showing configuration, tie-ins, etc. as necessary to describe system.
5. Provide central heating or cooling plants, distribution piping, equipment.
- Electrical Drawings (Power and lighting plans may be combined if submittal clearly conveys required information.)
 1. Lighting plans for each floor showing approximate fixture location, type, and lighting level required (in foot-candles).
 2. Power distribution plans showing location of incoming service, generators, and panelboards.
 3. Show interface points for communications, fire alarm, EMCS and other pertinent systems.
 4. Floor proposed locations for receptacles, telephone outlets and switches.
 5. It is the A/E's responsibility to contact the utility company during development of the project design in order to determine the available fault current at the project site.
 6. Provide the following for fire alarm systems:
 - a. Indicate locations of the fire alarm system alarm-initiating and notification appliances
 - b. Indicate locations of the fire alarm control and trouble signaling equipment

2.6.6 APPENDIX F - WORKING DRAWING (WD) DOCUMENTATION (2.1.5.7)

The Design Team shall provide the following items as a part of the Design Development Drawing Submittal:

- 2.6.6.1 Calculations: Calculations must be organized, indexed, numbered and submitted for each discipline involved. Design calculations shall identify assumptions, considerations and factors involved in the design and support the design shown on the plans and specifications. Provide one copy of the completed design calculations of each discipline to the Owner's facilities office.
- Structural Calculations: Calculations for every structural member are not required. Structural calculations for members representative of the various types of structural elements should be submitted. If submitted, computer printouts shall clearly indicate the individual member being analyzed or shall be accompanied by diagrams labeled with member numbers corresponding with the printout. The A/E shall be responsible for storing the complete set of calculations.
 - Plumbing Calculations. Include calculations for the following:
 1. - Plumbing fixture counts
 2. - Domestic cold water demand
 3. - Domestic water heater and hot water storage sizing
 4. - Primary and secondary roof drainage system sizing
 5. - Sanitary demand
 - Fuel Gas Calculations. Include calculations for the following:
 1. - Gas piping
 2. - Flue vent sizing
 - HVAC Calculations. Include calculations for the following:
 1. - HVAC building heat gain/loss
 2. - Ventilation (outside) air per space
 3. - Air distribution duct sizing and static pressure
 4. - Equipment selections including but not limited to: fans, coils, chillers, boilers, pumps, cooling towers
 5. - Hydronic and steam piping expansion and anchoring
 6. - Refrigerant system capacity and volume
 7. - Fuel oil supply and storage sizing
 8. - Air Changes per hour for each room
 - Energy Conservation Calculations. Include calculations for the following:
 1. ASHRAE 90.1 compliance check
 2. Building envelope thermal resistance and U-values
 - Electrical Calculations. Include calculations for the following:
 1. COMCheck verification
 2. Demand load for all switchboard, panelboards and feeders to multiple loads in a tabular form with at least 25% spare capacity
 3. Voltage drop calculations showing no more than 2% for feeders, 3% for branch circuits and 2% for exterior branch circuits that feed lighting or equipment not mounted to the building
 4. Photometrics of emergency lighting along the entire path of egress, at the same scale as the floor plan provided in the working drawings. NOTE: If egress paths are not indicated on the plan, it will be assumed that the lighting levels for the entire room or area will need to meet the required illumination levels required by the NYS Code and this Manual.

2.6.6.2 Working Drawings: Working drawings shall include but not be limited to the following information:

- General Requirements. Each drawing to be reproduced shall include:
 1. Name of the A/E,
 2. Project Title,
 3. Project location
 4. The Project Code,
 5. Drawing / Sheet Title,
 6. Drawing / Sheet number,
 7. Signed, dated professional seal(s) of the responsible licensed professional(s),
 8. The uniform date of the completed documents
- Title Sheet(s)
 1. Project Identification: University, Project Code, Appropriation Act Number
 2. Activity or function(s) to be performed in the facility
 3. Edition and Part (I or II) of the NYS Code on which the design is based
 4. Applicable accessibility standards
 5. NYS Code Construction Type
 6. (Use) Group(s) per NYS Code
 7. Other major code(s) used as a basis for design
 8. Maximum NYS Code occupancy for each level and total for the building
 9. Location and vicinity maps noted to show project location
 10. Tabulation of floor areas in SF (new and renovated), total area, total building volume
 11. Tabulation of units: Number of parking spaces, auditorium seats, bedrooms etc.
 12. Building Purpose/Occupancy.
 13. Design occupant load for each level and total for the building
 14. Design Live Loads for all floors
 15. Index of drawings
 16. Professional seal(s) and signature(s) of the architect(s) and engineer(s) responsible for the design. Seals shall be signed and dated.
 17. The uniform date of the completed documents
- Site Drawings
- Site/improvement plan & composite utility plan minimum for new construction and additions; shall be based on an approved comprehensive Master Plan.
 1. Provide scale and north arrow.
 2. Provide new and existing contours affected by work.
 3. Provide floor and contour elevations.
 4. Provide applicable boundaries with survey computations.
 5. Provide dimensioned relationship of new work to boundaries and existing structures.
 6. Indicate location of test borings.
 7. Indicate general parking and handicap parking.
 8. Indicate handicap accessible routes
 9. Indicate pedestrian traffic routes.
 10. Indicate demolitions: structures, walks, utilities, trees, etc.
 11. Indicate proposed landscaping (planting materials)
 12. Indicate existing and new utilities: storm sewers, sanitary sewers, water supply, gas, steam distribution pipes and tunnels, electric and telephone poles and lines, and hydrant locations with data on fire flow test.
 13. Indicate site improvements such as fencing, lighting, etc.

14. Provide typical paving section of each type and thickness required.
 15. Indicate special earthwork recommended and construction considerations noted in soils report.
- Demolition Drawings
 1. For total building demolition:
 - a. Provide plan of building with length & width dimensions,
 - b. Provide elevations (drawn or photographic) and cross section of building to be demolished,
 - c. Provide details of termination of demolition, underpinning, etc.
 - d. Asbestos and Lead Disclosure Statements
 2. For interior / selective demolition:
 - a. Provide floor plans showing existing partition, etc., and showing or describing existing material and construction to be removed
 - b. Provide information or estimates for bidding for work to be removed.
 - c. Asbestos and Lead Disclosure Statements
 - Architectural Drawings
 1. Floor Plans (for each floor)
 - a. Provide plans of each floor at $1/8" = 1'-0"$ minimum
 - b. Provide room/space numbers.
 - c. Provide overall dimensions.
 - d. If the work is an addition, indicate the relationship of new to existing spaces.
 - e. Distinguish new from existing construction.
 - f. Indicate demolition on the architectural plans or separate plans.
 - g. Indicate asbestos locations regardless of who removes it or how it is removed.
 - h. Indicate all openings, entrances, delivery areas.
 - i. Indicate accessible building entrances and exits.
 - j. Provide scale and north arrow.
 2. Reflected Ceiling Plans
 - a. Provide ceiling tile / grid layout
 - b. Indicate lighting fixture locations
 - c. Indicate sprinkler head locations
 - d. Indicate HVAC diffuser and grille locations
 - e. Indicate coffers, drop soffits, changes in height or materials
 3. Roof Plan
 - a. - Indicate proposed and existing drains.
 - b. - Indicate roof slope: $1/4"$ per $1'-0"$ to drains minimum (unless waived for reroofing).
 - c. - Indicate means of secondary (emergency) roof drainage.
 - d. - Indicate new and existing equipment.
 - e. - Indicate roof penetrations and structures.
 - f. - Indicate materials of existing roofs.
 - g. - Provide typical roofing section identifying materials.
 - h. - Indicate access to roof.
 - i. - Indicate direction of slope (high to low) with arrows
 4. Exterior Elevations
 - a. Indicate scale ($1/8" = 1'-0"$ minimum).
 - b. Indicate openings: windows, doors, louvers, vents.
 - c. Indicate percentage of glass vs. gross wall area.
 - d. Indicate floor elevations (above sea level).

- e. Indicate finishes.
 - f. Indicate stairs, ramps, and railings.
 - g. Indicate rooftop equipment and structures.
 - h. Indicate expansion and control joints.
 - i. Indicate grade at the face of the building wall.
 - j. Indicate subsurface construction.
 - k. Existing and new work shall be clearly distinguished.
- 5. Building Cross Sections (Scale: 1/16"=1'-0" minimum)
 - a. - Provide one longitudinal and one transverse section minimum.
 - b. - Indicate floor levels / elevations on sections.
 - c. - Indicate ceilings in proper relation to floors.
 - d. - Indicate method and extent of insulating exterior envelope.
- 6. Details and Wall Sections (Scale: 3/4" = 1'-0" minimum)
 - a. - Provide one section minimum for each type of wall construction.
 - b. - Indicate major materials and components.
 - c. - Indicate insulation and note R-value.
 - d. - Provide one section with dimensions and details for each stair configuration, minimum.
- 7. Finish Schedule
 - a. - Indicate proposed finishes for all spaces. Note those existing finishes to remain.
 - b. - Indicate ceiling heights of interior spaces.
 - c. - Indicate finishes, textures, colors, etc., required to be provided by the Contractor
- 8. Door Schedule
 - a. - Indicate size and material for each door and door frame
 - b. - Indicate glazing size and material for each door and frame
 - c. - Indicate fire resistance rating for each door and frame
 - d. - Cross reference a specified hardware set for each door assembly
- Furnishing/Equipment Plans
 - 1. Provide outline of equipment to scale.
 - 2. Provide outline of built-in furnishings to scale.
 - 3. Provide elevations, sections and details as necessary to describe built-in equipment, casework and furnishings included in the Work of the contractor.
- Structural Drawings
 - 1. Unless indicated otherwise below, the structural drawings shall provide complete details of all structural components so that no additional structural design will be required for the preparation of shop drawings except for standard connection details and fabrication calculations.
 - 2. Indicate design live loads, snow loads, wind loads, and seismic criteria used for design of structural systems per NYS Code Chapter 16.
 - 3. Indicate design bearing / support capacity (soil bearing, pile capacity, caisson capacity) for foundation system.
 - 4. Engineered design and details of engineered systems such as cast-in-place post-tensioned concrete, precast concrete components, steel joists and joist girders, pre-engineered metal structures, and shop / prefabricated wood components may be required to be provided by the contractor. In this case, the structural drawings shall include complete loading information as well as all other performance or size constraints for the components.

5. Structural drawings shall include plans at the same scale as the architectural plans. Details and sections shall be at a scale of not less than $3/4" = 1'-0"$.
6. The plans, details and specifications shall completely define the structural system and special conditions for the project.
7. Provide foundation plans indicating type & sizes.
8. Provide foundation details of improved bearing strata and other special requirements.
9. Provide floor framing plans of each level indicating type of system and member sizes/depths and column spacing.
10. Provide roof framing plans.
11. Provide typical section(s) of floor and roof systems identifying materials, thicknesses, and depths.
12. Provide details of connections to existing buildings, if applicable.
- Fire Protection Information Plan and Calculations. Provide the following as a minimum to demonstrate compliance with the code:
 1. Applicable edition and Parts of NYS Code and other applicable codes, including accessibility standards.
 2. (Use) Group(s) per NYS Code. For mixed-use occupancies, indicate which Groups are separated and non-separated.
 3. Construction Type per NYS Code.
 4. Indicate extent of fire protection sprinkler system and fire detection/fire alarm systems.
 5. Tabulation of square footage per floor and total building area including new SF, existing SF to be renovated, other existing SF and total building volume (cubic feet).
 6. Tabulation of units: Number of auditorium seats, bedrooms, etc.
 7. Design occupant load(s), including the number of occupants to be accommodated in each space.
 8. Indicate paths of means of egress, paths of exit access, travel distances and common paths of travel. Indicate specific locations where access controls or security locking systems will be provided within means of egress paths.
 9. For projects that will have partial, phased-in occupancy, indicate locations and construction of temporary barriers, fire resistance ratings of temporary barriers, locations of temporary exit signage, locations of temporary means of egress emergency lighting and the temporary exit access patterns at each floor for each substantially completed phase.
 10. Indicate rating of all fire resistance-rated assemblies, including smoke barriers.
 11. With reference symbols, completely show routes of all fire walls, fire barriers (including exit access corridor walls), and smoke partitions to illustrate continuity of fire-resistance ratings.
 12. With reference symbols, identify the extent of all fire-rated floor/ceiling and roof/ceiling assemblies. Distinguish new walls from existing walls and new construction from existing construction.
 13. Indicate locations of all portable fire extinguisher cabinets.
 14. Provide drawings including typical and special details that clearly define the locations and extent of the application of applied fire resistant materials.
 15. Define the UL design assemblies specific to the respective locations and application of applied fire resistant materials.
 16. Define the validation tests required for Special Inspections of applied fire resistant materials in the project.
 17. Indicate whether the building is designated as an "essential facility" for purposes of compliance with seismic and snow provisions in NYS Code Chapter 16.
 18. Indicate the seismic design category.

19. Calculations in support of the indicated Construction Type, based on Group, allowable height and allowable area, and permitted or required height and area modifications.
 20. Calculations to support the indicated design occupant load on a space by space and floor by floor basis.
 21. Calculations to demonstrate and support the indicated capacity of the egress components throughout the building.
 22. Provide a matrix that defines the “fire-resistance rating requirements” for building elements (NYS Code Table 601) including exterior walls, fire walls, fire barriers, shaft enclosures, fire partitions, smoke barriers and horizontal assemblies. Matrix shall indicate the listed design assemblies proposed to achieve the required fire resistance ratings. Include copies of each listed assembly.
 23. With reference symbols, completely show routes of all fire walls, fire barriers (including exit access corridor walls), and smoke partitions to illustrate continuity of fire-resistance ratings.
 24. Define the UL through penetration firestop assemblies for all utilities penetrating fire rated construction.
- Access Control Systems (Security). Shop drawings shall be submitted to Facilities for work elements including: electric strikes, electric latches, electric locks, magnetic locks and other electronic controls (card keys, access buttons, proximity sensors etc.), even if used as an overlay on mechanical door hardware. Provide the following as a minimum to demonstrate code compliance:
 1. Building floor plans defining the locations and components of the access control hardware proposed.
 2. Door hardware details and elevations defining the locations of all associated access control hardware.
 3. A copy of the door hardware (mechanical hardware) shop drawings for the doors where the access controls are to be provided;
 4. A sequence of operations demonstrating compliance with the requirements of the NYS Construction Code, Section 1008 Doors, Gates and Turnstiles;
 5. Documentation demonstrating that each of the access control components are listed for the intended use and that per the manufacturer’s documentation the specific components are compatible with each other;
 6. A description of how the elements interface with the building’s fire alarm system.
 7. Other security measures including cameras, contact switches or other security items which do not affect means of egress are not required to be included.
 - Plumbing Drawings
 1. Indicate items to be demolished as part of renovation projects.
 2. Provide plans for each floor noting locations and types of fixtures, water supply and distribution, sanitary drainage and special piping.
 3. Provide plumbing fixture schedules showing designations, connection sizes, and mounting heights of accessible fixtures. Flush valve handles shall be located on the wide side of the accessible stall.
 4. Provide plans indicating roof drains and areas served by each in square feet, piping and sizes.
 5. Provide riser diagrams indicating fixtures, water supply and distribution, sanitary drainage and special piping
 6. Provide details of connections at water heaters, air compressors and roof drain installation.
 7. Provide equipment schedules for water heaters, air compressors, air dryers and drains.
 - Mechanical (HVAC) Drawings

1. Indicate items to be demolished as part of renovation projects.
 2. Provide plans of each floor and roof indicating double line-duct layouts and mechanical equipment. Plans shall indicate ceiling-mounted lighting fixtures.
 3. Provide plans for each floor indicating chilled water, heating hot water, steam and condensate piping and piping sizes. Show provisions for expansion. (This may be shown on ductwork plans when legible.)
 4. Provide layouts of mechanical equipment and fan rooms to a scale not less than twice that of the floor plans. Show equipment, ducts and piping to coordinate the installation in tight areas. Show access and service space requirements such as that required for tube, coil, and fan removal.
 5. Provide schedules for all mechanical equipment, steam traps, and air devices, showing sizes, capacities, HP, CFM, electrical characteristics, locations and features.
 6. Provide drawings showing control schematics and automation points.
 7. Provide diagrams of chilled and heating water, steam, and condensate piping.
 8. Indicate central heating and cooling plants, distribution piping, equipment, anchors and expansion joints.
 9. Provide sections as required to clearly show the work in 3 dimensions.
 10. Indicate the building heating loads (in BTU or pounds of steam per hour) to include transmission plus infiltration, outside air, domestic hot water, and kitchen, laundry, hospital hot water and outside air loads.
 11. Indicate the sensible and total air conditioning cooling load of the building in tons. Also show the outside air portion of the cooling load in tons.
 12. Indicate fitting types for ducts.
- Electrical Drawings. Power and lighting plans may be combined if the combined drawing clearly conveys required information.
 1. Provide lighting plans for each floor indicating fixture location, type and lighting level required (in foot-candles).
 2. Provide power distribution plans indicating incoming service, generators and panelboards.
 3. Indicate interface points for communications, fire alarm, and EMCS.
 4. Provide floor plans indicating receptacles, telephone outlets, switches, audio visual and data.
 5. Indicate, in kilowatts or KVA, electrical load total, three-phase load, motor load and size of largest motor in horsepower.
 6. Provide control diagrams, panel board schedules and riser diagrams.
 7. Provide lighting fixture schedule on the drawings.
 - Control Systems
 1. Provide a written sequence of operation on the plans for each mechanical and electrical control system stating explicitly how systems are intended to function.
 2. Provide data regarding safety, alarms, indicators and control parameters.
 3. Provide control system input/output summaries.
 4. Indicate point(s) of connection of new to existing system.
 5. Indicate location of operator interface.