Department of Administrative Services

Consultants Procedure Manual

Construction Services

Technical Services

450 Columbus Boulevard
Hartford, CT 06103

0400 - Consultants Procedure Manual

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1.0 Through **5.0**	**Comprehensive Updates to All Consultants Procedure Manual Sections:**	**11.19**

End
01 – Summary of Updates

1.0 - General Information

1.1 Introduction to the DAS Consultant Procedure Manual

1.1.1 Purpose of this Manual:

This Consultants Procedure Manual is an information resource and *is an extension of the standard contract requirements* – see "Contract Forms" section 2.2.2 of this manual. and applies to Consultants that conduct business with the State of Connecticut through the Department of Administrative Services (Department) **-** Construction Services (CS). Throughout this document, "The Department" will refer to the Department of Administrative Services – Construction Services.

This manual includes:

1. **General Information** including what constitutes basic services and what constitutes extra services for a Consultant.
2. **Administrative Issues** including various contract issues and Consultant Evaluations.
3. **Technical Requirements** covering an array of issues from planning and programming to permits and approvals, regulatory requirements, and project phase requirements.
4. **Building Components and Standards** that define minimum quality requirements for projects administered by the Department and on behalf of the Department such as for Agency Administered projects.
5. **Construction Document Requirements** generally addressing document preparation and quality.

1.1.2 Organization of the Department Office of Design and Construction:

The Department has responsibility for the oversight and administration of design and construction (new and renovation) of the majority of the State's capital projects. This includes statewide services for early planning and budgeting and design oversight for minor and major projects.

The Department has the primary state responsibility for hiring architects, engineers, construction administrators and construction contractors related to building and facility projects.

The Department is responsible for the Building Code compliance process for state construction projects.

The Department handles Energy Management as a Statewide Service, for all agencies and includes technical advice and oversight on energy projects and policy, in a joint effort with the Department of Energy and Environmental Protection (DEEP).

The Department also provides technical resources, as a statewide service, for all state agencies related to building design and improvements; including underground storage tank removals and/or replacements, ADA support, and Asbestos, PCB, and Lead Abatement, and Contaminated Soil and Groundwater Assessment and Remediation.

1.1.3 Department Forms:

The documents that may be used for processing with the Department are available on the Department Webpage. Access forms and other documents at the following link: Web-based Library Click on the Library (Forms and Publications) at the top of the web page and select the appropriate form number series to view or copy the appropriate form(s). The forms are arranged per the stage of the project.

End

1.2 Definitions:

The terms defined in this section are used throughout this manual. These same terms are used in multiple contracts issued between the Department and Consultant(s) and Constructor(s). In all cases the language found in the contract (if different) will prevail. Whenever the following terms, or pronouns in place of them, are used the intent and meaning in this manual shall be as follows:

Acceptance of The Work:
The Owner's acknowledgement of the Acceptance of the Work from the Contractor or Construction Manager at Risk (CMR) upon issuance of a Certificate of Acceptance by the Construction Administrator and Consultant that all Work has been completed~~.~~, with the exception of heating and cooling systems requiring Seasonal Testing, and Approved Deferred Functional Performance Testing, to Certify Functional Completion of those systems. Owner's prior written approval shall be required for any and all such exceptions.

Addendum: *(Pl: Addenda)*:
A written or graphic instrument issued before execution of the construction contract(s) that modifies or interprets the bidding or proposal documents by additions, deletions, clarifications, or corrections.

Additional or Deleted Work:
Work required by the Department that, in the judgment of the Commissioner, involves any addition to, deduction from, or modification of the Work required by the Contract Documents.

Agency:
The (User or Client) Agency of the State of Connecticut having administrative authority of the facility in which the Work is being performed.

Amendment:
A revision to a contract between the Consultant and the Department.

Application for Payment, Partial Payment or Requisition:
Contractor's or Construction Manager's certified request for payment for completed portions of the Work and, if the Contract so provides, for materials or equipment suitably stored pending their incorporation into the Work.

Approved Deferred Functional Performance Testing:
Execution of checklists and Functional Performance Testing that is delayed only upon written request by the Constructor and the written approval of the Department Project Manager (PM) for any required check or test that cannot be completed including, but not limited to, the building's structure, required occupancy conditions or other deficiency.

Architect or Landscape Architect, Engineer (Consultant or A/E):
A sole proprietor, partnership, firm, corporation or other business organization under Contract with the Owner, commissioned to prepare designs, reports and / or Contract Drawings and Specifications, to advise the Owner and in certain cases, to perform regular inspections during construction and when authorized to perform the duties of the Owner's Representative.

As-Built Drawings:
Construction Drawings revised by the Constructor to show all significant modifications made during the construction process.

Base Bid:
Monetary value stated in the Bid Proposal Form as the sum for which the Bidder offers to perform the Work described in the Bidding Documents, exclusive of adjustments for Supplemental Bids.

Bid Bond:
Form of Bid Security executed by the Bidder as Principal and by a Surety to guarantee that the Bidder will enter into a Contract within a specified time and furnish any required bond as mandated by Connecticut General Statutes Section 4b-92.

Bid or Bid Proposal Form:
A complete and duly signed proposal to perform Work (or a designated portion thereof) for a stipulated sum submitted in accordance with the Bidding Documents.

Bid Security:
Certified check or Bid Bond submitted with Bid Proposal Form, which provides that the Bidder, if awarded a (sub)contract, will execute such (sub)contract in accordance with the requirements of the Bidding Documents and specified time and furnish any required bond as mandated by Connecticut General Statutes Section 4b-92, as applicable to the (sub)contract amount.

Bidder:
A sole proprietor, partnership, firm, corporation or other business organization submitting a Bid on the Bid Proposal Form for the Work contemplated~~.~~ , including Work to be performed under any Subcontract with the Construction Manager at Risk.

Bidding Documents:
Collectively, the Bidding Requirements and the proposed Contract Documents, including any addenda issued prior to receipt of Bids, relevant to competitive bidding for Subcontracts for designated portions of the Work.

Building Commissioning (Cx) and Building Envelope Commissioning (BECx):
A systematic process of ensuring that all building systems perform interactively according to the contract documents, the design intent, and the building's operational needs. Commissioning involves three phases: pre-design, construction, and warranty.

Building Commissioning Agent (or Authority) (CxA) and Building Envelope Commissioning Agent (or Authority) (BECxA):
An entity identified by the Owner who leads, plans, schedules, and coordinates the commissioning team to implement the Commissioning Process.

Building Commissioning Plan (Cx Plan) and Building Envelope Commissioning Plan (BECx Plan):
A plan that includes a list of all equipment to be commissioned, delineation of roles for each of the primary commissioning participants, and details on the scope, timeline, and deliverables throughout the commissioning process.

Cash Allowance:
An amount established in the Contract Documents for inclusion in the Contract Sum to cover the cost of prescribed items not specified in detail, and as shown in the Allowance Schedule~~.~~ , which shall be factored into and become a part of the Guaranteed Maximum Price or part of the Lump Sum bid.

Certificate of Acceptance:
A document issued by the Owner to the Constructor stating that all Work, excepting those items previously agreed to and approved by the Owner, has been completed and accepted by the Owner.

Certificate of Compliance:
A document stating that for the portion of the Project completed, either the design portion or the construction portion, has been performed in substantial compliance with all applicable building codes.

Certificate of Functional Completion:
A document issued by the Owner to the Constructor when all remaining Testing, Adjusting and Balancing (TAB) and commissioning responsibilities of the Constructor and their subcontractors (except for seasonal or Approved Deferred Functional Performance Testing and controls training), have been certified as complete by the Owner's Commissioning Agent (CxA).

Certificate of Occupancy:
Document issued by the authority having jurisdiction certifying that all or a designated portion of a building is approved for its designated use.

Certificate of Substantial Completion:
A document prepared by the Consultant and approved by the Owner on the basis of an inspection stating:

- that the Work, or a designated portion thereof, except for Functional Testing, Approved Deferred Performance Functional Testing, and controls training, is determined to be Substantially Complete;
- the date of Substantial Completion;
- the responsibilities of the Owner and the Constructor for security, maintenance, heat, utilities, damage to the Work and insurance; and
- the time within which the Constructor shall complete the remaining Work.

Change Order:
Written authorization signed by the Owner (Department), authorizing a modification in the Work, an adjustment in the Contract Sum, or an adjustment in the Contract Time.

Commissioner:
The State of Connecticut, Department Commissioner acting directly or through specifically authorized Department personnel or agent(s) having authority to perform duties defined in Article 25, “All Work Subject to Control of the Commissioner”.

Construction Administrator (CA):
A sole proprietor, partnership, firm, corporation or other business organization, under Contract or employed by the Owner commissioned and/or authorized to oversee the fulfillment of all requirements of the Contract Documents. The authorized Construction Administrator may be a Department Assistant Project Manager, Department Project Manager, a Clerk of the Works, an Architect, a Consulting Architect, a Consulting Construction Administrator, a Consulting Engineer etc. or any other designee as authorized and identified by the Owner.

Construction Change Directive:
A written authorization signed by the Owner, directing a modification in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum, Contract Time or both. Any Construction Change Directive effecting an adjustment to the Contract Sum or Contract Time shall result in a Change Order.

Construction Documents
Drawings, and Project Manual (specifications), Signed and sealed by the Consultant that set forth in detail the requirements for the construction of the Project and have received a Building Permit from the Department’s, Office of the State Building Inspector.

Construction Manager at Risk (CMR)
A sole proprietor, partnership, firm or Corporation, under a construction manager at risk agreement with the Department. The CMR is responsible for the performance of the Work under the Contract Documents.

Construction Phase Start Date or Date of Commencement of the Work:
The date, specified by the Owner in the Notice to Proceed, on which the Contractor is required to start the Work. For CMR jobs, the date shall be contingent upon Owner's acceptance of CMR's Guaranteed Maximum Price pursuant to Article 1 Definitions herein.

Constructor:
When used in this document, the Constructor refers to the Builder who could be the GC, CMR or Design Build entity

Consultant:
See definition for Architect or Engineer (Consultant or A/E), and the definition for Landscape Architect.

Contractor or General Contractor:
A sole proprietor, partnership, firm or Corporation, under direct Contract with the **Department** responsible for performing the Work under the Contract Documents. Whenever the words “Contractor” or “General Contractor” (GC) are used it shall be understood to mean Contractor.

Day:
Whenever the word Day is used it shall be understood to mean calendar day stated in the Bidding Documents, unless stated otherwise.

Deferred Submittals:
Those portions of the design not submitted at the time of the permit application and requiring submission to the building official within a specified period.

Delegated Design:
The transfer of design responsibility of certain aspects of the project from the Consultant to the Constructor.

Department or Owner:
The State of Connecticut, Department of Administrative Services, Division of Construction Services acting through its Commissioner or specifically authorized Department personnel or agent.

Design Build Contractor or Design Build Entity:
A sole proprietor, partnership, firm or Corporation, under direct Contract with the Department responsible for the design and construction of a project.

Equal(s):
Any deviation from the Specification which is defined as follows: A replacement for the specified material, device, procedure, equipment, etc., which is recognized and accepted as substantially equal to the first listed manufacturer or first listed procedure specified after review by the Consultant, and may be rejected or approved at the sole discretion of the Owner. All equals must be substantially equivalent to the first manufacturer or first procedure listed in the Specifications with reference to all of the following areas: the substance and function considering quality, workmanship, economy of operation, durability, and suitability for purposes intended; size, rating, and cost. The equal does not constitute a modification in the scope of Work, the Schedule, or Consultant's design intent of the specified material, device, procedure, equipment, etc.

Final Inspection:
Review of the Work by the Consultant and Department to determine whether Acceptance of the Work has been achieved.

Final Payment:
The last payment made by the Department to the Constructor, made after notice of the Acceptance of the Work. Payment shall include the entire unpaid balance of the Contract Sum as adjusted by modifications.

Functional Completion:
Functional Completion is when all remaining TAB (Testing, Adjusting, Balancing) and Commissioning responsibilities of the Constructor and their subcontractors (except for Seasonal and/or Approved Deferred Functional Performance Testing and controls training), have been functionally certified as complete by the Owner's Commissioning Authority (CxA and / or BECxA) and the Certificate of Functional Completion has been issued.

Functional Performance Test (FT) Process:
A documented testing of system parameters, under actual or simulated operating conditions. Functional testing is the dynamic testing of systems (rather than just components).

General Conditions:
The part of the Contract Documents entitled General Conditions of the Contract for Construction, part of Division 00 of the Specifications.

General Requirements:
That part of the Contract Documents entitled General Requirements, which is Division 01, "General Requirements", of the Specifications.

Guarantee:
See Warranty.

Guaranteed Maximum Price (GMP):
GMP shall mean the sum of the Cost of the Work as developed by the CMR and the CMR Fee for the construction and post-construction phase work, including all sales, use and consumer and other taxes required by law; all other fees, general conditions, bonds, required permits and insurance; tools, construction machinery, and temporary facilities required at the construction site; and all other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent, and whether or not incorporated in the Work. If the Owner and CMR cannot agree on a GMP, the Owner may terminate the Agreement and proceed with the construction phase through other means, including but not limited to a different CMR or different project delivery method.

Lump Sum:
An item or category priced as a whole rather than broken down into its elements.

Notice To Bidder:
A notice contained in the Bidding Documents informing prospective Bidders of the opportunity to submit Bids and setting forth the procedures doing so.

Notice To Proceed:
Written notice, issued by the Commissioner or the Commissioner's authorized representative, to the Constructor authorizing the Constructor to proceed with the Work and establishing the date for commencement of the Contract Time.

Owner or Department:
The State of Connecticut, Department of Administrative Services, Division of Construction Services acting through its Commissioner or specifically authorized Department personnel or agent.

Payment, Bond, Labor Bond or Material Bond:
A bond required to be furnished by the party performing the Contract for the protection of persons supplying labor or materials in the prosecution of the work provided for in the Contract for the use of each such person, in accordance with the threshold amounts and requirements set forth in Connecticut General Statutes Section 49-41.

Performance Bond or Surety Bond:
A bond furnished by the party performing the Contract and such party's surety, ensuring performance of the work provided for in the Contract, in accordance with the threshold amounts and requirements set forth in Connecticut General Statutes Section 49-41.

Performance Specification:
A description of the desired results or performance of a product, material, assembly, procedure, or a piece of equipment with criteria for identifying the standard.

Pre-Commissioning Checklists:
Installation and start-up items to be completed by the appropriate party prior to operational verification through Functional Testing.

Project:
The total construction of which the Work performed under the Contract Documents may be the whole or a part.

Project Elements:
The permanent structures, site improvements and other permanent developments at the site specifically defined and specified in the Contract Documents requiring construction and services, which construction and services may constitute the whole or part of the Project.

Project Manager:
The individual employed by the Department, designated and authorized the Commissioner, to be responsible for the overall management and oversight of the Project, and to represent the Agency.

Project Manual:
The set of documents assembled for the Work which includes, but is not limited to, Contract Documents, Bidding Requirements, Sample Forms, Conditions of the Contract, General Requirements, and the Specifications.

Proprietary Specification:
A specification that describes a product, procedure, function, material, assembly, or piece of equipment by trade name and/or by naming the manufacturer(s) or manufacturer's procedure, exact model number, item, etc., of those products acceptable to the Owner.

Record Drawings:
Record drawings are prepared by the Consultant and reflect on-site changes the constructor noted in the as-built drawings.

Request for Proposals and CMR's Proposal:
The document issued by the Department to solicit proposals for a Construction Manager at Risk for the Project and the CMR's document submitted in response to such solicitation.

Request for Qualifications:
The document issued by the Department to request submittals of qualifications by completing and submitting a Qualification Based Selection ("QBS") Booklet for evaluation by the Owner.

Retainage:
A percentage of each Application for Payment and a percentage of the total Contract Sum retained by the Owner.

Schedule:
A Critical Path Method (CPM) as required by Section 01 32 16.13 "CPM Schedules" – CMR of Division 01 "General Requirements", showing all events expected to occur and operations to be performed and indicating the Contract Time, start dates, durations and finish dates as well as Substantial Completion and Acceptance of the Work, rendered in a form permitting determination of the optimum sequence and duration of each operation.

Schedule of Values:
A document furnished by the Constructor to the Consultant and Owner stating the portions of the Contract Sum allocated to the various portions of the Work, which is to be used for reviewing the Constructor's Applications for Payment.

Seasonal Commissioning Tests:
Functional Tests that are deferred until the system(s) will experience conditions closer to their intended design conditions.

Shop Drawings:
Drawings that illustrate construction, materials, dimensions, installation, and other pertinent information for the incorporation of an element or item into the construction as detailed Contract Documents.

Specifications (Technical Specifications):
The description, provisions and other requirements pertaining to the method and manner of performing the Work and/or to the quantities and quality of materials to be furnished under the Contract.

Subcontractor:
A Subcontractor is a person or entity who has a direct contract with the Constructor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

Sub-Subcontractor:
A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

Submittals:
Documents including, but not limited to, samples, manufacturer's data, Shop Drawing, or other such items submitted to the Owner and Consultant by the Constructor for the purpose of approval or other action, as required by the Contract Documents.

Substantial Completion:
The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents, the determination of which shall be represented by the issuance by the Owner of a Certificate of Substantial Completion.

Substitution:
Any deviation from the specified requirements, which is defined as follows: A replacement for the specified material, device, procedure, equipment, etc., which is not recognized or accepted as equal to the named manufacturer(s) or procedure listed in the Specification after review by the Consultant, and may be rejected or approved by the Owner. The Substitution is not equal to the specified requirement in comparison to the named manufacturer(s) or first procedure listed in the Specifications in one or more of the following areas: the substance and function considering quality, workmanship, economy of operation, durability, and suitability for purposes intended; size, cost, and rating. The Substitution constitutes a modification in the scope of Work, the Schedule, or the Consultant's design intent of the specified material, device, procedure, equipment, etc.

Superintendent:
The Constructor's representative at the site who is responsible for continuous field supervision, coordination, and, completion of the Work, and, unless another person is designated in writing by the Constructor to the Owner and the Owner's Representative, also responsible for the prevention of accidents.

Supplemental Bid:
The monetary value stated in the Bid to be added to the amount of the Base Bid if the corresponding Work, as described in the Bidding Documents, if accepted.

Threshold Limit Building:
Any proposed (new) structures or additions as defined by the Connecticut General Statutes Section 29-276b.

Unit Price:
The monetary value stated by the Owner or the Constructor, as a price per unit of measurement for materials or services as described in the Contract Documents and/or Bidding Documents.

Warranty:
A written, legally enforceable assurance of specified quality or performance of a product or Work or of the duration of satisfactory performance.

Work:
The construction and services required by the Contract Documents, and including all labor, materials, equipment and services provided or to be provided by the Constructor to fulfill the Constructor's obligations. The Work may constitute the whole or a part of the Project whether on or off the site of the Project, and including all labor, materials, equipment and services provided or to be provided by Subcontractors, Sub-subcontractors, material suppliers or any other entity for whom the Constructor is responsible under or pursuant to the Contract Documents.

End
1.2 – Definitions

1.3 Selection & Project Delivery Options

The following information is extracted from the various Selection & Project Delivery Manuals located on the Department webpage, and other manuals as noted.

1.3.1 Overview

The Department has developed selection, proposal, and bidding policies and procedures in various manuals to aid in understanding how contracts are awarded on an impartial, equitable, and rational basis. The procedures are intended to ensure the integrity of all selection and bidding procedures and to define the duties and responsibilities of the various participants.

1.3.2 Selection & Project Delivery System Options

Within the various Selection and Project delivery systems are several different types of Selection Procedures that can be utilized for soliciting and evaluating consultant qualifications, proposals, and bids for procurement of services and construction of the projects.

The following are reference to the statutes for the different types of selection and bidding procedures:

.1 **Architectural / Engineering (A/E) Consultant Services Selection -** CGS §4b-55 - 4b-59**:**

Refer to: Selection Procedures & Project Delivery Methods Guidelines (Department manual - 0310) and to document number 1210 QBS – Guidelines for Selection and Contract Limits.

.2 **On-Call Consultant Service Selection & On-Call Contract Task Assignments -** CGS § 4b-51, 4b-56, & 4b-57:

Refer to On-Call Consultant Services Selections & Task Assignment Procedure Manual (Department manual 0330).

.3 **Competitive Sealed Proposal for Design-Build (D-B) -** CGS § 4b-24(b):

Refer to Design- Build (D-B) Total Cost – Best Value Selection Procedure Manual (Department manual 0350).

.4 **Competitive Sealed Proposal for Construction Management-At-Risk (CMR) - Guaranteed Maximum Price (GMP) -** CGS § 4b-103:

Refer to Construction Manager At-Risk (CMR) Guaranteed Maximum Price (GMP) Best Value Selection Procedure Manual (Department manual 0370).

.5 **Competitive Sealed Bid for Large Projects (D-B-B)** (AKA Formal Bid) - CGS §4b-91 - 4b-95:

Refer to: Selection Procedures & Project Delivery Methods Guidelines (Department manual - 0310).

.6 **Competitive Sealed Bid for Small Projects (D-B-B)** (AKA Informal Bid) - CGS §4b-91 - 4b-95:

Refer to: Selection Procedures & Project Delivery Methods Guidelines (Department manual - 0310).

.7 **Emergency Procurement -** CGS §4b-52(c):

Refer to: Selection Procedures & Project Delivery Methods Guidelines (Department manual - 0310).

End
1.3 – Selection & Project Delivery Options

1.4 Consultant Services

1.4.1 Basic Services

The consultant services provided to the State of Connecticut will be considered Basic Service as defined by the specific contract prepared for their project. Additional Services will be specifically listed within the contract. All phases and services listed within the text of the contract are to be delivered upon the implementation of a contract, or task letter with changes by Amendment. If a phase, specific duty or normal service is to be excluded, it shall be so noted within the text.

It is the responsibility and duty of each Consultant to make sure that any part of the contract they consider additional work or services is delineated as such. If a project is advertised for a specific expertise and that expertise is included as part of the Consultant team before a selection Committee, that service is now included as a basic service. An example of this situation:

The State, in its advertisement for work, identifies the need to expand a dining hall for an Agency. Included in its scope of work includes the need to expand the kitchen. Party to the design team is a kitchen consultant as a primary team player; this consultant is now part of the Basic Service of this contract and not an additional service.

Typical basic services are those activities that are normally delivered by the Consultant within the generally accepted phases of a design process. Schematic Design, Design Development, Contract Documentation, Bidding and Construction Administration are considered those typical basic phases.

Redesign or repackaging of the Contract Documents necessitated by the project bidding exceeding the agreed project budget will not be considered an additional service. The Consultant is required to design to the established budgets and is required to adjust the Contract Documents if the bid work exceeds the established budget. Should extenuating circumstances warrant additional services the Consultant may present their request to the Department PM for consideration by the Department's ADPM and Chief Architect.

1.4.2 Additional Services

The Department will support additional compensation for work requested of the consultant, by the Department, which exceeds the originally contracted scope of services. In no case should additional work commence without approval by the Department's Project Manager. Additional services requested by the Client Agency must be approved by the Department. Any additional fees shall be approved by the Department's Project Manager and by the State Properties Review Board (SPRB) when required.

1.4.3 Pre-Design Studies

This phase of the project is undertaken to develop a program or expand on an idea that has not been developed enough to enable either the Agency or the Department to adequately define a project or budget. This phase precedes the normal schematic design phase and is considered an additional service.

The pre-design study may require detailed interviews to determine the real functions to be accommodated; adjacency requirements, determination of space requirements to accommodate function and staff, security requirements, blocking and stacking, or other planning that may be required.

Basic services include (not to be considered a basis for additional services) items such as: review of existing record documents, review of existing conditions as they relate to record drawings; the development or required adjacencies and required square footage to meet normal design requirements.

1.4.4 Creation of As-Built Drawings (Record Drawings) When None Exist

When the scope of services includes modifications or additions to an existing building where there are insufficient record drawings available, the Consultant shall request a fee to develop accurate base condition drawings. The Department encourages the Consultant to consider newer technologies such as laser scanning to develop accurate base drawings or base models. The Project Manager will provide the Consultant with any available existing condition documentation from the Department's archives or from the Client Agency prior to final contract negotiation. The Consultant shall request such documentation prior to requesting additional fees.

When Record Drawings are created as an additional service, those drawings shall be provided in electronic format per Section 5.2 – Drawing Information, of this Manual.

1.4.5 Confirmation of Existing Conditions – Probes and Material Testing

When it is necessary to investigate building conditions that are inaccessible or not visible, the Consultant shall request additional services to investigate these conditions. Examples of such requirements include but are not limited to opening up (or accessing) existing walls, ceilings, floors, foundations (minor excavation), roofs including test cuts, location of conduit or reinforcing embedded in floor slabs, testing of materials such as mortar, masonry cleaning protocols (on historic structures), paint analysis using techniques such as infrared spectroscopy (on historic structures).

All investigation that have been conducted through partial demolition shall be restored to enclosed safe condition by the Consultant immediately following the investigation unless directed otherwise by the Department's Project Manager.

The fees shall include required access to the area requiring investigation such as providing lifts (including trained operators) or ladders or other safe means of access. The Consultant should verify with the Department Project Manager if the Client Agency can provide access to concealed spaces prior to establishing a fee for these services.

If it is not possible to determine the complete cost for these services at the time of initial contract negotiation the Consultant shall propose an allowance to cover such probes and testing.

1.4.6 Furnishings and Furniture System Layouts

Basic services shall include the design, detailing and specification of all fixed furnishings and equipment. This will be inclusive of fabrics, wall coverings, paint and other products that are required for a complete installation.

Basic services shall include layouts and scheduling (but not specification of) moveable furniture that can be utilized by the Department and Client Agency for purchasing furniture and equipment directly through State contracts. The Consultant shall work with the Department and Client Agency in developing a basis of design fabric and finish palette that compliments the finishes selected under basic services.

Basic services shall include design and detailing for all utilities required for systems furniture. The Department's PM will coordinate with the selected systems furniture vendor to define and locate needed service drops. The service drops will be coordinated into the final bid documents. If the systems furniture vendor is brought into the project following completion of the bid documents the Consultant is entitled to additional services to coordinate the work as part of a bid addendum or change order.

1.4.7 Equipment List and Specifications

Basic services shall include scheduling of all major equipment that requires dedicated power and / or services and utilities. If the Department's PM directs, the equipment can be specified by the Consultant and purchased through the contract for construction however, whenever possible, it is preferred that equipment be procured through State Contract with the Consultant limited to specifying and detailing utility connections that will be made by the Constructor. When purchased through the contract for construction it is the responsibility of the Consultant to specify a minimum of 3 equal products or seek sole-source permission per Department procedures.

In the event that the equipment is specified by the Consultant and purchased through the construction contract the Consultant's work shall be considered an additional service.

1.4.8 Coordination with a Construction Administrator (CA) Firm

The use of a CA firm is an extension of Department oversight and is not an expansion of the Consultant's scope of work. The hiring of a CA by the Department is not an additional service to the Consultant.

1.4.9 Separate Bid Packages/Documents for Sequential Construction

If additional bid packages are requested by the Department (including, but not limited to, new titles on each sheet, new reference standards per package, new supplementary general conditions, different format of pages for specifications and drawings, and the cost of duplicating the sheets for reproduction), these are efforts to be identified and could be considered as an additional service. If the Department Project Manager identifies the need during the initial Consultant's scope meeting the services shall be incorporated into basic services but the negotiated fee shall reflect the additional required efforts.

NOTE**:** re-issuing a bid package because the bids came in over budget is not to be considered additional work on the part of the Consultant.

1.4.10 Work Due to Extended Design/Construction Schedule (Not the Fault Of The A/E)

The contract language and intent in the Consultant contract, does not specify a finite duration for final acceptance of the work under. If the Department or the Agency cannot adhere to a pre-arranged schedule thus causing additional expenditures or action requiring additional work by the Consultant, the Consultant may request the Department Project Manager to negotiate additional fee to fairly compensate for delays or additional work. Time extension examples may include delay in funding, significant change of scope or poor contractor performance.

The consultant contract states that Consultant may be due additional fee if the actual construction time exceeds the Construction Contract Time by more than 10%. If the Consultant feels additional fee is warranted, the Consultant shall justify additional fees on the basis of extra work performed. Prior to exceeding the construction contract time by 10%, the consultant shall identify potential additional services to the Department Project Manager and establish a "Not-to-Exceed" estimate of cost. Added fees may be justified for attendance at job meetings beyond the 110% contact time and then on a man-hour basis, not a prorated time basis. The billing will be based on actual hours billable up to the established "Not-to-Exceed" estimate of cost. When considering additional fees, the Department Project Manager will evaluate causes for the construction delay. If the construction delay is attributable to errors and / or omissions in the contract documents, additional time attributed to those errors and / or omissions will be added to the construction contract time and not compensated as additional services.

1.4.11 Environmental Impact Information or Public Hearing

In general, the Department pays for any extensive A/E involvement in environmental activity relative to Department projects. If a design professional is involved in a project that requires extensive participation in the environmental process and additional effort is required by them to support or provide information that is not available; such as attend additional meetings, then the Department may approve this additional work with prior notification. Please see Section 3.3.1 – Environmental Policy Act of this manual for additional information

1.4.12 Third Party (Peer) Review – Threshold Projects

Any engineering firm being retained for the purpose of performing a structural peer review will be directly contracted by the Department and have a fee negotiated for these services. The Consultant shall provide all necessary information to the Third Party Reviewer as part of base services.

1.4.13 Energy Efficient Design

Work required to model or design alternative systems including impact on other systems must be clearly defined to enable the Department to determine what is beyond basic good design to justify an alternate design that has enhanced or improved energy attributes. When projects are required to follow the High Performance Building Regulations all necessary energy modeling will be considered basic services. For all projects the Consultant shall participate in applicable utility programs as part of basic services. Please see "Energy Issues" Section 3.4.4 of this manual for additional information.

1.4.14 Telecommunication/Data Design

Work involved beyond the basic location of primary feed, general system distribution, conduit systems, furniture systems interaction and terminus locations may be considered additional service unless it has been described as basic service on which the design fee is based.

1.4.15 Full Time Field Personnel

When requested, the Department will consider full time field personnel during construction as additional service. The fee will be negotiated on a lump sum basis and be inclusive of all reimbursable expenses.

1.4.16 Special Inspections

When Special Inspections are required as a part of regulations they are to be included in Basic Services. If the consultant is requested to provide additional inspection services after the execution of the contract, the Department will consider the work additional services.

1.4.17 Design Changes During Construction

Any Client Agency or Department initiated design changes following completion of the final CD documents may be considered as additional services due the Consultant. All requests for design changes shall be initiated by the Department Project Manager. Any change requests made to the consultant by other parties shall be referred to the Department Project Manager who will request a written proposal from the Consultant. Upon written authorization from the Department Project Manager the Consultant may proceed with the design changes.

1.4.18 Subsurface Investigation (Geotechnical)

For additions or new construction where soils need to be characterized, subsurface investigations will be considered an additional service. Please see “Subsurface Investigation Requirements” section 3.3.7 of this manual for additional information.

1.4.19 Surveys: Boundary and Topographic

Surveys shall be considered an additional service to the Consultant’s contract.

End
1.4 – Consultant Services

2.0 - Administrative Issues

2.1 Contract Process

Standard contracts have been developed by the Department in conjunction with the Office of the Attorney General.

2.1.1 Once the consultant has been selected, and the fee and scope of work negotiated, the Department Project Manager (PM), together with the Department legal office, will draft the contract, task letter or change (amendment) as appropriate.

2.1.2 For documents with fees in excess of those limits set forth in Connecticut General Statutes Section 4b-23(i), approval of the Connecticut State Properties Review Board (SPRB) shall be required.

2.1.3 The funding process is subject to bonding allocation by the Connecticut State Bond Commission and the time to accomplish this varies. Following confirmation of the availability of funds, the document is forwarded to the consultant for execution. A transmittal letter accompanies contracts to be signed and provides detailed instructions for the consultant. It is important that the consultant comply with the requests for supplemental documentation (e.g., insurance, current license, certificate of authority) in order to avoid delay in completing the processing of the document.

2.1.4 All contracts will be reviewed and approved by the Connecticut State Office of the Attorney General.

2.1.5 Change of Legal Entity or Name Change after Execution of the Contract:

2.1.5.1 The consultant is obligated to provide prior written notice of any intent on its part to:

.1 change its name;

.2 change the type of legal entity used to conduct its business;

.3 merge into another legal entity or

.4 be acquired by another legal entity. The entity that results from any of these actions is hereafter referred to as the “new entity”.

2.1.5.2 Once the name change, change in legal entity, merger or acquisition has occurred, the new entity must promptly enter into a contract amendment with the State reflecting that the new entity is being substituted for the original signatory to the contract and that the new entity has assumed all obligations under the contract. Following a formal request from the new entity, the Department’s legal office will request all necessary documentation from the new entity

The State has no obligation to execute a contract amendment with the new entity.

End
2.1 – Contract Process

2.2 Contract Forms

The various contract forms have been developed by the Department for the purpose of entering into a design and/or construction contract with an outside vendor on behalf of the State of Connecticut. These contracts are similar to, but are not identical to industry standard contracts. The applicable contract the Department enters into will be made available to the Consultant at the initial kick-off meeting (scope meeting).

2.2.1 Standard Fixed Fee Contract with the Terms and Conditions

A standard template of the Department design contract has been developed for complete architectural or engineering services, with inserts for the Department project manager to modify where appropriate. A contract is not complete without the referenced Terms and Conditions. This Consultants Procedure Manual is also an extension of the standard contract requirements as stated in the Department contract.

2.2.2 On-Call Contract and Task Letter Assignments

Periodically, the Department solicits interest for specific consultant disciplines to respond to open ended contracts. These contracts typically have a two year duration. The terms of the contract are for an upset limited fee, and may include all phases of design and construction administration. This work will be done for the Department, when this method is deemed appropriate and the value of an individual task is permitted within the Department's statutory authority. When the dollar value of the specific task exceeds the Department's statutory authority the contract will be selected through a formal process. Firms are chosen in a similar manner to all of our formal projects. The On-Call base contract has no funds associated with it, and is fully dependent upon the Client Agency identifying and funding a project.

There are multiple consultants selected for each On-Call discipline. Assignments are rotated by the Department to assure balanced participation of all of the assigned firms.

Once a project is identified, an On-Call firm is assigned. Following assignment the Department project manager will schedule an initial meeting (scope meeting). Following fee negotiation a Task Letter for the specific project is finalized and the work can commence.

2.2.3 Amendments

Changes to existing standard contracts are modified by Amendment.

End
2.2 – Contract Forms

2.3 Consultant Payments

2.3.1 Standard Fee Breakdown (Example)

The Department's standard breakdown of a Consultant's fee for basic services in connection with a "Standard Fixed Fee (Consultant) Contract" is as follows:

Schematic Design Phase:	**15%** of total fee
Design Development Phase:	**20%** of total fee
Contract Documents Phase:	**30%** of total fee
After receipt of bids or within 120 calendar days after approval of the documents submitted in the contract documents phase, whichever, occurs first:	**5%** of total fee
Construction Administration Phase:	**30%** of total fee

For other contract types, the fee breakdown will be as negotiated. This is a guideline for fee structure; specific project conditions may result in alternate negotiated fee distribution. The Department project manager shall coordinate with the Department Chief Architect to develop an appropriate fee distribution if it deviates from this standard.

2.3.2 Partial Payments

It is the policy of the Department to issue payments to consultants at the completion of major milestones during the design phases of the project. On a case-by-case basis, the Department may make contractual provisions to pay the Consultant in two equal installments for each of the schematic design and design development phases and three equal installments for the contract documents phase. Each request for installment payment shall be accompanied by a set of progress plans and specifications completed to a stage satisfactory to the Department. The Consultant shall identify the need for partial payments during contract negotiations. All invoices shall include: invoice number, invoice date, vendor number (FEIN/SSN no.), Project title, project location, Department project number, Department contract number, Department contract stage reference, and total amount due.

2.3.3 Payments During Construction

During the construction administration phase the Consultant may submit monthly invoices; refer to the Consultant contract for additional information.

2.3.4 Final Payment

The final payment to the Consultant will not be approved until all services called for in the consultant's contract have been completed to a stage satisfactory to the Department. In the case of construction administration, final payment will not be made until the Consultant has submitted, and the Department has approved, the record documents, as per his contract. For additional information see "Construction Phase" section 3.5.5 and "Drawing Information" section 5.2 of this manual.

2.3.5 Payments for Extended Construction Administration Services

For additional information see "Consultant Services" section 1.4.10 of this manual.

End
2.3 – Consultant Payments

2.4 Governmental Agency Exemption Certificate

Upon full execution and approval by all concerned parties of the Department's contract with the Consultant, the Department shall issue to the Consultant a Governmental Agency Exemption Certificate bearing the Department's tax exemption number.

All subcontractor services provided under the Consultant's contract with the State of Connecticut are not exempt from taxes. The Department of Revenue Services can guide the Consultant as to which services are exempt and which are not.

It is the responsibility of the Consultant to clarify tax status of those services with the Department of Revenue Services. The Department will not entertain any additional payments to the Consultant for taxes.

The form is the Contractor's Exception Purchase Certificate or CT Department of Revenue Services State of Connecticut CERT-141.

End
2.4 – Governmental Agency Exemption Certificate

2.5 Consultant Performance Evaluation (A/E, CA, CMR & DB Report Cards)

The Consultant Performance Evaluation form is used by the Department's Project Manager (PM) throughout the project's design and construction phases. The purpose of the Consultant Performance Evaluation Form is to measure the quality and service of the Consultant. It is important that the consultant knows the work will be evaluated at each phase of the project. The purpose of the evaluation is to ensure the contract documents, and the Consultant's overall service meets or exceeds our expectations. Prior to the final evaluation at the end of construction, the purpose is to identify problems with the service so the Consultant can take corrective action.

The Department PM shall issue the Consultant Performance Evaluation form at the completion of each identified phase in the Consultant Contract. The Evaluation form should be discussed openly with the consultant team, and allowing review and comment if they believe a problem is unfairly depicted. The evaluation form shall be reviewed with both the Department's Assistant Director of Project Manager (ADPM) and the Department's Chief Architect, (signatures required) before being sent to the Consultant. The evaluation forms will remain in the project file, and a copy will be maintained by the Department in a consultant file to be referenced during Consultant selections. The Consultant may appeal an evaluation to the ADPM. If an appeal is filed, the ADPM, together with the PM will review the evaluation and either adjust it or leave it as originally completed.

Performance evaluations shall be reviewed during the Consultant selection process for new work. Past performance is an important factor in determining Consultant selections.

2.5.1 The Evaluation Form(s)

(Consultant forms are located on the Department's Library web page)

Schematic Design Phase,	**Form 3910,**
Design Development Phase,	**Form 3911**
Contract Document Phase,	**Form 3912**
100% bid Phase,	**Form 6910**
Construction Phase,	**Form 7910**

If, a phase or activity is not applicable, the PM will insert N/A for a comment and the final score will be proportionally adjusted. The "Design Team" includes all Sub-consultants. If there is a problem with one of the consultant's sub-consultants and a negative statement regarding a sub-consultant is on the report, the sub-consultant has the right to attend a meeting with the Consultant and the PM to discuss the issues.

The following definitions apply to the rating system: The Department Project Manager may score the Consultant within the range of 0 and 10 points for each category, fractional ratings are not permitted.

Superior (10 points)	Far superior effort has been demonstrated, well beyond the expectations and scope of the work.
Satisfactory (7 points)	Within Department expectations for the submission.
Unsatisfactory (0 points)	Work has not been done, or the work done is not sufficient, is incomplete or demonstrates a below average level of quality assurance.

The Department Evaluation form(s) are based on a 100% maximum rating.

End
2.5 – Consultant Performance Evaluation

3.0 - Technical Requirements

3.1 Programming, Department Responsibility to Agencies

The Department Commissioner is given broad responsibility to establish and review space standards used throughout the state for purposes of establishing budgets and design parameters for state funded projects. In order to accomplish this task, the Department reviews the needs and requirements of users to assure standards are in the best interests of the state in terms of size and quality. Programming standards are periodically reviewed to remain current.

The intent of this chapter is to establish a planning guide for space allocation and budgeting purposes, as well as present planning approaches and methods for use by State Agencies in forecasting and calculating space needs. These space planning techniques are based on definitions and objective space assignment criteria and standards for determining the amount of assignable floor area needed for personnel, equipment and support functions.

The Department goal is to find a solution providing the best quality space with efficient and well-defined programmatic relationships.

Three levels of planning are presented to determine future space requirements ranging from a broad long-range estimate to a precise determination of floor area needed. Guidelines are provided to assist Client / Agencies in developing preliminary space program requirements. Following Consultant selection the Consultant shall refine and reconcile the preliminary programs through active engagement with the Client / Agency during the design phases of the project.

End
3.1 – Programming – DAS Responsibility to State Agencies

3.1.1 Space Planning Methods and Standards

It is an important goal in facilities planning, design and management to maximize the ratio of assignable space to non-assignable space. Design criteria used by architects and office space planners, result in a range of net to gross square footage of between 60% and 80% based upon program type and specific project needs: net square footage is the area assigned to active functions (such as office workstations, intra-unit circulation, conference rooms, cafeterias, mailrooms, duplicating and photocopy, etc.). The remaining area is non-assignable and represents circulation (central corridors, stairs, elevators), custodial (janitor's closets, storage of cleaning supplies and equipment), mechanical and building services (restrooms, boiler rooms, utility shafts, telephone and electrical closets, etc.) and structural (exterior walls, interior partitions, unusable areas in basements and attics).

3.1.1.1 Components of Assignable Space

Assignable area encompasses all floor space available for assignment to an occupant, (and) which can be put to useful purposes in supporting the Client / Agency's mission. Assignable area is used to determine the Client / Agency's overall facilities requirements. Following are some additional definitions of components comprising assignable floor area in State facilities:

Workstations - space for personnel, with desk, chair and other assigned furniture and equipment necessary to perform tasks, whether in a private office with floor-to-ceiling walls or an open office area either with or without modular system partitions.

Support Equipment - other furniture or special equipment (in addition to desks, chairs, and accessories directly assigned to workstations) needed to carry out general office functions. This category includes such items as photocopy machines, central file cabinets, computer terminals and possibly shared-use printers, and work tables.

Support Areas - functional areas and spaces not normally used to accommodate the workstations of office personnel, but necessary for the proper conduct of Client / Agency activities. This category includes conference rooms, reception areas, interview and testing rooms, laboratories, and other similar functions.

General Services - mail and central supply rooms, work rooms, printing and high-volume reproduction centers and records management functions are some of the functions included in this category.

Employee Services - lounges, employee health clinics, cafeteria, vending areas, candy counters, newsstands and concessions providing conveniences, services and personal items are included in this category.

Building Services - facilities management (e.g., building superintendent's office), shipping and receiving, and bulk supplies and equipment storage are among the functions included under building services.

Intra-Unit Circulation - this category refers to the assignable space between workstations for circulation within functional units, and includes secondary aisles and corridors to tie the various office functions together. A factor of 30 - 35 percent is used in the standards incorporated in this manual as an add-on for space assigned to office personnel (generally in open areas but excluding private office suites served by public corridors), unassigned equipment and furniture, and interview rooms. However, intra-unit circulation space allowances are not added to employee services and building services functions.

Economies of scale come into play with respect to the assignable-to-gross area used to measure efficiency of space. Experience in facilities management demonstrates the smaller the overall facility, the more floor area is required for non-assignable space. Smaller facilities require proportionally more assignable space per employee. This disproportion occurs because support areas and unassigned equipment required cannot be shared or need to be of substantial size to perform its function for Client / Agency activities.

3.1.1.2 Space Planning Methods and Standards

This section contains three different space planning models that can be used to determine the space needs of State Agencies. The model used to determine space depends on the level of detail involved and the purpose for which the space will be used.

1. **Level I** (Model for Calculating Agency Space Needs) is a general long-range forecasting model for determining gross floor space requirements.

2. **Level II** (Model for Calculating Space Needs) provides both assignable and gross space needs based on the numbers and categories of projected personnel, various support functions, and certain assumptions regarding building efficiency.

3. **Level III** (Model for Calculating Specific Space Requirements) provides a detailed assessment of assignable space requirements, using specific data on authorized and projected staffing, itemized equipment listing and support space.

Levels I and II are useful planning methods for projecting space needs as part of the five-year Facility and Capital Planning Process, while level III is applicable to definitive space requirements.

Level I uses broad space planning parameters and requires the total number of personnel employed by a State Agency in order to arrive at gross area requirements. This approach is useful for making preliminary estimates of aggregate space needs on a long-range basis. It will provide a rough basis for projected facility requirements when detailed information on staffing levels by specific category and support functions is not available.

Level II provides a more detailed approach to projecting space needs. While certain assumptions are built into the model regarding workspace for agency employees and floor area requirements for support functions and equipment, the format is flexible enough to adapt to unique requirements. This method is used where specific data on staffing category projections and other data are available.

Level III requires firm data on agency employees with specific position categories, as well as actual requirements for support space and unassigned equipment and furniture. This space planning method uses spreadsheets, and has been programmed to automatically calculate requirements based on **Department** standards.

LEVEL I Model for Calculating Agency Space Needs

The first general approach to making an approximate determination of space needed by State Agencies is on the basis of aggregate average gross floor area per person. This method of space forecasting takes into account the space needed for agency office personnel and supporting functions, as well as the non-assignable requirements such as corridors, restrooms, stairwells, lobbies and mechanical systems. The standards shown in the following table assume a general mix of office and related space, but do not include allowances for full-service cafeterias or large specialized areas such as public areas found in DMV Branch Offices or client waiting rooms in Human Services' District Offices:

Total Employee Population	Gross Floor Area/ Employee	Facility Size Range (Gross Square Feet)
Under 75 Persons	240	Under 17,500
Under 250 Persons	220	17,500 - 60,000
Over 250 Persons	190	Over 60,000

These standards are useful when making an initial approximation of space needs. These standards are intended to serve as a "rule-of-thumb" in calculating facilities needs when detailed planning data are lacking. Smaller buildings are less efficient due to disproportionate space necessary for lobbies, stairwells, corridors, restrooms, mechanical equipment and other non-assignable floor areas. When developing initial project budgets based on gross square footage calculations it is recommended to utilize Level II or Level III models. At this time the State of Connecticut Office of Policy and Management (OPM) uses an overall number of 175 gross square foot per person when evaluating building efficiency. The Department recognizes the OPM standards and show them as the middle level target when planning for a medium sized facility. If a proposed facility exceeds this threshold a justification shall be prepared for submission to the OPM to clarify required program space needs.

LEVEL II Model for Calculating Space Needs

Determining space needs using the Level II model requires data relative to the numbers and types of personnel and other elements of space use. This forecasting method provides more detail than Level I and is based on the numbers of executive, managerial, professional and clerical staff. It incorporates allowances for conference rooms, general services, building services, and employee services. This planning model also takes into account an agency's requirements to support technology and cafeteria facilities. Assignable space needs are then extrapolated to determine the gross space requirements based on building efficiency, (the ratio of assignable to non-assignable space).

Specialized program areas need to be identified to develop a reasonable tabular building program. Spaces such as classrooms, auditoria, technical shops, research areas etc. all need to be accounted for outside of general office space.

Please contact the Department's Chief Architect for the Level II space planning spreadsheet and for guidance in its application if necessary.

LEVEL III Model for Calculating Specific Space Requirements

This is the most detailed of the space planning models and is based on a fully developed preliminary program that projects anticipated staffing levels. Space has been determined for various levels of executive, managerial, professional and clerical positions for both systems furniture and standard furniture layouts. Refer to the Department Office Space Guidelines available through the Department web-based library. The space planning workbook can be downloaded here:

Request for Space Form (RFS)

The quantity of space assigned to each employee is based on current best practice and the requirements of the position to efficiently conduct state business. Job titles, pay classifications, seniority or rank, in conjunction with functional needs determine space allocation.

3.1.1.3 Conclusion

This chapter presents a series of planning guidelines to assist agencies in determining space needs and a set of guidelines and criteria to serve as a uniform basis for calculating those needs. The guidelines are a common reference point for use by all State Agencies. Although the space planning methods described in this manual are adaptable to unique situations, it is incumbent on the Client / Agency to justify exceptions to the space standards as described in this guidance document.

The space planning methods discussed in this manual have sufficient flexibility to adapt to a variety of applications.

The Department can assist Client / Agencies with Level II or Level III calculations of space needs forecasts using data input on personnel projections from the Agencies. Please call the Department's Chief Architect for assistance in obtaining a Level I, II or III space needs forecast.

End
3.1.1 – Space Planning Methods and Standards

3.1.2 Food Service Facilities

The Consultant and sub-consultants involved in the design of food service facilities and equipment specifications must be familiar with the U.S. Food and Drug Administration Food Code and public health standards for food establishments regulated by the Connecticut Department of Public Health (DPH). To assist the Consultant in the design of food service facilities see the following DPH publications:

- Compliance Guide for the Food Service Inspection Form:
- Food Service Inspection Form.

The DPH does not require design document submissions for review and will rely on the local/regional health inspector for compliance with the health requirements. Approval or sign-off must be obtained prior to going to bid.

If a private vendor is to manage the food service, the Consultant and Vendor shall review the design of the food service facilities with the local health department. See also "3.3.5 Permits, Certifications, Approvals Checklist & Policies" section of this manual.

The food service equipment and installation of the equipment shall conform to the standards of the National Sanitation Foundation (NSF) and NSF Manual on the Sanitation Aspects of the installation of Food Service Equipment.

Acceptable alternative:

Canadian Standards Association (CSA). A CSA sanitation mark is found on products that have been tested and found to meet all applicable NSF/ANSI sanitation requirements.

Edison Testing Laboratories (ETL Intertek). The ETL Sanitation mark is awarded to food service equipment that has been rigorously tested against national sanitation requirements.

Wastewater discharging food service equipment subject to Fats, Oils, and Grease (FOG) must meet the requirements of, and be installed in accordance with, the DEEP General Permit for the Discharge of Wastewater Associated With Food Preparation Establishments

Newly constructed facilities, renovated facilities, and facilities that are sold must enter into compliance as part of the permitting process. Additionally, a municipality can require a facility or facilities to implement these changes if a sewer system area is deemed to be a FOG problem area. The permit gives municipalities the authority to exempt food preparation establishments that have small discharges with minimal FOG quantities due to the nature of the food prepared.

For additional information contact:

Connecticut Department of Public Health
Bureau of Regulatory Services
Division of Environmental Health
Food Protection Program
860-509-7297
www.ct.gov/dph

End
3.1.2 – Food Service Facilities

3.1.3 Equipment Guidelines

The Consultant shall work with the Department project manager when moveable equipment is included as part of the project scope of work. When equipment will be purchased directly under state contract the Consultant shall coordinate those purchases through the Department project manager and the construction administrator (when available). Timing of purchases are on the critical path so familiarity with the state procurement process is critical.

The Department project manager shall make the final determination regarding equipment procurement methodology (direct state purchase versus inclusion in the contract documents) in consultation with the Consultant.

3.1.3.1 General Contract Equipment

Specific information related to the equipment or installation of equipment shall be included in the contract documents under the following conditions:

1. Where installation and final connections to roughing-in are closely involved with structural features and are so extensive in character that coordination under the supervision of the constructor is necessary.
2. Where moveable equipment shall match or coordinate with finish and space requirements of other building elements in the same area.

3.1.3.2 Contract Document Requirements

Plans and Specifications shall include:

1. Roughing, anchoring, installation and final connections where fixed equipment is either specified in the contract documents or included on the moveable equipment list for procurement outside of the General Contract.
2. Disconnecting, dismantling, moving, relocating, re-assembling, and re-installation with final connections, where existing equipment must be transferred from present locations to new locations.
3. If moveable equipment is being specified within the contract documents, or if it is to be purchased directly by the State, an equipment plan shall be provided to demonstrate the equipment location along with an equipment schedule that indicates service and utility requirements for each piece of equipment. The Consultant shall coordinate across sub-Consultant disciplines so that specified equipment will fit and have the correct utility / service connections available and that the equipment will physically fit within the space. The Consultant shall design required clearances including service clearances when laying out the equipment.
4. Where equipment is specified or selected by the Consultant, but not part of the contract for construction, procurement of the equipment will be via State Contract. If the item is not available under State Contract, the item shall be procured by the Client Agency.

3.1.3.3 Basis of Design – Minimum Acceptable Standard

A specific make and model of equipment may be the basis of design however, at least two acceptable alternate manufacturers must be included within the contract documents when the equipment is being specified and purchased through the Constructor. If the client agency requires a specific make and model from a specific manufacturer then a sole source request must be made to the Department if the equipment is specified by the Consultant. Refer to Section 5.4 “Single Source (Proprietary) Specification” in this manual for the process to request a sole source.

End
3.1.3 – Equipment Guidelines

3.1.4 Building Security

3.1.4.1 General Security Design

In accordance with CGS Sec. 4b-134 security characteristics for renovations and new construction shall be a consideration of the Consultant's design for Client / Agencies (State agency) as defined in 4b-130 (5).

1. Renovation projects: the Department will determine if the project will have a significant impact on the security characteristics of the building or structure. If so, the Department may conduct a security audit of the building or structure. The Consultant shall work with the Department's security personnel to ensure that the Consultant's design addresses audit recommendations, if applicable, and meets or exceeds the Department security standards.
2. New construction: the Department will require all new construction projects meet or exceed Department security standards. The Department PM shall schedule a meeting between the Department Director of Safety and Security or designee during the SD phase to evaluate building security requirements. This review will be both to determine appropriate technology and physical design features that can enhance building security. When required, documentation will be required during the DD and CD phases of the project, see "Design Development Phase" – section 3.5.2.13 and "Contract Document Phase" – section 3.5.3.13 of this manual.

For renovation projects determined to have a significant impact on security characteristics or for new construction, the Department Project Manager (PM) shall coordinate with Department security personnel during the design phases to incorporate desired security characteristics into the work.

End
3.1.4 – Building Security

3.2 Master Plan

A master plan commissioned by the Department shall be undertaken when an Agency has determined its facility or campus needs an overall plan for future building or expansion. Refer to Section 3.5.0.1.1 - "Pre-design Phase" in this manual for further detail.

3.2.1 Study Format

The study shall follow the “Major Group Elements” – Level II of ASTM Uniformat II (see table below) starting with the overall campus and then following for each building in the masterplan. Each building shall be handled separately but may be included in a single volume for the Agency of which it is a part.

Group Elements – Level II (ASTM Uniformat II)			
A10	Foundations	**D40**	Fire Protection
A20	Basement Construction	**D50**	Electrical
B10	Superstructure	**E10**	Equipment
B20	Exterior Enclosure	**E20**	Plumbing
B30	Roofing	**F10**	Special Construction
C10	Interior Construction	**F20**	Selective Demolition
C20	Stairs	**G10**	Site Preparation
C30	Interior Finishes	**G20**	Site Improvement
D10	Conveying	**G30**	Site Mechanical Utilities
D20	Plumbing	**G40**	Site Electrical Utilities
D30	HVAC	**G90**	Other Site Construction

3.2.2 Study Information

1. An Executive Summary: The minimum requirements of the summary shall include:

- **a.** Introduction including agencies involved, and condensed summary of the work
- **b.** Summary recommendations
- **c.** Description of multiple concepts, highlighting differences
- **d.** Key findings
- **e.** Schedule information
- **f.** Square footage of existing and new
- **g.** Consolidated schedule of costs
- **h.** Conclusions

2. Brief Campus or Building history, stating any buildings on the State Register of Historic Places

3. Analysis of existing conditions:

- **a.** Office of the State Fire Marshal reports
- **b.** Other planned state building projects that are in construction or in design at the site.
- **c.** Review existing building plans and conduct an on-site investigation of existing physical features and conditions.
- **d.** Types of spaces (i.e. offices, classrooms, cafeterias, science labs, etc.)
- **e.** Flexibility of spaces/Dual functions
- **f.** Buildable areas on site
- **g.** Site features (vehicular and pedestrian)
- **h.** Utilities and infrastructure
- **i.** Security
- **j.** Sustainability goals and policies

4. Recommendations shall consist of the following:
   - **a.** Detail specific items that need to be brought into compliance with the accessibility requirements of the State Building Code, taking all of the data gathering information into account.
   - **b.** Review recommended actions with the Department's Office of the State Fire Marshal to resolve all compliance issues relating to life safety.
   - **c.** Future development concepts and options
   - **d.** Types of spaces and reallocation of spaces
   - **e.** Exterior enclosures and sprinklers to meet the State Insurance Carrier standards
   - **f.** Take into consideration any campus or agency design guidelines and/or requirements
   - **g.** Buildable areas on site
   - **h.** Site features (vehicular and pedestrian)
   - **i.** Utilities and infrastructure
   - **j.** Security
   - **k.** Sustainability goals
5. Implementation:
   - **a.** Phasing of work
   - **b.** Future expansions
   - **c.** Future demolitions
6. Cost:
   - **a.** The cost estimate shall follow the "Major Group Elements" – Level II of ASTM Uniformat II
   - **b.** Include implementation costs and approximate task construction duration
   - **c.** If a code violation is found that is part of an existing Department project, no cost evaluation is necessary, but a reference of the Department project number is required, with an anticipated compliance date.

3.2.2 Study Submission

The typical Master Plan will have two formal submissions, draft and final. All Master Plan submissions shall be submitted in electronic format (PDF), the final report shall be tabbed and organized utilizing embedded bookmarks and hyperlinks. Every page of the study shall have the project number as a footer on the lower right side of the page. Refer to Section 5.1.1 "Project Manual Information – General Information" and Section 5.2.1 "Drawing Information – General Information" of this manual for additional requirements.

1. The draft submission shall follow format recommendations as identified above. The Department will consider format changes due to project specific requirements. All format changes shall be reviewed prior to the Draft submission with the Department. The draft submission will be reviewed by the Department and the Client Agency. The Consultant shall respond to all review comments. At the draft stage, priorities will be recommended by the Consultant based on data collected and prior input from the Department and Client Agency. The Owner review of the report may modify priorities incorporated into the final report.
2. The final report shall resolve review comments. The text shall be prepared in an 8 ½" x 11" format. The graphics while bound into the final report, may be a larger size than 8 ½" x 11". File size shall be limited to 10 MB.

End
3.2 – Master Plan

3.3 Site – Permits, Approvals, and Requirements

Index:

3.3.1 Environmental Policy Act

3.3.2 Storm Water Discharge Standards

3.3.3 Utility Hookups

3.3.4 Underground Storage Tanks

3.3.5 Permits, Certifications, Approvals Checklist & Policies

3.3.6 Boundary & Topographic Survey Requirements

3.3.7 Subsurface Investigation Requirements

End
3.3 - Site - Permits, Approvals, and Requirements

3.3.1 Environmental Policy Act

The purpose of the Connecticut Environmental Policy Act (CEPA) (Sections 22a-1 through 22a-1h of the Connecticut General Statutes) (as with the National Environmental Policy Act) is to identify and evaluate the impacts of proposed state actions which may significantly affect the environment. This evaluation provides the decision-maker (the sponsoring agency and the Department with information necessary for deciding whether to proceed with the project.

The consultant is not expected to decide whether a project warrants a complete CEPA review; such determination is left to the sponsoring agency and the Department. The Department's Chief Architect administers the CEPA process for the Department's projects in conjunction with outside consultation. At the discretion of the Chief Architect or at the request of the Department Project Manager or sponsoring agency, an Initial Environmental Review (IER) may be conducted by an environmental consultant to determine whether the project is applicable to CEPA or to assist in scoping out the environmental issues to be covered in an Environmental Impact Evaluation (EIE). The IER is a cursory review or screening process that looks at issues in broad terms. It is not meant to be a detailed review process nor is it required for every project. An IER serves these primary functions:

- to assist in determining if an EIE is needed;
- to document the review of potential issues that are determined not to be significant;
- to identify the significant issues to be analyzed in detail if an EIE is needed; and
- to assist in determining potential permits, certifications, and approvals for the project.

(Note: an IER does not replace the Consultant's obligation to continually assess what permits, certifications, or approvals the project may require as the project progresses or from submitting the Department *Checklist for Permits, Certifications, and Approvals* (Form 3030) with each phase of the project.)

The consultant selected for the design will not prepare a CEPA document as this would create an inherent conflict of interest. If an EIE is required, the Department will contract with an independent environmental consultant to prepare the document in accordance with the Department CEPA Procedural Manual, as amended. The Consultant shall provide the CEPA consultant with copies (hard or electronic as needed) of current design information, drawings, and site plans to incorporate into the environmental document. Normally, the CEPA document and the design are developed simultaneously.

The Consultant shall be responsible for reviewing a CEPA document, particularly if the CEPA process occurred prior to design, to ensure information relevant to design and construction are accurate, and that agreed upon mitigation measures can be incorporated into the design/construction and are incorporated into the contract documents. When required, a project cannot proceed to the contract document phase without having completed the CEPA process, unless special permission is granted by the Department. The CEPA process is considered complete when the CT Office of Policy and Management (OPM) determines the EIE and the Record of Decision are adequate.

The Consultant shall anticipate attending environmental document review meetings (typically called the Working Copy and Revised Working Copy review meetings). The Consultant is also responsible for complying with any permit requirements noted in the CEPA document. If the Consultant is involved in a project requiring additional effort beyond the normal services (e.g. attend additional meetings or a public hearing), the Department may approve this effort as an additional service. Refer to "Consultant Services" section 1.4 of this manual for additional information on additional services.

For historic building and site requirements refer to "Cultural Resources (Historical & Archaeological)" section 3.4.2 of this manual

Refer also to "Checklist for Permits, Certifications, and Approvals" (Form 3030) as indicated in section 3.3.5 of this manual

For further information or for assistance regarding CEPA, contact:

Chief Architect
Phone: (860) 713-5631

End
3.3.1 – Environmental Policy Act

3.3.2 Construction Stormwater Permitting Requirements

3.3.2.1 General Information

The purpose of the storm water discharge requirements is to ensure state facilities are constructed and operated in a manner conserving and protecting the waters of the state and to eliminate or reduce the risk of flood damage to property and life. The goal of stormwater management design should be, to the extent practical, no net increase to peak flows, no new stormwater connections, and infiltration with minimal engineering control structures (i.e., catch basins, piping, etc.).

Both the Consultant and the General Contractor shall conform to the requirements of Department of Energy and Environmental Protection's (DEEP) General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities" (DEEP-WPED-GP-015). In addition, Connecticut High Performance Building Standards and criteria for sustainable site design shall be incorporated as applicable.

For all projects involving soil disturbance, the following thresholds and requirements apply:

1. If the site disturbance is less than one (1) acre, a *S*oil Erosion and Sediment Control Plan that conforms to the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, shall be prepared and ***no registration*** with DEEP is required.
2. If the site disturbance is equal to, or greater than, one (1) acre, then a Stormwater Pollution Control Plan (SWPCP) that conforms to the “General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities" (DEEP-WPED-GP-015) shall be prepared and the project will require registration with DEEP.
3. SWPCPs and General Permit Registrations for sites between one (1) and twenty (20) acres need to be submitted to DEEP at least sixty (60) days prior to construction but should be prepared and submitted at the end of the DD Phase allowing adequate time for review and approval.
4. SWPCPs and General Permit Registrations for sites greater than 20 acres or discharging to tidal wetlands and within 500 feet of tidal wetlands or discharging to an “impaired water” resource must be submitted to DEEP a minimum of ninety (90) days prior to construction but preferably at the conclusion of the DD Phase allowing adequate time for review and approval.

For projects requiring General Permit Registration, the Consultant will need to prepare and submit the application and any other information necessary for submitting the application through DEEP’s “ezFile” Portal. The Consultant shall include the latest General Permit (DEEP-WPED-GP-015) as an appendix to the SPCP, along with other permit required applicable information necessary for DEEP review and approval. The SWPCP shall be listed and included in the “Available Information” of the Project Manual. The Department shall pay for the permit fee.

The General Permit shall be transferred to the Contractor upon bid award with notice to DEEP through a license transfer form for DEEP approval. The Contractor must revise the Permit Application as needed (subject to Department review and approval) and include a Contractor Certification Statement consistent with Permit requirements.

The Consultant’s professional engineer (or qualified soil and sediment control professional) shall also serve as the qualified professional for the initial SWPCP Implementation Inspections (for projects 15 acres or less). When notified by the General Contractor, the engineer shall inspect the site within the first thirty (30) days following commencement of the construction activity on the site. The site shall be inspected at least once and no more than three times during the first ninety (90) days to confirm compliance with the General Permit and proper initial implementation of all control measures designated in the SPCP for the site for the initial phase of construction. The Consultant’s professional engineer shall not be responsible for “routine inspections,” as described in the General Permit.

3.3.2.2 Available Resources

For questions or assistance about these permits contact:

Chief Architect
Phone: (860) 713-5631

End
3.3.2 – Storm Water Discharge Standards

3.3.3 Utility Hookups

During the project design phases the Consultant shall identify and coordinate with the applicable utility company all issues pertinent to the proper installation of utilities. Examples of the tasks that shall be completed by the Design Consultant are as follows:

- Obtain from the local jurisdictions written authorization to connect to the public water supply system, storm drain system, sanitary system, etc. (See Utilities re. Checklist for Permits Certifications and Approvals, Form 3030)

- Identify in the construction documents all fees to be carried in the general contractor's bid for utility connections to the public utility systems.

- Coordinate with the regulated utilities (e.g., electric company, gas company, etc.) the requirements that must be completed to properly install the utilities. Identify all fees and other costs associated with the utility hookups so that the Department can process a purchase order in a timely manner to avoid delay. Complete the Checklist for Permits Certifications and Approvals and return to the Department Project Manager.

The Design Consultant shall submit the design development drawings to the local utility owner for review and comment prior to phase completion. Drawings approved by the utility shall be included in the drawings and specifications.

The drawings submitted at the "Design Development (DD) Phase", section 3.5.2 of this manual**,** shall clearly indicate all expansions, additions, or relocation of utility systems which connect to the local utility. The documents must also clearly show the nature and extent of the work, the details for the construction, and note the sequence of the construction, as appropriate. All relocation or extensions of major local utility or agency underground utility lines shall be prepared under the direction of a registered professional engineer competent in this area of design and construction.

Coordination with the Regulated Utilities: Prior to the "Contract Document (CD) Phase", section 3.5.3 of this manual, coordinate with the regulated utilities (e.g., electric company, gas company, water, sewer, etc.) the requirements that must be completed to properly install the utilities. The Consultant shall submit the required construction documents to the local utility owner for review and comment prior to phase completion. Final drawings approved by the utility shall be included in the contract documents.

Easements may be required for several reasons, some of which are as follows:

- Construction on or in close proximity to adjacent property.
- Off-site utilities.
- Off-site storm water runoff.
- Temporary and/or permanent easements may be required with Agreement of Maintenance for items, which may be overhead, or on or below the surface

If easements are required, it should be indicated on the Checklist for Permits Certificates and Approvals.

- A legal description and map shall be provided by the Consultant. The Department project manager shall submit the legal description and map to the Department Leasing Unit. Consultant support of easements is considered an additional service and should be identified at the project kick-off so that the services can be included within the Consultant's contract.

Refer to the "Permits, Certifications, Approvals Checklist & Policies" section 3.3.5 of this manual.

End
3.3.3 – Utility Hookups

3.3.4 Underground Storage Tanks (UST)

3.3.4.1 Regulatory Requirements

Underground storage tanks (USTs) must be designed and installed in accordance with Federal Regulations (40 CFR 280 and 281), the Regulations of Connecticut State Agencies (RCSA) (Sections 22a-449 (d) –1 and 101 through 113 inclusive), NFPA 30, NFPA 31, NFPA 327, API 1604, and all other applicable state and federal regulations.

The contractor must comply with OSHA Regulations for hazardous waste operations (29 CFR 1910.120) if contamination is found or suspected.

Refer to the Checklist for Permits, Certifications and Approvals Form 3030 and/or "Permits, Certifications, approvals Checklist & Policies" section 3.3.5 of this manual.

3.3.4.2 UST Installations

All underground storage tanks shall be double-wall tanks with a continuous interstitial space monitored continuously via inert gas or liquid, vacuum monitoring, electronic monitoring with liquid sensors or mechanical monitoring and double-walled piping. Unheated oil feedstock may include up to 5% biodiesel in accordance with ASTM. Tank material must be demonstrated as compatible with unheated oil, biodiesel and all biofuels. Fiberglass reinforced plastic (FRP) underground storage tanks and non-metallic underground piping are preferred for unheated oils. #6 oil and in some cases #4 oil (depending on the return oil temperature) require steel tanks and piping due to the elevated product temperatures.

3.3.4.3 UST Removals

All permanent tank closures (excavation or abandonment in-place by cleaning and filling with a solid, inert material, usually dry sand or concrete) must be accompanied by an UST Closure Report which includes sampling of soils (and potentially groundwater) to verify that petroleum/CERCLA chemical releases have not occurred. If contamination is discovered, those releases must be reported immediately to the Department of Energy & Environmental Protection (DEEP), and clean-up must be conducted to bring levels of contaminants below current departmental standards, as defined in the Remediation Standard Regulations (Section 22a-133(k)-1 through 22a-133(k)-3 of RCSA).

The samples shall be analyzed for evidence of contamination in accordance with the DEEP guidelines for "Sampling and Analytical Methods for Underground Storage Tank Closure"

The discovery of contaminated soils / staging / remediation and regulated activities in an aquifer protection area may result in additional fees. Such fees shall be paid by project funds. The consultant shall assist the Department in the preparation of all documents and determination of required fees.

3.3.4.4 Stop Work and Notification

Contractors shall be required to stop work and notify the Department's PM in the event contamination is discovered. The Department has established guidelines for the continuation of the work and the investigation of the contamination subsequent to the detection.

Any soil excavated from a tank grave is considered potentially polluted and must be sampled and analyzed prior to either reuse on site, or disposal off site. Reuse of polluted soil must be done in accordance with RCSA 22a-133k-2. Polluted/contaminated soil to be removed from the site must be sent to a facility permitted to accept such soil. The analytical protocol of the receiving facility must be followed. Under no circumstance is soil to be removed from the site without prior written consent of the Department.

3.3.4.5 Tank Notification

All test results, closures, new installations or general changes in status of UST systems or facilities MUST be reported to the CT DEEP Storage Tank Enforcement Unit by submitting a Notification for Underground Storage Tanks (DEEP-UST-NOT-002) with accompanying fee (if required) at least 30 days prior to removal and UST Closure Report (if applicable) no later than 30 days after removal of the UST is complete. The Closure Report is to be submitted via DEEP's "ezFile" system by the Consultant. The Consultant shall assist the agency in properly notifying and reporting all permanent closures, temporary closures, new installations, and major modifications to DEEP on the prescribed form. The notification form must be emailed to the following address:

Site Assessment and Support Unit
Department of Energy & Environmental Protection
deep.30dayust@ct.gov

3.3.4.6 Available Resources

For general assistance regarding UST notification contact the CT DEEP Storage Tank Enforcement Unit

Program Coordinator
DEEP Bureau of Materials Management and Compliance Assurance
Site Assessment and Support Unit
Hartford, CT 06106-5127
Phone: 860-424-3376

For copies of the UST notification form, instructions and other required information, visit the DEEP Webpage > Environmental Quality > Materials Management > Underground Storage Tanks

End
3.3.4 – Underground Storage Tanks

3.3.5 Permits, Certifications and Approvals Checklist and Policies

Many Department projects involve at least one, if not multiple, permits, certificates, or approvals ("permits"). The permitting process can have a significant impact on a project's schedule and cost. As each permit carries unique lead times and approval requirements, constant Consultant attention is required throughout all project phases. All permits requiring approval prior to construction shall be obtained before a project can proceed to bid phase.

The Consultant shall submit permit applications as soon as practicable to obtain necessary approvals from regulatory agencies. A separate permit and approval status section shall be included in the project schedule, as this process can become the critical path on larger capital improvements.

To assist consultants in the permitting process, the Department has a Checklist for Permits, Certifications, and Approvals (**Form 3030**). The Consultant shall adhere to the following procedures and policies regarding permitting:

1. The Checklist shall be submitted with the Consultant's proposal and revised and resubmitted with each preconstruction phase submittal to the Department project manager.. Electronic copies of the Checklist are to be sent to the Department's Technical Services Unit at DAS.Technical.Review@ct.gov and. For each submittal, the Consultant is required to use the most current checklist form obtained from the Department website.
2. The Consultant shall review each permit to determine if it is applicable to the project. For supplemental information about an individual permit, contact the appropriate agency or agency website.
3. The Consultant shall coordinate with the appropriate agency(ies), complete all necessary application forms, and submit the permit(s) for the project, except as indicated below.
4. All CT Department of Energy & Environmental Protection Inland Water Resources Division, Office of Long Island Sound Programs and the CT Office of State Traffic Administration (OSTA) correspondences and applications shall be coordinated with the Department Chief Architect.
5. For complex or significant regulatory involvement, Department Technical Services shall be involved to participate and/or coordinate with the regulatory agencies and permitting process.
6. The Consultant shall ensure all the required permits, certificates, and/or approvals are obtained for the project and that the design meets applicable state and federal laws and regulations.
7. Permits required prior to construction should be obtained during design development, but no later than the early part of the contract documents phase. The Consultant shall notify in writing to the designated Department project manager any outstanding permits at 50% completion of contract documents. This requires that the Consultant's team read permit guidance documents, coordinate with the Department, the client agency, and regulatory agencies, and prepare permit applications during schematic design phase and have completed such permit applications at fifty percent (50%) design development phase for subsequent Department internal review and submittal to the appropriate agency.
8. The Consultant shall review all prior environmental and Connecticut Environmental Policy Act (CEPA) documents for the project to determine permitting requirements and other related issues. The Consultant shall ensure information relevant to design and construction are accurate, and that agreed upon mitigation measures in the documents are feasible and incorporated into the contract documents (see Sections 3.3.1 Environmental Policy Act and Section 3.3.2 Storm Water Discharge Standards).
9. The Consultant shall not submit the project for review or "approval" to any municipal land use commission or board, unless the designated Department project manager approves such review; however, such review is only a courtesy, since state actions are exempt from local approvals, unless explicitly required by statute.

If additional study is required by a permitting agency, then an additional scope of work can be negotiated with the designated Department project manager for such services. The Department is responsible for all application fees, unless it is necessary for the General Contractor to pay.

3.3.5.1 Available Resources

For questions or comments regarding the Checklist or for permitting coordination contact:

Chief Architect
Phone: (860) 713-5631
DAS.Technical.Review@ct.gov

End
3.3.5 - Permits, Certifications, Approvals Checklist & Policies

3.3.6 Boundary & Topographic Survey Requirements

3.3.6.1 Standards

All surveys shall be performed by land surveyors registered in the State of Connecticut. The Survey must include all areas that may be subject to construction operations including access beyond paved roads and staging areas. Include sufficient area (minimum of 50' from the proposed limits of construction) to determine the consequences of drainage and wetlands.

Each sheet shall have the registration seal of the surveyor, a certification of the standard of accuracy, and the date of the survey. Any information obtained from other sources or maps shall be noted, including its date and origin. Surveys shall always use an engineering scale and be either in the scale most used at the facility, or otherwise 1"=20, 1"=40, or smaller for particularly large properties. All plans shall be oriented in a similar manner, consistent with other project drawings; typically North to the top of the sheet. Survey drawings shall be prepared on the DAS standard drawing template.

Where the area surveyed involves more than one sheet, include a key plan and adequately marked "match lines" on each sheet.

The edges of all digitized maps must exactly match digitally with those of all adjacent maps.

The digital representation of the common boundaries for all graphic features must be exactly the same, regardless of level/layer. Each feature within a map theme must be represented by a single graphic element (e.g., polygon, line, or line string).

Lines and line strings which represent the same graphic element must be continuous (i.e., not broken or segmented), unless that segmentation reflects a specific visual line type. Lines/strings representing the same type of data must not cross except at intersections.

Polygons must be closed (i.e., the first x- and y-coordinates must exactly match the last x- and y-coordinates). Polygons of the same coverage must not overlap and must cover the area of interest completely (i.e., have no gaps in coverage).

All graphic elements that connect must exactly connect digitally, without overlaps or gaps.

3.3.6.2 Bench Marks

On all surveys showing elevations, a bench mark shall be established within the area covered by the survey from:

1. Existing bench marks, if any, if the survey is on the grounds of an existing facility. The Department has on file benchmarks within many of the facilities.
2. The USGS or USC&GS if the above is not available.
3. The town or city datum most used in the locality, if within the limits of a developed area.

A note on the survey shall describe the established benchmark and the reference datum. The established benchmark shall be a reasonably permanent object located outside the contemplated construction area and preferably within 600 feet of the proposed construction.

3.3.6.3 Boundary Surveys

The standard of accuracy for Property/Boundary surveys shall be either Class A-2 as defined in the "Regulations of Connecticut State Agencies, Sections 20-300b-1 thru 20-300b-20" of the Connecticut General Statutes.

Where Property/Boundary survey is required, the following requirements shall be applicable:

1. Where boundary lines are required, each boundary line of the lot shall be located and show accurately measured or computed lengths and directions based on the close traverse.
2. Where no permanent markers exist, permanent markers shall be installed at each corner and at the P.C. and P.T. of curves. Such permanent markers shall be 3/4 inch Rebar 30" long, unless specifically instructed to install concrete monuments. All markers and monuments to be set a minimum of 1 inch above the existing grade. The drawing shall show the names of streets and names of adjacent property owners with indications of the limit of adjacent owners' property on the boundary line.
3. On boundary surveys, a certified written description agreeing with measurements and courses given on the plot reading in a clockwise direction shall be submitted.
4. Deed references shall be noted on the map.
5. At least 2 control points shall be provided and depicted on the final survey.

3.3.6.4 Topographic Surveys

The standard of accuracy for topographic surveys shall be either Class T-2 or T-3 as defined in the "Regulations of Connecticut State Agencies, Sections 20-300b-1 thru 20-300b-20" of the Connecticut General Statutes.

Where topography is required, the following requirements shall be applicable:

1. Contours at 2 foot intervals, except for flat areas where 1 foot contours or spot elevations will best show the ground elevations. At least two benchmarks and two control points shall be provided and depicted on the final survey.

2. Elevation of floors, top of manhole frames, paved streets, curbs, culvert inverts and adjacent waterways.

3. Location of buildings, retaining walls, ditches, streams, stream channel encroachment lines, flood plain lines, manholes, catch basins, culverts, poles, fire hydrants, streets, drives, walks, fences, hedges, boundary of wooded sections, isolated trees with size and type, and any other artificial or natural features which would interfere with or cause obstruction to developing the land for further construction.

4. The survey services shall include a record search for prior building and utility occupancy. The survey research shall include review or prior agency plans for the project area and a review of CT DEEP aerial photos for the years 1950+ and 1970+ (20 years and 40 years prior to the survey). If prior occupation is found, the outline of the previous buildings shall be shown on the final survey.

5. Locations of surface utilities and the top of frame elevations obtained and depicted on the plans. Invert elevations shall be obtained on storm and sanitary structures only. All other underground utilities shall be depicted on the plan with notes as to the source of the information.

6. Agency Utility plans shall be researched and the recorded underground Utility data shall be shown.

7. On all surveys where topography only is required and there is no existing building, street, or bounded property line within 300 feet of contemplated construction, two temporary base lines at right angles to each other with ties shall be established outside the contemplated work area. Ends of the base line shall be marked by 5/8 inch diameter rods driven 2 feet into the ground.

8. The topographic survey shall show the "as drilled" location of each boring and test pit. Refer to "Subsurface Investigation Requirements" in Section 3.3.7 of this manual.

9. When wetlands, watercourses, or other waterbodies occur within the survey area, their limits shall be shown. Wetlands shall be delineated by a soil scientist. Refer to "Surficial Soil Investigation Requirements- Wetlands Delineation" section 3.3.6.8 of this chapter.

3.3.6.5 Legend

A legend shall be provided.

3.3.6.6 Consultant's Responsibilities

The Consultant shall be responsible for including all general survey requirements in the survey proposal requests. In addition, the survey proposal requests shall indicate certain specific requirements such as orientation, scale, datum, etc., that comply with requirements previously mentioned. Determination of such requirements shall not be imparted on the surveyor.

3.3.6.7 Submittals

A PDF of the competed survey must be submitted to the Department project manager prior to approving payment.

Final mapping to be prepared in AutoCAD latest release. Surveys shall be provided in the latest Connecticut State Plane Coordinate System, feet, North America Horizontal and Vertical Datum of 1983 (horizontal), and North American Vertical Datum of 1988 (vertical).

3.3.6.8 Surficial Soil Investigation Requirements – Wetlands Delineation

Wetlands shall be delineated by a registered soil scientist having a minimum of 3 years professional experience in soil science in accordance with both Section 22a-38, CGS Inland Wetlands and Watercourses Act, and the current federal delineation method; Corps of Engineers Wetlands Delineation Manual.

End
3.3.6 – Boundary & Topographic Survey Requirements

3.3.7 Subsurface Investigation Requirements

3.3.7.1 General

1. The purpose of subsurface investigations is to provide sufficient geotechnical data to properly evaluate conditions relative to design or construction situations for structure, site and utility work.
2. Subsurface investigations shall comply with the CT State Building Code and the additional requirements included herein.
3. Geotechnical subsurface data, whether existing or new, should be obtained for any building, additions, site work, etc. When provided within the Consultant's services this work is considered an additional service. See "Consultant Services", section 1.4.19 of this manual.
4. For borings, comply with the requirements of the Connecticut Department of Transportation (DOT) Geotechnical Engineering Manual, as to methods, sampling, etc.

3.3.7.2 Program Requirements

1. Subsurface investigations shall extend below footings to a depth where the intensity of the footing pressure will have a negligible effect on the soil. Extend several borings to a minimum five feet below the lowest excavation elevation if refusals, such as boulders, cemented soils, ledge rock, etc., are encountered..
2. Subsurface investigations shall be made for site work if excavation will be required, or where unsuitable, unstable or highly organic materials might occur in construction areas.
3. Subsurface investigations shall be provided based on recommendations of the structural engineer in conjunction with the geotechnical engineer. These investigations shall identify soil conditions allowing the Consultant to design appropriate foundation systems.
4. If construction is to occur below existing grades, (elevator pits, floors, pavements, sumps, etc.), groundwater observation wells shall be installed with provisions for periodic readings from the time of completion until Contract Documents are submitted.
5. Investigations shall be so located that minor revisions to proposed construction will not require extrapolation of data.
6. Where deep foundations are anticipated, the Consultant or sub-consultant shall recommend required borings. In addition the Consultant or sub-consultant shall recommend boring methods in consultation with the driller or drilling contractor (e.g. driven casings drilled casings, hollow stem augers, etc.) to properly characterize the sub-surface conditions. Driving criteria and blow counts are to be recorded.
7. Prior to design of foundations a geotechnical investigation and report shall be prepared in conformance with pile foundations requirements of the geotechnical investigations section of the CT State Building Code. A geotechnical investigation shall not be required for work of a minor nature, where exempt by the CT State Building Code or where exempt by the State Building Inspector.

3.3.7.3 Specific Requirements

1. The subsurface investigations "As Drilled" locations shall be determined by a licensed land surveyor or professional engineer. Elevations shall be based on the project datum. A location plan sealed by the surveyor shall be submitted with the subsurface investigation report, unless done as a part of a separate surveying contract, in which case the survey information shall be provided to the subsurface investigation contractor for inclusion in the report.
2. Subsurface investigations shall be performed under the supervision of a licensed geotechnical engineer. Complete visual descriptions of all materials, certified by a licensed geotechnical engineer well versed in the soils engineering field, shall be recorded in the investigation report. Soils descriptions shall be according to ASTM D 2488, with the description of the type of material, except for topsoil, limited to the definitions or combinations thereof of Part 3 of ASTM D 2488. Rock descriptions shall include type, condition, and if cored, the % recovery and the Rock Quality Designation.
3. All subsurface investigation data and test results shall be included with the Design Development phase submission.
4. For borings, a standard sample shall be obtained from ground surface. Also, several 18" test pits shall be excavated to verify the depth of topsoil and construction suitability of the surface soils. The quantity and location of test pits shall be determined by the Consultant.
5. Proposals are to be in a unit price format with estimated quantities provided by the Consultant.

3.3.7.4 Contract Document Requirements

1. The complete subsurface data shall be included on the contract documents. The investigation locations shall be indicated on a plan and tied to existing permanent features that are to remain.

3.3.7.5 Additional Requirements

1. The geotechnical engineer shall advise the Consultant regarding layout of the under slab and foundation drainage systems.
2. The geotechnical engineer shall assist the Consultant in preparation of specifications for Earthwork, Foundation Drainage, Pile Foundations, and Foundation Underpinning.
3. The geotechnical engineer shall review the completed design drawings and specifications to verify compliance with the recommendations of the geotechnical report.
4. The geotechnical engineer shall review the Statement of Special Inspections to confirm proper implementation of the construction QA/QC program.
5. The geotechnical engineer shall provide construction phase services to verify incorporation of design elements.

END
3.3.7 - Subsurface Investigation Requirements

3.4 Regulatory Code Requirements:

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3.4.1 Building Code Review

3.4.2 Cultural Resources (Historical & Archaeological)

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End
3.4 – Regulatory - Code Requirements

3.4.1 Regulatory – Building Code Review Requirements

3.4.1 Building Code Review

3.4.1.1 Checklist for Permits, Certification, and Approvals (Form 3030)

Checklist for Permits, Certifications and Approvals (**Form 3030**) supplements this manual. The code items on the Checklist are shown below. The Checklist lists each permit by agency and the phone number for the permit contact. The Consultant shall review each code requirement to determine if it is applicable to the project. Furthermore, the Consultant shall coordinate with the appropriate agency or agencies, complete all necessary application forms, and submit the code permit(s), certificate(s), and/or approvals for the project.

For specific direction regarding design and construction documents requirements, see the specific items and associated instructions described in the following sections.

3.4.1.2 Building Information Form (Form 3011) and Delegated Design (Form 3050)

Data in the Building Information for Code Analyses (Form 3011) shall be included on the contract drawings. This form is available from the Department's Library web site.

During the DD phase, and updated during the CD phase, the Consultant is required to complete "Delegated Design Approval" (Form 3050). Work approved for Delegated Design shall be included on the Construction Documents and specifically on the code sheet. The building permit shall stipulate the work designated as Delegated Design.

Delegated Design results in Deferred Submittals. Deferred Submittals require submission to the Office of the CT State Building Inspector (OSBI) and / or the Office of the CT State Fire Marshal (OSFM). The Department PM shall transmit the approved Submittal to the OSBI and / or OSFM for review and approval. For additional information please see "Delegated Design" section 5.5 of this manual.

3.4.1.3 Connecticut State Building Code and modifications to the State Building Code

Information pertaining to the current Connecticut State Building Code including information pertaining to the modification request procedures can be obtained from the OSBI Website. Forms available include:

- Request for Modification of the State Building Code
- Request for Approval for Inclined Stairway Chair Lifts, Vertical or Inclined Wheelchair Lifts and Limited Use/Limited Access Elevators (LULA)
- Request for Accessibility Exemption of the State Building Code

3.4.1.4 Connecticut Fire Safety Code & CT Fire Prevention Code and modifications to the CT Fire Safety Codes

Information pertaining to the current Connecticut State Fire Safety Code including information pertaining to the modification request procedures can be obtained from the OSFM Website. Forms available include:

- Fire Safety Code Modifications Procedures
- Application Request for Fire Safety Code Modification
- Application Request for Educational Sprinkler Waiver (CGS §29-315)

3.4.1.5 Modification Request Procedure

The requirements and procedures to request a modification to the current codes are as follows:

.1 The need for modification(s) to the appropriate codes shall be identified during the SD Phase and submitted by the Consultant through the Department Project Manager.

.2 The Consultant shall complete the appropriate Request for Modification Form and shall be identified as the applicant, except for the "Handicap Exemption Request Form" where the Department will be the applicant and shall provide the notarized signature.

.3 The Consultant shall submit the Request for Modification with all supporting documentation (two complete sets) to the Department PM. The PM will submit this package to the assigned code official.

.4 The assigned code official will review the proposed modification package for completeness and transmit the request to the State Building Inspector or State Fire Marshal for action.

.5 The Consultant shall be responsible for all efforts necessary to obtain a resolution to the request for modification.

.6 Approval or disapproval of the request for modification shall be received prior to the submittal of the Bid Documents. It is imperative for the Consultant to request any necessary code modifications to avoid any delay in the project.

.7 If the request for modification is denied, the Consultant will be responsible for changes necessary to produce the construction documents on schedule and in compliance with the codes.

3.4.1.6 Code Authority Jurisdictions

OSBI and OSFM have primary jurisdiction for all Department administered projects. Most Department administered projects will be assigned to OSBI as the primary code authority.

3.4.1.7 Requirements for all projects

.1 Permit Application

The Consultant shall prepare, and the Department PM shall submit all required documents found on the OSBI Permit Checklist including but not limited to:

The Building Permit Application form
Geotechnical Reports
Statement and Schedule of Special Inspections (see below for additional information)
Energy conservation per IECC
PDF Electronic Submission of the plans and specifications for review and approval.

.2 Certificate of Compliance

The Consultant shall complete and submit the *Certificate of Compliance -Part 1 Preconstruction Phase* (Form 3150) to certify that the documents have been designed in accordance with the current codes.

Prior to occupancy of the building, the design professional shall complete the *Certificate of Compliance – Part 2 Construction Phase* (Form 7150) and submit it to the Department PM.

The Department PM will be responsible for obtaining signatures from the Constructor, and Department Commissioner (or designee) on the Certificate of Compliance. The Department PM will forward completed copies of the Certificate of Compliance to the State Building Inspector.

Note: The *Certificate of Substantial Completion* (Form 7810) and the *Certificate of Compliance, Part 1 and Part 2*, shall be completed, approved and signed by the Department Commissioner (or designee) prior to the Client Agency assuming beneficial occupancy.

3.4.1.8 Requirements for "Threshold Limit" Structures and Additions to Existing Buildings

All new structures or additions to existing buildings that exceed the threshold limit shall comply with the following requirements in addition to the other code requirements for threshold limit buildings.

.1 Third Party Structural Review

The Department PM shall hire a structural engineering consultant to independently review the structural plans and specifications. A written report from the independent structural review consultant shall accompany the application for a building permit.

3.4.1.9 Certificate of Occupancy, Certificate of Acceptance

OSBI will issue a Certificate of Occupancy for new buildings, additions or changes of occupancy, or a Certificate of Approval for renovations. No space shall be occupied prior to approval by OSBI / OSFM.

End
3.4.1 - Building Code Review

3.4.2 Cultural Resources (Historical & Archeological)

3.4.2.1 Protection of State-Owned Historic Properties

State-owned resources that have been determined to be historic properties are protected under the Connecticut Environmental Policy Act (CEPA). The CEPA process is designed to minimize or to avoid an adverse effect on cultural resources, particularly properties listed on the State or National Register of Historic Places. CEPA regulations mandate State agencies prepare environmental classification documents and to coordinate the development of facilities with the State Historic Preservation Office (SHPO) of the Department of Economic & Community Development (DECD).

3.4.2.2 Guidelines for the Rehabilitation of Historic Buildings

Rehabilitation of historic buildings is outlined in "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings", which are available from National Park Service online at:
https://www.nps.gov/tps/standards/four-treatments/treatment-rehabilitation.htm
https://www.nps.gov/subjects/historicpreservation/standards.htm

Any building or site that is listed on the National Register or State Register of Historic Places shall be submitted to the Department for review by the SHPO for compliance with these Standards. Submissions shall be made at the conclusion of each design phase. During the Schematic Design Phase the documents shall clearly identify the approach to preserving or altering an historic structure (including contributing site features). The design shall incorporate all directions given by the SHPO. If project recommendations are made by the SHPO that are not able to be accomplished within the project budget the Consultant shall recommend alternate solutions for consideration by the SHPO. Final resolution shall be the responsibility of the Department in consultation with the Department's Chief Architect. The Consultant's submissions to and coordination with the SHPO are part of basic services for all projects designated on the State or National Register of Historic Places.

3.4.2.3 Environmental Review for Impact to Architectural and Archaeological Resources

Notice will be sent to the SHPO for all projects for an evaluation of the potential impact on cultural resources under the provisions, of the Connecticut Environmental Policy Act. The Department project manager (PM) will send a copy of the minutes of the "scope of work meeting" with the Agency and the Consultant to the SHPO. To facilitate a determination the Department PM will provide a street address and location map to the SHPO along with the previously described meeting minutes. Projects that involve ground disturbance in archaeologically sensitive areas may require an archaeological survey. If an archaeological survey is required it shall be considered an additional service to the Consultant.

When an Environmental Assessment (EA), Finding of No Significant Impact (FONSI) or an Environment Impact Evaluation (EIE) is prepared the SHPO will be contacted for review comments. The Department PM will notify the Consultant if a project is on the National or State Register of Historic Places.

Contact:

Department of Economic and Community Development (DECD)
State Historic Preservation Office
Tel. (860) 500-2393

END
3.4.2 - Cultural Resources – Historical & Archaeological

3.4.3 Artwork (1%)

3.4.3.1 Regulatory Requirements

The State of Connecticut has adopted statues (Sec 4b-53 through 4b-54) and regulations (Sec 4-131a-1 through 4-131a-13) that certain bonded projects open to the public will have 1% of the bonded construction costs allocated to enhancement of State buildings with quality works of art by professional artists and craftsmen. This work includes but is not limited to, fresco, mosaic, sculpture and other architectural embellishment or functional art created by a professional artist. Work of art does not include landscape architecture or landscape gardening.

The works of art are funded through the Department in conjunction with the Connecticut Department of Economic & Community Development (DECD). The Art budget line item is 1% of the estimated construction cost.

The DECD is responsible for the program and will organize the selection process. The DECD will also oversee the installation of the artwork on site.

3.4.3.2 Artwork Applicability

The Project Budget shall provide the estimated budget for artwork, if applicable. Qualifying projects include those that provide for the construction of a new building or the comprehensive renovation and/or expansion of an existing facility. Projects exempted from the program include the construction of sheds, garages, warehousing/storage facilities, buildings of a temporary nature, buildings located on the grounds of a correctional institution, and those housing physical plant operations. State buildings funded through CHEFA (Connecticut Health and Educational Facilities Authority) funds are not mandated to participate in the 1% for Art program. For CHEFA funded projects participation is determined by the Client Agency.

3.4.3.3 Responsibilities of the Consultant

It is the responsibility of the Consultant to assist with the art work site selection in coordination with DECD. DECD administers the artist selection process. A first stage committee (site-committee), comprised of representatives of DECD, the Agency, the Department and the Consultant will determine the best locations to integrate artwork into the project. The type and selection of artwork(s) will be determined by the second art committee, (the site committee and additional arts professionals). DECD will negotiate the artist's contract(s), which will be processed through the Department's Legal Unit. The Department Project Manager will oversee the selection and implementation process.

Department Regulations require the following:
In addition to other duties established by contract, the architect (also Consultant) shall:

1. Recommend specific sites for works of art and the scale and type of work he or she deems most appropriate.
2. Consult with the selection panel on art type and location.
3. Maintain a close working relationship with the artist.
4. Assure that all service requirements for the work of art are met in the design documents and that the work may be installed efficiently and expeditiously.

If the artwork has been commissioned prior to issuance of the bid documents the Consultant shall be responsible for coordination of the artwork within the contract documents. Structural support, necessary anchorage and foundations and services such as electrical power, lighting, anchors, etc. shall be included in the contract documents. The Consultant cost for these services are part of basic services.

If the artwork is not ready for integration within the contract documents prior to bid the Consultant may be entitled to additional services if the documents require modification following completion of the contract documents.

3.4.3.4 Contact Information (for any additional information required)

Connecticut Office of the Arts / Department of Economic & Community Development (DECD)

% for Art Program Specialist
(860) 500-2393 (Main number)
Website: https://portal.ct.gov/DECD/Services/Arts-and-Culture

End
3.4.3 - Artwork (1%)

3.4.4 Energy Issues (High Performance Buildings, Energy Conscious Design)

3.4.4.1 High Performance Building Guidelines

In general, building construction projects with a value over $5,000,000, or building renovations with a value over $2,000,000, (total amount of the funds appropriated for the project) are required to follow the state Guidelines for High Performance Buildings. Please visit the Department web based library for Document 0450 – Capital Projects High Performance Buildings Guidelines for an overview of High Performance Building Requirements. See the attached link for the complete compliance manual:

High Performance (Green) Building Standards for State Agency Buildings and School Buildings

3.4.4.2 Energy Conscious Design

There are multiple programs available from the utilities that provide financial incentives to include energy efficient equipment and systems in a project. These programs cover activities from new construction and major renovations to equipment replacements and minor improvements. The Department actively participates in the programs with all Connecticut public utilities.

Consultants are required to participate in the programs for which their project qualifies. The Consultant shall coordinate with the utility during SD Phase, and attend meetings and provide the data and analysis required by the utility to insure the maximum incentive for the state is accomplished. The Department Project Manager shall be made aware of all proposed program participation and expected impacts to the Project. The Consultant shall identify, in each section of the technical specifications, the items associated with a utility agreement. The Consultant is responsible for verification that the materials and systems installed meet the requirements of the agreement for the project.

The primary contact person for implementation of the programs is the Department Project Manager. The facility's utility account representative, if one is assigned to the facility, is the utility's initial point of contact. The following are additional contacts associated with the utility programs:

Typical activities for participation, not all inclusive:

- Attending a brainstorming meeting with the utility to determine possible Energy Efficiency Measures (EEMs) to evaluate for energy saving potential and incentives
- Providing equipment performance data and control methodology on the EEMs chosen for evaluation to help determine potential incentives to the utilities (and energy modelers if applicable)
- Providing estimated annual use load profiles or other energy use analysis and estimated additional cost to implement on the project for custom EEMs to utilities (and energy modelers if applicable)
- Verify that construction documents include the EEMs with approved utility incentives and identify in each section of the technical specifications, the items associated with a utility agreement
- Forward copies of approved submittals related to EEMs to the utility (and energy modeler if applicable)
- Provide information on construction changes impacting approved EEMs to the utility (and energy modeler if applicable) to allow the utility to assess impacts to approved incentives
- Verify that the materials and systems installed meet the requirements of the utility agreement for the project
- Respond to inspection preparation or follow up requests for information about EEMs to enable payment processing by the utilities

Typical activities for energy modelers, not all inclusive:

- Attending a brainstorming meeting with the utility to determine possible Energy Efficiency Measures (EEMs) to evaluate for incentive and the appropriate baseline system descriptions to apply in the energy models
- Coordinating with design professionals to gather equipment performance data and control methodology on the EEMs chosen for evaluation
- Providing baseline case, measure runs, and proposed energy model files and reports as required by the utilities
- Comply with the energy modeling guidelines provided by the utilities

- Respond to requests for information about the baseline model, measure runs and proposed design model and reports to enable an incentive offer from the utilities
- Coordinate with design professionals to receive copies of approved submittals related to EEMs and any associated construction changes
- Providing baseline case, measure runs, and as-built energy model files and reports as required by the utilities
- Respond to requests for information about the baseline model, measure runs and as-built model and reports to enable payment processing by the utilities

3.4.4.3 Contact Information

Eversource Energy
Energy Efficiency
107 Selden Street
Berlin, CT 06037
Telephone: (877) 947-3873
www.energizect.com

United Illuminating Company
Conservation and Load Management
180 Marsh Hill Rd, MS AD-2A
Orange, CT 06477
Telephone: (203) 499-2000
www.uinet.com/wps/portal/uinet/smartenergy/business_soutions/commercial_industrial_solutions

End
3.4.4 – Energy Issues

3.4.5 Material Testing Laboratories

3.4.5.1. The Department utilizes a state contract for testing services. Project specific material testing will be contracted directly by the Department project manager.

3.4.5.2. The Department project manager shall direct the Consultant and / or the Construction Administrator to determine types and quantities of testing services required.

End
3.4.5 - Material Testing Laboratories

3.4.6 Elevator Inspection by OSBI – Bureau of Elevators

3.4.6.1 General

Acceptance of any elevator within the State of Connecticut is the responsibility of the Office of State Building Inspector (OSBI), Bureau of Elevators. OSBI has established a listing of common reasons for non-acceptance of new elevator installations. The following sections are a non-exhaustive list of potential design problems.

3.4.6.2 Motor/Machine Space

- Improper door lock on machine room door: the door shall be provided with a spring-type lock arranged to permit the door to be opened from the inside without a key.
- Improper motor room door: Fire rating of machine room and machine room door must be in accordance with the building code.
- Maintain a minimum of 7 foot overhead clearance.
- Improper disconnecting means: the disconnect shall be an enclosed externally operable fused motor circuit switch or circuit breaker capable of being locked in the open position.
- Car light, receptacles(s) and ventilation disconnecting means: the disconnect shall be an enclosed externally operable fused motor circuit switch or circuit breaker capable of being locked in the open position and shall be located in the machine room or control room for that elevator car.
- The motor room shall be provided with natural or mechanical means to keep the ambient air temperature and humidity in the range specified by the elevator equipment manufacturer. Environmental requirements are to be permanently posted within the space. Any mechanical equipment or condensation lines installed in the space shall not be above any elevator equipment.
- Use of motor room for non-elevator equipment, piping, wiring, etc. is prohibited
- Use of machine room as a thoroughfare is prohibited
- Presence of access panels in ceilings or walls. (A suspended ceiling with non-elevator equipment above would be considered an access panel) is prohibited
- Proper guards must be provided on all luminaires. Lighting shall be a minimum of 19 fc.
- Telephone wiring must be in conduit within the machine room.

3.4.6.3 Hoistway

- Voids or gaps in hoistway walls or door bucks are prohibited.
- Provide proper top of car clearances, and a minimum of 43” refuge space on top of car.
- Provide a receptacle and a light on top of car with guard and a minimum of 10 fc.
- When required by the building code, hoist ways shall be provided with means to prevent the accumulation of smoke and hot gases.
- Glass hoistways shall conform to ANSI Z97.1, 16 CFR Part 1201, or CAN/CGTSB-12.1, whichever is applicable.
- Fire rating of hoistway must be in accordance with the State Building Code.
- Elevator cab shall be provided with a two-way communications means between the car and a location staffed by authorized personnel.
- A lighted visual signal in the lobby for stand by generator and telephone failure.
- Any projections greater than 4” shall be beveled at a 75 angle.
- Minimum elevator lobby lighting levels are 10 fc.

3.4.6.4 Pits

- Pit must be maintained in a clean, dry condition
- Pit outlets must have GFCI protection.
- Pit lights must be a minimum of 10 fc and be guarded.
- Sumps or sump holes must have securely fastened covers flush with pit floor.
- Pit ladder shall extend 48” above the elevator sill.
- Elevator rungs shall be provided to at least the height of the sill. The rung shall be a minimum of 4-1/2” from centerline of rung to wall.

3.4.6.5 Sprinklers in Hoistway

When sprinklers are installed in the hoist way or machine room, a means of automatically disconnecting the main line power before or upon the application of water must be provided. Most common means has been by a shunt trip breaker actuated by heat detectors located adjacent to (within 24 inches of) each sprinkler head.

3.4.6.6 Fire Recall Systems

Fire alarm initiating devices used to initiate Phase 1 Emergency Recall Operation shall be installed in conformance with the requirements of NFPA 72, and shall be located at each floor served by the elevator, in the associated elevator machine room, control spaces, or control room, and in the elevator hoist way (when sprinklers are located in those host ways).

3.4.6.7 Elevator Agreement (to be provided in the specifications)

The consultant shall include in the specs Form 50 50 00 Elevator Agreement- an Agreement between the Department and the Constructor to insure a generic diagnostic device will be provided for any future service to the elevator. This form is available on the Department web based library within section 5000 General Conditions & General Requirements.

NOTE: These lists represent many of the design deficiencies found with elevator design documents. The Consultant shall prepare documents that meet all the requirements for elevators in the state.

End
3.4.6 – Elevator Inspection

3.4.7 Fire Protection and Water Supply

3.4.7.1 Fire Protection

All buildings that require sprinkler and/or standpipe systems shall conform to the most current version of the codes and Department requirements, as follows:

- Connecticut State Building Code.
- Connecticut State Fire Safety Code.
- Department Consultants Procedure Manual.
- FM Global Property Loss Prevention Data Sheets and Technical Bulletins

Shop Drawings: Sprinkler system shop drawings and hydraulic calculations must be stamped by a professional engineer licensed in the state of Connecticut and must include the Department project number. Submit electronic information: (as noted in Division 01 Section 01 33 00 “Submittal Procedures”) to the State's Insurance Carrier (SIC), and to the Office of State Fire Marshals (OSFM)

STATE INSURANCE CARRIER (SIC):

FM Global Boston Operations
Plan Review
500 River Ridge Drive
Norwood, MA 02062
Tel: (781) 440-8241
engbostonplanreview@fmglobal.com

OFFICE OF STATE FIRE MARSHAL (OSFM):

State Fire Marshal
(860) 713-5750

Before the shop drawings are submitted to SIC or OSFM the Consultant and/or the Consultant’s fire protection sub-consultant shall review the sprinkler design for compliance with the all codes and Department requirements. SIC and OSFM review comments will be addressed to the Department Project Manager. The Department Project Manager shall transmit comments to the Consultant. The Consultant shall incorporate required document changes into the record drawings for submission during the project closeout. The Department Technical Services Unit will resolve disputed issues between the SIC and OSFM and the Consultant.

CONSTRUCTION**:** SIC requires two (2) weeks prior notice of a sprinkler system acceptance test.

3.4.7.2 Water Supply

The Consultant shall submit water supply technical data as a design development deliverable. The data must be obtained within the past two years from a water-flow test approved by the Department. If data is not available the Consultant shall request a test be conducted by the local water company. The water test shall conform to the procedures described in the National Fire Protection Association (NFPA) Standard 291, "Fire Flow Testing and Marking of Hydrants", (specific edition currently enforced by codes); or the procedures described in the NFPA Handbook "Testing of Water Supplies". The results of the water flow test shall be plotted in the form of a three-point curve to ensure accuracy of the test results. The water flow test report is to be included in the fire suppression section of the project manual.

End
3.4.7 – Fire Protection and Water Supply

3.4.8 Hazardous Materials

3.4.8.1. All products, systems and assemblies supplied to the State under a Department construction contract shall not contain materials that are classified as hazardous. Hazardous materials include, but are not limited to, products such as asbestos (ACM), lead, polychlorinated biphenyl (PCB) and other materials that have proven to cause a health risk or are defined as hazardous under any state, or federal, rule or regulation. Although state construction projects do not require approval of the local jurisdiction (with the exception of demolition – see section 3.4.9 of this manual); where applicable the Consultant's design shall be consistent with local rules and regulations with regards to hazardous materials.

3.4.8.2. Unless otherwise indicated, the Department will hire environmental consultants to conduct hazardous materials assessments within an existing building and/or potential site contamination concerns (soil or groundwater). The Department will also hire environmental consultants for Environmental Site Assessments (Phase I, II, II, etc.) for the project or site. The Consultant shall coordinate with the Project Manager on these issues including providing design plans and specifications to the environmental consultants. The Consultant or Constructor shall not sample for PCBs without the express consent of the Department Project Manager. If the assessments indicate an area of the building or site require remediation of hazardous materials, the Department shall directly hire an environmental consultant to design the remediation. The Consultant shall include the hazardous material report and remediation design documents within the Contract Documents. The Department will determine if the work will be conducted by the Constructor or by an independent contractor hired directly by the Department.

3.4.8.3. Should hazardous materials be discovered during construction the Department will evaluate the materials and provide environmental contractors to remove the materials. This process is initiated by requesting a "Hazardous Materials Inspection" through the Department. The Hazardous Materials Assistance Request and Authorization (form HAZ-01) can be used by either the Department or an Agency to request asbestos removal, lead testing, or indoor or outdoor air quality.

3.4.8.4. Within the Contract Documents the Consultant shall incorporate language mandating any hazardous materials be removed or isolated in accordance with state procedures. Reference Division 01 "Alteration Project Procedures" section 01 35 16. This includes asbestos containing material, lead, products containing persistent bioaccumulative toxic chemicals" (PBT's) such as polychlorinated biphenols (PCB's), Di-2-ethylhexyl phthalate (DEHP), and mercury.

3.4.8.5. Note: the Contract Documents shall require the Constructor to remove asbestos for roof replacement projects. The Department requires the Consultant add technical requirements including asbestos removal (if asbestos has been found in flashing or roofing material). The Consultant shall indicate where test cuts were made on the existing roof on the Contract Drawings. The Contract Drawings shall include keynotes or descriptive language indicating the composition of the test cuts including whether ACMs were found.

End
3.4.8 – Hazardous Materials

3.4.9 FM Global Review of Capital Projects

FM Global field engineering provides plan review and project loss prevention services for State of Connecticut property as part of their insurance services to the state. These services are designed to assist in managing construction (renovations and new) to ensure maintenance of the highest level of loss prevention possible. The reviews are limited building enclosure (roofs, walls, etc.) and other items as described in the list below.

The following are examples of projects that will receive review by FM Global:

1. All new construction
2. Existing facility renovations resulting in significant change in occupancy or construction
3. Exterior envelope recladding, window and door replacement.
4. Modifications to fire protection – sprinkler, detection and notification for new construction & renovations
5. Re-roofing projects or roof modifications
6. Photovoltaic (PV) panel installations
7. Diesel fuel installations/modifications associated with boilers and/or generators including ignitable fuel tank installations.
8. Electrical transformer installations
9. Fuel fired equipment installations (boilers, ovens and furnaces)
10. External exposures (i.e., the installation of a nearby buried pipeline, special coastal or topographic considerations such as flooding or high winds, etc.)

Additional review requirements relating to fire protection design are found in section 3.4.7 of this manual. The State Insurance Carrier reviews are limited to fire protection design (section 3.4.7 of this manual), building enclosure (roofs, walls, etc.) and other items as described in the list above and elaborated upon in the following sections.

3.4.9.1 Review Process

Upon development of project scope the Department project Manager (PM) shall contact FM Global to provide any known building deficiencies. The PM shall review the deficiencies and incorporate them into the scope of work if the deficiencies are within the project limits.

At issuance of either a design task letter or formal design contract the Department project Manager (PM) shall notify FM Global of the project. The Consultant shall review the FM Global deficiencies correcting them if within the project scope.

At the conclusion of each phase (SD, DD, and CD) the PM will submit the Contract Documents to FM Global for review. Upon receipt of the FM Global comments the Department PM will forward comments to the Consultant for response.

Any FM Global comments the Department PM and the Consultant object to shall be submitted to the Departments Technical Services Unit for review and final decision.

At the conclusion of the CD phase and prior to bidding all FM Global comments shall be addressed and resolved by either compliance or by appeal to the Department Chief Architect. FM Global will provide a written analysis following each phase that notes additional action or acknowledges closure of prior comments / recommendations.

3.4.9.2 Submittal Requirements

.1 SD, DD and CD phases: The Consultant should coordinate submittal requirements with the Department PM. The following are typical submission requirements:

- .1 Basic wind speed (Data Sheet 1-28 vs CT Appendix K – the more conservative figures should govern), seismic use group, occupancy category, exposure category, building importance factor, and ground roughness.
- .2 Uplift ratings using FM Global Data Sheet 1-28.
- .3 RoofNav numbers for all planned roofing systems www.roofnav.com

.4 FM Global Form 2688 with the Contractor information left blank (checklist for roofing systems) found on the RoofNav website.

.5 Formal responses to FM Global review comments submitted to FM Global before FM Global will have the opportunity to indicate if the complete submittal is acceptable to FM Global. The FM Global acceptance of the roofing and building envelope design must be obtained during the design phase.

.6 Basic code provisions.

.2 Construction Phase Requirements: during product submittals and shop drawing review the Consultant shall verify FM Global requirements are satisfied for all relevant components. The Department PM (or the Department's Construction Administrator) will submit approved product submittals and shop drawings to FM Global.

3.4.9.3 Contact Information – FM Global

Plan Review Department
Boston Operations Field Engineering
FM Global
1175 Boston Providence Hwy
P.O. Box 9102
Norwood, MA 02062
781-440-8241
engbostonplanreview@fmglobal.com

End
3.4.9 – FM Global Review of Capital Projects

3.5 Project Phases - General

Generally, a project is produced in three phases followed by delivery of electronic Bidding Documents to the Department. If the project is limited in size and scope, the Department may authorize its preparation in one or two phases.

3.5.0.1 Preconstruction Phases:

The Phases are entitled:

.1 **Pre-Design Phase:** When needed to define project scope and budget or programming / feasibility studies a pre-design phase will be requested by the Department's Project Manager. The detailed Scope of Work for the specific pre-design phase services will be defined in Exhibit 'A' of the Standard Fixed Fee Consultant Contract or defined within Consultant's Contract (for studies). Note: this phase is not considered part of the Consultant's basic services. Refer to Exhibit 3.5A at the end of this section for typical Pre-Design Phase requirements.

.2 **Schematic Design (SD) Phase;** see section 3.5.1 of this manual

.3 **Design Development (DD) Phase;** see section 3.5.2 of this manual

.4 **Contract Document (CD) Phase;** see section 3.5.3 of this manual

.5 **Bidding Phase:** see section 3.5.4 of this manual**.**

3.5.0.2 Proceed To Next Phase:

The Consultant is permitted to proceed to the next phase only after receiving written authorization from the Department Project Manager.

3.5.0.3 Phase End (or interim) Document Submissions:

Submit the required documents for each phase as stated in the Consultant contract. See Section 5.0 and related sub-sections of this manual for electronic document submission requirements.

3.5.0.4 Review Comments & Consultant Responses:

Design documents will be reviewed digitally, with all comments directly placed on the documents using appropriate computer software. The Department project manager will receive all digital design review comments generated by the CA, CMR, FM Global, RediCheck (or equivalent service), Technical Services, OSFM / OSBI etc. The Department Project Manager will transmit reviewed digital documents to the Consultant, and the Consultant shall reply to all review comments, maintaining the native digital document format**.** Subsequent reviews will not be initiated until the Consultant responds to prior review comments. "Will comply" is an acceptable response when accompanied by a short simple declarative sentence indicating corrective measures. Provide illustrative sketches where necessary.

3.5.0.5 Coordination, Integration And Completeness Of Document Submissions:

The prime Consultant is responsible for the coordination, integration and completeness of the Review Submissions. All submissions (Schematics, Design Development, Contract Documents and Bid Documents) shall be coordinated, and reviewed by the prime Consultant, and corrections completed – prior to submission to the Department. Incomplete submission may be returned without review. If the Design Development or Contract Documents submissions have received numerous comments, or the proposed "systems" require major modification, coordination or completion; a complete resubmission of that phase shall be required.

3.5.0.6 General Document Guidelines:

Avoid redundancy to prevent contradictions across disciplines or between the drawings and specifications. All work relative to a specific discipline should only be detailed on those respective sheets, or clearly make reference to other discipline sheets for detail.

Final specifications shall be individually tailored to the project scope, including all needed, yet limited to, project-specific information. Technical specifications shall avoid the use of canned language from specific manufacturers or specification writing software.

Do not use the terms “new” or “proposed” to describe Contract work. All work depicted in the contract documents is assumed new unless clearly identified as “existing” or “not in contract (NIC)”.

Note the specific responsible party when work is to be performed “by others”.

Avoid terms which refer exclusively to another disciple for that scope of work.

When using “similar” or “sim” clearly identify the differences to the referenced detail.

End
3.5 – Project Phases – General

Exhibit 3.5A
Predesign Study Requirements

3.5A.1 Existing Construction – Renovations & Additions

The Predesign Study shall be submitted as a single electronic format (PDF) tabbed and organized utilizing embedded bookmarks and hyperlinks (following the format below). The basic format shall be 8 ½ x 11 however larger formats may be embedded within the document. Overall file size shall not exceed 10 MB. Orientation shall be portrait. Every page of the study shall have the project number as a footer on the lower right side of the page. Refer to Section 5.1.1 "Project Manual Information – General Information" and Section 5.2.1 "Drawing Information – General Information" of this manual for additional requirements. These guidelines are intended to provide general guidance. Deviations are permitted based on the specific project requirements but should be discussed with the Department PM.

Report Cover

Table of Contents

Executive Summary:

Summarize recommendations including overall project cost, scope and program, schedule, alternative approaches, major priorities. Identify major project challenges. Indicate *major* building code, accessibility and life safety code deficiencies. The Executive Summary should be concise, two to three pages maximum and should lead with project recommendations and overall budget range.

History / Background:

Provide in depth background on the existing building(s) and site. Detail site and building development over the years. Identify prior and current occupants. If historic provide information on its significance (provide the State of National Register nomination form as an appendix).

Building Deficiencies:

Utilizing simple floor plans develop keynotes as follows:

BC-XX: Connecticut State Building Code related deficiencies
AC-XX: Accessibility related deficiencies
FC-XX: Connecticut State Fire Safety Code related deficiencies
A-XX: Architectural related deficiencies
L-XX: Landscape related deficiencies
C-XX: Civil related deficiencies
M-XX: Mechanical related deficiencies
E-XX: Electrical related deficiencies
P-XX: Plumbing related deficiencies

S-XX: Structural related deficiencies

Deficiencies shall be provided in matrix form organized by discipline as indicated in the listing noted above. A simple example follows:

Deficiency Matrix:

No.	Location	Description	Comments
AC-01	Men's room 101	Non-accessible stalls	Turn-around space inadequate
L-01	Entry courtyard	Concrete pavers	Pavers broken, or missing
S-01	B12	Timber beam splitting	Splitting mid span requiring immediate attention

Keynoted drawings shall be an appendix to the report

Detailed Budget:

Utilizing the Deficiency Matrix develop a budget by each identified element:

Budget:

No.	Location	$	Priority		
			$ High	$ Medium	$ Low
AC-01	Men's room 101	35,000		35,000	
L-01	Entry courtyard	12,000			12,000
S-01	B12	6,500	6,500		
	Total	**53,500**	**6,500**	**35,000**	**12,000**

Additions to the existing structure would follow the format requirements for New Construction and would be added to the Detailed budget but following a Uniformat II level 2 level of detail

3.5A.2 New Construction Including Additions

Executive Summary:

Summarize recommendations including overall project cost, scope and program, schedule, alternative approaches, major priorities. Identify major project challenges. The Executive Summary should be concise, two to three pages maximum and should lead with project recommendations and overall budget range.

History / Background:

If construction is on a previously developed site, provide in depth background on the existing building(s) and site. Detail site and building development over the years. Identify prior and current occupants. If existing historic structures are recommended to be demolished provide information on its significance and justification for demolition (provide the State of National Register nomination form as an appendix).

Program:

Provide a detailed program developed in conjunction with the Client Agency. Provide benchmark information for similar building types / uses

Concept Drawings:

Provide concept plans at an appropriate scale – typically developed to 1/16" = 1' but will vary based on size and scale of the project. At the pre-design phase the concepts should be limited to basic plan and rough massing. There is no need to develop detailed elevations; basic site plans shall indicate building entry, parking areas, major site features. At least three alternatives shall be provided.

Budget:

Provide a budget following Uniformat II level 2 Group Elements for each concept.

End
Exhibit 3.5A Predesign Study Requirements

3.5.1 Schematic Design (SD) Phase Requirements: (35% Completion)

Outline:

3.5.1.1 General;
3.5.1.2 Architectural;
3.5.1.3 Site Work;
3.5.1.4 Structural;
3.5.1.5 Mechanical;
3.5.1.6 Electrical;
3.5.1.7 Plumbing;
3.5.1.8 Fire Protection;
3.5.1.9 Telecommunications;
3.5.1.10 Building Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA);
3.5.1.11 Code/Permits;
3.5.1.12 Equipment;
3.5.1.13 Cost of the Work Estimate;
3.5.1.14 Design Narrative Report.

3.5.1.1 General Requirements:

.1 Develop or refine the program for the project.

.2 Identify regional area characteristics, site features: natural and artificial.

.4 Diagram vehicular and pedestrian circulation.

.5 Identify all Agency needs.

.6 Refer to “Project Manual Information” Section 5.1 in this Manual for additional requirements.

.7 Complete the "Checklist for Permits, Certifications and Approvals" (form 3030).

.8 Modify Division 01 “General Requirements”, section 01 11 00 “Summary of Work” (in short form or long form as required by project magnitude), as a draft. Download the latest version from the Department’s web-based library.

.9 Provide a table of contents for the project manual inclusive of Division 1 and trade sections. Use the latest CSI numbering format.

.10 Design concepts for the mitigation measures described in any environmental document.

.11 Any environmental document shall be reviewed to ensure that all agreed mitigation measures have been incorporated in the drawings and specifications.

.12 Willserve request letter with estimated project parameters and loads shall be sent to local utilities. Mapping and standard specifications shall be requested in this letter when required. Provide documentation of communication to Department project manager

.13 Project Schedule update.

.14 **Submission to State Insurance Carrier**: schematic design documents (drawings and project manual) shall be submitted by the Consultant to the State Insurance Carrier for review and comment. This review will include fire sprinkler design and building envelope and will establish requirements that may exceed minimum building code requirements. The Consultant will be required to resolve all issues that arise during this review process with the State Insurance Carrier. For additional information please see “Fire Protection and Water Supply” – section 3.4.7 and “FM Global Review of Capital Projects” section 3.4.9 of this manual.

.15 **Building Information Modeling (BIM):** any project that will be constructed using the CMR (Construction Manager at Risk) methodology shall follow the Department BIM requirements defined in document 0420 – DAS BIM Guidelines that is found in the Department's web based library: CT BIM Guidelines

.16 **Conceptual Design Reviews (50% Schematic Review):**

The Department projects, with construction budgets of $5,000,000 or more, as well as those projects with a lower construction value as determined by the Department's Chief Architect, shall provide a design presentation to the Chief Architect, Architect, Engineer and Assistant Director of Project Management, at the mid-point of the Schematic Design effort to illustrate the design concept.

The Chief Architect shall be included on meeting invitations whenever building design will be reviewed during this phase. Should it be the intention of the Consultant to present design concepts to the client agency prior to the 50% Schematic Review, there shall be an informal presentation to the Department as indicated above in advance of any Client / Agency presentation.

.1 **Informal Presentation(s):** Informal presentations shall not stop progress or require special preparation beyond what is already necessary for the design review with the Client / Agency. The intent of the review is to confirm that the concept(s) presented is within the project scope and budget, and is appropriate based on the general character of the project location's immediate environment. The objective of this overview is to obtain the Department's general concurrence with the proposed design approach.

.1 **Multiple Preliminary Concepts:** When the consultant has not been hired to provide a pre-design study, the consultant shall graphically document the process (in any appropriate medium) to demonstrate to the Department and the Agency how the design has been developed. There should be a minimum of three preliminary concepts demonstrating the thought process in pursuing the preferred concept.

.2 **Informal Review Meeting:** The informal review meeting will take place at **Department** offices, and will include the above noted DAS staff, or their designated representative, plus the Department Project Manager, the Assistant Director of Project Management (ADPM) and the Consultant design team. During this meeting, the Consultant design team will address design issues, major scope issues raised as part of schematic design effort and the related project status, and incorporation of sustainable design elements (CT High Performance Building requirements). The design team shall recommend solutions for any major scope issues.

.3 It is understood that the design may not be fully refined at this time, but major design decisions should be in place. It is the intent of the Department to have the Consultant present a project to the Client / Agency that is compliant with project goals and is within the project budget.

.4 The 50% SD presentation is based on the current project status. The following are minimum expectations: approximate site location has been determined, the floor plan and preliminary adjacencies have been developed and represent the project program, basic elevations showing massing, major materials and relevance to its context. This submission shall include the existing topographic and utilities survey.

3.5.1.2 Architectural:

.1 Refer to "Cultural Resources (Historical & Archaeological)", Section 3.4.2 of this manual if the building is designated as a State or Federal Historic Structure. Note an historic structure would include a contributing structure in a designated historic district even if the property is not individually designated.

.2 Floor Plans (1/16", 1/8", 1/4" scale or as required), must indicate overall dimensions and square feet area of each floor.

.3 Elevations (sufficient to delineate the design).

.4 Sections (sufficient to delineate the design), include large scale sketches, as required, to illustrate the design.

.5 Approximate grade elevations. (may be part of 3.5.1.3)

.6 Indicate floor-to-floor dimensions.

.7 Indicate Fire classification (ref. "Building Information Form" form 3011).

.8 Roofing – Submit an analysis of multiple roof systems including a benefit analysis for each, to justify the system and the cost.

.9 Pedestrian access and circulation. (may be part of 3.5.1.3)

.10 Parking and vehicular circulation. (may be part of 3.5.1.3)

.11 Energy conservation and related building envelope performance measures.

.12 Coordinate building security design – see “Building Security” section 3.1.4 of this manual. Include a brief narrative of passive and active security provisions and design approach for site and building within the SD Design Narrative.

.13 Handicapped accessibility.

.14 Study model and/or 3D renderings (large projects & when requested).

.15 Trash removal/recycling provisions.

.16 Show Telecommunication, Mechanical and Electrical rooms.

3.5.1.3 Site Work:

.1 Site or plot plan with sufficient contour lines or spot elevations to describe existing conditions and the footprint of the proposed building/s, orientated in the same direction as all other project drawings. Show past outline of foundation if previous demolition.

.2 Locations of all existing utilities, existing easements and rights of way.

.3 Comply with "Subsurface Investigation" section 3.3.7 requirements, (include boring logs on plans, and sewage disposal system investigations where applicable).

.4 Methods and design of the storm water management facilities and methods of sewage disposal.

.5 Source of water supply.

.6 Location of roads, parking areas, existing buildings.

.7 Note any issues with adjacent properties if any.

.8 Survey to comply with "Boundary & Topographic Survey Requirements" Section 3.3.6 in this manual.

.9 A copy of the original survey is to be included either as a base for the proposed work or as a separate drawing.

.10 Proposed new underground utilities shall be shown.

.11 Calculation/location of required parking spaces for disabled persons.

.12 Method of Soil Erosion and Sediment Control.

.13 Location of all wetlands and watercourses.

.14 Where a project has specimen large healthy older trees within the contract limit lines or immediately adjacent to the work area to the greatest extent possible the Consultant shall develop design solutions to retain the trees and provide a preservation plan utilizing the services of a licensed arborist.

.15 The Consultant shall coordinate with the geotechnical report, the client agency and the Department to determine required pavement lifespan and areas where heavy and regular duty paving shall be specified.

3.5.1.4 Structural:

.1 Proposed type of structural system with relation to indicated use-group, construction classification and design loads.

.2 Any special or unusual uses or conditions anticipated.

.3 Seismic requirements for additions, alterations or repairs must be addressed / resolved.

.4 All live loads and concentrated loads, including values of components in formulas for snow, wind and seismic forces shall be indicated on the drawings or within the structural portion of the project narrative.

3.5.1.5 Mechanical:

.1 Floor Plans must show locations for equipment rooms, boiler rooms, and main duct shafts. Show locations for main duct and piping runs.

.2 Indicate flow diagrams for air and water systems, including major components.

.3 Identify all existing major equipment or systems to be reused as part of renovation work.

.4 Floor plans with zones hatched/shaded.

.5 Narrative/Basis of Design (BOD) that describes the mechanical systems, type of temperature controls, basic material and equipment as part of the “SD Design Narrative Report.”

.6 See additional requirements in Section 3.4.4 – “Energy Issues (High Performance Buildings, Energy Conscious Design)” of this manual.

3.5.1.6 Electrical:

.1 Provide electric load letter.

.2 Outline new Energy Savings Systems, upgrades, and conservation measures. Refer to “Energy Issues (High Performance Buildings, Energy Conscious Design)” Section 3.4.4 of this manual.

.3 Provide single line diagram indicating the interconnection of the main electrical equipment including the generator (if applicable), automatic transfer switches, uninterruptable power supply (if applicable), panelboards, feeders, and preliminary connections to major mechanical equipment such as chillers, cooling towers and air handling units. Indicate voltage, phase and amperage throughout the diagram.

.4 Identify existing systems and major equipment to be re-used in renovation work.

.5 Identify main switchgear room**,** life safety room, and auxiliary electrical rooms on architectural floor plans including code required clearances.

.6 Overall site plan with preliminary service point (where applicable).

.7 Narrative/Basis of Design (BOD) that describes the electrical systems, standby power, basic material and equipment as part of the “SD Design Narrative Report.”

3.5.1.7 Plumbing:

.1 Provide preliminary Gas Load letter.

.2 Layout of domestic water service room including water meter, backflow preventers, water heaters, thermostatic mixing valves, recirculation pumps, drains, trap primers, etc.

.3 Identify all existing major equipment or systems to be reused as part of renovation work.

.4 Preliminary routing of hot, cold and recirculation mains. Show locations of pipe chases.

.5 Narrative/Basis of Design (BOD) that describes the plumbing systems, basic material and equipment as part of Section 3.5.1.14, “Design Narrative Report.”

3.5.1.8 Fire Protection:

.1 Fire protection water service room layout, including main pipe sizes, backflow preventer, fire pump, jockey pump, pump controller (if applicable).

.2 Fire protection zoning plans hatched/shaded.

.3 Identify all existing major equipment or systems to be reused as part of renovation work.

.4 Obtain and include water flow test information from the local water authority for use in system design.

.5 Narrative/Basis of Design (BOD) describing fire protection systems, basic material and equipment as part of the "SD Design Narrative Report."

3.5.1.9 Telecommunications (including Building Security):

.1 Identify source of incoming Telephone Service, i.e., Utility, agency, overhead, underground, etc.

.2 Identify location of BMDF and IDF rooms on architectural drawings.

.3 Identify proposed method of horizontal and vertical raceway and cable distribution for voice and data communication systems.

.4 Identify whether or not installation of voice, data, and security wiring and connection is to be included in the Contract work.

.5 Coordinate with the Department and the Client Agency to determine specific Telecommunications and Security requirements. In addition, the Design consultant shall communicate and/or meet with DAS Bureau of Enterprise Systems and Technology for coordination of telecommunications system(s) installation.

.6 Provide telecommunications requirements and identify building and/or campus security infrastructure requirements**.** See "Building Security" section 3.1.4 of this manual.

3.5.1.10 Building Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA):

.1 Develop a Basis of Design of commissioned systems in conjunction with the Consultant team, based on the owner's project requirements.

.2 Coordinate with the Consultant team to document adherence of the Basis of Design to the Client / Agency's project requirements.

.3 Conduct a design review of systems to be commissioned.

.4 Prepare a SD Phase commissioning report.

.5 Refer to Section 3.4.4 – "Energy Issues (High Performance Buildings, Energy Conscious Design" of this manual for additional information and references.

3.5.1.11 Code/Permits:

.1 **Codes:**

The need for Modification to code requirements shall be identified and modification requests submitted by the Consultant at the schematic design phase.

.1 Complete the "Building Information Form" (form 3011) and include the information, but not the form itself, on the drawings. (do not include in the project manual).

.2 Submit plumbing fixture count calculations in accordance with the CT State Building Code Requirements.

.3 The plans must indicate all rooms/spaces that have an occupant load of **50** or more persons. Occupant loads shall be shown on the code sheet floor plans along with egress paths and loads.

.2 Permits:

.1 The Checklist for Permits Certifications & Approvals (form 3030) shall be submitted with the Schematic Design Phase to the designated Project Manager for all Projects. Copies of the Checklist are to be sent to Department Technical Services.

.2 The consultant shall ensure use of the latest Checklist version included on the Department's digital library.

.3 For projects requiring a DEEP Inland Water Resources application, a request to the Department Project Manager and Technical Services shall be made for the project be included on the Department's DEEP Project Priority List.

.4 For more detailed information regarding the Checklist and Permit policies, refer to "Permits, Certifications, Approvals Checklist & Policies" Section 3.3.5.

.3 Department Review:

.1 The Consultant shall schedule a review through the Department's PM with the OSBI to be held at the Department offices for all projects. If the work is minor in nature and does not impact egress, life safety, or accessibility requirements in a material way, the State Building Inspector, may waive this requirement.

3.5.1.12 Equipment:

.1 No requirements at this submission.

3.5.1.13 Cost of the Work Estimate:

.1 A program for design shall be prepared that is within the approved budget. If the design exceeds the construction budget amount, the Consultant shall develop recommendations to alter scope and design to deliver the project on budget. These recommendations shall be part of SD Design Narrative Report.

Upon 100% completion of the Schematic Design Phase the Consultant shall provide an estimate of the total "Cost of the Work" of the project. The cost estimates shall be submitted to the Department PM and shall utilize the "Major Group Elements" – Level I of ASTM Uniformat II (www.csiresources.org), and shall include, but not be limited to, the following:

Major Group Elements – Level 1 (ASTM Uniformat II)				
A	Substructure;		**E**	Equipment & Furnishings;
B	Shell;		**F**	Special Construction & Demolition;
C	Interiors;		**G**	Building Sitework.
D	Services;			

.1 **Inflation Values:** Adjust reported cost estimates to reflect inflation values; the estimated value for construction should represent the cost to complete the work at the scheduled construction end date as predicted from the start of construction. Questions regarding the calculation of inflation values should be reviewed with the Department Project Manager, Owner's Representative (CA), and CMR when available.

.2 **Cost of the Work Estimate Reconciliation:** When the CMR has been contracted by the Department to provide Schematic Design Phase Services then, upon 100% completion of Schematic Design Phase, the A/E's Cost of the Work Estimate shall be reconciled with the CMR's Cost of the Work Estimate. In conjunction with the Department PM, CA and CMR, the Consultant, as directed by the Department, shall take the appropriate action to correct and/or avoid potential cost overruns and make adjustments to their SD Phase Cost of the Work Estimate. When there is no CMR, or when the CMR is not yet contracted, the Consultant shall reconcile the estimate with the independent CA estimate.

3.5.1.14 Design Narrative Report:

For the 100% Schematic Design Phase submittal the A/E shall furnish the following deliverables in electronic format compliant with additional requirements found in this manual:

.1 100% Schematic Design Phase Drawings.

.2 Electronic Files of the 100% SD Phase Presentation (see "Drawing Information - General" section 5.2 of this manual.

.3 Schematic Design Color Perspective: One (1) 11" x 17" and electronic copy presented at a minimum resolution of 300 dpi (3300 x 5100).

.4 SD Design Narrative Report:

Upon 100% completion of SD Phase the Consultant shall submit a "Design Narrative Report" providing a brief summary of design intent. The Design Narrative shall be submitted to the Department PM and include but not be limited to the following:

.1 General:

Provide a summary description of the project.

Example: *Provide a summary description for the overall scope and intent of the project; i.e. Project Exceeds Threshold Limitations, Gross SF, Number of Stories, etc.*

Provide a summary analysis of the construction cost. If necessary, working in conjunction with the Department PM**,** include any value engineering measures to align the scope of the work with the project's construction budget.

.2 Design Basis:

Identify and briefly describe supporting documents (i.e., programming, feasibility, technical and other studies) that the A/E utilized in developing the design for the project.

Example: *Identify key elements of program.*

.3 Major Group Elements:

Provide summary descriptions of the building elements and related sitework. Utilize the "Major Group Elements" – Level I of ASTM Uniformat II (www.csiresources.org) and include, but not be limited to, the following:

Major Group Elements – Level 1 (ASTM Uniformat II)			
A	Substructure;	**E**	Equipment & Furnishings;
B	Shell;	**F**	Special Construction & Demolition;
C	Interiors;	**G**	Building Sitework.
D	Services;		

.4 Phasing:

State and describe the project's phasing requirements. Provide an initial graphic phasing plan as applicable.

Example: *The project will or will not be phased. The scope of the project will or will not encompass the entire building. The exact limits of construction and the sequencing shall be determined as part of the initial design efforts.*

.5 Existing Site Conditions:

Describe site conditions. Identify extent of demolition, excavation, etc. Describe features to be preserved / relocated.

.6 Existing Conditions Investigation Reports:

Identify any supporting documents (i.e., geotechnical reports, topographical surveys, existing conditions or other studies) that the A/E has relied upon in developing the design for the project.

.7 Roofing:

Provide a brief written description of proposed roofing type supported by a justification addressing:

Structure	Deck Type(s)	Anchoring	Insulation
Roof Load(s)	Existing Conditions	Guarantees	Cost
Slope(s)	Application	Reflectivity (color)	Flashings
Penetrations	Drainage		

Exposure: Local Atmosphere, Grease, Oil, Exhausts, Chemicals
Fire safety: (i.e. torch application)

.8 Landscape Design:

Describe scope and extent.

Example: *Landscape design of hardscape, softscape, water features and site lighting are a part of this work. Project extent shall include front portico and central hardscape approach extending to front curb and exterior perimeter landscape areas as may be affected by construction activities.*

.9 Sustainability Goals:

Describe any particular Sustainability Goals and requirements.

Example: *CT High Performance Building Standards, LEED Silver, Commissioning, Integrated Design, etc.*

.10 Furnishing and Equipment:

Describe scope and extent.

Example: *The A/E shall develop a furniture and equipment plan, however the specific design, selection, purchasing, installation and coordination of the moveable furnishings and equipment (i.e., desks, tables and chairs) generally depicted therein is or is not a part of basic services.*

.11 Environmental Issues:

Describe scope and extent.

.12 Hazardous Materials Abatement:

Describe scope and extent.

.13 Building Security Requirements:

Describe scope and extent (see section 3.1.4 of this manual).

.14 Other:

This report shall include room summary schedules, and code/permit summary requirements.

.15 Cost of the Work Estimate:

Include estimate per section 3.5.1.13 in this Manual.

End
3.5.1 – Schematic Design (SD) Phase Requirements

3.5.2 Design Development (DD) Phase Requirements: (60% Completion)

Outline:

3.5.2.1 General;
3.5.2.2 Architectural;
3.5.2.3 Site Work;
3.5.2.4 Structural;
3.5.2.5 Mechanical;
3.5.2.6 Electrical;
3.5.2.7 Plumbing;
3.5.2.8 Fire Protection;
3.5.2.9 Telecommunications;
3.5.2.10 Building Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA)
3.5.2.11 Code/Permits;
3.5.2.12 Equipment;
3.5.2.13 Building Security;
3.5.2.14 Design Narrative Report;
3.5.2.15 Cost of Work Estimate;
3.5.2.16 Rendering

3.5.2.1 General

All design review items from the Schematic Design checklist, in addition to the items that follow:

.1 Submit an updated "Permits Certifications, and Approvals Checklist" (DAS form 3030).

.2 All applicable permit applications either must be approved or in review by the regulatory agency(ies).

.3 Refer to the **"**Project Manual Information" Section 5.1 this Manual for additional requirements.

.4 Edit all Division 01 "General Requirements" sections including an update of 01 11 00 "Summary of Work" (in short form or long form as required by project magnitude) as a draft. Download the latest version from the Department's web-based library.

.5 Update Project Schedule.

.6 Revise/update Design Narrative Report/Basis of Design.

.7 Any environmental document shall be reviewed to ensure that all agreed mitigation measures have been incorporated in the drawings and specifications.

.8 **Building Information Modeling (BIM):** any project that will be constructed using the CMR (Construction Manager at Risk) methodology shall follow the Department BIM requirements defined in form 0420 – DAS BIM Guidelines.

.9 **Submission to State Insurance Carrier**: design development documents (drawings and project manual) shall be submitted by the Consultant to the State Insurance Carrier for review and comment. This review will include fire sprinkler design and building envelope and will establish requirements that may exceed minimum building code requirements. The Consultant will be required to resolve all issues that arise during this review process with the State Insurance Carrier. For additional information please see "Fire Protection and Water Supply" – section 3.4.7 and "FM Global Review of Capital Projects" section 3.4.9 of this manual.

.10 At 50% completion of the DD Phase the Consultant shall present all proposed material finishes, including basis of design material selections, to demonstrate proposed color and texture. Initial presentation will be made at the Department offices prior to formal presentation to the Client Agency.

.11 **Delegated Design:** The Consultant shall submit Department form 3050 – Delegated Design Approval at the conclusion of the DD Phase for review and approval. Please see "Delegated Design" section 5.5 of this manual for additional information.

3.5.2.2 Architectural

.1 Title sheet with small plan to show project location related to adjacent roads, streets and other structures.

.2 Plot plan with project limit lines and north arrow.

.3 Floor and roof plans at 1/8" scale (min.), fully dimensioned, indicating the dimensions of all egress components, doors, stairs, aisles, passages, etc.

.4 Building sections shall be as required to illustrate all construction methods.

.5 Detailed wall sections for all typical conditions shall be developed. These sections shall detail the building envelope, including foundations, eaves and or parapets and transitions to roofing systems. Include any required waterproofing, such as used at plaza decks. Wall sections shall indicate required fireproofing.

.6 Elevations shall identify all materials and show dimensions and grades.

.7 **Critical Vertical Dimensions:** When projects include additions to existing structures, provide surveyed data for all critical vertical elements such as finished floor elevations, top of parapet, door thresholds, and all critical horizontal datum for coordination with existing elements.

.8 Reflected ceiling plans; typical and special details.

.9 Door and Finish schedules.

.10 Layout of equipment and furniture.

.11 Accessibility – provide access provisions: doors, ramps, elevators, toilets, phones, drinking fountains, emergency exits, lights, alarms, etc.

.12 Fully developed code plans: Indicate fire separation walls along with all walls on floor plans and include a legend. Provide fully developed, detailed wall sections at all typical fire separation wall conditions. Indicate occupancy loads for every space, egress path and exit capacities.

.13 Supplementary General Conditions: Make first adaptation of this document to the project; include agency operational constraints and site constraints on the contractors operations and activities.

.14 All architectural and engineering decisions are to be finalized by the conclusion of the DD phase.

.15 Location, sizes, and finish schedule of Mechanical, Electrical and Telecommunication rooms. Coordinate with "Mechanical", "Electrical", "Plumbing", "Fire Protection" and "Telecommunication" sub-sections all within this chapter.

3.5.2.3 Site Work

.1 Exact location and elevation of building(s) shown.

.2 Locations of subsurface investigations related to established existing features and subsurface investigations information.

.3 Show finished grade contours, benchmark and a graphic legend. Also verify conditions at the site.

.4 Locate utilities as to elevation, size and direction.

.5 Show roads, parking areas and site improvements, with sections.

.6 Comply with State Department of Public Health criteria.

.7 Show existing and proposed planting.

.8 Include/submit soil management plan.

.9 Include/submit vegetation management plan.

.10 Show existing and proposed surface treatment and drainage.

.11 Include soil erosion and sediment control/storm water pollution control plan, text, and details, and a general permit registration or individual permit, if required.

.12 Proposed utility hook-ups and any easements, if needed.

.13 General site work detail.

.14 Ensure topographical and boundary CADD drawings comply with the standards and criteria in "Boundary and "Boundary & Topographic Survey Requirements" Section 3.3.6 of this manual.

.15 Develop and submit a concrete paving maintenance plan.

3.5.2.4 Structural

.1 Basement - foundation plans including foundation and wall design.

.2 Floorplans, roof plans and framing plans. Sizes of typical members/ types of construction.

.3 Fireproofing for primary and secondary structural elements

.4 Indicate bottom of footing, and top of steel, elevations based upon site survey datum.

.5 Seismic criteria and information in accordance with the State Building Code.

.6 Footing schedule and basic column framing plan.

3.5.2.5 Mechanical

.1 See "Energy Issues, (High Performance Buildings, Energy Conscious Design)" Section 3.4.4 of this Manual.

.2 Floor Plans drawn to 1/8" or 1/4" scale.

.3 Main pipe and main duct layout with sizes and typical zone piping and ductwork distribution layouts.

.4 Show exterior louvers and openings; coordinate with Architectural drawings.

.5 Mechanical rooms drawn to 1/4" scale minimum and mechanical room ductwork drawn "double line". Show service areas around equipment**.**

.6 All equipment, including that furnished by others but connected under Division 23 - Heating Ventilating, and Air-Conditioning**,** should be shown.

.7 Air and water flow diagrams developed.

.8 Preliminary schedule and detail sheets. Schedules and details to be "Blocked out" and titled**,** equipment tags and model numbers indicated.

.9 Roof Plan: show location and weight for all roof mounted equipment. Show service areas around equipment.

.10 The plans and specifications should be sufficiently developed to prepare a reliable cost estimate.

.11 Renovation work: prepare demolition drawings including confirmation and coordination of existing conditions at site.

3.5.2.6 Electrical

.1 Site utility details for electric. Review design scope with the Department and Client / Agency.

.2 Update single line diagram. Include equipment ratings for main switchgear, generator, and automatic transfer switch (where applicable).

.3 Lighting, power and system floor plans; show light fixtures, receptacles, motors.

.4 Indicate location, feeds, duct banks, ratings and details of exterior/area lighting. Include a fixture and/or equipment schedules.

.5 Exit signage and exterior emergency lighting above discharge doors shall be located on the drawings and coordinated with egress plans.

.6 Fire alarm system: provide riser diagram and equipment locations. Include interface details with existing alarm system(s) and city, fire suppression systems, and other low voltage systems.

.7 Indicate all power distribution equipment on floor plans. Where applicable, provide preliminary required emergency power system design, including generator sizing and transfer system.

.8 Provide panel board schedules.

.9 Renovation work: prepare demolition drawings including confirmation and coordination of existing conditions at site.

.10 Provide data sheets for basis of design lighting fixtures (presented at 50% DD review)

.11 Floor Plans drawn to 1/8" or 1/4" scale. Electrical rooms drawn to 1/4" scale showing equipment clearances.

3.5.2.7 Plumbing:

.1 Update Gas Load letter (if applicable).

.2 Layout of domestic water service room including water meter, backflow preventers, water heaters, thermostatic mixing valves, recirculation pumps, drains, trap primers, etc.

.3 Plans showing location of fixtures, major pipe runs and equipment and updated chase wall locations.

.4 Lab and kitchen layouts showing equipment types and plumbing requirements.

.5 Locate and identify roof drains and leaders.

.6 Locate and identify floor drains and cleanouts.

.7 Indicate the need for any specialized systems (RO/DI water, oil separator, grease traps, acid neutralization, etc.

.8 Piping plans (domestic and process).

.9 Floor Plans drawn to 1/8" or 1/4" scale.

.10 Renovation work: prepare demolition drawings including confirmation and coordination of existing conditions at site.

3.5.2.8 Fire Protection:

.1 Drawings: Develop notes and legends, schedules, riser diagram and details. Indicate and coordinate sprinkler head type and locations with RCP. Indicate main piping distribution including mains, standpipes and risers (including pipe sizes), Indicate flow test on note sheet. Coordinate and indicate hose valve, sprinkler control assemblies and cabinet locations. Locate fire department connection(s), alarm bell and water supply on site plan.

.2 Renovation work: prepare demolition drawings including confirmation and coordination of existing conditions at site.

.3 Incorporate any/all State Insurance Carrier requirements.

.4 Finalize need of fire pump assembly (if applicable).

.5 Fire Protection sections of specifications shall include hydrant "three point" flow test data. Ref. also to "Fire Protection & Water Supply" section 3.4.7 of this manual.

3.5.2.9 Telecommunications

.1 Indicate source of telephone service on site plan, and location and size of BMDF / IDF rooms on floor plans. See also "Utility Hookups" Section 3.3.3 in this Manual.

.2 Indicate location of voice and data outlets on floor plans. Coordinate locations with agency representative.

.3 Show proposed method of horizontal and vertical raceway and cable distribution for voice and data communications systems. Provide one line riser diagram of voice and data distribution systems.

.4 Identify needs for power, HVAC, emergency standby or UPS systems, for computer rooms, BMDF and IDF Rooms.

.5 See “Building Components and Standards - Voice and Data Raceway Distribution” section 4.1.3 of this manual.

.6 Renovation work: verify conditions in field. Provide wiring and terminations only if part of the scope of work.

3.5.2.10 Building Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA):

.1 Coordinate with the Consultant team to document adherence of the Basis of Design to the Client / Agency’s project requirements.

.2 Develop a preliminary Commissioning Plan encompassing the design, construction, initial occupancy and post occupancy phases. The plan shall include, but not be limited to the following:

- **.1** Outline the commissioning responsibilities of the CxA/BECxA, Department, Client / Agency, Construction Administrator, Consultant team, general contractor, and sub-contractors.
- **.2** The plan shall identify which systems shall be commissioned.
- **.3** The plan shall provide an overview of the method of verification and documentation that shall be used during the commissioning process.
- **.4** The plan shall contain draft preliminary schedules for the commissioning of systems.

.3 Conduct a design review of systems to be commissioned.

.4 Prepare an issue log and reports as necessary.

.5 Prepare a DD Phase commissioning report

.6 Refer to Section 3.4.4 – Energy Issues (High Performance Buildings, Energy Conscious Design of this manual for additional information and references.

3.5.2.11 Code / Permits

Codes:

.1 Refer to schematic design submittal and update if required.

.2 Update the "Building Information Form" (DAS form 3011) and include the information, not the form, on the drawings.

.3 Submit Statement of Special Inspections.

Permits:

.4 All applicable permit applications, either must be approved or in review by the regulatory agency(ies).

.5 The Checklist shall be submitted with the design development phase to the designated Department PM for all Department Projects.

.6 Prior to submitting a Checklist, the consultant shall ensure use of the latest Permit Checklist Form (DAS form 3030) included on the Department’s web based library.

.7 DEEP Flood Management Certification: No later than the 50% stage of the Design Development phase, the Consultant shall prepare and submit electronically a completed Department of Energy and Environmental Protection (DEEP) “Flood Management Certification” application. See DAS form 3900 for additional information.

.8 DEEP Construction Stormwater and General Permit and Stormwater Pollution Control Plan – at the end of the Design Development phase / beginning of the Construction Document phase the Consultant shall apply for the Construction Stormwater General Permit if required. See DAS form 3900 for additional information

.9 For more detailed information regarding the Checklist and permit policies, refer to “Permits, Certifications, Approvals Checklist & Policies” Section 3.3.5 of this manual.

3.5.2.12 Equipment

.1 **Food service:** layout depicting all critical dimensions, with major equipment and its utility requirements scheduled as well as coordinated with MEP documents.

.2 **Laboratories:** layouts with all critical dimensions of fixed and moveable lab furniture, typical casework elevations indicating types of storage and reagent shelving configuration. Confirm required benchtop equipment clearances with agency / lab-users, major (non-benchtop) equipment scheduled including utility requirements. Reflected ceilings plans to be coordinated with fixed casework and equipment. Utilities coordinated with MEP documents.

3.5.2.13 Building Security

.1 Where required, the Consultant shall fully integrate building security features into the architectural, structural, MEP and technology plans. See **"**Building Security" section 3.1.4 **–** of this manual.

.2 Provide initial security drawings that include required infrastructure, camera locations, head-end and monitoring locations.

3.5.2.14 Design Narrative Report

Following the format for the SD Design Narrative Report, update to include changes and refinements made during the DD phase. Provide a list of delegated design items. Refer to Section 5.5 "Delegated Design" for more information.

3.5.2.15 Cost of the Work Estimate

Upon 100% completion of Design Development Phase the Consultant shall provide an estimate of the total "Cost of the Work" of the project. The cost estimates shall be submitted to the Department PM and shall utilize the "Major Group Elements" – Level II of ASTM Uniformat II (www.csiresources.org) and shall include, but not be limited to, the following:

Group Elements – Level II (ASTM Uniformat II)			
A10	Foundations	**D40**	Fire Protection
A20	Basement Construction	**D50**	Electrical
B10	Superstructure	**E10**	Equipment
B20	Exterior Enclosure	**E20**	Plumbing
B30	Roofing	**F10**	Special Construction
C10	Interior Construction	**F20**	Selective Demolition
C20	Stairs	**G10**	Site Preparation
C30	Interior Finishes	**G20**	Site improvement
D10	Conveying	**G30**	Site Mechanical Utilities
D20	Plumbing	**G40**	Site Electrical Utilities
D30	HVAC	**G90**	Other Site Construction

.1 **Inflation Values:** Adjust reported cost estimates to reflect inflation values; the estimated value for construction should represent the cost to complete the work at the scheduled construction end date as predicted from the start of construction. Questions regarding the calculation of inflation values should be reviewed with the Department Project Manager, Owner's Representative, and CMR.

.2 **Cost of the Work Estimate Reconciliation:** Upon 100% completion of Design Development Phase the Consultant's Cost of the Work Estimate shall be reconciled with the Owner's Representative's independent cost estimate and the CMR's Cost of the Work Estimate (for CMR projects). In conjunction with the Department PM, Owner's Representative, and CMR, the Consultant, as directed by the Department, shall take the appropriate action to correct and/or avoid potential cost overruns and make adjustments to their DD Phase Cost of the Work Estimate.

3.5.2.16 Rendering (per Consultant Contract)

.1 Framed color perspective of project (per Consultant contract). The minimum rendering size shall be 20” X 30” (or may be other size if appropriate and allowed by the Department’s Chief Architect), and have a brushed aluminum frame. In addition provide an electronic copy presented at a minimum resolution of 300 dpi (6,000 x 9,000).

.2 The name of the project, project address, Consultant, the full name of the **Department**, Client / Agency, estimated completion date and estimated construction cost - shall appear on the rendering.

End

3.5.2 – Design Development (DD) Phase Requirements

3.5.3 Contract Document (CD) Phase Checklist (90% Completion):

Outline:

3.5.3.1 General;
3.5.3.2 Architectural;
3.5.3.3 Site Work;
3.5.3.4 Structural;
3.5.3.5 Mechanical;
3.5.3.6 Electrical;
3.5.3.7 Plumbing;
3.5.3.8 Fire Protection;
3.5.3.9 Telecommunications;
3.5.3.10 Building Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA);
3.5.3.11 Code/Permits;
3.5.3.12 Equipment;
3.5.3.13 Building Security;
3.5.3.14 Special Subcontractor Qualifications;
3.5.3.15 Supplemental Bids;
3.5.3.16 Cost of the Work Estimate;
3.5.3.17 Final Design Narrative Report;
3.5.3.18 Rendering.

3.5.3.1 General:

Include all items from the schematic design and design development checklists in addition to the items as follows:

.1 Specifications shall be fully developed and complete. Sections shall conform to 6 digit, 50 Division, three part, CSI format with all cross-references sufficiently coordinated. Refer to “Unit Prices” Section 5.3 and “Project Manual Information” Section 5.1 this Manual. Final specifications shall include all equipment sections and temperature control sequence of operation. Do not include "size as required", "to be determined at installation" etc., either on drawings or in specifications.

.2 Drawings shall be fully developed and complete. Refer to sections below for specific information per discipline. All sources of all information shall be indicated on the drawings.

.3 The final submittal shall include accepted responses to all previous design and review comments.

.4 Subjective evaluation terms shall not be used. Work within the project scope shall not be referred to as “proposed”.

.5 “Checklist for Permits, Certificates and Approvals” (form 3030) shall be updated, complete, and submitted. Follow through with any remaining permit issues.

.6 All environmental documents shall be reviewed to ensure that all agreed mitigation measures have been incorporated in the drawings and specifications.

.7 Include an interdisciplinary coordination (use of “Redicheck” http://www.redicheck-review.com/ / or equivalent) to ensure consistent, fully coordinated documents prior to submittal of the completed documents. Details of this requirement are as follows:

.1 It is the expectation of the Department that each submission during the CD Phase will be reviewed by the prime Consultant (typically the Architect). Each submission shall be

coordinated across disciplines. While preliminary submissions will not be complete, they shall be coordinated and accurate at their existing level of completeness. All submissions shall be readable with appropriate sized text and differentiated line weights. See "Drawing Information – General" - section 5.2 of this manual for additional requirements.

.2 The Consultant shall submit the written results of an internal review of all of the documents along with the 90% CD Phase submission for document quality assurance and coordination. It is preferred the review be performed by person(s) not directly working on the project. This mandatory review and submission shall be submitted to the Department PM prior to the third party external interdisciplinary coordination. The Consultant shall require their sub-consultants to conduct similar reviews on their project scope; these reviews shall be submitted with the Consultant's review comments.

.3 The 90% submission during the CD phase is the final review of the document set. The consultant shall deliver the final budget, along with the project documents for final quality assurance and accuracy review. At this milestone, the Consultant shall deliver documents to the Department they believe are complete and fully coordinated. The Department will conduct internal and external reviews and return comments to the Consultant to be incorporated into the project documents prior to bidding. Once incorporated, the documents are considered at the 100% Construction Documents stage.

.8 **Building Information Modeling (BIM):** any project that will be constructed using the CMR (Construction Manager at Risk) methodology shall follow the Department BIM requirements defined in form 0420 – DAS BIM Guidelines available on the Department web-based library.

.9 Any changes to material and equipment selections presented during the DD phase shall be presented to the Department and Client Agency no later than at 50% completion of the CD phase.

.10 **Delegated Design:** Any changes to the approved Delegated Design / Deferred Submittal requirements shall be identified on a revised form 3050 for Department Approval. The final list of Deferred Submittals shall be placed on the code sheet on the drawings.

.11 **Submission to State Insurance Carrier**: contract documents (drawings and project manual) shall be submitted by the Consultant to the State Insurance Carrier for review and comment. This review will include fire sprinkler design and building envelope and will establish requirements that may exceed minimum building code requirements. The Consultant will be required to resolve all issues that arise during this review process with the State Insurance Carrier prior to issuance of the documents for bidding. For additional information please see "Fire Protection & Water Supply" section 3.4.7 and "FM-Global Review of Capital Projects" section 3.4.9 of this manual.

.12 Final narrative/BOD.

3.5.3.2 Architectural:

.1 Refer to "Drawing Information" section 5.2 this manual.

.2 Drawings**:** Floor plans, roof plans, elevations, sections shall not be less than 1/8":1'-0" scale, large details as needed to understand intent of the design; fully dimensioned; all material identified. Include legends and abbreviations.

.3 Final layout of equipment and furniture. Design and detailing of required services.

.4 Final room numbering coordinated with signage requirements – confirm with Client Agency room numbering and signage requirements; incorporate building standards into signage specifications.

.5 Final door, hardware and finish schedules

.6 Key plan on each drawing for large projects.

.7 Detailed expansion and control joints.

.8 Elevations of all exterior surfaces including finish grades.

.9 Provide as many sections as needed to show all wall conditions; typical construction; elevators; stairs; wall treatments; flashing; intersections of different materials; insulation(s); wall reinforcement; footing and foundation details and required fire proofing.

.10 Provide large-scale details sections to illustrate interrelationship of elements not shown in wall sections.

.11 Anchorage details and spacing requirements for structures and nonstructural components due to seismic loads.

3.5.3.3 Site Work:

.1 Contract limit lines, property line, north arrow.

.2 New and existing grades.

.3 Bench mark, base lines.

.4 Name of surveyor and date of survey.

.5 Survey: statement of accuracy.

.6 Line-work shall clearly differentiate between existing and Contract work.

.7 Landscape, details, site furnishings, topsoil, fills.

.8 Roads and parking lots including drainage, radius, details, walks, stairs etc.

.9 Site lighting.

.10 Refer to “Utility Hookups” section 3.3.3 in this manual.

.11 Include subsurface investigation information on the drawings.

.12 Septic system.

.13 Where applicable**,** details shall comply with "Connecticut Department of Transportation, Bureau of Highways, Standard Details”; (typical for catch basins, manholes, curbing, stone walls, wire and chain link fencing).

.14 The designer is to determine project conditions and shall eliminate all conditional, subjective or interpretive requirements within the project documents by either deletion or replacement with specific, definitive and/or measurable requirements.

.15 Consultant must coordinate all new or upgraded Utilities, including necessary easements, with the appropriate Utility company(s).

.16 Ensure topographical and boundary CADD drawings comply with the standards and criteria in “Boundary & Topographic Survey Requirements” section 3.3.6 of this manual.

3.5.3.4 Structural:

.1 Foundation plan (plans, sections, footings, special ties, piles, etc.) including slab bases, footing drains and under-drains, retaining walls and site work walls and stairs foundations.

.2 Floor plans, roof plans and details. Coordinate with all plumbing and building storm drainage.

.3 Framing details.

.4 Columns and reinforcement schedules.

.5 Design Loads for walls, floors, roof, wind, seismic, etc.

.6 Fireproofing for primary and secondary structural elements.

.7 Elevations of footings (based on site survey datum), walls, top of steel, and finished floor.

.8 Caissons: Bottom elevation of each caisson is to be indicated on the drawings.

.9 Piles: Estimated length for each group/cluster.

.10 Anchor details and spacing requirements for structures and nonstructural components due to seismic loads.

3.5.3.5 Mechanical:

.1 Plans, details and flow diagrams. All pipe, ductwork, and equipment sized and indicated, with maintenance clearances depicted.

.2 Indicate air inlet/outlet devices, neck size, velocity (CFM) and type.

.3 Show details for expansion compensation, anchors and guides.

.4 Completed schedules, legends and general notes.

.5 Large scale plans of boiler and equipment rooms, and similar type areas, 1/4”=1’-0” or larger.

.6 Provide riser diagrams multistory duct and pipe.

.7 Drawings shall include a summary of methods used and results of applicable code required heating and cooling calculations and associated equipment sizing to clearly demonstrate compliance.

3.5.3.6 Electrical:

.1 Complete site distribution drawings. Detail underground duct-banks, manholes, luminaire posts.

.2 Complete one-line power diagram, or power riser diagram. Indicate all major power equipment, transformers, panel boards, motor control centers with conduit and conductor sizes. Identify distribution voltages, short circuit ratings. Complete primary and secondary system details.

.3 Complete all lighting and power floor plans. Indicate all fixture designations, circuit numbers, receptacles, motors. Provide a minimum of three equivalent luminaire selections for all fixture types. *Where the basis of design selections are unique designs the Consultant or sub-Consultant shall develop two additional selections that meet the design intent and present them to the* ***Department*** *and Client Agency.*

.4 Indicate electrical switchgear, panel boards, transformers and major equipment on the floor plans. Indicate clearances required by all codes.

.5 Detail emergency and life safety systems, and/or other special or unique systems with details of components and methods of installation.

.6 Complete all schedules and provide connected loads for all circuits indicated on panel board schedule.

.7 Drawings should indicate consistent nomenclature and circuit designations for: switchgear, panelboards, switchboards, and feeders, control stations and motor-control centers, transfer switches, communication equipment, and auxiliary systems as applicable for systematic field identification of components.

.8 Coordinate with the mechanical designer to provide on the drawings a statement describing compliance path(s) used to meet applicable energy and sustainable construction code requirements.

3.5.3.7 Plumbing:

.1 Final Gas Load letter (if applicable).

.2 Final layout of domestic water service room including water meter, backflow preventers, water heaters, thermostatic mixing valves, recirculation pumps, drains, trap primers, etc., with maintenance clearances depicted.

.3 Plans showing all major pipe mains, branches and equipment including but not limited to:

1. Waste and vent piping, noting inverts of all underground pipe crossings and penetrations through foundation.
2. Domestic water piping.
3. Natural gas piping and meter.
4. Purified water piping.
5. Acid neutralization piping
6. Kitchen waste piping

.4 Lab and kitchen layouts showing equipment types and plumbing requirements.

.5 Final locations of roof drains and leaders.

.6 Final location of floor drains and cleanouts.

.7 Sanitary and venting riser diagrams for multistory buildings.

3.5.3.8 Fire Protection:

.1 Complete Drawings indicating: notes and legend, schedules riser diagram and details. Indicate and coordinate sprinkler head type and locations with Architect / RCP, diffusers, structure and lighting. Indicate main piping distribution including feed mains, stand pipes and risers, Indicate flow test on note sheet, Coordinate and indicate hose valve, sprinkler control assemblies and cabinet locations with Architect. Locate fire department connection(s), alarm bell and water supply on site plan.

.2 Coordinate FDC locations, fire standpipe hose valve locations, sprinkler control assemblies with the Fire Marshal and or Building Inspector.

3.5.3.9 Telecommunications:

.1 Provide correspondence from telephone utility company outlining method of service and charges if any. See "Utility Hookups" section 3.3.3 **-** of this manual.

.2 Final voice and data raceway for cable distribution systems, including outlet locations and conduit sizes.

.3 Final design of telecommunications rooms, and computer room(s). Coordinate with Client / Agency requirements.

.4 Complete conduit riser diagram for voice/data systems, including all required sleeves.

.5 Telecommunications requirements. See “Building Components and Standards - Voice and Data Raceway Distribution Components and Standards” section 4.1.3 of this manual.

3.5.3.10 Building Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA):

.1 Coordinate with the Consultant team to document adherence of the Basis of Design to the Client / Agency’s project requirements.

.2 Develop a final Commissioning Plan encompassing the design, construction, initial occupancy and post occupancy phases. The plan shall include, but not be limited to the following:

- **.1** Full definition of the commissioning responsibilities of the CxA, Department, Client / Agency, Construction Administrator, Consultant team, general contractor, and sub contractors.
- **.2** Identification of systems which shall be commissioned.
- **.3** An overview of the method(s) of verification and documentation that shall be used during the commissioning process.
- **.4** Final preliminary schedules for the commissioning of systems.

.3 Determine and coordinate the integration of commissioning requirements and activities into the construction documents, including writing the general commissioning specifications.

.4 Conduct a design review of systems that will be commissioned.

.5 Update the issue log and provide issue reports as necessary.

.6 Prepare a CD Phase commissioning report.

.7 Refer to “Energy Issues (High Performance Buildings, Energy Conscious Design” section 3.4.4 –of this manual for additional information and references.

3.5.3.11 Code/Permits;

.1 **Codes:**

- **.1** Refer to design development submission requirements and update information, if required.

.2 Update the "Building Information for Code Analysis" (DAS form 3011) and include the information, not the form, on the drawings if required.

.3 Fire-resistant ratings of structure elements and locations of penetrations for electrical, mechanical, plumbing and etc. shall be shown.

.4 Fire protection systems plans and specifications must conform to NFPA 13 and 14; FM Global requirements and current State Building and Fire Safety Codes. Refer also to "Fire Protection and Water Supply" Section 3.4.7 in this Manual.

.5 A statement of Special Inspections (title must be "Statement of Special Inspections) to be filled out and submitted by the Consultant to the Department.

.2 Permits:

.1 Follow through with any remaining issues with the above listed permits as required.

.2 If there are any outstanding permit issues (code or environmental), notify the designated Department PM.

.3 All necessary approvals for construction related permits must be obtained prior to bidding.

.4 At the beginning of the CD phase verify submissions of the Flood Management Certification and Construction Stormwater General Permit has been completed and submitted to DEEP

.3 Required Review:

.1 For the 90% document submission the Consultant shall submit to the Department PM a letter from their code consultant indicating the project has been thoroughly reviewed by the code consultant and complies with all applicable codes.

3.5.3.12 Equipment

.1 **Food service**: provide final layout, equipment details for all custom fabrications, indicate where all utilities tie into equipment and custom fabrications, and all major equipment including utility requirements scheduled as well as fully coordinated with MEP documents.

.2 **Laboratories / trade shop equipment:** provide final layouts, casework details, details coordinating utilities into casework. Casework elevations to be finalized for every condition, indicate all wall mounted utilities on elevation drawings and coordinate with MEP drawings, indicate all casework mounted utilities and coordinate with MEP drawings. Schedule final inventory of all major equipment, identify existing equipment and differentiate from new equipment, coordinate utility requirements for all existing and new equipment, coordinate final equipment schedule including utility requirements. Coordinate with Agency / users to identify new equipment including all basic specifications (dimensions, critical weights, utility requirements, manufacturer and model numbers, if available). Refine reflected ceilings plans shall be fully coordinated with fixed casework and equipment. Utilities fully coordinated with MEP documents.

3.5.2.13 Building Security

.1 Where required, the Consultant shall fully integrate building security features into the architectural, structural, MEP and technology plans. See "Building Security" section 3.1.4 – of this manual.

.2 Provide final security drawings that include required infrastructure, camera locations, head-end and monitoring locations. Coordinate work with other architectural and engineering disciplines.

.3 Working with the Client / Agency's security unit or the Department security personnel (dependent on Client / Agency) determine whether devices and equipment shall be purchased through the Constructor or directly under state contract. In all cases the infrastructure pathways shall be part of the Constructor's scope of work and shall be represented in the Consultant's documents accordingly.

3.5.3.14 Special Subcontractor Qualifications

Section 4b-93 of the Connecticut General Statutes requires the naming of subcontractors for specific trade work as follows: (1) masonry work, (2) electrical work, (3) plumbing; and (4) heating, ventilating and air conditioning work. When such trades and any additional trades or specialized work will require qualifications of a specific nature the Consultant shall, in coordination with the Project Manager:

.1 Develop within Division 01 of the Project Manual a section titled "Special Subcontractor Qualifications Statement". This section shall refer to the applicable trade sections to which it applies and include a form that will be filled out by the respective Special Sub-contractor identifying the organization, self-performed work, similar project examples, resumes of supervisory personnel and trade references.

.2 Within each applicable trade section, cross reference the Division 01 Section identified above and develop Quality Assurance requirements specific to that trade section that will demonstrate the sub-contractor's minimum requisite experience and expertise

.3 Coordinate with the Department's Project Manager the bidding requirements for receipt and analysis of the "Special Sub-contractor Qualifications Statement".

Special Sub-Contractor Qualifications may be applicable to different types of specialized work such as Historic Preservation, research laboratory space with specialized environmental requirements, archival spaces and museums as examples. Special Sub-Contractor Qualifications should only be used when the construction expertise necessary for a successful project exceeds the typical minimum requirements. If guidance is required to develop these requirements contact the DAS Chief Architect.

3.5.3.15 Supplemental Bids

Refer to General Requirements Section 01 23 13 – Supplemental Bids. Supplemental bids differ from bid alternates in that they can only be accepted in their numerical order. This is to prevent manipulation of the bidding. The Department does not permit bid alternates.

The Department relies on accurate cost estimating from the Consultant, the CA and the CMR so that projects, when bid, are within budget. Use of Supplemental Bids should be limited to avoid bid confusion. As a general rule of thumb, any more than three or four supplemental bids should be avoided.

The Consultant shall closely coordinate with the Department's Project Manager and the Client Agency to prioritize the formulated supplemental bids. Supplemental and base bid work shall be clearly delineated in the drawings and specifications. The naming and description of the supplemental bids must be consistent on the drawings and exactly match the schedule found in Part 3 of the General Requirements section 01 23 13.

3.5.3.16 Cost of the Work Estimate

Upon completion of 50% and 90% Construction Document Phase (or as indicated in the Consultant contract) the Consultant shall provide an estimate of the total "Cost of the Work" of the project. The written cost estimate shall be submitted to the Department PM and shall utilize the "Major Group Elements" – Level III of ASTM Uniformat II (www.csiresources.org), and shall include, but not be limited to, the following:

Individual Elements – Level III (ASTM Uniformat II)			
A1010	Foundations	**D5010**	Electrical Service & Distribution
A1020	Basement Construction	**D5020**	Lighting and Branch Wiring
A1030	Slab on Grade	**D5030**	Communications & Security
A2010	Basement Excavation	**D5090**	Other Electrical Systems
A2020	Basement Walls	**E1010**	Commercial Equipment
B1010	Floor Construction	**E1020**	Institutional Equipment
B1020	Roof Construction	**E1030**	Vehicular Equipment
B2010	Exterior Walls	**E1090**	Other Equipment
B2020	Exterior Windows	**E2010**	Fixed Furnishings
B2030	Exterior Doors	**E2020**	Movable Furnishings
B3010	Roof Covering	**F1010**	Special Structures
B3020	Roof Openings	**F1020**	Integrated Construction
C1010	Partitions	**F1030**	Special Construction Systems
C1020	Interior Doors	**F1040**	Special Facilities
C1030	Fittings	**F1050**	Special Controls & Instrumentation
C2010	Stair Construction	**F2010**	Building Elements Demolition
C2020	Stair Finishes	**F2020**	Hazardous Components Abatement
C3010	Wall Finishes		
C3020	Floor Finishes	**G2010**	Roadways

C3030	Ceiling Finishes
D1010	Elevators & Lifts
D1020	Escalators & Moving Walks
D1090	Other Conveying Systems
D2010	Plumbing Fixtures
D2020	Domestic Water Distribution
D2030	Sanitary Waste
D2040	Rain Water Drainage
D2090	Other Plumbing Systems
D3010	Energy Supply
D3020	Heat Generating Systems
D3030 **D3040**	Cooling Generating Systems Distribution Systems
D3050	Terminal & Package Units
D3060	Controls & Instrumentation
D3070	Systems Testing & Balancing
D3090	Other HVAC Systems & Equipment
D5010	Electrical Service & Distribution
	Standpipes
D4030	Fire Protection Specialties
D4090	Other Fire Protection Systems

G2020	Parking Lots
G2030	Pedestrian Paving
G2040	Site Development
G2050	Landscaping
G3010	Water Supply
G3020 **G3030**	Heat generating equipment Storm Sewer
G3040	Heating Distribution
G3050	Cooling Distribution
G3060	Fuel Distribution
G3090	Other Site Mechanical Utilities
G4010	Electrical Distribution
G4020	Site Lighting
G4030	Site Communications & Security
G4090	Other Site Electrical Utilities
G9010	Service and Pedestrian Tunnels
G3050	Cooling Distribution
G3060	Fuel Distribution
G1020	Site Demolition and Relocations
G1030	Site Earthwork
G1040	Hazardous Waste Remediation

.1 **Inflation Values:** Adjust reported cost estimates to reflect inflation values. Do NOT present costs to the estimated start of construction, mid-point of construction or to present day values. Questions regarding the calculation of inflation values should be reviewed with the Department Project Manager, Owner's Representative, and CMR.

.2 **Cost of the Work Estimate Reconciliation:** Upon 50% and 90% completion of Construction Document Phase the A/E's Cost of the Work Estimate shall be reconciled with the Owner's Representative's independent cost estimate and the CMR's Cost of the Work Estimate. In conjunction with the Department PM, Owner's Representative, and CMR, the A/E, as directed by the Owner, shall take the appropriate action to correct and/or avoid potential cost overruns and make adjustments to their CD Phase Cost of the Work Estimate. This may require adjustments to the contract documents.

3.5.3.17 Final Design Narrative Report

Following the format for the SD & DD Design Narrative Report update to include changes and refinements made during the CD phase.

3.5.3.18 Rendering (per Consultant Contract)

.1 If Design Development was skipped in the Design process, refer to **Design Development Requirements 3.5.2.16** for the rendering requirements, and as outlined in the Consultant's contract.

End
3.5.4 – Contract Document (CD) Phase Checklist

3.5.4 Bidding Phase

3.5.4.1 General:

.1 Upon completion and approval of the Contract Documents, the Consultant shall submit drawings and specifications to the Department PM. Follow the requirements as outlined in the Design Phase Checklist, form 3025 which is found in the Department web-based library. The cover sheet shall include signatures and consultant seals for all major consultants: architect, MEP engineers, structural, civil, etc. Only those disciplines that are required to be licensed need seal and sign the documents. The date on the drawings and project manual shall be the date sent to the Project manager. Revision block shall be empty of all dates and revision text.

.2 The Consultant and sub-consultants shall sign and seal the drawings and specifications for which they are responsible with their individual professional stamps and signatures. If the prime Consultant is a corporation, it may also place its corporate seal on the drawings and specifications with the signature of the corporate officer authorized to sign. When the project is ready for bid utilize the current Department Cover Sheet, Title Block and Specification Title Page downloadable from the Department's web-based library (3000 Series). Comply with CT Regulation Sec. 20-289-7a for digital seal and signature of contract documents, otherwise the hand-sealed cover and title sheets shall be scanned and combined with the technical drawings and specifications, respectively. Do not use company logos on the cover sheet, use firm names and the firm address only, indicate discipline for all firms included on the cover sheet.

.3 The contract documents will receive approval by the Department and the user agency if they are satisfied the design fulfills all the project requirements. Approval by the Department only indicates the documents are a reasonable representation of the design solution that is consistent with the original authorization, and reflect intent as developed by the client agency and the Department. It is the responsibility of the Consultant to prepare and present Contract Documents that are thoroughly reviewed and coordinated and consistent with Department guidelines and manuals as applicable.

.4 Prior to receipt of the competitive bid: Per Section 01 25 00 Substitution Procedures the Architect or Engineer must review every substitution formally submitted (Form 7001). Each shall be evaluated and approved or rejected by the Design Consultant and notice of disposition shall be formally given by an addendum.

.5 After bids are received, Section 01 25 00 Substitution Procedures defines procedures for consideration of equal or substitutions.

.6 **Conformed Set of Bid Documents:** The "Construction Documents" that contain all pre-award "Addenda" changes are known as the "Conformed Set of Bid Documents." The Conformed Set of Bid Documents must incorporate all changes exactly as indicated on the pre-award Addendum and shall NOT include any changes, revisions, and/or deletions that were not part of a pre-award Addendum. If there are any changes, revisions, and/or deletions needed that were not part of a pre-award Addendum, the A/E shall notify the Department PM in writing and submit a "Proposal Request" as a separate document for a post-award construction modification. The A/E shall prepare the "Conformed Set of Bid Documents" documents as follows:

.1 **Drawings:** Annotated with revision symbols to identify changes made by all "Addenda" changes; shall contain the words "CONFORMED BID DRAWING." Add "CONFORMED BID DRAWINGS" in large letters on the Cover Sheet, which shall be signed, sealed, and dated by the A/E. All changed drawings shall be republished, signed, sealed, and dated by the A/E.

.2 **Specifications:** Add "CONFORMED BID SPECIFICATION" and the date in the footer at the bottom of all Specification pages and in large letters on all of the Specification Cover Sheets that are signed, sealed, and dated by the A/E.

.3 **Submission of Conformed Set of Bid Documents:** Prior to the start of Construction the A/E shall provide the Department with an electronic copy of the Conformed Set of Bid Documents (see section 5.2 of this manual for electronic document requirements) for use by the Department, CMR, or Contractor and their Subcontractors for use in preparing shop drawings, coordinating work, etc. Additional requirements may be indicated in the Standard Architect's Fixed Fee Contract ("Exhibit A").

3.5.4.2 Project Manual

The project manual shall include a list of the contract documents such as Instructions to Bidders and Construction Specifications Bidding Requirements, Contract Forms, and Procurement and Contracting Requirements (Division 00). The Division 00 documents will be provided and incorporated into the bid documents by the Department Office of Legal Affairs, Policy, and Procurement (OLAPP) at the time of bid. The Division 00 documents may be provided to the Consultant for coordination of work, prior to bidding. The Technical Specifications (Divisions 01 through Division 45) shall be created and submitted by the Consultant.

.1 Addendum:

If bid document revisions are required after project advertisement, they shall be formalized using the Department's Bid Addendum Form 6030, available on the Department's web-based library. The addendum shall be created by the Consultant and submitted to the Department PM and OLAPP for posting / distribution.

End
3.5.5 – Bidding Phase

3.5.5 Construction Phase

General: During the Construction Phase, the Department places a high value on the completeness and accuracy of the Contract Documents. It is the Department's expectation that during the Construction Phase the Consultant will strongly support and advocate for the content of the Contract Documents. It is for this reason that the intent of the design must be clearly defined and delineated. All changes to the project during construction are particularly costly to the State due to the loss of a cost-competitive environment.

3.5.5.1 Duties During Construction

1. The Consultant is required to attend project start up meetings.
2. **Schedule of Values**: the Consultant shall review the Schedule of Values and advise the Owner of any concerns or discrepancies. General Requirements require the constructor to breakdown each line item by labor and material; particular attention to these respective values is critical in establishing the Schedule of Values and the Owner relies on the Consultant, in conjunction with the CA to ensure the initial Schedule of Values is a fair representation of the work.
3. **Project Schedule**: the Consultant shall review the initial Project Schedule and comment on any concerns or discrepancies. The Project Schedule is a critical tool, prepared by the constructor but reviewed by the Consultant and the CA. The Owner relies on the Consultant's expertise to evaluate the Project Schedule and subsequent revisions to assist the Department in the administration of the Project during the construction phase.
4. **Submittal Schedule**: The Consultant is obligated to review submittals and respond within a timely manner. The constructor's initial submittal schedule is a critical administrative tool. Consequently, the Consultant shall carefully review the submittal timing in conjunction with the Project Schedule and critical path and advise the Department if there are any concerns or discrepancies. Particular attention shall be paid to periods of time where mass transmittals are anticipated; the Consultant should review and verify appropriate staffing will be available. Conversely recommendations can be made by the Consultant to distribute the anticipated submittals in such a manner to reduce potential backlogs.
5. **Deferred Submittals**: The Consultant shall return all Deferred Submittals to the Department PM for OSBI / OSFM for review and approval once the Consultant has approved the submittal (or approved as noted). The Deferred Submittal is not fully approved when OSBI and or OSFM has received and approved the submittal. Only items identified by the Consultant during the design phases and placed on the code sheet of the contract drawings will be considered for Delegated Design / Deferred Submittals. Refer to "Delegated Design", section 5.5 of this manual for additional information.
6. **Job Meetings (weekly or as required):** the Consultant's attendance and participation is critically important. The job meeting brings all the critical participants together to review progress and address any ongoing issues. To the extent possible these meetings should be used to solve problems. In order to accomplish this the Consultant shall staff these meetings with knowledgeable persons highly familiar with the contract documents who understand the complexities of the construction process. Further, the Consultant shall make sure the appropriate sub-consultants are present at the job meetings where their discipline is being discussed or reviewed. Although technology may allow for remote attendance it is preferred that the sub-consultants are present in person. In no case will it be acceptable for the prime Consultant to attend remotely.
7. **Contract Modification Procedures:** Section 01 26 00 of the General Requirements delineates specifics of the contract modification process during construction. It is particularly important the Consultant and the Consultant's sub-consultants respond to RFI's as quickly as possible to provide timely responses to questions from the constructor. Should the consultant receive mass RFIs it is important to prioritize responses in conjunction with the constructor, the Department and the Department's CA to provide the most critical responses soonest. Should the RFI result in cost implications it is important to resolve via issuance of Supplemental Instructions, Proposal Requests, or (if necessary) as a Construction Change Directive as soon as is reasonably possible. Throughout the construction process, the Consultant needs to apply the necessary resources to help resolve all open issues.
    1. **Equals and Substitutions:** equals or substitutions are discouraged after contract award. There are occurrences when products are discontinued and substitutions are justified. The procedures for substitutions are delineated within Section 01 25 00 of the General Requirements and shall be followed for any and all requests. Any deviation from these procedures will be rejected by the Department.

2. **Drawing Revisions:** the Consultant shall place their seal and signature on all document revisions that modify the permitted set of construction documents. For example, all S-K drawings, and changes to the project manual, in response to an RFI or other instrument of the contract modification procedures shall be sealed and signed by the Consultant to demonstrate compliance with the State codes and regulations.

8. **Testing Services** – the Consultant, in conjunction with Department staff shall develop material testing requirements that will identify necessary testing and required frequency. (See "Material Testing Laboratories" section 3.4.5 from this manual for additional detail).

9. **Additional Material Testing Requests:** should the Consultant suspect that placed materials are not in conformance with the contract documents and are not scheduled to be tested in the regular course of construction, the consultant shall advise the Department's PM of the need for additional testing

10. **Submittal Procedures:** delays in submittal response can have financial impact on the project. It is the responsibility of the constructor to review and comment on all submittals prior to transmitting to the Consultant for review. It is the responsibility of the Consultant to return the submittals within a reasonable time period that is identified in the Consultants Attachment 1 to the contract as well as within Section 01 33 00 of the General Requirements. The Department prefers submittals be processed and returned as quickly as possible and reminds the Consultant that the allowable review period is the maximum number of days permitted. If the consultant can demonstrate that submittals are not being adequately reviewed by the constructor prior to receipt they should work with the Department's PM to encourage the constructor to provide adequate reviews. Whenever submittals are not in keeping with the contract documents corrective action must be taken. The Department relies on the Consultant to achieve the value specified within the contract documents.

11. **Project Management Software:** the consultant will be provided with access to the Department's internet based project management and recording software and shall utilize the software for project related communications and construction related contract modifications and submittals as directed by the Department Project Manager. The Department will provide training to the Consultant in the use of the software throughout the project duration. The requirements for use of this project management and recording software will apply to the consultant and sub-consultants.

12. **Engineering Layout:** the Consultant shall cooperate and assist the Department's CA and constructor in initial site and building layouts to assure the design intent is achieved. Particular attention by the Consultant to any established benchmarks and critical dimensions should be verified and documented within the Consultant's report.

13. **Progress of the Work:** attending progress meetings and reporting on field observations are a requirement of the Consultant's Terms and Conditions. The Consultant shall report on the progress of the work on a semimonthly basis (per the Consultant's Terms and Conditions). The Consultant's report shall identify any deviations from the contract documents as well as other project issues as may arise. The report shall include the observations of the sub-consultants when their respective disciplines are under construction. Where necessary the Consultant's report should include digital images properly annotated.

3.5.5.2 Commissioned Building Systems (Including Building Envelope)

1. **Commissioning Support:** the Consultant and their sub-consultants shall coordinate with the Department's Commissioning Agent (CxA) and Building Envelope Commissioning Agent (BECxA)as follows:

   1. Review and incorporate as appropriate the CxA's and BECxA's comments from submittal reviews.

   2. Review and comment on the CxA's and BECxA's periodic "commissioning process progress reports" and "issues log reports".

   3. Review and comment on the final "commissioning process report"

   4. Participate in the initial operation and maintenance personnel and occupant training session by presenting the project basis of design (design intent).

   5. Participate in other training as detailed in the training program.

2. **Commissioning Agent Requirements:** The CxA and BECxA's shall provide the following services during the construction phase:

   1. Organize the Commissioning Process components and conduct a pre-bid and pre-construction meeting to review the commissioning requirements with the complete Commissioning Team.
   2. Organize and conduct periodic commissioning team meetings necessary to plan, develop the scope of, coordinate, and schedule activities and resolve problems.
   3. Review submittals concurrent with the Consultant team's review.
   4. Develop specific test procedures, direct the execution of the tests by the contractors, and document the results of the tests.
      1. These functional test procedures shall provide a detailed procedure of how the system shall be tested and a record sheet for recording the test results.
      2. The test procedures shall be as explicit and exact as possible to ensure that the test can be easily repeated by more than one tester and the same results obtained.
   5. Document the correction and retesting of noncompliant items by the contractors.
   6. Develop pre-functional test checklists and verification of completion forms for all equipment to be commissioned.
   7. Work with contractors in completing checklists and verification forms. Track checklist and verification form completion.
   8. Develop and implement a quality based sampling plan to verify proper completion of all testing requirements.
   9. Review contractor's construction checklists to verify that contractor's quality process is achieving the Department and Client / Agency project requirements.
   10. Review the Operations and Maintenance (O&M) manual for achieving the Department and Client / Agency project requirements.
   11. Review, pre-approve, and verify the training provided by the contractors.
   12. Verify delivery of the O&M manual.
   13. Prepare a Construction Phase commissioning report.

3. **CxA and BECxA's requirements during Pre-Occupancy Phase:**

   1. Verify that the project has met the CT High Performance Building Standards, see "Energy Issues High Performance Buildings, Energy Conscious Design" section 3.4.4 of this manual.
   2. Schedule and verify deferred and seasonal testing by the contractors.
   3. Verify continuing training.
   4. Review the warranties with the operations and maintenance staff.
   5. Prepare a Pre-Occupancy Commissioning Report.
   6. Document enclosure Test Records (BECxA)
   7. Assist in the preparation of record Drawings
   8. Prepare a final Commissioning Report
   9. Prepare and deliver building enclosure preventative maintenance program including cyclical verification of building enclosure components with enforcement of warranty provisions. (BECxA)

4. Systems to be provided with functional testing procedures shall include, but are not limited to, the following systems. (It is incumbent on the CxA to provide for all building systems in the project**):**

1. All air handling units and associated heating and cooling coils, etc.

2. All humidifiers

3. All exhaust fans

4. All return fans

5. All variable air volume (VAV) terminal units and associated reheat coils

6. All lab terminal units (supply and exhaust) and associated reheat coils

7. Chillers and all associated chilled water and condenser water pumps, etc.

8. Boiler, boiler combustion air fan, and all associated pumps, tanks, condensate pumps, etc.

9. All heat exchangers and associated pressure relief valves (PRVs)

10. Cooling towers

11. Chilled water distribution systems

12. Hot water heating distribution systems

13. Computer room air conditioning units and associated split system condensers

14. All unit heaters, cabinet heaters, etc.

15. Building automation and Direct Digital Controls and system interlocks

16. Emergency generator and associated transfer panels

17. Lighting control systems

18. Fire protection systems and equipment; fire alarm system interfaces with HVAC systems

19. Security Systems

20. Telecommunications Systems

21. All lab fume hoods and bio-safety cabinets

22. Lab piping systems and lab gases

23. Lab vacuum pump

24. Lab air compressor

25. Pure water system generator and distribution system

26. Lab control system

5. For Building Envelope Systems Commissioning procedures and requirements refer to NIBS Guideline 3-2012 or latest version

Refer to Chapter 3.4.4 – Energy Issues High Performance Buildings, Energy Conscious Design of this manual and also to Section 01 91 00 for additional information and references.

3.5.5.3 Punch List

1. At substantial completion, if the project is not 100% complete the constructor shall develop a comprehensive punch list for review by the Consultant and the CA (and the Client / Agency if requested). Items on a punch list should be minor in nature and cannot have any impact on life safety that would prevent the Owner from occupying the building**. Incomplete or uninstalled work will not be accepted by the Department as substantially complete.**

2. If the Consultant, in conjunction with the CA deems the project is substantially complete the Consultant and sub-consultants in conjunction with the CA shall review the constructor's punch list in detail and add all items that have been omitted.

3. Authoring punch lists are time consuming and tedious. The Consultant shall provide adequate resources to complete the punch list as soon as practicable once notified that the constructor deems the project substantially complete. Based upon the project schedule, the timing for substantial completion should be known well in advance of the necessary date.

3.5.5.4 As-Builts (submitted by the Constructor) Record Documents (by Architect)

Accurate record documents are an asset to the Department and to the State as they assure future projects will benefit from the detailed representation of the work. These documents become a permanent record of the project and require the careful attention of the Consultant and the sub-consultants. All changes that impact the drawings shall be recorded. All plan types (from all A/E disciplines) must be updated with revised layouts, no matter how minor. Changes that impact elevations and details shall also be updated. Minor dimensional differences within the typical construction margin of error are not necessary to update into the Record Document release. Refer also to Division 01 General Requirements "Execution and Closeout Procedures" Section 01 77 00**,** for As-built Document Submittal requirements and "Drawing Information – General" section 5.2 of this manual for additional requirements.

3.5.5.5 Closeout

Closeout procedures are well defined in the General Requirements and within the Consultant's contract. Whereas a project may be substantially complete and occupied by the client agency it is critical the Consultant work with the Department Project Manager proactively to fulfill all of the contractual requirements to achieve final completion and project closeout. The final component of any construction project administered by the Department will be the final consultant evaluation. Timely closeout of the project is one critical component to receiving a positive evaluation to assure the Consultant maintains good standing with the Department.

.1 Certificate of Substantial Completion

The Certificate of Substantial Completion (Form 7810) is issued when all project construction work is complete with only minor corrective work (punch list items) remaining. Only after the Certificate of Substantial Completion is issued can the constructed project be occupied by the Client Agency. At this point all the warranties and guaranties take effect.

This certificate is further defined in the "General Conditions of the Contract for Construction" Section 00 72 13 of the contact documents.

End

3.5.6 – Construction Phase

4.0 – Building Components and Standards

4.1 BUILDING COMPONENTS

The following are Department guidelines for various building components. This section follows the current Construction Specification Institute (CSI) numbering system as follows:

4.1.1 Structural and Architectural

Division	Description
02	Existing Conditions
03	Concrete
04	Masonry
05	Metals
06	Wood, Plastic and Composites
07	Thermal and Moisture Protection
08	Openings
09	Finishes
10	Specialties
11	Equipment
12	Furnishings
13	Special Construction
14	Conveying Systems

4.1.2 Fire Protection, Plumbing, HVAC and Electrical

Division	Description
21	Fire Suppression
22	Plumbing
23	Heating, Ventilating and Air Conditioning (HVAC)
25	Integrated Automation (included in Div. 23)
26	Electrical

4.1.3 Voice & Data Raceway Distribution & Security

Division	Description
27	Communications – Voice and Data Raceway Distribution
28	Electronic Safety and Security (future)

4.1.4 Landscape Site and Utilities

Division	Description
31	Earthwork
32	Exterior Improvements
33	Utilities

End

4.1 – Building Components and Standards- General

4.1.1 STRUCTURAL AND ARCHITECTURAL BUILDING COMPONENTS

Division 02 - EXISTING CONDITIONS – no specific requirements

Division 03 - CONCRETE

Reinforcing and reinforcing accessories for all exterior concrete including but not limited to sidewalks, walks, pads or site walls shall be epoxy coated in accordance with ASTM A775: Standard Specification for Epoxy-Coated Steel Reinforcing Bars, or ASTM A884: Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement. Consideration shall be given to including a salt guard topical coating.

All reinforcing shall meet the minimum requirements of ASTM A615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; Grade 60.

Field bending of bars shall not be permitted without approval of the engineer.

All exterior concrete exposed to deicing salts shall have a minimum 28-day compressive strength of 4,500 psi.

All exterior exposed concrete shall be air entrained between 4% and 7% of the concrete volume.

Reinforcing placement and coverage shall be in strict conformance with ACI 318: Building Code Requirements for Structural Concrete and Commentary requirements.

Water Reducing and/or plasticizing chemical admixtures shall meet the requirements of ASTM C494: Standard Specification for Chemical Admixtures for Concrete. The use of these admixtures shall be in strict conformance with the manufacturer's standards and requirements.

Fly ash shall meet the requirements of ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

Admixtures containing chlorides or sulfides shall not be used.

Exterior slabs or walk surfaces shall vary from a true plane no more than 1/8" in 10 feet. See Section 4.1.4 Landscape, Site and Utility Standards.

Flatness and Levelness requirements (FF/FL interior slabs on grade) and (FF framed slabs) shall be clearly defined in the project specifications. Measurements to determine as-built (FF/FL) shall be conducted no later than 72 hours after concrete placement.

The use of moisture vapor reducing admixtures (mixed or topical) shall be at the discretion of the design professional. If used, the design professional shall ensure that the use of these admixtures does not adversely affect the warranties specifically provided by other trades.

The concrete materials and testing requirements shall be clearly defined in the Statement of Special Inspections prepared by the Structural Engineer of Record (SER).

Division 04 - MASONRY

Brick

Brick shall meet or exceed the requirements of ASTM C 216: Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); Grade SW; type of brick shall be determined by the Consultant. Brick properties shall be tested in conformance with ASTM C67: Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile. The average compressive strength of the bricks shall be 5000 psi minimum, based on net area. The initial rate of absorption shall be less than 25 grams per 30 square inches of surface area per minute. Individual units shall not vary by more than 5 percent. Maximum water absorption by 5 hour boiling test shall be between 6 and 10%. The maximum saturation coefficient shall be not more than an average 0.68 and 0.70 for individual test.

Bricks shall be rated as not effloresced.

Brick test reports and certifications are required as part of a typical project submittal. The Department requires at least one material property test for conformance of actual units delivered to the site.

Concrete Masonry Units (CMU)
CMU for exterior use shall meet or exceed the requirements of ASTM C90: Standard Specification for Load-bearing Concrete Masonry Units for normal-weight, hollow units with a minimum average compressive strength of 3,000 psi. Light weight units shall not be used for exterior applications. An integral water-repellant admixture shall be used when fabricating the CMU. Mix proportions shall be in strict accordance with admixture manufacture's recommendations. Mortar and grout used with CMU shall also contain an integral water repellant that is compatible with the water repellent in the CMU.

Stone Panel Veneer
Stone panel veneers may be constructed using thick units or thin cladding. Thick units are those thicker than 2 inches and shall have the stone gravity load transferred by steel angles or other steel elements back to the building structure at every floor level or every other floor level as determined by the design professional. Thin cladding panels shall be between 2 inches and 1-1/4 inches and shall have independent gravity support for each panel as determined by the Consultant.

Stone fabricators shall be members in good standing with the Indiana Limestone Institute of America, Inc., the National Building Granite Quarries Association, Inc., or the Marble Institute of America.

Cast Stone Units
Cast Stone are architectural precast concrete units designed to simulate natural cut stone, utilizing finer grades of aggregates to achieve various aesthetic intent. Cast stone is used as a masonry material for architectural features and trim or as a facing for buildings or other structures.

Composite Stone Panels
Composite stone panels are natural stone composite panels comprised of a thin stone veneer and an aluminum honeycomb backing which is sandwiched between a water impervious, high-strength, fiber-reinforced epoxy skin. The design professional must receive approval during the Design Development Phase from the **Department** for specific applications of these products.

Mortar and Grout
Mortar shall be specified to conform to the requirements of ASTM C270 Standard Specification for Unit Masonry. The mortar used should have the lowest compressive strength to meet the performance requirements of the project. Mortar may be site mixed or a dry, pre-blended mix may be used.

Mortar color shall be selected by the Consultant during the design phase and shall be presented to the Department during the design phase reviews. All unit masonry walls shall be specified with colored mortar.

Grout shall be specified to conform to the requirements of ASTM C476 and may be fine or coarse based on the requirements for the wall construction. Grout slump shall be between 8 and 11 inches. Admixtures should only be used following a thorough review by the Consultant. Admixtures shall not contain calcium chloride, antifreeze compounds.

Ties, Anchors, Joint Reinforcement
Ties and anchors are required to connect the outer and inner wythes of masonry or to attach the masonry veneer to a structural backing. Stainless steel or hot dipped galvanized steel ties, anchors and joint reinforcement are to be used for superior corrosion resistance. Where the building is exposed to corrosive environments such as along the shore line stainless steel ties, anchors and joint reinforcement shall be used. Embed ties, anchors and joint reinforcement in mid-thickness of joint, with ¾ inches minimum and 1-¾ inches maximum cover from exterior face of veneer. Types, sizes and spacing of the ties and anchors shall be determined by the Consultant for each specific building.

Corrugated sheet metal ties or anchors for masonry veneers are prohibited. Ties and anchors with drips are not permitted because the drips reduce the compressive and tensile capacity of the ties when transferring the lateral loads between the wythes.

Flashing and Weeps
Through wall flashing and weeps are required at masonry cavity and veneer walls to collect water and direct it back to the exterior, and, in the case of weeps, to allow for the wall to breathe from top to bottom. Flashings should be located above grade level at the base of the wall, above and below wall openings, at the tops of walls, beneath copings, and at any discontinuities in the air space, such as recessed courses or shelf angles. Flashing is to be turned up at least 8 inches and is to be securely fastened to the inner wythe of masonry or wall sheathing covering the metal studs in masonry veneer with metal stud backup systems. Flashing is to extend through the outside face of the exterior brick wythe where it is to be used in combination with sheet metal pan flashing or a sheet metal drip edge. Flashing shall be continuous or have end dams when interrupted. Laps in flashings shall be soldered or welded and lap a minimum of 2 inches over the adjacent piece of flashing – welds are required on both top and bottom surface of the flashing. Flashings may be sealed in lieu of soldered / welded only when permitted by the Department's Chief Architect. If sealed then laps shall extend a minimum of 6 inches over the adjacent piece of flashing and sealant shall be continuous. Weeps are to be located immediately above the flashing, immediately below relieving angles, immediately below sills and immediately below parapets and placed between 16 and 24 inches on center.

Flashing materials may be 1) stainless steel or copper sheet metal in combination with self-adhered rubberized asphalt or EPDM membranes; or 2) composite type of a thin layer of metal sandwiched between one or two layers of another material, such as bitumen. Weeps shall be plastic cell vents or open head joints in the exterior masonry. Weep tubes, with or without wicking material, are not permitted.

Sills
All sills shall be continuous for openings less than 4'-0". For longer openings joints in sills should be minimized. Unit masonry sills, such as brick sills are not permitted. Sills shall extend for a minimum of 8" on either side of window jamb.

Cavity Wall Thermal Insulation
Closed cell extruded polystyrene insulation or mineral wool board insulation are the preferred material for cavity wall insulation. When using flammable insulating materials, wall openings such as windows and doors, shall have the cavity bridged with non-combustible materials to reduce the risk of combustion within the cavity. Do not use polyisocyanurate insulation within wall cavities due to moisture absorption and subsequent loss of R value.

Drainage Mat in Cavity
When the wall design results in an air space less than 2 inches (actual) a drainage mat shall be installed over the outside face of the thermal insulation. There shall be a minimum 1 inch clear air space between the drainage mat and the outer wythe of masonry (1 ½" preferred).

Masonry Cavity Walls / Masonry Veneer with Masonry Backup

Masonry cavity walls and masonry veneer with masonry backup shall consist of two wythes of masonry separated by a cavity. Thermal insulation shall be set into the wall cavity against the inner wythe of masonry. The thickness of the insulation shall be determined by the R value requirements of the wall system. An air and vapor barrier shall be applied to the outside face of the inner wythe of masonry. This barrier shall be a two component, fluid applied membrane that cures to form a resilient, monolithic, fully bonded, elastomeric sheet; or a self-adhered, rubberized asphalt sheet as determined by the design professional. Air and vapor barriers shall satisfy the requirements of the fire-rating assembly of the wall. In addition, a dew point analysis, preferably a computer simulated analysis such as a WUFI, shall be performed to determine whether a permeable or impermeable air barrier should be installed in the wall assembly.

Wall ties are required to provide a connection between the wythes of masonry. Horizontal joint reinforcement is required to control differential movement, to resist in-plane and out-of-plane loads from wind and seismic events, and to connect multi-wythe walls. Truss-type joint reinforcement is not recommended for use because the configuration of the truss diagonals can restrain differential movement between wythes that can possibly result in bowing of the walls. The type, number, spacing and size of the anchors shall be designed by a licensed architect or structural engineer for each specific building. Ties that exceed the code limitations for cavity depth shall be required to submit engineering calculations demonstrating the load bearing capacity of the proposed veneer tie or anchor.

The brick veneer shall be supported by hot dipped galvanized steel angles at each floor level or every other floor level as determined by the Consultant. In no case shall a wall be designed or constructed over 30’ in height without horizontal relieving angles.

The base of the wall shall be supported by a concrete foundation. The foundation shall be a minimum of 8 inches above grade level where it supports the inner wythe of masonry. When the bottom of the outer wythe of masonry is less than 8 inches above grade the cavity between the brick and concrete shall be packed solid with mortar or grout. A bond break shall be placed between the face brick and foundation.

Walls shall be designed and constructed to allow water penetrating the outer wythe of masonry to be diverted back out of the wall using through wall flashing and weeps.

Walls shall be constructed so that the cavity is free of mortar droppings. Drainage materials, such as plastic mesh, are required at the base of the cavity.

Thermal and moisture related expansion shall be accommodated with vertical expansion joints and horizontal expansion joints. Vertical expansion joints shall extend through both wythes of masonry. Vertical expansion joints are required along the length of the wall at spacing determined by the design professional, but in no case should they exceed 30 feet. Vertical expansion joints are also required at or near corners, at offsets and setbacks, at wall intersections, and at changes in wall heights. Horizontal expansion joints shall be installed at relieving angles. The locations of all vertical and horizontal expansion joints should be clearly marked on the contract documents. Spacing of vertical and horizontal expansion joints are integral to the overall design and shall be clearly identified on the building elevations. Selection of joint color(s) are critical to the wall design and shall be presented to the Department during the design phase.

Vertical control joints shall be placed 20 to 25 feet apart at corners of the building, at parapets and long walls. For straight solid walls vertical control joints shall not exceed 40 feet.

Bond breakers shall be placed between courses of different types of masonry to compensate for the differential material volume changes due to atmospheric moisture and thermal variations. Brick masonry will exhibit non reversible growth over time. Cementitious based masonry units will exhibit non-reversible shrinkage over time. Consult the masonry unit manufacturer for the anticipated range of volume change.

Brick Veneer with Steel Stud Backup

Brick veneer with steel stud backup may be used when the wall is properly designed to resist dead loads, wind loads and seismic loads. In addition the wall must be water resistant, provide for thermal movement and prevent condensation between the steel studs.

Steel stud backup is not permitted for parapet walls; where steel studs are being used in compliance with these guidelines parapets shall have masonry backup.

Wall construction shall consist of brick veneer, an air space and steel studs faced with wall sheathing attached to both sides of the studs. This sheathing will help to brace the studs, however engineered bracing may also be required at specific buildings. Anchors to tie the brick veneer to the steel studs are required. The type, number, spacing and size of the anchors shall be designed by a licensed architect or structural engineer for each specific building. Ties that exceed the code limitations for cavity depth shall be required to submit engineering calculations demonstrating the load bearing capacity of the proposed veneer tie or anchor. Insulation is required in the cavity, and there shall be a minimum 1 inch clear air space between the drainage mat and the brick veneer. The insulation shall be set against the exterior layer of sheathing. The thickness of the insulation shall be determined by the R value requirements of the wall system. The sheathing fastened to the exterior face of the studs shall be 1/2” thick minimum glass fiber mat-faced sheathing. An air and vapor barrier shall be applied to the outside face of the glass fiber mat-faced sheathing. The inside face of the metal studs can be covered with gypsum wall board or other finish wall system.

The brick veneer shall be supported by hot dipped galvanized steel angles at each floor level or every other floor level as determined by the Consultant. In no case shall a wall be designed or constructed over 30’ in height without horizontal relieving angles.

The brick veneer shall be supported laterally with stainless steel or hot dipped masonry wall anchors fastened to the steel studs using a minimum #10 self-taping stainless steel screw.

The steel studs shall be 16 gauge minimum to provide sufficient thickness to engage the threads of the wall anchor screws. The studs shall have a protective coating conforming to ASTM A653/653M with a minimum G90/Z275 coating designation or ASTM A875/875M with a minimum GF90/ZGF275 coating designation. Steel studs shall be designed to have a maximum out-of-plane deflection due to service loads of L/600. The use of G90, G60 or G45 “equivalent” coatings are not acceptable.

The base of the wall shall be supported by a concrete foundation a minimum of 8 inches above grade level. When the brick veneer is less than 8 inches above grade the cavity between the brick and concrete shall be packed solid with mortar or grout. A bond break shall be placed between the face brick and foundation.

Walls shall be designed and constructed to allow water penetrating the veneer to be diverted back out of the wall using through wall flashing and weeps. Flashing is required at all locations where the air space is interrupted. It shall extend a minimum of 8” up the backing and continue past the outside face of the veneer. Any flashing that is not continuous shall be fabricated with end dams. Weeps are to be located immediately above the flashing, immediately below relieving angles, immediately below sills and immediately below parapets and placed between 16 and 24 inches on center. See flashing and weeps section above for more requirements.

Walls shall be constructed so that the cavity is free of mortar droppings. Drainage materials, such as plastic mesh, are required at the base of the cavity.

Thermal and moisture related expansion of the veneer shall be accommodated with vertical expansion joints that are located along the brick façade at intervals determined by the Consultant and also at openings, offsets, corner conditions, wall intersections and changes in wall heights. Horizontal expansion joints shall be installed at relieving angles. The locations of all vertical and horizontal expansion joints should be clearly marked on the contract documents. Spacing of vertical and horizontal expansion joints are integral to the overall design and shall be clearly identified on the building elevations. Selection of joint color(s) are critical to the wall design and shall be presented to the Department during the design phase.

Vertical control joints shall be placed 20 to 25 feet apart at corners of the building, at parapets and long walls. For straight solid walls vertical control joints shall not exceed 40 feet.

Bond breakers shall be placed between courses of different types of masonry to compensate for the differential material volume changes due to atmospheric moisture and thermal variations. Brick masonry will exhibit non reversible growth over time. Cementitious based masonry units will exhibit non-reversible shrinkage over time. Consult the masonry unit manufacturer for the anticipated range of volume change.

Single Wythe CMU Walls
Single wythe exterior CMU walls are not permitted due to their poor water resistance properties.

Masonry Cleaning
Masonry cleaning should be completed 24 to 48 hours after completion of Work. For acidic cleaners, use soft, nylon-bristle brush or roller. For neutral or alkaline cleaners, use soft, natural-bristle brush or roller. Rinsing should be complete at pressures between 400 and 600 psi. Rinsing should continue until the runoff is pH neutral. Test pH of surface to confirm surface has returned to neutral.

Masonry Restoration / Historic Preservation
Design of repairs to existing buildings and for historic preservation shall be completed by Consultants specializing in this type of work. The technical requirements of the Project Manual shall include Special Subcontractor Qualifications to require Constructors be specialists in masonry restoration and historic preservation. At a minimum the technical requirements of the Project Manual shall require Constructors submit a written quality-control program to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry or other nearby building components. A written, detailed description of materials, methods, equipment, and sequence of operations to be used should also be submitted by the Constructors.

Division 05 - METALS

Structural Steel
All primary steel members shall conform to the minimum requirements of ASTM A992 or ASTM A500 Grade B. Secondary members shall conform to the minimum requirements of ASTM A36.

High strength bolts, including nuts and washers, shall comply with the requirements of ASTM A325 or ASTM A490. Minimum dimensions for bolts, washers, shall comply with the requirements of the Specification for Structural Joints using ASTM A325 or A490 bolts.

All structural steel welding shall be performed in accordance with AWS D1.1 “Structural Welding Code” by AWS certified welders.

The steel materials and testing requirements shall be clearly defined in the Statement of Special Inspections prepared by the Structural Engineer of Record (SER).

Where the Consultant is exposing structural steel consideration should be made to specifying as Architectural Exposed Structural Steel. Specifications should follow recommended practices as defined by the American Institute of Steel Construction (AISC) Code of Standard Practice, Reference Section 10.

Lintels and Railings
Hot-dip galvanize steel lintels and exterior railings after fabrication. Any surfaces damaged due to welding and/or erection shall be touched up with zinc rich paint. Specify that lintel surfaces left exposed after installation and railings (interior and exterior) receive high-performance coatings.

Do not use ferrous metals in toilet rooms, kitchens, natatoriums or other high humidity areas unless they are hot dip galvanized after fabrication. Alternatively use aluminum or type 302 or 304 stainless steel as suited to the given application.

Handrails
Acceptable materials for exterior installations are stainless steel or brass / bronze with no open ends. Consider use of slip joints and minimizing welding in favor of blind mechanical fasteners.

Expansion Joints
Interior floor covers shall be metal having no rubberized cork, urethane, vinyl or other joint filler exposed to foot traffic. The base plate shall be designed to set the cover plate flush with the finish floor and have secure anchorage.

Division 06 - WOOD, PLASTIC and COMPOSITES

Rough Carpentry
Specify preservative treatment that resists fungus and insect infestation for all wood in damp areas in contact with earth, concrete, masonry, plaster or roofing including wood blocking and lumber cant strips.

Architectural Woodwork
Specify architectural woodwork to be shop fabricated in accordance with The Architectural Woodwork Institute Premium Grade standards except for minor items or assemblies where a lower standard will provide an acceptable appearance for the given application.

Unless there is a compelling reason to do otherwise, specify cabinets (casework) to be fully shop finished according to an A.W.I. standard. It is recommended that plastic laminate clad casework have the interior surfaces, including shelves, finished with laminate of the types suited to the applications.

Specify every item of cabinet hardware by name, number and manufacturer using a basis of design approach and provide at least two alternate manufacturers. Specify finish.

Fire-retardant Wood:
When specifying fire retardant treated wood or plywood adjust the load capacity of the respective products by following the appropriate ASTM recommendations.

Division 07 - THERMAL AND MOISTURE PROTECTION

Waterproofing / Damp-proofing
Below grade foundation walls and elevator pits shall be damp proofed and or waterproofed to meet design requirements and or site conditions.

Roofing Requirements

Roof Types for Various Pitches:

0” to ¼”/12” Fluid applied roofing systems (approval from the Chief Architect would be required prior to utilizing this system)

¼” to ½”/12" Modified bitumen

¼” to ½”/12” Single ply membrane - reinforced, 72 mil or unreinforced 90 mil.

½” to 1"/12" 4-ply asphalt and gravel, modified bitumen or single ply membrane as above.

1" to 3"/12” metal interlock roof panels, modified bitumen or single ply membrane as above.

4"/12" and greater shingles, slate, tile, metal interlock or single ply membrane (thickness as indicated above) when approved by manufacturer.

Warranties
Refer to Division 1 General Requirements Section 01 78 30 “Warranties and Bonds” for the warranty requirements for different roofing types.

Clearances
Locate and place A/C units, fans, skylights, hatches and other roof-mounted items so that they may receive at least 8" high base flashing. Provide at least 24" clearance between the item and adjacent construction unless the design dictates otherwise and at least 24" under the item.

Roof edge flashing (coping and gravel stop/fascia conditions) shall be pre-manufactured systems conforming to wind resistance requirements in accordance with ANSI/SPRI ES-1. Provide data indicating the design horizontal and vertical loads on the roof edge flashing.

Odors and Fumes
Where a roofing system calls for hot asphalt, the Consultant shall specify low fuming asphalt, low Equiviscous Temperature (EVT) asphalts and the use of low fuming kettles that capture off gassing of the liquid asphalt. In all cases the materials specified shall be compatible with the roof and its particular slope.

The General Requirements and the technical specifications shall require coordination of placement of kettles away from air intake, keeping kettles covered at all times coordinating the work schedule for roofing work to occur when the building isn’t occupied (when possible).

Hazardous Materials
If an existing roof that is to be replaced or repaired contains asbestos materials, refer to “Hazardous Materials” section 3.4.8 this manual for additional technical requirements.

Exterior Insulation Finish Systems (EIFS)
Use of EIFS is not permitted on Department projects.

Concealed Gutters
The use of concealed gutters is discouraged. If used, design shall allow for servicing and replacement of drain bodies without extensive demolition of adjacent construction. Particular care must be made to allow for slope within the gutter to facilitate drainage and for adequate expansion when using metal liners. Concealed Gutter liners shall be fabricated from minimum 24 oz. copper with soldered joints or 26 gauge type 304 stainless steel with soldered joints (preferred to copper). The use of scuppers to discharge rain water outboard is preferred over concealed internal drainage.

Flashing
Flashing is to be turned up a minimum of 8 inches for vertical surface. Flashing shall be continuous or have end dams when interrupted. Laps in flashings shall be soldered or welded and lap a minimum of 2 inches over the adjacent piece of flashing – welds are required on both top and bottom surface of the flashing. Flashings may be sealed in lieu of soldered / welded only when permitted by the Department’s Chief Architect. If sealed then laps shall extend a minimum of 6 inches over the adjacent piece of flashing and sealant shall be continuous.

Opening flashing at heads, jambs and sills, must extend a minimum of 8” beyond wall openings. See paragraph above for end dam at sills.

Flashing materials may be stainless steel (minimum 24 gauge) or copper sheet (minimum 16 oz.) metal in combination with self-adhered rubberized asphalt or EPDM membranes.

Miscellaneous
Limit penetrations to the least possible number.

Provide safety rails at roof mounted equipment within 10 feet of the roof edge and at roof hatches.

Provide walkway pads to and around roof-mounted equipment that requires servicing. Use pad approved by the roofing materials' manufacturer.

Provide ladders or ship's stairs between all roof levels over three feet difference in height or over any intermediate parapets (both sides of the parapet) where either side of the finished roof exceeds three feet from the top of the parapet.

If an IRMA type roof is used, either attach the insulation to the supporting construction or hold it in place with manufacturer-approved materials/methods to prevent the insulation from floating.

Roofing systems shall be approved by the State Insurance Carrier. See "State Insurance Carrier (FM Global) Review for Capital Projects" section 3.4.9 of this manual for specific procedures and requirements.

Include a statement in the roofing section regarding end-of-day roofing conditions; i.e., treatment of edges of insulation and roofing as well as typical interim termination details to assure a temporary water-tight assembly during roof installation (reroofing projects).

Do not place ducts or conduits directly on roofing. Support these items above the roof in with premanufactured supports and bases and as recommended by the roofing materials' manufacturer.

Pressure Treated Lumber is not permitted for supports.

Division 08 - OPENINGS

Hollow Metal Doors and Frames
In general, it is required that frames be SUAW (set up and welded). For existing openings, frames may be KD (knock down) with mitered corners and positive attachment devices to produce hairline uniform joints when the use of a welded frame is not possible or practical.

Fabricate exterior doors with 16 gauge, galvanealed steel faces, and frames with 14 gauge galvanized steel. The door surface shall be perfectly flat, showing no oil canning or weld spots. Interior doors shall be 18 gauge with 16 gauge frames. These gauge sizes do not apply to Department of Correction (DOC) projects.

Refer to DOC for requirements for security door testing.

Wood and Mineral Core Fire Doors
Exterior Wood doors are not recommended unless they are a replacement on an historic structure.

The construction components in wood and mineral core fire door shall not be less than following requirements:

- Top and bottom rails shall be not less than 5" wide solid wood.
- Styles shall be triple plywood to provide secure anchorage for screw fasteners.
- Lock blocks shall be not less than 5" x 12" solid wood.

Finish Hardware
In general, hardware for renovated buildings and for additions to existing buildings shall be the same as used in the existing building, including finish. This applies to all exposed hardware such as locksets, exit bolts and closers. Order not less than 1-1/2 pair of hinges per door leaf up to 7'0" high

and one additional for each additional 30" in height or fraction thereof. Use only commercial grade hardware.

Require that closers and other surface mounted hardware on mineral core doors be though-bolted, or specify that these doors have 5-1/2" top and bottom rails and lock blocks.

Do not use in-floor closers or concealed-in-head closers unless there are compelling reasons for their use.

For jail or prisons, specify detention hardware (locks for cells, for example) with the cells and related items in Division 13.

Windows
Maximize energy efficiency at all window systems including punched openings, storefront systems and curtain wall systems. Avoid designs that rely on the use of colored glass or applied tints within the glass units; use of colored glass will become a maintenance concern when the insulated glass units begin to fail. All frames, if metal, shall be thermally broken and include insulating glass (this does not apply to restoration of historic windows). When specifying wood interior frames on new construction the exterior construction shall be extruded aluminum or fiberglass. Metal wrapped wood frames are not permitted on Department projects. All windows shall be specified with high performance coatings with a 20 year material warrantee against fading and peeling. All window assemblies shall be commercial grade, residential specified window units are not permitted on **Department** projects.

Historic Windows:
For all projects that are on the State or National Register of Historic places it is the Department's strong preference to restore rather than replace windows. The Consultant shall inspect every opening during the Schematic Design Phase and identify recommended repair and restoration needs including for any original hardware to render the windows "like new". When windows are to be restored, the windows should be removed from the building and restored in a controlled environment. Identical or compatible materials shall be used for repair. If the frame and muntins are of sufficient depth it is permitted to install insulated glass units within the restored window sash as long as sash balance and hardware will properly function. In all cases the Consultant shall follow the recommendations of the Secretary of the Interior. The Consultant shall develop minimum Special Subcontractor Qualifications for window restoration within the project manual, see section 3.5.4.14 of this manual. If the Consultant does not have in-house expertise with the restoration of historic building materials then the Consultant shall hire a specialized sub-consultant such as an architectural building conservator as part of their basic services.

Division 09 - FINISHES

General
Do not use single layer gypsum board on partitions in areas where vandalism or other abuse could be expected. Select materials for these areas that will not fail due to the expected level of abuse. Use materials, if available, that offers a multi-year warranty against abuse.

Walls of toilet rooms and rooms which house water-using fixtures in institutions and other high-use facilities must be designed with the assumption that there will be water leaks. Use cementitious based backer board or Glass-Mat faced Gypsum Backer Boards as the substrate, do not use moisture-resistant gypsum board. The Department prefers using concrete masonry units with a ceramic tile or two-part epoxy finish. The use of steel studs is permitted at wet walls or areas exposed to high moisture with a minimum 8" CMU or concrete base. An alternate structural support could be wood studs, when permitted by building code construction classification and where there is diminished concern of vandalism or abuse.

Use hard surface floors, such as ceramic tile or two-part epoxy, and marble thresholds, at toilets, bathrooms and commercial kitchens.

Specify a minimum 3-coat paint application. Select paints suited to the given substrate. Also, specify dry film thickness for each coat.

Finish Floors on Concrete Slabs
Vapor barriers are required at all slabs on grade and all below grade floor slabs. Coordinate type and placement of the vapor barrier with the flooring manufacturer. All vapor barriers shall be a minimum 15 mils. In general, the vapor barrier should have a lower permeance than the floor finish to be installed, but no greater than 0.3 perms. Prepare the surface of the concrete slab as required by the flooring manufacturer and in conformance with ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring. The concrete slab must be adequately dry to receive flooring as required by the flooring manufacturer. Testing for dryness shall include both ASTM F1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride and ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. The alkaline level of the concrete surface shall also be tested by placing distilled water on the slab and after allowing the water to sit for 60 seconds use pH paper to determine the alkaline level. It is recommended testing be conducted by an independent agency retained by the Department. Contractor's questions related to the testing should be referred to the Consultant.

Provide unit costs and an allowance to apply a moisture mitigation system to the surface of the concrete in the event the moisture in the slab is unacceptable to the flooring manufacturer and the construction schedule cannot tolerate waiting for the concrete to dry. The type of system must be coordinated with the flooring manufacturer.

Commercial Carpet Guidelines

Direct Glue Down Application:

(a) Carpet Type Broadloom

Tufted: 100% C-F nylon, level loop with permanent anti-static and soil hiding features
Face Yarn: Antron III, also IV, Zeftron or Ultron
Yarn Ply: 3 (minimum)
Face Yarn Weight: 28 oz./sq.yd. minimum.
Total Weight: 67 oz./sq.yd. minimum.
Dye Method: Solution dyed
Backing: Primary-Synthetic; Secondary-Jute or woven Synthetic
Recommended Traffic Designation: Heavy

(b) Installation: Cement to the floor, following an approved seaming diagram submitted by the carpet contractor, with an adhesive recommended by the carpet manufacturer. Carpet pile direction shall be consistent, and installed in the largest possible lengths and widths to minimize the number of cross and length seams.

(c) Seams: Seams should not be perpendicular to openings. Seams occurring at doors, parallel to doors, should be centered under doors. Cross seams should be made with a waterproof contact adhesive. All workmanship and the entire installation must meet the standards prescribed by the manufacturer and the carpet and rug institutes recommended standards and procedures.

Tackless Application with Cushion

(a) Carpet Type: Same as Direct Glue-Down Applications (above)

(b) Cushion: Carpet cushion shall consist of hair and jute. No seconds or imperfections will be acceptable. Hair and fiber cushion shall be of all new selected, clean washed cattle hair and fiber, moth proofed. Weight not less than 40 ounces per square yard, and shall be Crown "Stanton" or approved equal.

(c) Installation: Install following an approved seaming diagram submitted by the carpet contractor over a layer of cushion. Use tackless strips around room perimeter. Spot-

cement cushion to floor to prevent Seams: Seaming is the same as in Direct Glue-Down Applications (above) except all parallel seams shall be hot-melt taped using Bond, Taylor, Roberts or equal, applied as recommended by the carpet manufacturer.

Requirements of Regulatory Agencies

(a) Flammability: Carpeting shall have an average critical radiant flux of greater than or equal to 0.45 watts per square centimeter N.F.P.A. 253, and specific optical density of 450 or less, N.F.P.A. 258. Manufacturers' test reports encompassing fire hazard classification, sound absorption, and static control qualities shall be submitted to the State of Connecticut before installation.

Guarantees

(a) The carpet contractor shall re-stretch carpet, repair seams, joints and edges, if required, once after the original installation is completed during the warrantee period.

(b) The carpet contractor shall submit a 3-year written guarantee assuring the State of Connecticut that the carpet will remain tight and free of wrinkles; and to correct any other condition which may appear due to faulty installation procedures. Refer to Division 1 General Requirements Section 01 78 30 “Warranties and Bonds” for the warranty requirements for carpeting.

Division 10 - SPECIALTIES

No specific requirements

Division 11 - EQUIPMENT

Also refer to “Equipment Guidelines”, Section 3.1.3 this manual

Division 12 - FURNISHING

No specific requirements

Division 13 - SPECIAL CONSTRUCTION

No specific requirements

Division 14 - CONVEYING SYSTEMS

Elevators

Refer “Elevator Inspection (Design Considerations)” section 3.4.6 of this manual. Avoid the use of fibrous spray on fire-proofing materials in elevator machine rooms to minimize interference with machinery (with loss of adhesion these materials can clog motors and controls). An “Elevator Agreement” shall be included in all specifications. This agreement allows the proper diagnostic tools to become the property of the State of CT. The “Elevator Agreement” can be found on the Department’s web-based library, “Elevator Agreement” 50 50 00

End

4.1.1 – Structural and Architectural Building Components and Standards

4.1.2 FP, Plumbing, HVAC, Electrical Building Components and Standards

Division 21 - FIRE SUPPRESSION

Provide a complete fire protection system for the building including but not limited to: automatic sprinkler system, standpipe system if required by Code, fire department connection, and automatic fire pump if required by Code. Fire Protection Systems shall be designed to FM Global requirements in addition to those of the CT State Building and Fire Safety Codes.

Hydrant Tests

All projects involving street-pressure sprinkler systems, street-pressure fire standpipe systems, or fire pumps require hydrant tests on the mains in all streets that could be used to feed the building. Latest water flow test information shall be obtained from the local water authority for use in the design of the fire protection systems no later than the end of the schematic design phase.

Automatic Source and Fire Department Connections

Water systems should be supplied from the public water supply. A fire department connection shall be provided to allow the fire department to supplement the public water supply.

Verify fire department connection location and size requirements with the local fire department.

Use street pressure for automatic fire protection systems when determined sufficient by hydrant flow tests.

Where street pressure is insufficient, an automatic fire pump shall be provided to supplement the public water supply.

Piping

Piping shall be pitched and valves installed to facilitate complete drainage of the system.

All piping run within finished portions of the building shall be run concealed in pipe spaces, ceilings or furred chases and exposed only in mechanical rooms and where shown on the drawings.

Piping shall not pass exposed through electrical rooms or be erected over any switchboard or other electrical gear.

Protect piping exposed to vehicular travel.

Piping subject to alternate wetting and drying, such as drain piping, test piping, fire department connections between FDC and check valve, and all dry-pipe sprinkler system piping, shall be hot dipped galvanized, Schedule 40, and properly sloped to completely drain.

Avoid running wet pipe systems in areas exposed to freezing. Piping subject to temperature fluctuation, such as local weather conditions, shall be provided with expansion compensation.

Wet pipe systems may be Schedule 40 and Schedule 10, black steel.

Standpipe Systems

Standpipe systems should be automatic wet pipe Class 1 type systems.

Provide control valves on all standpipe risers.

Provide 2 1/2" hose valves with chained caps.

Pressure regulating type hose valves shall be used where pressure exceeds 175 psi.

A test connection shall be provided at the drain riser to facilitate testing of pressure regulating hose valves.

Installation shall comply with latest edition of NFPA 14 "Installation of Standpipe and Hose Systems".

In combination systems, sprinkler connections may be taken from the fire standpipe risers.

Sprinkler Systems

Unless allowed by Code and accepted by the Department, projects shall be fully sprinklered with a full coverage system. Sprinklers should be wet pipe systems except where project requirements dictate otherwise.

Where subject to freezing, dry pipe systems shall be utilized. In limited locations, dry-type sprinkler heads may be considered. Glycol filled systems are not allowed.

Where water discharge would damage expensive equipment or potentially cause an extended disruption of service, pre-action or clean agent fire suppression systems shall be considered and discussed with the Department. Typical such spaces include data centers and data closets.

Sprinkler system design shall be based on the hazard occupancy of the facility and shall be coordinated with FM Global classification requirements.

Water supply density shall be based on NFPA and Insurance Underwriter requirements, whichever is more stringent.

Sprinkler work should include water-flow alarm devices and tamper switches on sprinkler control valves.

Coordinate sprinkler head locations with architect's reflected ceiling plan.

Fire Pumps

Size fire pumps as required by the Authority having Jurisdiction (AHJ), the State Fire Marshal, and the Insurance Underwriter.

Fire Pump systems shall be designed per NFPA 20 standards.

Fire-pump heads shall include the pressure required at the top of the system, total system height, system friction, and the minimum available suction pressure.

Fire pump system shall include pressure maintenance pump and full service fire pump controller for fire pump and jockey pump.

Electric fire pumps shall have soft start and stop capabilities and shall have an automatic transfer switch for transfer of power between normal and emergency power sources.

Diesel fire pump systems shall have an adequate fuel supply to meet the requirements of NFPA and the Insurance Underwriter.

All fire pump systems shall have a test header to facilitate testing and water discharge of the fire pump system.

Fire pumps shall be installed in a dedicated fire pump room with direct access from the building exterior. Fire pump room access should be coordinated with the Architect early in the project so that all room requirements are met.

Division 22 - PLUMBING

General
Building Services

Domestic Water Service
Domestic water service shall be extended from 5'-0" outside of the building.

Service pipe size shall be based on Code sizing criteria and good engineering practice.

Water service piping 4" and larger shall be ductile iron. Service piping smaller than 4" shall be copper.

Service entrance piping shall be provided with a main shutoff valve, backflow preventer based on utility company requirements, and provisions for utility provided water meter installation.

Sanitary Sewer Service
Sanitary sewer service lateral(s) shall be extended to 5'-0" outside of the building.

Service piping sizes shall be based on Code drainage fixture unit requirements and good engineering practice.

Sanitary sewer service piping shall be service weight cast iron or, as preferred for all below-grade pipe; schedule 40 PVC.

A main drain cleanout shall be provided on the sanitary sewer service line.

Storm Sewer Service
Storm sewer service lateral(s) shall be extended to 5'-0" outside of the building.

Service piping sizes shall be based on Code requirements and good engineering practice.

Storm sewer service piping shall be service weight cast iron or, as preferred for all below-grade pipe; schedule 40 PVC.

A main drain cleanout shall be provided on the storm sewer service line.

Storm sewer piping shall be laterally braced in accordance with the CT State Building Code.

Natural Gas Service
Natural gas service and gas meter assembly shall be provided by the Gas Company.

Gas service entrance piping to the building shall be provided with a main service line shutoff valve located outside of the building.

Natural gas system delivery pressure and capacity shall be coordinated with the Gas Company.

Natural gas service piping shall be black steel.

Plumbing Services: Soil, Waste and Vent Piping

Utilize neoprene vent roof flashings with stainless steel clamps.

The use of plastic piping is preferred for below grade soil, waste, and vent systems, especially on those with long horizontal runs.

Cast Iron

Cast iron soil & vent pipe and fittings above grade shall be service weight (SV) No-Hub. Pipe and fittings shall conform to ASTM A-888. No-Hub couplings shall conform to ASTM C 1277.

Cast iron soil & vent pipe and fittings below grade shall be service class Hub and Spigot. Pipe and fittings shall conform to ASTM A-74. Neoprene gaskets shall conform to ASTM C 564.

Cast iron soil pipe (CISP) shall be supported every five (5) feet and at every joint. Hangers shall also be installed at branch locations and where lines change directions. Stacks and risers shall be supported at the base by concrete piers and by riser clamps at floor level.

If using CISP below grade, install according to CISP Institute's Pipe and Fittings Handbook, Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings".

All drain piping downstream of equipment having the potential to discharge hot steam condensate to drain in the event of a malfunction must be cast iron.

PVC

PVC drainage and vent piping shall be ASTM D 2665 Schedule 40 with DWV fittings. Below-grade piping shall be installed per ASTM D 2321.

All solvent cemented joints are to be adhesive primed per ASTM F656 and D2564.

PVC piping shall not be used in noise sensitive areas or in return air plenums.

Chemical Waste & Vent Piping Within the Building

Chemical waste & vent piping shall be PVDF drainage piping. The Department prefers the use of compression ring/mechanical joints; use of electrofusion joints shall be discussed with the Department and explained and justified in the Design Narrative.

Acid neutralization systems for healthcare and/or laboratory facilities shall be active automatic central type neutralization systems including neutralizing tanks, mixing tanks, caustic solution tanks, sampling tanks, and pH monitoring.

Acid neutralization systems for small single classroom type applications shall be point-of-use or central passive acid neutralization tanks using limestone as the neutralizing agent.

Domestic Water Piping

General

The use of Domestic water piping materials other than copper tubing shall be approved by the Department.

All pipe, fittings, and valves in contact with drinking water shall be listed by a third party agency to NSF 61 Annex G and NSF 372.

Change in Direction: Install fittings for changes in direction and branch connections. Install piping to permit valve servicing.

Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

Copper Tubing
Copper water tubing shall be ASTM B 88; hard drawn aboveground, and either hard or soft below-grade.

Joints shall be made with no lead solder or the copper press-joint fittings.

Solder Joints
Solder Filler Metals: ASTM B 32, lead-free alloys.

Copper Press-Joint Fittings
Press-Joint Fittings: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B 16.22 and performance criteria of IAPMO PS 117.

The use of Push-on-Joint Fittings is not allowed for domestic water piping.

Plumbing Specialties

Valves
A gate valve, angle valve, or compression stop shall be placed immediately below each plumbing fixture on each hot and cold supply so that service can be readily shut off for maintenance.

All branch lines in the water supply piping shall be fitted with ball valves. Ball valves shall also be used for sectionalizing the water distribution system.

Ball valves shall be provided at each piece of equipment or pump to allow isolation for servicing.

A gate or ball valve shall be provided at the domestic water service entrance inside of the building.

Ball valves must be equipped with valve stem extensions long enough to allow the handle to easily clear any pipe insulation installed over the valve.

Ball valves shall be two-piece, full port type.

The Department prefers the use of air admittance valves in lieu of combination drain/vent system for island sink.

Water Hammer Arresters
Water hammer arresters shall be installed on cold water piping to toilet rooms where flush valves are used and where any quick-acting automatic equipment valves are used. The arresters shall be the hydro-pneumatic type and shall be sized per PDI-WH 201.

Gages
Provide pressure gages on each side of water meters, water filters, and PRV's.

Backflow Preventers
Backflow preventer requirements shall be coordinated with the Water Company during the design phase of the project.

Backflow preventers shall be installed in locations accessible for testing, maintenance, and service and shall not be located above ceilings or at inaccessible locations.

Pumps

Constant Pressure Pumps
Where constant pressure pumps are required on the potable water system, they shall be variable speed and be installed in a duplex or triplex configuration.

Pumping System
All pumps shall have bronze impellers.

Sewage Ejector and Sump Pumps
Sewage ejector and sump pumps shall be provided where the drainage piping in a building cannot meet the invert elevation of the gravity drainage system.

Sewage ejector and sump pump systems shall include submersible type pump(s), fiberglass basin, float switches, sealed and vented cover, and control panel. Sump pumps do not require a vented cover.

Domestic Water Heaters

Water Heaters
Steam fired water heaters shall be circulating, compact type heat exchangers. Use of a storage tank is optional based on the engineer's load calculations. The unit shall be complete with ASME rated pressure and temperature relief valves, inlet and outlet thermometers, pressure gauges upstream and downstream of the control valve, bronze body circulating pump, condensate strainer, float and thermostatic trap, control valve, vacuum breaker, steam line strainer and all auxiliaries necessary to compose a complete working unit. If a storage tank is provided, it shall have a cement lining and shall include interconnecting piping between the heat exchanger and the storage tank.

Natural Gas Fired Water Heaters shall be commercial high efficiency type with integral storage or a pre-piped system including a high efficiency water heater and separate storage tank. The use of condensing water heaters is encouraged. Units shall be complete with ASME rated pressure and temperature relief valves, inlet and outlet thermometers, pressure gauges, bronze body circulating pump, and all auxiliaries necessary to compose a complete working system. If a storage tank is provided, it shall have a cement lining and shall include interconnecting piping between the heat exchanger and the storage tank.

Electric water heaters may be used as a point-of-use type system. The use of electric water heaters as a central type system should be avoided.

Plumbing Fixtures

Floor Drains
Coordinate floor drain locations with Client Agency. Consider installation of floor drains in the following:

- At emergency showers
- At toilet and locker rooms
- Immediately outside of accessible shower stalls
- Mechanical rooms
- Commercial kitchens
- Dish washing areas
- Other areas as appropriate

Floor drains in mechanical rooms, laundries, promenades, terraces, and similar locations shall have perforated sediment bucket with integral auxiliary drainage rim so designed that grate cannot be set in place until bucket is in position.

Floor drains shall have cast-iron bodies. Floor drains in unfinished areas shall have cast-iron grates or similar. Floor drains in toilet rooms and in other finished areas shall have stainless steel grates or other polished finish.

Where trap priming systems are to be installed, consider the specific installation characteristics when specifying either solenoid type or pressure-based primers.

Floor sinks located in food service or other sanitary areas shall be stainless steel or cast iron with acid resistant interior. Floor sink grates in these areas shall be stainless steel.

Floor drains or floor sinks installed as part of a chemical waste system shall be constructed of acid resistant materials.

Trench drains shall be coordinated with Structural and included on the slab plans.

Water Closets
Toilets shall be wall hung, vitreous china, elongated bowl, siphon jet action, 1-1/2 inch top spud.

Toilet seats shall be open front, no cover, white with stainless steel check hinge.

Closet fittings and carrier shall be horizontal adjustable type carriers for multiple fixture installation.

Flush valves shall be hands-free electronic, high efficiency type and shall not exceed 1.28 gallons per flush. Automatic flush valves shall be either hard-wired or self-recharging electronic type with full manual override.

Flush valves installed in ADA compliant toilet compartments shall have the water supply rough in at 10” above the toilet seat to avoid conflict with the grab bar.

Urinals
Urinals shall be high efficiency wall hung, vitreous china, washout with 3/4-inch top spud and 2-inch outlet.

Carriers shall be complete with fixture bolts, bearing plate, adjustable extension, steel pipe uprights, cantilever foot bases and chrome plated trim.

Flush valves shall be sensor operated and shall consume no more than 0.125 gallons per flush. Automatic flush valves shall be either hard-wired or self-recharging electronic type with full manual override.

Lavatories
Lavatory carriers shall be of the institutional type with support plate, bearing plate steel uprights and block bases for supporting lavatory fixture with concealed hangers.

Lavatory supply and waste lines should enter through the wall and not the floor to allow for easier cleaning and better sanitation.

Lavatory faucets shall be electronic sensor type faucet with integral mixing valve and integral check valves to prevent cross-migration of hot and cold water. Automatic flush valves shall be either hard-wired or self-recharging electronic type.

Showers
Shower heads shall be self-cleaning and of the vandal-proof type solidly attached to shower stall. Use water saver type.

Shower valves shall be thermostatically controlled, with chrome plated metal levers.

Recessed bases or tiled units shall be coordinated with architectural and structural plans.

ADA Compliant Showers
Shower valves shall be thermostatically controlled, with chrome plated ADA compliant metal levers.

ADA showers shall have a hand-held shower head in addition to the wall mounted shower head, with diverter valve for switching operation between each. The hand-held head shall have a 60" flexible stainless-steel supply hose mounted to a 30" wall mounted slide rail.

Antifreeze Hose Bibs
Provide antifreeze hose bibs adjacent to all building entrances for the purpose of washing down walks and entrances. Additional hose bibs shall be provided around the perimeter of the building at approximately 100' spacing

Hose bibs shall be recessed wall box type with loose key operation.

Service Sinks
Service basins shall be 36x24 inches with three (3) inch wide and twelve (12) inch high shoulders, cast as a single unit. Service basin material shall be terrazzo. The sides of the service basin installed against any wall shall be provided with stainless steel tiling flanges cast integral with the basin and extending two (2) inches above the shoulders. On exposed sides, the service basin shall be provided with integral cast stainless steel caps extending over the top of the shoulder and at least 1-1/2 inches down the sides. Provide a 3 inch drain connection with stainless steel strainer plate and trap. Install counter-flashing as required.

Service sink fitting shall be equipped with bucket hook, wall brace, 3/4 inch threaded hose connection, vacuum breaker, and integral stops.

Emergency eyewash stations shall be provided adjacent to service basin locations where chemical injection systems are used or where cleaning chemicals are stored.

Roof Drains
Roof drains shall be cast iron construction with cast iron dome grates. Overflow roof drains shall be provided for overflow roof drainage systems and shall be of the same construction as the primary roof drains.

Dual outlet primary/overflow roof drains can be provided as an alternative to (2) separate roof drains.

Insulate drain body and all rain water leaders.

Emergency Plumbing Fixtures
Emergency eyewash and shower units for use in laboratory or healthcare facilities shall be stainless steel with recessed pull-down eyewash unit and ceiling mounted shower.

Emergency fixtures in unfinished areas shall be exposed type units with plastic shower heads and eyewash bowls.

All emergency fixtures shall be plumbed with tempered water. Tempered water shall be provided by either a central tempered water supply piping system with a central emergency thermostatic mixing valve or point-of-use emergency thermostatic mixing valves.

Drinking Water Cooling Systems
Electric water coolers shall be wall mounted, semi-recessed dual height to meet ADA requirements.

The coolers shall be equipped with a basin of 18-8 stainless steel, bubbler, water valve and pressure regulator, a sealed refrigeration system with air-cooled condenser.

Integral water bottle fillers shall be considered, particularly at educational facilities.

Front panel of unit shall be removable, and unit shall be so constructed that the refrigeration unit can be removed without moving the cooler from the wall.

Laboratory Gas

Science laboratory fuel gas systems shall be designed for use of portable bottles in lieu of permanent piped system unless otherwise approved by the Department.

Compressed Air Systems

Air compressors for healthcare and laboratory facilities shall be duplex or triplex configuration and shall include air dryers and appropriately sized receiver tank. Compressor systems shall be approved for use in healthcare systems and shall have oil-free operation.

Air compressors for industrial or shop use shall be duplex configuration.

Piping for healthcare and lab facilities shall be copper with brazed joints. All piping, valves, and fittings shall be cleaned and certified for use in healthcare systems.

Piping for industrial or shop areas shall be schedule 40 black steel with threaded and welded joints.

Vacuum Systems

Vacuum pumps for healthcare and laboratory facilities shall be duplex or triplex configuration and shall include appropriately sized receiver tank. Vacuum pumps shall be approved for use in healthcare systems and shall have oil-free operation.

Piping for healthcare and lab facilities shall be copper with brazed joints. All piping, valves, and fittings shall be cleaned and certified for use in healthcare systems.

Process Water Systems

Reverse Osmosis/Deionization (RO/DI) water equipment shall include pre-treatment filters, RO treatment unit, post-treatment sterilization, and storage tank.

RO/DI distribution system shall include distribution pumps and supply and return piping system.

RO/DI piping system shall be PVDF or other approved material for process water systems.

Piping

All piping run within the building shall be run concealed in the finished portions of building in pipe spaces, ceilings or furred chases and exposed only in mechanical rooms and where shown on the drawings.

No pipe shall pass in front of or interfere with any openings, door or window. Head room in front of openings and doors shall in no case be less than the top of the opening.

Piping shall not pass exposed through electrical rooms or be erected over any switchboard or other electrical gear.

Pipe sizes shall be indicated on the plans at each change in direction and at all branch take off locations.

To help mitigate potential clogs, plumbing layouts and drainage designs shall avoid installations of long, solitary DWV piping downstream of low flow water closets, and/or adjust pipe sizes accordingly.

Unions

Unions shall be installed adjacent to all equipment to facilitate repair and replacement.

Electrolysis Control
Electrolysis control between dissimilar materials shall be achieved through the use of dielectric nipples and a non-dielectric union. Dielectric unions shall be avoided whenever possible.

Sleeves
All pipes passing through wall or floor construction shall be fitted with sleeves. Sleeves shall be of sufficient diameter to allow for the insulation without binding. Floor sleeves in mechanical rooms shall extend 4 inches above finished floor, all other spaces minimum one inch above finished floor.

Sleeves in bearing walls, masonry walls, masonry partitions, and floors shall be standard weight steel pipe finished with smooth edges. For other than masonry partitions, through suspended ceilings and for concealed vertical piping, sleeves shall be No. 22 USG galvanized steel.

Where pipes pass through waterproofed floor or walls, design of sleeves shall be such that waterproofing can be flashed into and around the sleeves.

The annular space of sleeves through exterior and below grade walls shall be sealed watertight with industry standard mechanical sleeve-seal system.

The annular space of sleeves through non-fire rated penetrations shall be filled with fiberglass insulation and caulked.

Where pipes pass through fire-rated floors, walls, or partitions, the use of a UL approved system for through-penetrations is required.

System and Equipment Drains
All piping shall be arranged to completely drain the system. Drains shall be located at system low points.

All cooling tower drains and overflows are to be piped to sanitary system (not onto roof).

All system and equipment drains are to be piped to a floor drain.

Piping Systems Disinfection
Before being placed into service, all new water lines, except those used exclusively as fire lines, shall be disinfected in accordance with AWWA standards. Final connections to existing water lines shall not be made until this procedure is completed and accepted.

Piping Systems Testing
All piping must be tested prior to receiving insulation.

Tests shall be coordinated in advance with the AHJ and comply with applicable codes and manufacturer’s written instructions.

Pressure Gages and Thermometers
Gages for general use shall be specification grade, calibrated for static head. Similar gages for water and air shall be provided. All gages shall be equipped with snubbers and gage cocks or shutoff valves suitable for the applicable pressures.

Steam and pumped condensate pressure gages in mechanical room shall be 6-inch diameter dial type. Other gages shall be 4-1/2-inch diameter dial.

Siphons shall be used with all steam gages.

Thermometers for general use shall be stem type with an adjustable bracket. Thermometers shall be organic liquid filled (red). Mercury filled thermometers are prohibited.

The gage and thermometer scale shall read to twice the operating pressure or temperature.

Valves

General
Valve body materials shall be compatible with piping system materials.

Ball valves shall be used for shut-off purposes and globe valves for throttling purposes. Gate valves may be used in large line sizes, limited to shutoff service only.

Pump Valves
All constant speed circulating pumps shall include a separate shut off valve, balancing valve, and check valve. Triple duty valves are not allowed.

Triple duty valves or balancing valves shalll not be used on pumps equipped with variable speed drives.

Shutoff Valves
Isolation shutoff valves shall be installed at each piece of equipment, terminal unit, and each branch takeoff to facilitate shutdown for repair. Positive shutoff balancing valves with memory may satisfy this requirement at terminal units.

Balancing Valves
Balancing valves shall be installed at all control valves and plumbing terminal devices. Balancing valves shall also be installed to control hot water recirculation systems.

Check Valves
Check valves, where required, shall be installed on the equipment side of shutoff valves to facilitate their servicing.

Drain Valves
Drain valves shall be a minimum of 3/4" with hose end connection.

Pipe Hangers and Supports
All piping shall be arranged to maintain required pitch and provide for proper expansion and contraction.

No holes are to be drilled or burned in structural building steel for hanger rod supports.

Vertical runs of pipe shall be supported with riser clamps made specifically for pipe or tubing being used.

Provide piping suspension systems with vibration isolation capability as required.

Plumbing Insulation

Pipe Insulation
All pipe insulation shall be continuous through walls, partitions, ceiling openings and sleeves where fire and smoke ratings permit such penetration.

Where pipes pass through fire-rated floors, walls, or partitions, the use of a UL approved system for through-penetrations is required. The annular space around the pipes shall be packed with mineral wool or other noncombustible material and sealed at each exposed edge to maintain the rating of the system in accordance with the through-penetration sealant manufacturer's written instructions.

Insulation on all cold surfaces must be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.

In general, all other piping systems shall be insulated with fiberglass piping insulation with an all-service jacket. Fittings, flanges, and valves shall be insulated with fiberglass inserts and pre-molded polyvinyl jackets.

Insulation shall be protected against crushing through the use of protective shields or rigid insulation inserts.

Special insulation protection shall be considered for areas subject to abuse, moisture, etc. (i.e. outside, wash down areas).

Equipment Insulation
In general, equipment shall be insulated with elastomeric or mineral fiber insulation. All equipment handling a medium below ambient temperature shall be additionally provided with a sealed vapor barrier.

Division 23 - HVAC

General Approach
This narrative describes minimum requirements that must be met for the installation of all work. It represents the overall concept of the HVAC system and is not intended to present all devices and materials that will ultimately be required to serve the facility.

Perform all necessary design analysis and calculations, including heating loads, cooling loads, and ventilation rates. Refer to the currently adopted energy conservation code regarding required equipment sizing calculations for renovation projects.

Where required for compliance with Connecticut's High Performance Building Standards (CT HPBS), energy simulations shall be generated for the project and approved by the Department's technical services office.

Design building systems in accordance with good engineering practice, current code requirements (with all subsequent Amendments), ANSI/ASHRAE/IES Standard 90.1, and SMACNA duct construction standards.

Design Criteria & Goals
The following list includes the primary goals for the design of the HVAC system, after basic functionality and code compliance, per direction of the Department in conjunction with the Client / Agency:

Consistency with campus/building standards
Initial capital cost
Operating costs
Life cycle cost
Flexibility for future changes
Reliability/redundancy
Durability; ease of maintenance
Acoustical performance

Owner's Project Requirements
Where applicable, the Designer (and/or Commissioning Agent) shall work with the Department and Client / Agency to establish the Owner's Project Requirements (OPR) at the onset of a project. Refer to ASHRAE Guideline 0 for information on this document's development and use. The OPR shall be referenced throughout the design and construction process to verify design document, basis-of-design, construction submittal, functional testing, and building operation compliance.

High-Performance & Sustainability Goals
Refer to CT Statutes to determine applicability requirements for a Department project's adherence to CT HPBS.

Consider designing and constructing all Department projects in compliance with the CT HPBS, International Green Construction Code, or other widely recognized sustainability standard. Designers are also encouraged to reference and implement recommendations within the Advanced Energy Design Guides (AIA, ASHRAE, IES, USGBC) series of publications for achieving zero energy buildings or significant building energy savings. It has been shown that significant performance improvements can be realized with minimal, yet strategic, time and capital investment.

The specific project's sustainability goals shall be determined at the outset of the project, and the design shall be monitored through the phases of the project to ensure compliance.

Basic Energy Performance Strategies
Many energy performance strategies are now required by the State Building Code. In addition to those required by Code, additional measures shall be considered in the following order:

1. Passive measures which minimize energy costs without adding complexity to the system, such as building orientation, envelope performance and durability, etc.
2. Strategies which optimize the operation of conventional systems such as extended economizer, energy recovery, variable flow air and water distribution, high delta T systems*, reduced ductwork/piping pressure drop to reduce motor horsepower, reduced air handling unit face velocity, magnetic bearing chillers, condensing boilers, etc.
3. Strategies and/or inclusion of renewable energy generation systems which are more complicated to operate, or more costly to install and maintain.

   *High delta T system refers to chilled/condenser and heating water systems with delta T's above the historical 10 and 20 deg F, respectively, providing the potential for overall system first cost reduction and operating efficiency gains.

Outdoor and Indoor Design Conditions
Outdoor and indoor design conditions shall be per Code, utilizing current ASHRAE weather data.

Use of ASHRAE Standard 55 is encouraged in the design of HVAC systems. Consider not only indoor space temperature, but radiant temperature, and other conditions described within the Standard.

Indoor Air Quality
Design air distribution systems with ventilation rates and exhaust requirements per the International Mechanical Code. Where appropriate for specialized spaces, such as laboratories, use approved design guidelines.

In general, and as required by good practice, extract exhaust close to the point of generation rather than through general exhaust from the space.

Monitor and adjust outdoor air ventilation rates as required by Code and good practice. Consideration shall be given to controlling outdoor air based on direct air quality measurement systems which measure carbon dioxide, indoor air pollutants, etc.

Systems
HVAC Zoning

HVAC systems shall be zoned to maintain occupant comfort and to optimize system operation. Zoning approach shall be discussed with the Department during schematic design and design development phases and prior to completion of the design. The Consultant's basis of design (BOD) narrative shall describe zoning strategies along with any potential shortcomings so the Department is aware of any inherent risks.

HVAC zoning capabilities are highly dependent on the system being used, e.g. VAV, fan coil units, multi-zone systems, heat pumps, chilled beams, etc. Decisions regarding the system to be used shall consider zoning capabilities and limitations.

In general, design shall follow good practice which provides zoning based on exposure, interior vs. perimeter, occupancy rate and variability, occupancy schedule, odor migration avoidance, etc.

For areas with special pressure relationship and control requirements, documents shall indicate simplified pressure relationship diagrams.

Sequence of Operations Approach
Sequences of operation are highly dependent on the specific project, so they shall be customized on a project by project basis. In general, sequences shall be written to accomplish the following overarching goals:

Compliance with Code

Occupant comfort
Proper indoor air quality
Consistency with other similar sequences of operation in the building or on the campus
Energy conservation
Occupant safety
Equipment safety
Hours of operation
Seasonal variation

Sequences of operation shall incorporate prioritized alarms to alert personnel of system malfunctions. Alarm protocol shall be discussed with the Agency so that specifications can include various methods of notification.

Energy Supply

Energy supply options shall be reviewed with the Client / Agency and the Department project manager. The most common fossil fuel energy sources are natural gas and fuel oil. In order to offset the use of fossil fuels, the Department prefers incorporation of photovoltaic, solar thermal, ground source, wind turbine, biomass, and other established renewable energy generation systems technology wherever possible.

Where natural gas is available at reasonable cost, it is generally a preferable fuel source over fuel oil due to its cleaner operation, consistent lower cost, applicability for packaged and high-efficiency equipment, and reduced potential for environmental impact.

Dual fuel (natural gas and oil) may be considered where redundancy is required. In the event that dual fuel systems are being considered, the impact of fuel oil storage shall also be considered.

Heat Generating Systems

Heat generating equipment shall be selected for durability and efficiency.

Often, the distribution of hot water throughout a facility proves to be the most efficient heat delivery method. However, the use of heat pump technology should be considered, particularly for buildings that often demand simultaneous heating and cooling.

When boilers are used, they should be gas-fired condensing type with an efficiency goal of at least 90%, unless steam or higher temperature hot water is required for the building.

Steam generation and distribution is often a less efficient means of heat energy transport for space and domestic water heating. However certain advantages of steam allow for its consideration in specific applications.

Appropriate levels of redundancy shall be discussed with the Department Project Manager. Unless approved otherwise, heating systems shall be designed with a minimum of 70% redundancy for non-critical occupancies and with a minimum of 100% redundancy for critical occupancies.

Thermal Energy Storage

Thermal energy storage is encouraged on applicable larger facilities where electricity rates are considerably lower off-peak, and/or where such system's installation results in cost/efficiency benefits based on a reduction of the size of refrigerant equipment.

Chilled Water Generating Systems

General

Chilled water circulation is generally the least energy efficient method to provide refrigerated air conditioning. However, this method remains preferred when, particularly in larger facilities, it proves to be the most cost-effective process.

Alternatively, consideration should be given to circulating refrigerant from electrically powered recycling vapor-compression systems for direct use in air-conditioning coils, or distributing refrigerant directly to point of service air-conditioning coils (such as VRF systems).

Chiller Selection Criteria
The appropriate chiller type is highly dependent on the specific application. In general, systems shall be selected for higher efficiency and reasonable maintenance.

Air-cooled chillers shall be considered for smaller tonnage systems, and for systems with limited cooling requirements during high wet-bulb seasons, such as academic buildings with little summer usage. Split air-cooled chillers where chilled water does not leave the heated space shall be considered to reduce the potential for freezing. Where packaged chillers are utilized, consider providing an appropriate percentage of glycol in the system. Designs which require annual draining down of chilled water systems to prevent freezing are not permitted.

Water-cooled systems, although requiring higher maintenance, shall be considered for higher tonnage systems and for buildings with significant cooling requirements during high-wet bulb seasons. Include variable-speed driven cooling tower fans when their use decreases life-cycle cost.

Chillers shall be selected for low energy consumption at both full and partial loads. Consideration shall be given to variable speed drives, magnetic bearing designs and other technologies to reduce energy consumption.

Plant Configuration
Where applicable, consider use of modern chiller controls and variable-primary-flow systems that also vary evaporator flow, offering potential for installation cost savings, chiller efficiency gains, and reduced pumping energy in comparison to the primary-secondary configuration.

Air Distribution Systems

General
Dedicated Outdoor Air Systems (DOASs), Energy Recover Ventilation, and Demand Controlled Ventilation (DCV) can offer significant advantages and provide sufficient payback when thoughtfully incorporated into air system design, and therefore, their consideration is recommended by the Department.

Air distribution systems shall be constructed according to SMACNA for the pressure class involved. Ductwork shall be sized to velocities and pressure drops to achieve low-noise, energy efficient systems. To reduce fan power, consideration shall be given to strategically oversizing ductwork.

Where possible, particularly in school buildings, locate ductwork and associated devices over unoccupied spaces, such as corridors, to ease access for repair and maintenance.

Air-Handling Units
Air handling units, indoor or outdoor, shall be constructed of materials appropriate for the application. Component selection shall consider the following:

A. Unit Casings: Factory finished double wall construction
B. Fan & Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower. Variable-speed supply, return and condenser fans are preferred when available. Fan redundancy shall be considered for larger air handling units and for critical applications.
C. Freeze protection: Protecting coils from freezing shall be considered when designing the system. Designs requiring coil drain-down are not permitted. Techniques which may be employed in combination include freeze-stats, freeze-protection pumps, glycol charging, face

and bypass coils, air blenders, etc. Attention shall be paid to avoiding outdoor air stratification which may cause nuisance tripping.

D. Air Filtration Section: Filter efficiencies shall be appropriate for the application, including requirements for HEPA filtration, final filtration, and MERV-13 requirements for LEED.
E. Air-To-Air Energy Recovery: provide energy recovery as required by Code or if determined to reduce energy consumption in a cost-effective manner.
F. Service Corridor: Provide service corridors on larger outdoor units.
G. Access section: Provide access sections along the length of the unit to provide access to components for replacement, service, or cleaning.
H. Coils: Heating and cooling coils shall be selected for the appropriate loads. Consideration shall be given to reducing coil face velocities to reduce energy consumption, particularly on 24/7 systems. Specify baked phenolic or cathodic epoxy coating on systems in close proximity to saltwater. Condensate drains shall have traps installed such that water freely exits condensate pan without transfer of untreated air into, or treated air lost from, the system.

The use of hot gas bypass is discouraged by the Department and shall be limited to atypical conditions when more efficient design options fail to meet application demands.

Warranties shall be minimum 10 years on compressors, 10 years on gas-fired heat exchangers, and 3 years on other components, such as control circuit boards, variable speed motors, and thermostats.

Metal Ducts
Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on applicable static-pressure class.

Run ducts as straight as possible to reduce pressure drop, noise, first cost, and to avoid system effect at fan discharge locations into duct sections.

Use round spiral duct and radius elbows wherever space constraints allow.

Minimize use and length of flex duct throughout the design. Specify sheet metal inlets at VAV boxes. Use duct liner only in the amount needed for adequate sound attenuation.

Where duct in public spaces is to be exposed, careful consideration shall be given to the type and installation location of ductwork, transitions, joints, dampers, accessories, hangers, etc. with respect to the occupancy, use and aesthetics. As an example, consider requiring round duct, minimized joints, and relocating dampers if possible.

Duct Accessories
Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct and duct hangers and supports construction methods unless otherwise indicated. Sheet metal materials will be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

Air Terminal Units
Air terminal units used as part of a variable volume system shall control or modify the amount and/or temperature of air being distributed to a specific zone in order to efficiently achieve the desired comfort level within spaces. The use of pressure-independent units is preferred.

On fan powered units, when the option is available, ECMs shall be considered over PSC motors if the initial cost difference is offset by increased energy savings.

Diffusers, Registers & Grilles
Ceiling- and wall-mounted diffusers, registers, and grilles to be rated according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets". Provide units of all aluminum

construction in high humidity environments, including but not limited to bathrooms, showers, locker rooms, kitchens, sterilizer rooms, etc. Provide units of stainless-steel construction in more corrosive environments.

Exhaust Ventilation Systems

General Exhaust Systems

General exhaust systems shall be provided where general spaces require exhaust for either contaminant removal or for offsetting outdoor air being brought into the system.

In situations where door undercuts are not sufficient to allow the necessary flow between spaces without excessive pressure drops, transfer grills will be provided between the adjacent spaces to facilitate the flow. Careful drawing coordination is required to adequately illustrate to all associated construction trades, sizes and locations of transfer openings. If the wall through which the air is being transferred is part of a fire or smoke rated assembly, the transfer opening will require protection in the form of a fire damper, smoke damper, or smoke curtain.

Special Exhaust Systems

Special exhaust systems will be provided for hazardous exhaust, rooms with high moisture content, and high heat generation.

Kitchen Hood Exhaust Systems

Grease ducts shall be short, straight, and vertical to the extent possible. Minimize horizontal runs, 90 degree turns and other obstructions.

Avoid field-fabricated and welded systems; specify listed grease ducts whenever possible.

Fans should be variable speed, direct drive. Avoid belts.

Where multiple hoods exist, integrate exhaust fan redundancy into the design.

Listed demand control kitchen ventilation system should be incorporated for energy efficiency.

Radon Exhaust Systems

Systems shall be designed per ANSI/AARST CC-1000-2018 and specifications shall require installers to be on CT DPH Nationally Certified Mitigation Professionals list.

Life Safety Air Handling Systems

Life Safety air handling systems, including atrium smoke removal systems and stairwell pressurization systems, shall remain on standby and operate only during emergency events as allowable and required by code.

Perimeter Hydronic Heating

Provide perimeter hydronic heating where required for occupant comfort, for preventing condensation on glass, or for allowing building heating during a power outage with minimal backup power required. Appropriate types of systems include finned tube radiation, flat panel radiators, or overhead radiant panels.

Cabinet & Unit Heaters

Provide cabinet unit heaters, unit heaters, or other industry recognized heating devices at all entrances and exits from the building.

Humidification

Design shall consider whether humidification is appropriate. Humidification systems require ongoing maintenance, therefore, where humidification is not specifically required by Code or good practice, the engineer shall discuss the topic with the design team and the Department Project Manager before

humidification is included in the design. Applications where humidification may reasonably be employed include the following:

Where required by Code, such as in hospitals
In systems that operate at high outdoor air percentages, such as labs
Where equipment requires humidification for proper operation, such as data centers
Where occupant comfort is determined to required humidification.

In all buildings where humidification is being provided, dew point calculations shall be performed, and proper vapor barriers and glazing types shall be specified to control condensation. In general, chemically treated steam shall not be used for direct injection into the airstream.

Controls & Instrumentation

Assembly includes all devices such as thermostats, timers, sensors, control valves, etc., necessary to operate the systems as designed.

Interface with the following building systems as applicable:

A. Heating, Cooling, Ventilating and Energy Generating Systems
B. Heating/Cooling Air Handling Units
C. Hoods & Exhaust Systems
D. Terminal Devices
E. Domestic Water Heating and Distribution Systems
F. Energy Monitoring & Control
G. Building Automation Systems

HVAC Controls

The Building Automation System (BAS) shall be composed of one or more independent, standalone, microprocessor-based building controller(s) to manage the global strategies of the HVAC system. Include devices to control equipment for HVAC systems and components, including those for terminal heating and cooling units not supplied with factory-wired controls, thermostats, timers, sensors, control valves, wiring systems used as signal pathways for high-speed data transmission, etc., as necessary to operate the total system. Software shall be free of license fees.

Single (Sole) Source

Building Automation Systems are sometimes allowed to be sole-sourced when either the project work is comprised of renovations or additions to an existing building or if the project is part of a campus standardized around a specific BAS system. Review the suitability of sole-sourcing the BAS system with the Department before proceeding into system design. See “Single Source Specification” section 5.4 of this manual.

Elements of the BAS System may include

A. Communication & Architecture - all control products comprising a BACnet internetwork
B. DDC Equipment
C. Unitary Controllers
D. Input Devices
E. Miscellaneous Devices - local control panels & power supplies
F. Snap Switches
G. Break-Glass Emergency Switches
H. Actuators and Control Valves
I. Dampers and Damper Accessories
J. Mounting Elements
K. Unshielded Twisted-Pair Cabling, Fiber-Optic Cabling, or industry proven wireless components

Systems Testing & Balancing

Air & Water Side Testing & Balancing - Heating, Cooling & Exhaust

All air and water systems, including domestic hot water recirculation, will be balanced by an independent, certified, testing and balancing agency. This includes operation of all systems to determine capacity and adjustment of water flow in chilled water and hot water systems, air flow of air handling units, supply and exhaust fans, and supply and return, and exhaust registers.

Systems may include:

A. Balancing Hydronic Systems - includes operating and testing of pumps, setting of all control valves, and determining system capacity.
B. Balancing Air Systems - includes operating and testing of all air handling devices, adjusting of all fans to set rate of air flow, setting all fan motors at desired operation, setting of air flow at all registers, grilles, diffusers, and louvers to deliver design flow, and testing and calibrating of thermostats to achieve desired space temperature.
C. Balancing Existing Hydronic and Air Systems – where a project is expected to affect the balance of an existing system that is being extended, the project scope shall include rebalancing of the existing systems.

Materials & Methods

Materials and methods are highly dependent on the specifics of the project being designed. The following shall be used for general information only and is not intended to substitute for good engineering judgment and practice.

Piping:

Hydronic heating and chilled water piping will be Schedule 40 black steel with welded or flanged fittings when 2-1/2 inches and larger and Class 125 cast iron screwed fittings when 2 inches and smaller.

Hot and chilled water piping may be Type "L" copper with 95/5 (lead free) soldered fittings or pressure-seal fittings and joints. Provide proper dielectric fittings where copper piping connects to steel piping.

Steam piping will be Schedule 40 black steel with welded, flanged or screwed fittings. Condensate piping will be Schedule 80 of the same material.

Refrigeration piping will be type ACR copper tubing with brazed joints.

For closed-loop hydronic systems where PEX tubing is used as an industry standard (such as in radiant slab and snowmelt applications), specify oxygen barrier tubing.

Water system piping will be run level. Take-offs will be made from the bottom of the main or at 45° from the bottom of the main. Provide drain valves at all low points; manual air vents, with shut off valves for maintenance, at all high points. Use eccentric reducers on horizontal lines, flush to top of the pipe.

Provide unions and shut-off valves at all equipment, coils, etc. Specify full port valves wherever possible.

All piping will be supported in a manner to prevent vibration or sagging.

Ductwork:

All ductwork and accessories will be constructed, fabricated and installed in accordance with the latest SMACNA Standards for the intended pressure class.

Ductwork shall not be located outdoors exposed to the weather except where inadequate interior space can be demonstrated. Where exterior ductwork exposed to the weather is installed, the ductwork and insulation shall be constructed such that water ponding does not occur. Ductwork insulation shall be covered with an approved, UV-resistant, waterproofing membrane system.

Ductwork exhausting humid air, such as from shower rooms, shall be constructed of either aluminum or stainless steel.

Furnish and install UL listed fire dampers and access doors at all duct penetrations of walls, floors, partitions, etc., that are required to have a fire resistance rating.

Ductwork, Piping, and Equipment Insulation Systems:
Ductwork, piping, and equipment shall be insulated to an R-value of at least the minimum required by the applicable energy Code.

Insulation exposed to weather shall be provided with a UV resistant, watertight jacket with fitting and valve covers.

Piping insulation will run continuous through all pipe hangers with protection saddles or rigid insulation inserts.

Maintain the integrity of all piping vapor barriers.

Insulation in locations subject to damage shall be protected with a sealed metallic or plastic jacketing system.

Chilled water pumps shall be enclosed with a galvanized sheet metal box with 2” thick elastomeric insulation lining. Box shall be constructed of two pieces fastened and gasketed together such that pump can be readily removed for service.

Division 26 - ELECTRICAL

Building Voltages

For Buildings with loads equal to or greater than 750kVA, consider 480Y/277V distribution with 208Y/120V step down transformers for receptacles and other 120V loads.

For Buildings with loads smaller than 750 kVA, provide 208Y/120V distribution.

Step down transformers shall be located in rooms with adequate fire ratings, transformers connected for sound isolation using flexible conduit, and isolation pads or, when supported from the building steel, spring hangers.

Motors

Motors less than 1/2 hp shall be single phase, 115 volts for operation on 120-volt circuits. Motors 1/2 hp and larger shall be three phase. All Motors operating on three phase shall be rated at 600V.

Three phase motors shall utilize variable speed drives. Voltage sag exceeding 3% on motor start is unacceptable.

Design Calculations

The Department requires that the Design Professional submit calculations for all projects, including:

- Illumination of typical spaces
- Service entrance ampacity
- Voltage drop
- Alternate power service sizing (generator, invertor and UPS)

Underground Ducts and Raceways for Electrical Systems

Underground primary and secondary service entry cables shall be installed in minimum 5-inch and 4-inch, respectively, PVC conduit encased in concrete. Conduit may be NEMA TC-6 Type EB or Schedule 40. Elbows shall be rigid.

Concrete encased steel reinforcing is required under traffic areas.

All concrete-encased duct banks shall be installed utilizing base spacers.

Manholes and Transformer Foundations

Electric manholes shall be precast with pulling irons and cable supports.

Manholes shall be fitted with non-locking type heavy frame and cover. Provide minimum 32" clear access opening. The word “ELECTRIC” shall be cast in the cover in three (3) inch high letters. The opening shall be in one corner. A non-conductive ladder extending to the surface shall be provided.

Transformer foundations base shall be precast. Base and lid shall have tongue and grove seal.

Factory bell ends are to be used where conduits penetrate manhole/foundation walls.

All cables shall be properly dressed and racked on the support arms around the walls of the manholes providing adequate slack for future rearrangement and splicing.

Grounding

All electrical systems shall be suitably grounded, including all non-current carrying metallic components of all equipment and metallic conducts. Grounding shall be accomplished as required by the National Electric Code.

Transformer foundation shall have a minimum 2/0 AWG bare copper ground ring with at least two (2) 96” ground rods. Exothermically weld rods and ring. Ring shall be a minimum of 24” from the edge of the foundation.

Grounding and Bonding for Electrical Systems

All new buildings shall have a concrete-encased electrode grounding (Ufer) system per NEC.

Provide a common bare copper main ground bus, wall mounted adjacent to the service entrance equipment.

Make bolt-on connections at ground bus as follows:

- Water service
- Ground rods
- Building steel
- Telecom ground bus(es)
- Lightning protection system (when provided)
- Step-down transformer(s) within the main electrical room (when provided)

All conduits carrying conductors shall have a ground wire.

Low-Voltage Electrical Power Conductors and Cables

Minimum wire size shall be #12 AWG.

Provide separate neutral conductor for every interior branch circuit.

Use solid conductors for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

Service Entrance, Feeders, and Branch Circuits: Single conductors in raceway, minimum 75C rated. MC cable is not acceptable for service entrance.

All exterior wiring connections, and those made at or below grade shall be waterproof with UL listed waterproof connectors.

Push-on wire connectors, other than for luminaire disconnects, shall not be allowed.

VFD rated cable shall be used for 25Hp, three phase, 480V AC or 208V AC motors and above, when used in conjunction with a VFD. The designer may elect to specify VFD rated cables on smaller motors if so desired.

Compression lugs shall be used for connections where practicable. Compression lugs shall be UL listed, two-hole type, long barrel connectors.

Raceway and Boxes for Electrical Systems

Minimum conduit size to be 3/4 inch.

Lighting runouts may be flexible metallic conduits, no longer than 72 inches.

Aluminum and plastic conduit is not acceptable (interior). Use of rigid PVC conduit within corrosive environments is acceptable.

Intermediate grade, rigid steel, and EMT conduit are acceptable. MC Cable is acceptable from the load side of the first box to other loads.

Back-to-back outlets in commons walls are not permitted. Outlet boxes shall be separated by at least one stud wherever possible.

Vibration and Seismic Controls for Electrical Systems

Refer to the State Building Code to determine any requirement for seismic restraint.

Identification for Electrical Systems

Panel directories shall denote their source of power and all other panel information.

Provide emergency power warning sign at service disconnect per NEC 700, as required.

Label all electrical equipment, including information identifying whether the equipment is fed from normal, standby, emergency, or UPS/Clean power branches.

Specialty Studies:

Where appropriate based on best practices, the following specialized studies shall be conducted either by the Consultant or as a delegated design specified within the project manual:

Engineering Power Studies

Short circuit Studies, Protective Device Evaluation Studies, Protective Device Coordination Studies and Arc Flash Protection Studies. The study shall be performed, stamped and signed by a registered professional engineer.

The studies shall include all portions of the electrical distribution system from the normal power incoming primary source or sources, the emergency and standby power source or sources, down to and including all panels and distribution equipment in the distribution system, and as required to comply with NFPA 70E. Normal system connections and those which result in maximum fault and/or arc flash conditions, shall be adequately covered in the study.

The power system studies are required to confirm the adequacy of the ratings of all electrical system components and proper coordination settings of all circuit breakers.

Coordination Study

Perform coordination study to support the selection of instrument transformer ratios, protective relay characteristics and settings, fuse ratings, low-voltage circuit breaker ratings, characteristics, and settings.

The study shall demonstrate that the protective devices, as selected and set, will ensure that the minimum unfaulted load is interrupted when protective devises isolate a fault or overload anywhere in the system while satisfactory protection is provided for equipment against overloads, and short circuits are interrupted as rapidly as possible.

Fault Current Study

The short-circuit current available on the primary feeder will be required from the local utility company.

Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:

- Switchgear and switchboard bus.
- Medium-voltage controller.
- Distribution panelboard.
- Branch circuit panelboard.

NFPA 70E (Arc Flash Analysis) Study
Calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.

The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.

The analysis shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

The Arc-Flash Hazard Analysis shall be performed in compliance with IEEE Standard 1584 (latest edition), the IEEE Guide for Performing Arc-Flash Calculations.

The Arc-Flash Hazard Analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.

The Arc-Flash Hazard Analysis shall include the proper settings for arc flash reduction maintenance switch(es), if specified on the project. Provide settings to avoid nuisance tripping.

Provide proper labeling per NFPA 70E on all equipment, including any hinged doors of rear-accessible equipment.

Lighting Control Devices
Automatic Lighting Controls:
All interior building spaces shall be controlled via automatic means, at a minimum, through occupancy or vacancy sensors.

Dual-technology is typically preferred, but consider whether the use of one technology over another is more appropriate for specific applications.

When ceiling sensors are used, always provide manual switch(es) on the load side to allow user control.

Review the appropriateness of networked sensor systems for new construction and major renovation projects.

Consider providing occupancy sensors with output relays to allow the building automation system to monitor occupancy for HVAC system control.

Require in the contract documents that the successful controls vendor submit final layout drawings for review and approval as part of the shop drawing package. Include that the Vendor may have to modify their layout from that designed, as necessary to meet vendor-specific requirements or limitations at no additional cost to the project.

Central Lighting Controls
When appropriate, interior building lighting in common spaces and certain “night” lights shall be controlled via occupancy sensors and per schedule set by the building users. Provide timed override stations for certain spaces that may be occupied after normal business hours.

Exterior building mount and site lights shall be controlled through relay or contactor panels.

Low-Voltage Electrical Distribution
Services (480V and below)
Design shall include single-line diagram(s) from the Service Entrance equipment through to each branch circuit panel or large load. Show all breakers through any panelboard mains.

Equipment shall be fully rated, series rated is not acceptable.

Consider using a SPD (surge protective device) on lighting/appliance panels

All busing and wiring is to be copper. Specify that all field-replaceable lugs are to be copper (switchgear, switchboards, and panelboards).

All circuit breakers of frame sizes from 100 amperes up to 400 amperes shall incorporate adjustable magnetic trip. Breakers 400 amperes and larger shall incorporate electronic trip units with functions as determined by the coordination study and as required by NEC.

Ground fault protection – provide where required by the National Electric Code.

208V systems shall not have ground fault breakers in the secondary distribution system except as required by code.

Low-Voltage Transformers

Provide high efficiency copper-wound transformer Dry type Transformer
Comply with NEMA Standard TP-1-1996, and list and label as complying with UL 1561.

Cores: One leg per phase.

Enclosure: Ventilated, NEMA 250, Type 2.

Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

Switchboards

Provide hinged doors, front and, as applicable, rear. Rear doors shall have hasp for padlock. Label rear doors to match the front.

Provide vertical barrier between adjacent upright sections to prevent arc event from traveling through the rear of the lineup.

Provide at least one (1) spare breaker in each frame size and at least 10% fully provisioned space capacity.

Overcurrent protective devices within switchboards shall be solid state with metering capability.

Panelboards

Provide “door-in-door” hinged front cover.

Panels shall have complete bus and mounting hardware requiring only the installation of additional breakers for future expansion.

Allow 20% spare space capacity for future breakers.

Distribution Panels

Consider second level of surge protective device (SPD), especially if panel feeds sensitive or critical loads or has branch circuits running outside of the building footprint (site lighting, etc.).

Branch-Circuit Panels

Group installed panelboards shall have separate trim.

All circuit breakers in utilization panelboards shall be of the bolt-on type.

Where flush panelboards are used, install a two-inch conduit for every three spare poles to a point above the suspended ceiling. Specify green ground wire with all circuits.

Provide main breaker, door with lock, and tamperproof screws.

Identification

Metal identification products around panelboards, switchboards and switchgear are highly discouraged.

Define labelling requirements based on industry standards and Client Agency input for, at a minimum: switchboards, panelboards, distribution panels, and wiring devices (include circuit/panel information).

Electricity Metering

Provide provisions for digital meter within isolated compartment integral to the service entrance equipment. Compartment shall include current transformers (CT's) on a shorting block and voltage connection brought to a fuse block with disconnect (mount CT's and voltage connection ahead of the main). Coordinate with State facility for any manufacturer standards. Provide data connection from the meter location back to the nearest data closet.

Additional sub-metering shall be considered for high performance building standards compliance or where additional energy data can afford management of energy consumption.

Wiring Devices

Receptacles

Receptacles shall be rated 20A, specification grade. Install with ground pin up or left.

All requirements for special receptacles shall be reviewed with users.

Receptacles shall be provided at least every 50 feet in all corridor areas for operation of floor care equipment.

Switches

Local wall switches shall be heavy duty, specification grade, quiet operating rocker or toggle type, 20A, 120/277V.

Require labeling of switch cover plate for three (3) or more devices ganged together.

Cover Plates

Different colors to identify normal, emergency, standby, and UPS power.

Enclosed Switches and Circuit Breakers

Provide equipment by the same manufacturer as the service entrance equipment.

Variable-Speed Motor Controllers

All three phase motors shall have variable speed controllers.

Motor controller shall be built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by an industry-recognized means.

Engine Generators

Review project for requirements of a generator.

When generators are used, coordinate manufacturer, silencer type, fuel type, amount of fuel storage, emissions and other options.

Coordinate emissions requirements with the project's environmental engineer.

Equipment shall not be installed on building roof or other locations that are difficult for service and replacement.

Specify a 5-year full coverage warranty.

Coordinate monitoring with the building automation system and remote annunciator.

Items to be reviewed for inclusion on generator system:

Life Safety Loads such as:
- Lighting and Exit signs
- Fire Alarm
- Fire Pumps
- Public safety equipment.

Systems to protect occupants such as:
- Smoke Control systems including makeup and control components.
- Laboratory Exhaust systems and associated controls.
- Security systems.

Systems to protect the structure such as:
- Heating system, generation and circulation.
- HVAC Controls
- Storm water sump pumps.
- Sewage ejector pumps.

Systems to allow Occupancy during outage such as:
- Cooling / Refrigerant systems.
- HVAC Ventilation.
- Receptacle loads as dictated by end users.
- Additional lighting loads.
- Communication systems.
- Bathroom fixtures.
- Elevators.

Systems to allow protection of occupant work (or research) such as:
- Scientific refrigerators and freezers
- Scientific incubators
- Bio-safety cabinets

Transfer Switches

Transfer switch shall contain single pole double throw (SPDT) contacts for central control system, and a sufficient number of poles to switch phase wires plus a neutral wire where necessary. Transfer switch shall include capabilities for monitoring "normal source acceptable", "emergency source acceptable" and "switch status". Transfer switch shall include provisions to accept two remote inputs; "transfer/exercise" and "engine exercise".

Review the following options as required by project type:
- Overlapping neutrals on systems with ground fault protection
- Open versus closed transition (for generator systems only)
- Paralleling (for large generator systems only)

Delayed transition
Bypass Isolation

Facility Lightning Protection

For new buildings, major renovations, and additions, perform a lightning risk assessment per NFPA 780.

System components shall be copper however Air Terminals may be fabricated from aluminum.

Down conductors are to be concealed.

Design per NFPA 780 and require a U.L. Master Label.

Surge Protection Devices

Service Entrance – Provide SPD at each building service. Unit should typically be 240 kA per phase, 120 kA per mode (including all phases and phase to ground). Unit to have disconnect and field replaceable metal oxide varistor (MOVs).

Panelboard - Provide SPD at panels serving predominantly computer loads (server rooms), any exterior loads, and as directed. Unit should typically be 160 kA per phase, 80kA per mode (including all phases and phase to ground)

Integral mounting within the electrical equipment is preferred over surface mounting (keep the leads to the bus 60 inches or less).

Unit shall comply with most recent edition of UL 1449 and UL 1283.

Interior Lighting

For all projects, consideration should be given to providing dimmable LED source for all general lighting.

The professional shall submit computer generated point-by-point illumination calculations of most interior spaces for review. The use of certain “typical” rooms shall be acceptable. Show calculations for each space without daylight contribution.

The Illuminating Engineers Society Lighting Handbook, current edition, shall be used as a standard for lighting levels.

Fixtures to have a DLC listing and meet requirements of the local utility company rebate program.

LED source to be 3500K degree Kelvin color temperature and a minimum CRI of 82 rated unless otherwise requested or discussed.

Luminaires

All luminaires shall be UL or CSA/US approved and labeled.

Lens shall be 100% virgin acrylic injection molded prismatic diffusers meeting the ASTM specifications for methacrylate molding compounds D.788-69A. Minimum lens thickness shall be 0.125”.

Emergency Lighting

Each building shall be equipped with an egress lighting system as required by the Connecticut State Building Code.

Provide emergency lighting along the path of egress, including the exterior of a building and ending at a public way.

All egress lighting (which includes stairwell lights, exit lights, selected corridor lights), shall operate twenty-four (24) hours a day and shall be connected to the Life Safety panel. There may be some deviation from this depending on the type emergency lighting installed and the amount of daylight available in any given space.

Battery type emergency lighting shall only be utilized when other emergency sources are not available.

Exit Signs
Exit lights shall be LED and have stencil face with red letters.

Self-contained exit signs powered by a radioactive source (tritium or similar) are not acceptable. Non-radioactive, photo-phosphorescent are acceptable when power is not readily accessible.

Equipment shall be UL or CSA/US approved and labeled.

Exterior Lighting
Refer to Division 33, CPM Section 4.1.4, for Exterior Lighting requirements.

End
4.1.2 – FP, Plumbing, HVAC and Electrical Components and Standards

4.1.3 Voice & Data Raceway Distribution Components and Standards

Division 27 - COMMUNICATIONS

The Connecticut DAS Bureau of Enterprise Systems and Technology (DAS/BEST) is typically involved in the telecommunications contracting process for State construction, and coordination with DAS/BEST during the design phase is required.

General
The Engineer shall specify a complete raceway distribution system for the Voice and Data communications systems including, but not limited to, the following:

- The Telephone Service conduits from the Utility, or Site Distribution, to the Building Main Distribution Facility (BMDF). A minimum of one 4-inch active and one 4-inch spare conduit shall be specified for each BMDF.
- Vertical and Horizontal raceways between the BMDF and the Intermediate Distribution Facilities (IDF's). A minimum of two 4-inch conduits shall be specified for to each IDF.
- Vertical and Horizontal raceways between the IDF's on each floor. A minimum of two 4-inch conduits, or sleeves shall be specified between each IDF.
- Horizontal raceway distribution between the IDF's, and the workstations on that floor. See "Station Raceway Distribution" below, for additional input.
- All raceway fittings, outlet boxes, junction boxes, pull boxes, etc. required for the voice and data raceway system. Standard size outlet box shall be 4" x 4" with 1" conduit raceway and pull string.
- All Grounding and Bonding required by NEC Code.
- All fire sealant is required to fill-in wall and floor conduit penetrations.
- All Electrical & Environmental requirements for the BMDF and IDF rooms, as outlined in Client Agency supplied guidelines. (The Consultant shall request any agency specific guidelines during the design phase.)

In addition:

- Identify whether or not voice/data wiring and terminations are part of this contract.
- Voice/data communication systems, raceways, and wiring shall be designed per Telecommunications Industry Association/Electronics Industry Alliance (TIA/EIA) and Building Industry Consulting Service International (BICSI) standards.
- Distances between BMDF and IDF's shall be coordinated to control maximum lengths and number of devices on each circuit.
- Coordinate building and security safety with scope of low voltage systems.
- Coordinate interfaces between door hardware, security controllers and alarm system wiring.
- Coordinate interior and exterior access control systems with school requirements and each existing system and vendor.
- Validate vendor input during design to ensure cost and scope are maintained, and documents coordinated.

Agency-Specific Standards:

- Connecticut State Colleges & Universities (CSCU) systems must comply with their Telecommunications Infrastructure Standards, requiring additional Design team coordination.
- Connecticut Military Department systems must comply with their cabling and other specific Telecommunication standards.

Site Distribution
Provide a complete design of the site utility raceway distribution for the Telephone and Data systems, including associated installation details and specifications.

Telephone and Data duct-banks, manholes etc. shall be coordinated with all other utilities (i.e. Electric, CATV etc.).

Station Raceway Distribution
Raceway distribution between the workstations and the IDF's shall be provided by one of the following methods:

(a) Ceiling Distribution
(b) Raised Floor System
(c) Under-floor Ducts
(d) Exposed and surface mounted raceways
(e) Cellular Floor System

Unless otherwise directed by The Department, the Ceiling Distribution system, utilizing raceways, cable trays or similar cable management methods, shall be the preferred State method.

Ceiling Distribution system shall consist of:

- Conduit stub-ups from outlet boxes to accessible ceilings.
  - Grouping of station cables shall be routed in cable-trays or wire-ways to the IDF/BMDF.
  - Raceway systems shall be designed to provide neat and efficient routing, facilitate cable management best-practices, and provide for sufficient access.
- Home-run conduit from outlet boxes to IDF's in Non-accessible ceilings
- Surface mounted raceways, where ceilings are not accessible or where approved by the Department.

End
4.1.3 – Voice & Data Raceway Distribution Components and Standards

4.1.4 Landscape, Site and Utility Standards

Division 31 - EARTHWORKS

Site Clearing

Coordinate the disconnection, capping or sealing and removal of all underground utilities to minimum 10ft off the building footprint.

Provide protective fencing for all trees and plants scheduled to remain within the work area. The tree protection zone shall extend 5' beyond the drip line, to the edge of the critical root zone, or to a radius of 1ft per inch caliper, whichever is greatest.

All site excavation work shall comply with the trenching and excavation requirements of 29 CFR1926.651 and 1926.652, or comparable OSHA-approved state plan requirements.

Earth Moving

Unless indicated otherwise by the geotechnical engineer, rock excavation shall provide a minimum separation of 2 ft. below underside of finish floor slab and 1 ft. below utilities and footings.

Unpaved areas shall be 1 vertical to 2 horizontal maximum, and 2% minimum, slope with appropriate temporary and permanent erosion control. Lawn areas shall be 1 vertical to 3 horizontal maximum slope. Minimum slope exception: Athletic fields.

Import material for use on-site shall be free of rock and gravel larger than 2 inches in any dimension, and any material, including native material to be reused, shall be free of debris, waste, frozen materials and organic matter, and shall have proper material gradation. Refer to Division II M02 of CT DOT Form 817 for the use of new material and the geotechnical report for reuse of existing and use of new material.

Soil materials and testing requirements shall be clearly defined in the Statement of Special Inspections prepared by the Structural Engineer of Record (SER).

Stockpiled soil must be protected and maintained within 2 percent of optimum moisture for use on-site.

Backfill materials shall only be placed on subgrades free of mud, frost, snow, and ice.

Subgrade compaction shall conform to the standard Proctor test per ASTM D 698, or the modified test per ASTM D 1557 when a higher level of compaction is required. Other areas with specific compaction requirements shall be tested in accordance with ASTM D1556, ASTM D2167, ASTM D2922, and ASTM D2937 where applicable.

Division 32 – EXTERIOR IMPROVEMENTS

Asphalt Paving

Mix designs shall conform to standards contained in the current version of CT DOT Form 817.

Pavement grades shall conform to the following:

Parking areas: 1% minimum, 2% in accessible parking areas maximum in any direction, and no greater than 3% in all other areas.

Access driveways: 1% minimum and 5% maximum. Exceptions or deviations shall be reviewed by the Department.

The Department prefers concrete be specified for walkways at primary building access points. Asphalt walkways are only to be used for secondary access ways.

The use of porous asphalt shall be pre-approved by the Department and limited to atypical project conditions, with required maintenance plans developed and submitted by the Consultant no later than the DD Phase.

Imprinted Asphalt

The use of imprinted asphalt shall be pre-approved by the Department and generally limited to new pavement installation within crosswalks.

Concrete Paving

Reinforcement, associated accessories and installation shall conform to the Concrete Reinforcing Steel Institute's Manual of Standard Practice.

Follow ACI 201.2R recommendations for concrete materials and installation, and ACI 308 recommendations for concrete curing methods.

Refer to Section 4.1.1, Div 03 CONCRETE for additional exterior concrete requirements.

Require mockups to demonstrate typical joints, surface finish, texture, curing, and standard of workmanship. Mockups shall be kept in-place until completion of work.

Provide minimum 4500 PSI, 6" reinforced concrete for truck courts and loading areas. Increase thickness to 8" for dolly pads. Civil and Geotechnical engineers shall confirm concrete thickness and reinforcement as appropriate for other specific locations and traffic loading conditions.

Provide minimum 4500 PSI, 5" thick concrete, with 6x6 – 10/10 wire mesh with doweled expansion joints, for all main walkways and at building entrances. Curbs shall be integral where possible and doweled to walkway when dissimilar materials are used (ex: granite curbing). ACI standards shall be followed where additional guidance is required.

Joint fillers shall be asphaltic per ASTM D1751.

Provide topically applied salt guard at all exterior concrete walks. Include reapplication requirements in concrete paving maintenance plan.

Decorative Concrete Paving

The use of decorative concrete paving shall be pre-approved by the Department due to concerns with maintenance, proprietary designs, and varying levels of installer qualification.

Concrete color shall be integral, controlled by mix design, and sufficiently dosed with even dispersion.

Concrete Paving Joint Sealants

Polyurethane sealant shall be used when additional puncture resistance is required, such as primary walkways.

Unit Paving

Loading, intended usage, and proper drainage shall be considered when designing unit paving system.

Pavers shall withstand typical Connecticut climate freeze / thaw cycles when tested according to ASTM C 67.

When light duty, ASTM C 902 brick pavers are used, they shall be Type I, Class SX with sufficient slip resistance.

Concrete pavers exposed to vehicular loading shall conform to ASTM C 936.

When using exposed gravel or stone, vandalism reduction shall be considered when selecting aggregate size, such as requiring ¼" or smaller stone, or drysetting if pervious surface is not required.

Consider providing a gravel snow protection strip adjacent to primary walkways.

Porous Unit Paving

The specification of porous paving requires pre-approval by the Department. If approved, a maintenance plan is required to be included in the Operation and Maintenance submission.

Curbing

Concrete Curbs shall conform to CT DOT Form 817, Article M.03.02, Class “F”, 18” x 6” wide cast in place or precast concrete.

Provide integral curbs when abutting a sidewalk.

Granite Curbs shall conform to CT DOT Form 817, Sub-article M12.06-1.

The use of asphalt curbing is restricted to areas with limited traffic. Asphalt curbs do not withstand plowing and heavy vehicle impact. Department pre-approval is required for the design and specification of asphalt curbing when recommended for areas of limited traffic.

Parking Bumpers

The Department prefers the use of bollards in lieu of parking bumpers (wheel stops) to avoid tripping hazards and additional maintenance. If the Consultant recommends wheel stops, Department pre-approval is required. Approved wheel stops shall be pre-cast concrete, minimum 4500 psi, coated with manufacturer’s standard salt-resistant clear sealer, and mounted with galvanized steel dowel hardware.

Pavement Markings

Placement of markings shall be performed a minimum of 5 days after asphalt placement.

Pavement markings shall be double coated.

Pavement marking paint shall comply with CT DOT Form 817, Section M.07, or any new edition.

Tactile Warning Surfacing

Provide cast-in-place detectable cast-iron metal warning tiles with manufactured integral anchor lugs, slip resistant surface treatment, and rust inhibiting coating (either factory- or field-applied).

Domes shall have ADA compliant spacing in a square pattern.

Permanently embed tile wet-set into freshly poured concrete.

Synthetic Grass Surfacing

When recommending synthetic grass surfacing the Consultant shall evaluate and recommend the best system based upon intended use. The determination of appropriateness shall occur during the SD Phase and require pre-approval by the Department and the Client Agency. Relative pros and cons shall be included in the SD Design Narrative including long term maintenance costs as well as a cost benefit analysis. Examples of items to be addressed in the Design Narrative are: expected type(s) of sport, installation method, initial and long term cost, and specifics such as fiber type, pile height, and infill type, as well as game line and marking installation and maintenance.

Installed sports-related synthetic grass surfacing shall be performance tested.

When approved for use, the Consultant shall require the Constructor to provide a maintenance plan as part of the Operations and Maintenance submission.

Permanent Chain Link Fences and Gates

Fence framework shall comply with ASTM F 1043 and follow ASTM F 1553 criteria for other components. All fences shall have upper and lower frame rails, with middle rail on fences over 4’ high.

Fabric shall be minimum 9-gage, Class 2 PVC-coated over zinc-coated steel wires woven into a diamond mesh. Consider a smaller fabric opening where appropriate.

Coat selvage ends of wire fabric with a manufacturer’s standard clear protective coating.

Grounding at installations near current sources must be considered.

Swing Gates shall have welded frames with heavy duty gate hinges, and pedestrian gates shall have kick plates and ADA latches allowing access from either side.

Decorative Metal Fences and Gates

Installations shall meet the loading and performance requirements of ASTM F2408.

Structural components shall be provided with a 20 year warranty when available.

All fence and gate components shall be steel in areas requiring vandal resistance.

Designs shall include either requirements that minimize rusting of welds, or use of mechanical fasteners in lieu of welds. Field welding is discouraged in favor of blind sleeving.

Specifications shall require mockups for typical and welded connections to establish an acceptable standard of care, and for any specialty fence and gate installations.

All cut and drilled material shall be sealed per manufacturer's approved process.

Steel materials shall be G-60 zinc coated, with epoxy prime- and acrylic top-coat on panels and posts.

Posts shall be set in concrete footers extending, at a minimum, to the frost line depth.

Segmental Retaining Walls

Require a delegated design, based on parameters determined from the Geotechnical report, with signed and sealed drawings from a Professional Licensed CT Engineer

Site Furnishings

The Consultant shall work with the Client Agency to determine specific requirements and standards during the SD Phase. Selection of product should emphasize long term durability with minimal maintenance requirements.

Site furnishing materials, finishes, and construction shall withstand and be weather, corrosion and temperature-extreme resistant.

Horizontal surfaces shall be designed to shed water or otherwise dry quickly.

Hollow member ends shall be capped for water-tightness, appearance, and safety.

Weld beads shall be uniform or ground to smooth fillets for appearance, with joints fully closed.

Fasteners shall be noncorrosive and concealed, capped, or countersunk and plugged.

Planting Irrigation

The design and specification of planting irrigation requires Department pre-approval; the elimination of the need for permanent irrigation through the use of drought tolerant, native, natural plantings is preferred.

> Exception: Client Agency may require permanent irrigation of athletic fields to maintain acceptable playing-level quality.

If the Client Agency requires planting irrigation, the Consultant shall consider designing systems using recycled or reclaimed water.

Large underground piping mains may be DIP or PVC, and soft copper tube shall be used when under 4" diameter. Large aboveground mains may be galvanized steel or PVC, and hard copper tube shall be used when under 4" diameter, as well as for risers to plants. Underground branches, risers, and drain piping shall be PVC. Circuit piping may be PVC or PE.

Soil Preparation

Onsite topsoil shall be initially tested during the design phase. Based upon the initial testing, the Consultant shall develop allowances for soil amendments in the Contract Documents.

The Consultant shall provide direction on the logistics plan to avoid over-compaction during construction. Areas of subsoil subjected to construction traffic shall be scarified prior to topsoil placement (4" depth or to a maximum of 80% compaction).

The Consultant shall include requirements for testing of borrow material and stripped topsoil during construction.

Turf and Grasses

Specify low-maintenance, drought and pest tolerant, native or naturalized products, except as otherwise required on sports fields.

Species that do not require regular mowing shall be used on sloped or other inconspicuous areas.

Consider requiring installer to provide continuing maintenance during the entire 24 month warrantied period.

Plants

Plants shall be drought tolerant, native or adapted, and non-invasive, with consideration given to animal resistance.

Plants near parking, drives, and sidewalks shall be salt tolerant and shall not produce fruit or sap.

Deciduous shade trees shall be minimum 2.5”-3” caliper and evergreens shall be a minimum of 6 ft. in height.

Consider siting deciduous trees of size to reduce building summer cooling loads, yet allow for building solar gain in the winter.

Consider requiring installer to provide continuing maintenance during the entire 24 month warrantied period.

Division 33 - UTILITIES

General

Coordinate with the following sections:

- Division 22, CPM Section 4.1.2, for Building Water, Sanitary and Natural Gas Service
- Division 26, CPM Section 4.1.2, for Electrical and Site Lighting
- Division 27, CPM Section 4.1.3, for Telephone and Data Services

Water Wells

Test Wells for water supply well systems shall be drilled during design phase to determine available flow.

Ground-Source Heat Pump (GSHP) Systems

Coordinate with Agency to determine whether adequate maintenance staff is available before considering implementation of a geothermal system.

Test Bores for vertical borehole GSHP systems shall be drilled no later than the completion of the Schematic Design project phase to verify ground heat exchange capacity and drilling conditions, and shall be positioned within the geothermal field, located for implementation into the completed system. The drilling of test bores shall be an additional service to the Consultants agreement. For additional information see “Consultant Services” section 1.4 of this manual.

Upon completion of the test bores any spoils from drilling shall be removed by the Consultant and the site fully restored to its initial condition.

Procure GSHP field analysis and long-range system simulation and provide documentation of results from a contractor accredited by IGSHPA (International Ground Source Heat Pump Association).

Refer to the Connecticut Department of Public Health’s (DPH) EHS Circular Letter #2008-58 and incorporate applicable portions of DPH Recommendations for Regulation of Geothermal Wells in system design and specifications.

GSHP systems shall not be installed within the building footprint unless approved by the Department’s Chief Architect.

Provide requirements for protection of piping from site traffic during construction, means of locating underground components, including horizontal piping and first and last boreholes, and means to isolate interior and exterior system loops.

Building Storm and Stormwater Management Systems

Building Storm and Stormwater Management Systems shall be designed per DEEP Water Quality Manual and DOT Drainage Manual. The design narrative shall discuss reasons for specific system selection. Require Contractor to provide signed and sealed documents for alterations from designed system.

Exterior Lighting

Lighting temperature shall be 2300K-4000K unless otherwise approved by the Department's Chief Architect.

Consideration shall be given to lighting aesthetics versus maximizing efficiency by raising pole heights.

Concrete bases shall be rebar reinforced with embedded anchor bolts and shall be designed to support the pole and luminaire assembly including local wind load parameters and assembly effective projected area.

Exterior lighting shall be designed to Illuminating Engineering Society of North America recommended enhanced security lighting levels. Verify town/city ordinances/zoning regulations and notify the Department of any conflicts.

Walkway Lighting

Where sidewalks are adjacent to roadways, the roadway light source may be deemed acceptable where the minimum lighting levels are satisfied.

Site Lighting Circuitry

All underground circuitry shall be installed in minimum 2" PVC schedule 40 conduit with burial depths in accordance with the latest edition of the NEC.

A direct buried handhole shall be installed adjacent to the base of each concrete pole base. Provide heavy-duty covers where subject to vehicular activity.

Provide copper clad ground rod for each pole, installed inside direct buried handhole.

All wiring connections made at or below grade shall be waterproof with UL listed waterproof connectors.

End
4.1.4 – Landscape, Site & Utility Components and Standards

5.0 – Construction Documents

5.1 Project Manual Information

5.1.1 General Information

.1 In addition to the standard Department page shown within this Manual (refer to section 5.3.3) the following requirements shall be adhered to;

- **.1** In upper right page header: Section number, section name, number of pages per each section.
- **.2** On lower left footer: revision of Department provided spec section.
- **.3** On lower right footer: Department project number. (Example: BI-RT-839).

.2 At the Schematic Design phase, the project manual shall include project specific table of contents including Division 01 General Requirements. This must include modified Division 01 "Summary of Work". Refer to "Schematic Design (SD) Phase" section 3.5.1 of this manual for additional requirements

.3 The Design Development phase will require, as a minimum, a Table of Contents indicating all trade sections anticipated, editing and formatting for all Division 01 sections. Refer to "Design Development (DD) Phase" section 3.5.2 of this manual for additional requirements.

.4 The Contract Documents phase requires a comprehensive project manual. It shall include a Table of Contents, all Division 01 sections (modified as necessary), all Technical Sections, unit prices (if necessary) and supplementary bids (if necessary). The Division 00 sections will be provided by the Department project manager. Refer to "Contract Documents (CD) Phase" section 3.5.3 of this manual for additional requirements.

.5 The project manual shall utilize the six digit CSI MasterFormat.

.6 If a product is identified in the specification by brand name and manufacturer, a minimum of three (3) such products and their manufacturer must be named.

.7 For single source specifications refer to "Single Source (Proprietary) Specification" section 5.4 in this manual.

.8 For items utilizing Delegated Design refer to "Delegated Design", section 5.5 of this manual.

.8 The Project Manual shall be submitted in electronic format at each phase. Refer also to the DAS Construction Services Design Document PDF Requirements guide for detailed formatting information.

- **.1** Bidding Requirements: supply all documents as outlined in the Design Phase Checklist, form 3025 which is found in the Department web-based library.
- **.2** Portable Document Format (PDF) submission requirements (each phase submission):
  - **.1** All electronic documents shall be presented in PDF file format.
  - **.2** All PDFs shall be created directly from the native application (MS Word, AutoCAD, InDesign, MS Publisher, etc.). They shall not be scanned from a paper print.
  - **.3** The Project Manual PDF file shall have the following naming taxonomy:
    "[*DAS Project Number*]_[*DAS Design Phase Acronym*]_Project Manual"
    - Examples for typical document types and design phases:
      - BI-XY-123_CD_Drawings
      - BI-XY-123_DD_Project Manual
      - BI-XY-123_SD_Narrative Report
  - **.4** The Project Manual shall be assembled into a single pdf file including all Division 01 and greater sections (see 5.1.1.8.1 above for other additional or qualifying submission requirements).
  - **.5** Bookmarks are required to be placed in the assembled PDF.
    - **.1** Bookmarks shall have a hierarchal arrangement by Division then Section – bookmarks below the section level are not permitted.
    - **.2** Bookmarks shall be saved with full page view (they should not be zoomed into a portion of the page when selected).

5.1.2 Available Resources

Additional information about the specification format may be obtained by contacting:

Department Chief Architect
Phone: (860) 713-5631

End
5.1 –Project Manual Information

5.2 Drawing Information:

5.2.1 General Information:

.1 Final drawings for all projects shall be one of the following sizes: 24" x 36" or 30" x 42". The dimensions refer to the outside edge or cut line. Use only one sheet size for each project. Any requirement to modify these dimensions must be addressed early in the project and be approved by the Department Technical Services Team.

.2 Drawings of each submission phase should conform to the above standard sizes. Certain topographical plans, plot surveys and engineering projects that include large areas may require larger sheet sizes. The Department must approve all exceptions.

.3 Appropriate differentiation in line weights and use of other drafting standards are critical to effective communication of the design intent as determined by the Department. Refer to “Bidding Phase“ Section 3.5.4 of this Manual.

.4 Drafting Standards shall be as follows:

- **.1** Key Plans: where there are partial plans (demo, new work, RCP, etc.) provide a key plan adjacent to the title block to indicate partial plan location.
- **.2** For elevation and building section drawing sheets provide a key plan adjacent to the title block to indicate where building section cut or elevation is in relation to the entire plan.
- **.3** Minimum (virtual) pen line thickness of 0.007 in or 0.18 mm.
- **.4** Minimum lettering height of 1/8".

.5 List of items available to the Design Consultant on the Department web page under Publications and Forms / DAS Construction Services Library include:

- **.1** Department Coversheet (for seals and approval signatures) under Design Phase forms (3000 series) Coversheet (CAD and PDF Template).
- **.2** Department Title Block (for typical drawings) under Design Phase forms (3000 series) Title Block (CAD and PDF Template).
- **.3** Reference to the Project sign under Design Phase forms (3000 series) Project Sign (CAD and PDF Template).
- **.4** General Conditions and General Requirements (5000 series) for: Design-Bid-Build (DBB) Major Capital Projects (greater than $5,000,000); Design-Bid-Build Minor Capital Projects (less than $5,000,000); CMR Projects; Design-Build (D-B) Projects; are located on the Department web page under the 5000 Series.
- **.5** General Conditions & General Requirements Section of the Department Library = Bidding Requirements, Contract forms and Conditions of the Contract (Division 00) – this is available to the Consultant for coordination information, however the Department Bidding and Contract section will insert this information in the Contract Documents when the project is prepared for bidding.

.6 Refer also to “Bidding Phase” section 3.5.4 of this manual.

5.2.2 Large Format Document Standards:

.1 All drawings at the Bidding phase prepared for Department projects must be submitted as detailed on the Design Phase Checklist, Department Form 3025. The US National CAD Standards shall be utilized.

.2 Software used to produce CAD drawings shall be compatible with the AutoCAD latest release. Documents created in an alternate native software application will be converted to AutoCAD (latest release). At each end of phase submission the Consultant shall deliver documents in PDF format to the Department PM. CAD (.dwg) format shall be required if the project is cancelled or placed on hold.

.3 The Consultant shall upload deliverables to the Department project management software at each required phase end submission**.**

.4 The title block from the DAS Construction Services Library shall be filled out completely. No changes are permitted to the title block layout or graphics.

.5 The Department recommends use of the AIA short or long layering guidelines as a standard layering format.

.6 All drawing fonts used in the native CAD software shall be TrueType, and embedded within associated PDF files, recognized as searchable, selectable text.

.7 If the project is required to utilize building information modeling (BIM) refer to the Department BIM Guidelines for additional information.

.8 Within the title-block, "Drawing Prepared By" shall indicate the firm name and address of the consultant or sub-consultant who was responsible for preparation of that specific drawing and who will be subsequently stamping and sealing that sheet. Individual firm graphic logos (consultant or sub-consultant) shall not be inserted on the drawings.

.9 Drawing orientation shall be consistent on all plans drawings, i.e. north is always the same direction from plan to plan. All floor plans, including reflected ceiling plans and all landscape and civil, structural, MEP plans, etc. shall include a project north arrow designation for all phase submittals including drawings used for interim presentations. Project north need not be true north but true north shall be indicated on LA / Site / Civil plans along with project north designation.

.10 The drawings' PDF file shall have the following naming taxonomy:
"[*DAS Project Number*]_[*DAS Design Phase Acronym*]_Drawings"

- Examples for typical document types and design phases:
  - BI-XY-123_CD_Drawings
  - BI-XY-123_DD_Project Manual
  - BI-XY-123_SD_Narrative Report

Additional information about drawing format may be obtained by contacting the Department's Chief Architect. Telephone (860) 713-5631. Refer also to the DAS Construction Services Design Document PDF Requirements guide for detailed formatting information.

5.2.3 Record Drawing Submission:

Record Drawings are required per the Consultant's contract – electronic copies shall be submitted to the Department PM at the completion of the project. All revisions, additions, changes and as built conditions shall be recorded. Submission shall include CAD files as well as PDF format. See Minimum PDF Requirements below for additional information.

.**1** CAD submission requirements:

.1 Delete all unused geometry that is not part of the final project.

.2 Find and delete all invisible objects.

.3 Delete all unused layers and layer filters.

.4 Delete or purge all unused data (text, blocks, nested objects, etc.)

.5 Audit the file for any drawing file database errors and correct.

.6 Bind all xrefs into the final drawings.

.7 Imbed all images as OLE objects, no files referenced outside of the DWG

.8 Include penset with files

.9 All revision numbers and clouds shall be deleted.

.10 Each drawing shall have its own drawing file

.11 File name to be DAS Project Number and Drawing Number (ex. BI-2B-000 A100)

.12 Save back to AutoCAD version 2013

.2 For projects authored in BIM software such as Revit:

.1 Convert the files to CAD and submit as indicated above.

.2 Submit the model as follows:

.1 Purge and remove unused families, materials, and other objects from the Revit projects to reduce file size.

.2 Set the Path for Revit links in the Revit file and CAD links to “Relative”.

.3 Include dependent files such as linked Revit models, CAD files, DWF markups, decal images, and external keynote files, or custom material assets.

.4 Detach the Revit model and associated Revit files. This removes the typical error messages when you copy central files using the operating system.

.3 Record drawings must be submitted to the Department Project Manager before final payment is approved.

5.2.4 Consultant Drawings, Minimum PDF Requirements:

.1 Statement of Need:
Portable Document Format or PDF formatted electronic documents have become more sophisticated as time progresses. For both text and graphic files the PDF gives us the ability to review, share and store documents electronically in a consistent format. PDF software allows for commenting on, marking-up and subsequent, or real-time, sharing of the reviewed documents with others inside and outside of the organization. These commenting features are relatively intuitive.

DAS Construction Services / Technical Services embraces a paperless environment. In order to take advantage of these PDF software tools, documents must be produced in a consistent, industry recognized manner.

All consultants are already using the open PDF format to publish their documents. The software required to publish documents in PDF format is either integral to the native application, or readily available and inexpensive. Consultants are required to submit their documents as follows:

.2 Requirements for all Project Phases:
All PDFs should be created directly from the native application (e.g. Revit, AutoCAD, Word, etc.). Drawing line work must be vector based and scale independent. All text must be provided as TrueType (or OpenType) font and shall be searchable and selectable. In accordance with the Guidelines for Construction PDF Documents all other drawing/specification details will be determined by the project team during the project execution planning phase and as required by the DAS / Department Consultants Procedure Manual and as obligated by contract.

.1 Drawing pdf requirements: In addition to the requirements above:

- PDF design documents shall not be protected, secured, or formatted such that intended Department use is inhibited, (ex: password protection shall not be used and PDF/A format shall be used only for record drawings)
- Drawing files shall have page numbers that exactly match the drawing number. When opened in PDF reading software, the application shall recognize each page by its drawing number, for example, sheet A1.01 is identified as “A1.01”, not “Page 1”.
- Bookmarks shall be placed on the drawings to speed navigation. Drawing major disciplines and sub-categories, but not every drawing sheet, shall be bookmarked. Bookmarks shall follow the naming taxonomy of the associated drawing sheets. When selected, bookmarks shall navigate to full-page view (as opposed to a zoomed-in portion of the page).
- Documents exported to PDF from the native CAD software, shall be Optical Character Recognition Optimized (OCR-Optimized).

- All drawings, in all disciplines, shall be identical in size with title blocks and borders registering in an exactly consistent location for all sheets.

.2 **Project Manual pdf requirements:** In addition to the requirements above:

- Document files shall be bookmarked by major division and then by section only, sub-category bookmarks are not permitted within the individual sections.

.3 **Record Drawing submissions:** In addition to the requirements above:

- Record drawings must be produced in PDF/A format.

.4 For additional information please see Appendix A below:

Appendix A

The following has been adapted from the referenced Construction PDF Coalition Guidelines (CPC guidelines)

1.0 Consistency Across Disciplines:

1.1 In order to review documents in the most efficient manner possible, the following items shall be consistent across all PDFs generated for the project by all disciplines.

.1 Sheet size and orientation of sheets should be consistent so that if overlaid, they align – in accordance with NCS v7 UDS 2.2 Sheet sizes (US National CAD Standards).

.2 Consistent plot location in paper space through location of gridline intersections or other project baseline on similar sheet types amongst the set, across disciplines. For example floor plan or enlarged plan views.

.3 Scale of each sheet type/view to be consistent amongst the set, across disciplines. Scale should be determined for each sheet type (i.e. overall plans at 1/16", partial plans at 1/8", enlarged plans at 1/4", sections at 3/4" etc.) Reference UDS Module 4 (US National CAD Standards) and template project worksheet.

.4 Consistent gridline visibility (i.e. should be consistent for navigating across all sheets, across disciplines for alignment purposes).

.5 Naming convention should be consistent with like pages across disciplines as mandated by the State of Connecticut, organized by major disciplines and subcategories following the naming taxonomy of the drawing sheets. Please refer to the NCS Module 1 Drawing Set Organization Module 1.7 Appendix B.

.6 Each sheet shall have a page label that matches the Drawing number (e.g., "A-101", not "Page 1").

.7 If and when possible, Hyperlinks created within the native application should be maintained within and between PDF sheet outputs

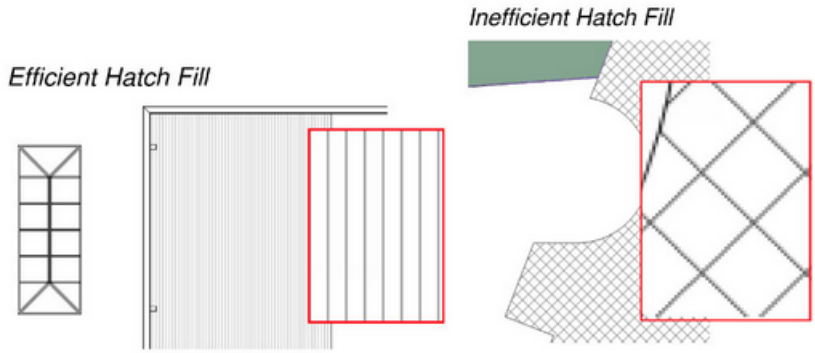
2.0 Creating PDF files:

2.1 The goal for creating PDF files is to streamline the flow of data for use in reviewing documents. This also pertains to documents used for construction and operations while minimizing overall file size. Best practices include the following:

.1 PDFs shall be created directly from authoring application with output quality consistent with native file format.

.2 Use vector based lines when creating PDFs.

.1 Use efficient hatch fills so as not to inhibit PDF performance or increase file size. Complex line styles slow down rendering speed. Rather, simple lines styles provided within the native software program perform the best.



.3 Use True Type fonts to allow text searchability within the PDF (SHX fonts are not searchable and therefore prohibited)

.4 Limit information generated in PDF to what is agreed upon by the Project Team including the following

.1 Unused layers;

.2 Extraneous viewports;

.3 Unneeded Meta data

.5 Maintain output scale when exporting to PDF.

3.0 Metadata:

3.1 *If available from source software*, document and element metadata can be used to produce a data-rich PDF, allowing for better navigation and searching of the document, as well as reduced need for manual data input.

.1 Each sheet should contain the following metadata:

.1 Page # or Spec #;

.2 Project Title Name;

.3 Sheet Title;

.4 Revision;

.5 Date Issued;

.6 Author;

.7 Discipline;

.8 Document type (i.e., elevation, detail, floor plan, specification)

End
5.2 – Drawing Information

5.3 Unit Prices

5.3.1 General Information

Unit prices and allowances shall be defined by the Consultant and included in the Contract Documents. The Consultant shall be required to accurately determine quantities to base the allowances on and the unit prices need to be reflective of market conditions at the time of bidding. By defining the unit costs and allowances the Department can accurately compare bid results.

The following unit prices are included in the Department Contract and will be used to calculate the value of additions to or deductions from the work called for in the contract document referenced section(s) of the Specifications. If actual quantities differ from the quantities given in the base bid quantity number, the greater or lesser quantities will be multiplied by the applicable unit price and used to adjust the contract sum. The owner reserves the right to increase or decrease any or all of the quantities as may be necessary to properly complete the project.

The “Consultant Bid Data Statement” (form 6005) must be filled out by the Consultant summarizing any supplemental bids, cash allowances, special unit prices, the construction cost estimate (broken down by division summary) and the Unit Prices

The Unit Prices below are examples extracted from “Contract Considerations” Spec Section 01 20 00**.** The Unit Prices shall be modified per project.

5.3.2 Unit Price Schedule – Examples

.1 Unit Price Schedule – Miscellaneous:

MISCELLANEOUS ITEMS		UNIT	$ ADD	$ DEDUCT
a.	Structural fill	[Insert]	[Insert]	[Insert]
b.	Footing forms, contact area	[Insert]	[Insert]	[Insert]
c.	Footing concrete, in place	[Insert]	[Insert]	[Insert]
d.	Wall forms, contact area	[Insert]	[Insert]	[Insert]
e.	Wall concrete, in place	[Insert]	[Insert]	[Insert]
f.	Reinforcing steel bars, in place	[Insert]	[Insert]	[Insert]
g.	Structural steel, in place	[Insert]	[Insert]	[Insert]

.2 Unit Price Schedule – Alterations:

ALTERATION ITEMS		UNIT	$ ADD	$ DEDUCT
a.	Roof Blocking	[Insert]	[Insert]	[Insert]
b.	Roof Planking	[Insert]	[Insert]	[Insert]
c.	Flashing	[Insert]	[Insert]	[Insert]
d.	Roof Sheathing	[Insert]	[Insert]	[Insert]
e.	Roof Flashing	[Insert]	[Insert]	[Insert]
f.	Structural Deck	[Insert]	[Insert]	[Insert]
g.	Roof Drain Assemblies	[Insert]	[Insert]	[Insert]

5.3.3 Sample Specification

Below is a sample specification that could be required in the Project Manual technical sections quantifying base bid quantities. Without exhaustive demolition of decking during the design process to reveal the extent of required decking replacement, unit pricing allows cost effective management of unknown problems (latent conditions) that will impact project cost during construction. Check with the Department Project Manager and the Chief Architect for any additional guidance.

Section ## ## ##

Section Name

Page 1 of ?

PART 1 GENERAL

1.1 WORK INCLUDED

A. Framing, wood blocking, wood plank and rough hardware including fasteners.

1.2 UNIT PRICES

A. Unit prices for certain work of this Section are listed on a page in the General Documents that precede the technical specifications. The General Contractor and Project Manager will verify the actual quantity used.

B. The base bid shall include the replacement of 860 square feet of roof plank which shall match the existing.

C. The base bid shall include the replacement of 800 linear feet of roof blocking which shall match the existing.

SAMPLE

PART 2 PRODUCTS

2.1 LUMBER

A. Pressure treated #1 Common Southern Pine or #1 Construction Douglas Fir permitted. All limber designated pressure treated on the drawings shall be pressure treated and shall conform to AWPA (American Wood Preservers Association) standard C2 (above ground). The presence of AWPA quality mark L-2 shall be accepted as evidence of conformance to this specification for .25#/CF of preservative.

PART 3 EXECUTION

3.1 WORKMANSHIP

A. Replace existing, deteriorated wood decking, rafters and wood plates as directed or determined by the Project Manager. Use hot dip galvanized fasteners only.

End of Section 06 10 00

Project Number: BI-RT-###

End
5.3 – Unit Prices

5.4 Single Source (Proprietary) Specification

5.4.1 General Information

The Consultant is required to either specify a minimum of three, equal products or use a performance specification that does not identify a specific manufacturer. Under certain conditions the Department will permit single source specification. The request may be initiated by the Client Agency or by the Consultant. If the request is for uniformity with existing equipment systems or materials it is considered a Client / Agency request. When the request is initiated because the specified product has characteristics that are uniquely applicable to the project the Consultant will initiate the request.

When there is a compelling reason to limit the specification the following procedures will be required:

5.4.2 Single Source Request Procedures

.1 If the Client / Agency requests a single manufacturer it shall provide a written request to the Department Chief Architect, Chairman Single Source Committee. The committee is the sole entity that can give permission for a sole source specification. It is the Department project manager's responsibility that the request to the Single Source Committee includes the following documentation:

.1a For Client / Agency requests a signed letter on the Client / Agency letterhead in support of the requested product providing justification why the item cannot be competitively bid by multiple manufacturers.

.1b For Consultant requests provide a signed letter on the Consultant's letterhead justifying why the requested product is superior to other selections in this particular instance. Prior to making the request the Consultant shall review with the Department project manager and the Client / Agency representative that they support this request. The justification letter shall indicate this support.

.2 Product data or literature of the requested materials in support of its unique characteristics shall be attached to the justification letter.

5.4.3 Specifying Specific or Proprietary Products

.1 When naming multiple manufacturers within the Project Manual provide at least three manufacturers. The products must be technically similar from a performance, aesthetic (if relevant) and quality perspective.

.2 It is acceptable to use one of the three specified manufacturers as a "basis of design". If a product is identified as the "basis of design" then the other two products must be technically similar from a performance, size, aesthetic (if relevant) and quality perspective.

.3 The use of "Or Approved Equal" is not permitted within the technical specifications or on the drawings. It is the responsibility of the Consultant to identify at least three equal manufacturers, develop a performance specification or follow the request for single source process outlined above.

.4 There is a contractual mechanism to allow considerations of substitutes by the constructor during the bidding and construction phases. If during the bidding phase the constructor wants to submit a named product which differs from specified products the constructor shall submit in accordance with section 01 25 00 Substitution Procedures. Substitutions submitted during the construction phase shall follow the requirements of section 01 25 00 Substitution Procedures and section 01 33 00 Submittal Procedures.

.5 All substitutions, whether submitted during bidding or construction, shall be approved by the Consultant and Client / Agency and transmitted to the Department Chief Architect utilizing Department form 7001 with all appropriate attachments for consideration before the substitution can be accepted for use in the project.

End
5.4 – Single Source Specification

5.5 Delegated Design

5.5.1 Definitions

Delegated Design: Delegated design is the transfer of design responsibility of certain aspects of the project from the Consultant to the Constructor.

Design-assist: In the design-assist process, a sub-consultant specializing in the specific trade or system (such as building envelopes) is brought to the team. This consultant assists the prime Consultant in mitigating the potential for constructability issues and identifying key interfacing design details early on. In this model it is preferred the specialized sub-consultant is a part of the A/E team.

Deferred Submittals: The use of delegated design or design-assist results in deferred submittals, which are those portions of the design not submitted at the time of the permit application but are required to be submitted to the building official within a specified period. Generally, if an element has not been reviewed and approved under the original permit, it is required to be submitted as a deferred submittal to the Authority Having Jurisdiction (OSBI / OSFM) for review and approval. Any changes to the originally approved drawings as a result of a deferred submittal shall be submitted for review as a revision to the approved drawings.

5.5.2 General

The Department recognizes the trend of increasing complexity of building systems associated with continual advancement of high performance building construction requirements. In this environment, many building systems and components may be proprietary, requiring engineering by the manufacturer and thus designated as Delegated Design, resulting in Deferred Submittals. The Consultant shall retain responsibility to define the elements of the building consistent with the required standard of care.

Delegated Design has inherent risks when utilized with state funded construction. This is mainly due to requirements for competitive bidding of sub-trades, especially when utilizing the CMR delivery process. Essentially, the Consultant is yielding part of their control over the design outcomes when a component of the work is delegated to the Constructor. The added complexity of the deferred submittal process may slow down the approval process or cause coordination issues. The Consultant is responsible for maintaining an appropriate standard of care and providing any additional coordination including expedited submittal review required during the deferred submittal process on such Delegated portions of the design. Any reduction in the standard of care is unacceptable to the Department.

The Consultant shall submit Department Form 3050 “Delegated Design Approval”; a proposed list of items requiring deferred submittals, as a deliverable at the conclusion of the DD Phase. The Department PM will schedule a meeting with the Consultant to review their proposed list. Any changes to the approved list shall be submitted at the completion of the CD phase for Department approval. The final approved list of deferred submittals shall be placed on the code sheet within the Contract Documents.

NOTE: Any item not identified and approved on Form 3050 shall not be specified for Deferred Submittal and engineering shall be by the Consultant. The Department will not accept additions for Delegated Design / Deferred Submittal subsequent to the conclusion of the Bidding Phase.

During construction, the Consultant shall review and approve the Deferred Submittal, and the Department PM shall then submit to the OSBI and or OSFM for their review and approval. For additional information please see “Building Code Review”, section 3.4.1 of this manual.

End
5.5 – Delegated Design