Department of Design and Construction

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Design Consultant Guide

Appendix

Bill de Blasio, Mayor
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A. Design Process, Procedure, and Protocol

1. DESIGN RESPONSIBILITY

The Consultant shall follow appropriate architectural and engineering practices in designing projects and preparing design and construction documents. The Consultant is responsible for the design, checking, cross checking, coordination, and cross-referencing of the project documents. Any review undertaken by DDC or other NYC agencies and other regulatory entities shall not eliminate, substitute for, or reduce the Consultant's responsibility for their work.

a. Program Changes

The Consultant shall not make any change in the program requirements or scope of the project without written authorization from DDC.

b. Consultant Recommendations

c. The Consultant shall make recommendations necessary to supplement the Task Order or Project Objectives so as to achieve an efficient design. The Consultant shall bring to the attention of DDC, in writing, any additional work or scope reductions that may be needed to assure proper use and occupancy and adherence to budget.

d. Consultant's Interpretations

The Consultant shall be available for required interpretations of plans and specifications, and shall promptly advise DDC of problems with or conflicts among drawings, specifications, and site conditions.

e. Sub-consultants

The Consultant shall assure that each sub-consultant is aware of and complies with the contents of this guide, as it pertains to their responsibilities under the contract. All sub-consultants shall be licensed or registered in the State of New York.

2. SCHEDULES, SPECIAL INSPECTIONS, AND SUB-CONSULTANT APPROVAL

a. Initial Schedules

The Consultant shall prepare a Gaant Chart or Critical Path schedule indicating compliance with the project phase durations established by DDC at the outset of the project. Standard durations for design and construction phases for DDC projects have been established. Any deviation from these durations will be communicated by DDC prior to project outset. The Consultant's initial schedule shall indicate completion dates, including review time as established in the Task Order or Project Objectives for all phases of the project. The initial schedule will be submitted by the Consultant at the Design Kick-off Meeting, and will be discussed at that meeting. Schedules shall conform to DDC requirements and shall be resubmitted as necessary until agreement has been reached on all issues raised. With the written agreement of DDC, schedules will be revised by the Consultant to reflect any necessary changes in the project. The Consultant shall be responsible for adhering to the approved project schedule.

b. Special Inspections

The Consultant is required to indicate all items subject to Special Inspection on the construction documents Title sheet or General Notes sheet and all DOB filings. Before construction kick-off, DDC will designate the entity responsible to perform the Special Inspections. DDC will generally provide Special Inspections by means of a separate Requirement Contract or through a Construction Management Contract.

c. DDC Approval of Sub-consultants

DDC reserves the right to approve all proposed sub-consultants. If the sub-consultants were not named in the base Consultant contract, such sub-consultants firm names and relevant information including SF254 and SF255 forms shall be submitted to the DDC Project Manager for approval at or before the initial Design Kick-off Meeting.

3. BUDGET AND COST ESTIMATING

a. Changes in Cost Estimates

In addition to the CSI-format cost estimates to be submitted at each project milestone, the Consultant shall maintain current information relating to the estimated cost of the project throughout the design process. The Consultant shall inform DDC promptly in writing of any significant changes in such estimated cost, due to market conditions or changes in the scope of work or design of the project.

b. Adherence to Project Budget

It is the Consultant's responsibility to provide a design that is within the budget of the project. If the Consultant believes the project is underfunded, they shall inform DDC in writing asking for guidance in how to proceed with the design process. If the estimates exceed the budget, it is the Consultant's responsibility to redesign to bring the project design within the budget at no cost to DDC.

4. CODE AND REGULATORY COMPLIANCE

The design shall comply with all applicable codes, zoning regulations, laws, guidelines, and other requirements of City, New York State, and Federal agencies having jurisdiction over any phase of the work. The Consultant is responsible for obtaining all design approvals from regulatory agencies, commissions, and utility companies (see Appendix A-2 of this Guide).

a. Zoning Analysis

A zoning analysis is expected for all changes in use, building additions, and new buildings to the extent applicable to the intended scope.

b. Compliance Strategy

The Consultant shall analyze the applicable codes, regulations, guides, resolutions, etc., and determine the best approach to design and file the project Scope of Work.

c. New and Existing Buildings

All new buildings shall conform to current codes. At the outset of all renovation and building addition projects, the Consultant shall analyze all viable prior codes and the current codes listing the pros and cons of each in relation to the intended Scope of Work in order to determine the best approach to achieve the project scope.

d. Environmental Review

The design process must respond to environmental concerns and the project design must incorporate measures to mitigate adverse environmental impacts whenever feasible. The environmental review process for any project will address rules and regulations

established by the NYC Department of Environmental Protection (DEP), NYS Departments of Conservation (DEC), Health, and Labor, and applicable United States Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) standards. See Appendix A-2.

e. Filings

All filings for design approval as required by all governing entities are considered a part of Basic Services unless determined otherwise by the Commissioner. Unless noted otherwise in the Project Objectives, any filing required to obtain approval beyond "as-of-right" development is not considered part of Basic Services. See Appendix A-3 of this Guide.

f. Local, State, and Federal Jurisdiction

Adherence or satisfaction of local jurisdiction codes and regulations does not override the need for compliance with state and federal codes and regulations. The Consultant shall inform DDC of potential conflicts and propose methods of resolution. In all instances the more restrictive requirement applies.

g. Regulatory Changes

If regulatory requirements change during the course of the project, the Consultant is responsible for informing DDC and seeking a resolution to any related design issues.

5. SITE DATA

a. Requests for Surveys

DDC shall furnish surveying and subsurface information to the Consultant when required by the scope of the project. The Consultant shall request all necessary site data including level of detail required from DDC within two weeks of the Schematic Design Kick-off Meeting. The level of detail requested by the Consultant shall be verified by DDC before the start of the surveys.

b. Surveys

Surveys may consist of topographical and property line maps, indicating building footprint, first floor and or entry point elevations, legal grades, street utilities, reference benchmarks, and a baseline.

c. Subsurface Information

Subsurface information may include test borings, water table determinations, soil and rock sampling, and performing physical tests, complete with written results.

d. Consultant's Responsibility

The furnishing of site information by DDC shall in no way limit the responsibility of the Consultant to properly analyze the documents and data furnished, and develop suitable designs in accordance with the best professional practices. Any additional information required must be requested from DDC in writing as early as possible. See also Investigative Criteria for Structures and Soil in Section K.

e. Examination of Site

The Consultant shall examine the designated site, noting any such condition that may impact the project. The Consultant shall promptly bring to the attention of DDC any condition on the project site and adjacent sites which are potentially hazardous or might be prone to damage. Similarly, the Consultant shall notify DDC of any inadequacy or uncertainty regarding existing facilities or utilities, or other reasonably discoverable impediments, which might prevent the orderly and expeditious construction of the project.

f. Reference to Surveys

The Consultant shall design and plan the work in conformance with available information concerning existing property lines, grades, levels, sewers, utilities, and subsurface structures, conditions, and facilities.

g. Examination of Public Records

In addition to a review of surveys, the consultant shall undertake a thorough site inspection and an examination of all relevant public records. Additional information and investigations may be required as site conditions dictate.

h. Boring Location Plan and Soil Samples

The Consultant shall be responsible for the preparation of boring location plans and for the selection of any specimen soil samples for analysis by laboratory testing.

i. Reimbursement of costs

Any material furnished by DDC to meet the requirements of the project shall be at no cost to the Consultant. The Consultant shall be reimbursed, as per the Agreement, for any DDC requirement to obtain additional topographical and property line surveys, borings, and soil or rock testing.

6. ALTERATION OF EXISTING STRUCTURES

The Consultant shall be familiar with existing conditions at the project site throughout the design period of the Contract, and ensure that all drawings and specifications accurately reflect current conditions. The creation of Existing Conditions Drawings is expected as part of Basic Services. All field measurements are the responsibility of the Consultant.

a. Goal of alteration projects

The goal of an alteration project is to meet the same standards described in this document for new projects. Equipment and systems at 20 years of life or older, or beyond their useful service lives, should be evaluated for possible replacements with new equipment and systems designed to meet the current usage of the facility. Renovation and rehabilitation designs must satisfy the immediate occupancy needs and anticipate additional future changes. Remodeling must make building systems become more flexible. Compliance with the design criteria is required whenever feasible. Parameters of reuse and disruption of service must be clearly specified in construction documents. The result of the project should be enhanced performance, not just equipment replacement.

Alteration projects can occur on three basic scales:

i. In the refurbishment of an area within a building, such as a floor or suite, the aim must be to satisfy the new requirements within the parameters and constraints of the existing systems. The smaller the area in comparison to the overall building, the fewer changes to existing systems must be attempted.

ii. In the major renovation of an entire structure, the consultant has the opportunity to design major upgrades into the mechanical, electrical, and communication systems. The mechanical services can come close to systems that would be designed for a new building, within the obvious limits of available physical space and structural capacity.

iii. In the upgrade or restoration of an historic structure, designated landmark or landmark quality property, criteria will be provided by DDC Historic Preservation Office (the latest update of published guidelines, standards, rules, application forms and instructions pertaining to historic preservation) to help guide the design of the alteration. Please refer to Historic Preservation Design Criteria section for additional information.

b. Consultant to Verify Existing Conditions

When existing conditions drawings, specifications, and or data are not available; the Consultant shall make all reasonable efforts to document the existing conditions. When the project involves alteration or an addition to an existing structure, the Consultant shall be responsible for verifying all measurements and details of existing construction, and documenting same for all areas affected by the work. The Consultant shall verify, through visual examination and physical measurement, the accuracy of all drawings, specifications, and data furnished by DDC. Documentation from other sources and DOB records shall also be verified.

c. Inadequate Examination

The Consultant is expected to make a diligent effort to verify existing conditions, both visible and concealed. The Consultant is put on notice that construction change orders and disputes most frequently arise from existing conditions that have not been adequately surveyed or documented. Inadequate examination of existing conditions also leads to the largest number of design related Errors and Omissions claims.

d. Probes

The Consultant shall be responsible for specifying the type, quantity, and location of probes needed to adequately investigate concealed construction. A&E shall review the Consultant's request for necessity, adequacy, and extent. See also Investigative Criteria for Structures and Soils in Section K.

e. Disturbance of Existing Conditions

The Consultant shall be responsible for identifying and notifying DDC of all locations where the proposed design will disturb, intersect with, or affect any component of an existing building or facility. This identification must be in writing, and be accompanied by drawings acceptable to DDC, which clearly convey the required information.

f. Compensation for Additional Services

If existing conditions prove to be at a significant variance with the construction as indicated in as-built drawings provided by DDC, subject to the prior approval of DDC, the Consultant may be compensated for additional services as stipulated in the Agreement. Such compensation shall relate to the cost of undertaking new as-built drawings only if an allowance was not already included through a complexity factor to the base fee in the Agreement.

g. Hazardous Condition Rating

All inspection reports, including those pertaining to building facades, shall use a rating system to classify the results of the inspection. The rating system definitions shall be indicated in each report and those for building facades shall conform to the Structural Condition Ratings described in Section F.

h. Furniture and Equipment for Re-Use

The Consultant shall prepare an inventory of existing furniture and equipment and complete an analysis for its potential re-use in the renovated structure.

7. HAZARDOUS MATERIALS SURVEY AND DOCUMENTATION

Unless otherwise established in the Task Order or Project Objectives, DDC will provide inspections to identify hazardous materials within the project area as defined by the Consultant and shall provide plans and specifications for the removal, handling, and disposal of hazardous materials as needed. The Consultant shall coordinate the hazmat work scope in the documents provided by DDC into the Bid Documents and include any work required incidentally by the hazmat removal scope. DDC acknowledges that the Consultant bears no responsibility for the performance of abatement work.

8. MEETINGS

The Consultant shall inform DDC of all meetings pertaining to the project which the Consultant attends or plans to attend.

a. Attendance

During the Pre-Schematic Design, Schematic Design, Design Development, and Construction Documents phases, the Consultant shall attend regularly scheduled as well as all other necessary meetings.

b. Design Progress Meetings

i. The DDC Project Manager shall invite the design review Team Leader and other DDC team members to the design progress meetings.

ii. Scheduling of meetings with the Client Agency or DDC technical staff shall be done through the DDC Project Manager.

iii. Meetings shall be indicated on the Consultant's schedule, and will include regular Design Progress Meetings, as directed by DDC. The Consultant may be required to attend or conduct meetings regarding issues such as programming, landscape, site conditions, engineering systems, historic preservation, sustainability, active design, cost estimating, technical specialties, specifications, and permits and approvals.

iv. Additional meetings may be required with the Community Board or group, LPC, PDC, and the Client Agency.

c. Construction Meetings

During construction the Consultant shall attend job meetings at the site and other meetings as are reasonably required to interpret the Construction Documents.

d. Minutes of Meetings

For all meetings prior to the construction bid award, minutes shall be recorded by the Consultant, and shall be submitted to the DDC Project Manager or Resident Engineer within three days after the meeting. The Consultant shall also record all job site progress meetings unless otherwise directed by the Resident Engineer.

i. When recording minutes, the Consultant shall number each meeting consecutively and record the date, place, and attendees. The minutes shall include the agenda, all items discussed, conclusions, and questions for resolution.

ii. Unresolved issues must continue to appear in the minutes until they are resolved. The party responsible for the resolution of open issues, and the date the resolution is due, and the actual date of resolution shall also be noted. Similarly, corrections and approvals of minutes shall be recorded.

iii. An updated Progress Schedule shall be attached to the minutes of each meeting.

iv. The Consultant shall transmit electronic copies of the minutes and the updated schedule to DDC. Certain projects may require that copies be sent to additional agencies as directed by DDC.

9. SUBMITTALS

a. Submission of Documents

The Consultant is required to submit various Reports, Sketches, Drawings, Specifications and Progress Schedules at key project milestones. The content and level of detail required of each submittal is described in the appropriate chapters of this Guide.

b. Review of Submission

All work submitted to the DDC will be reviewed for conformance to DDC design criteria and the Client Agency requirements. Time required for reviews shall be incorporated into the Consultant's project schedule. Marked-up drawings and written review comments shall be returned to the Consultant. Acceptable written responses to all review comments must be submitted prior to the commencement of subsequent phases.

c. Computer Aided Design

Project drawings shall be developed on a CAD drawing system acceptable to DDC. Consultants are required to furnish digital files in addition to multiple sets of prints for all submissions. Additional prints and/or mylars are required when submitting Final Compliance Documents

10. CONTRACT ADHERENCE

a. Consultant Contract Administration

The DDC Project Manager is responsible for administering the Consultant's Contract. The Consultant shall not deviate from the terms of the Contract in any way unless specifically authorized in writing to do so by DDC. Approved minutes of meetings will be considered authorization in writing, except for changes in Scope of Work.

b. Request for Changes in the Scope of Work

Request for Changes in the Scope of Work shall be in writing to DDC, and can only be incorporated into the project after approval by DDC through an authorized design change order.

c. Changes

DDC reserves the right to direct the Consultant, at no charge to the City, to make changes in equipment size, location, capacity, or performance for all portions of the Consultant's design which were not adequately represented or previously approved by DDC.

d. Additional Services

The Consultant may be required to perform "Additional Services" in addition to the "Basic Services" as outlined in the Task Order or Project Objectives. Additional services are also described in the Contract, as well as the methods and amount of compensation stipulated. The "Additional Services" may include but not be limited to the following:

i. Construction Services

Construction Services include all requested activities beyond the defined Basic Services during construction. Such services may involve increased participation at site meetings, field reconnaissance, special inspections, resident engineering, and additional architectural services.

ii. Full-time Project Representation

Full-time Project Representation covers the assignment of full-time site representatives to assure that the work conforms to the construction documents. Note, this may be included either as part of the Basic Services or additional services as indicated in the Task Order.

iii. Planting and Tagging

Selection and tagging of plant materials, and supervision of the planting operation by a Landscape Architect.

iv. **Probes, Surveys, and Testing Services**
Probes, Surveys, and Testing Services include probes to be performed for the purpose of investigating concealed construction, surveys performed for the purpose of verifying site conditions, and tests regarding material properties. Special testing is needed for historic and other older structures which include analysis of existing materials and finishes, treatment tests, and testing of treatment products and replacement materials.

v. **Copying Contract Documents**
Printing additional sets of Contract Documents beyond those stated in the Consultant Contract.

vi. **Travel Expenses**
DDC authorized out-of-town travel to verify material sources, suppliers, and fabrication.

vii. **Percent for Art Coordination**
Administering the Contract with an artist providing artwork for the project under the Percent for Art Program of Department of Cultural Affairs, if not required as a Basic Service.

viii. **Value Engineering Service**
Providing material for and participating in Value Engineering studies.

ix. **Space and Furniture Planning**
Providing detailed furniture and equipment listings for purchase requisitions and installation supervision. This may be described in the Task Order or Project Objectives.

x. **Documentation**
Provision and reproduction of photos, drawings, and other documents, which DDC may require for the project, beyond those stated in the Consultant Contract.

B. Architectural Design Criteria

1. ARCHITECTURAL DESIGN

The Consultant shall strive to create a design that is responsive, welcoming, engaging, effective, and exceeds the requirements of code compliance while remaining efficient, secure, and functional. Public work is the best opportunity for design excellence to enrich the lives of all New Yorkers.

2. URBAN DESIGN

The Consultant shall consider such factors as building placement, massing, street and block typography, urban space and form, historic fabric, neighborhood character, microclimate, public infrastructure, access, and relationship to adjacent buildings and spaces. All designs shall reflect previously approved master plans wherever applicable.

3. SITE DESIGN

The Consultant shall analyze programmed site issues, pedestrian and vehicular circulation, adjacent off-site conditions, existing site conditions, flood plains, programming, zoning regulations, community needs, and environmental considerations. The Consultant shall take into consideration subsurface conditions based on site visits, borings, probes, and surveys.

a. Borings and Probes

At the Pre-Schematic and/or Schematic Design Phase a borings and probes program shall be conducted to identify unsatisfactory subsurface materials that will have to be removed to insure stable sub-grade conditions. In all cases buried or abandoned foundations must be removed in entirety. The Consultant must refer to the Structural Engineering Criteria and Investigative Design Criteria for Structures and Soils sections in this chapter.

b. Flood Plain

The Consultant shall investigate and determine the actions necessary for the design to fully meet the requirements for construction within a flood plain if applicable. Factors such as floor level, access, configuration, structural system, utility connections, materiality, and functionality, among others, must be in conformance with FEMA guidelines and NYC Code.

c. Historic and Landmark Sites

Historic and designated landmark sites will require research on historical site usage, design, and materials. Additional exploratory probes may be required. The requirements for landmark sites will be as indicated in the Task Order or Project Objectives. Review by the Landmarks Preservation Commission will be required for designated landmarks or projects within historic districts.

4. EXISTING CONDITIONS

The Consultant shall conduct a thorough investigation of existing site conditions. The creation of existing condition drawings is expected as part of basic services. All field measurements are the responsibility of the Consultant. A property survey indicating property limits, dimensioned building footprint, setbacks, elevations at entry points, site features, spot elevations of land, utilities, etc., will be provided by DDC.

5. BUILDING CODE AND ZONING RESOLUTION

The Consultant shall analyze the applicable codes, regulations, guides, resolutions, etc., and determine the best approach to design and file the project scope of work. At the outset of all renovation and building addition projects, the Consultant shall analyze all viable prior codes and the current codes listing the pros and cons of each in relation to the intended scope of work in order to determine the best approach to achieve the project scope. All new buildings shall conform to current codes. A zoning analysis is expected for all changes in use, building additions, and new buildings to the extent applicable to the intended scope. The Consultant shall inform DDC of potential conflicts and propose methods of resolution. Unless noted otherwise in the project objectives, any filing required to obtain approval beyond "as-of-right" development is not considered part of basic services.

6. ENTRY

The Consultant is encouraged to investigate required security in the design of entries, and to balance these needs with the desire for public facilities to appear welcoming. Unsecured recessed entries are generally not acceptable. To improve air quality and reduce cleaning costs, recessed full width walk-off mats at main building entrances are strongly recommended.

7. ACCESSIBILITY

The Consultant is responsible for complying with current design standards for barrier free design, including local, state, and federal requirements. Consultants are asked to design to the spirit of Universal Design principles, surpassing the minimum requirements of all applicable accessibility laws. Conformance to NYC Local Law 58 or NYC Building Code does not fulfill the obligation of the Consultant to comply with state and federal law.

8. CIRCULATION

Provision for the movement of people and vehicles should be as clear as possible. Circulation shall be accommodated in an efficient manner fully cognizant of programming and life safety concerns. Paths of emergency egress shall always be identified, visible, illuminated, and accessible in compliance with all code requirements.

9. ACTIVE DESIGN INITIATIVE

The Department of Design and Construction supports active design principles. Consultants are asked to design using active design strategies that promote occupant health. Such strategies include providing opportunities for incidental exercise, such as the use of communicating stairs to travel between floors. The Consultant is encouraged to integrate a main circulation stair that is visible from and accessible to the main entrance, bicycle racks, staircases with art, views and daylighting, and other active design elements where feasible.

10. NATURAL LIGHT

Glare-free or controlled natural light should be maximized in all occupied spaces. Controlled natural light improves the indoor environment and with occupancy sensing lighting controls, reduces energy costs. The Consultant is expected to use appropriate low-e coatings for increased energy efficiency in insulating glass for all exterior windows and skylights.

11. WINDOWS

Operable windows are desirable. Cost and means of glass replacement shall be taken into account in window sizing and configuration as well as glazing selection.

12. SKYLIGHTS

Utilize skylights when site constraints or programming preclude exterior-wall glazing.

13. EXTERIOR CLADDING AND MATERIALS

The Consultant shall seek materials that are cost effective, durable, easily maintained, and appropriate to the context of the project site. For renovations and additions, the qualities of the new exterior materials shall compliment or match the existing materials. The Consultant shall also refer to the Structural Engineering Criteria.

14. GRAFFITI

Client Agencies may require sealants to protect against graffiti. When specifying sealants, the Consultant shall evaluate the risks of long term damage to materials, particularly masonry historic structures and landmarks. Knowledge of prior coatings on the building is required, as are material samples with and without proposed sealants. Only non-toxic sealants shall be specified (see Section D of this appendix for Sustainable Design Criteria).

15. ROOFING

The Consultant shall specify a roofing system with a binding guarantee of duration acceptable to DDC. Roofs should be designed to reduce the Urban Heat Island Effect. The incorporation of “green roof” and “blue roof” systems, which can reduce solar gain and manage stormwater flows, is also encouraged (see Section D of this appendix for Sustainable Design Criteria).

16. INTERIOR MATERIALS

Finish materials shall not adversely affect the health of workers or occupants. Health considerations shall extend to the material’s production, off-gassing during installation, and environmental pollution engendered by the disposal process. Projects shall incorporate the specification language referenced in this guide.

a. Flooring

When budgetary and maintenance conditions allow, flooring from renewable resources such as linoleum, rubber, clay, or cork, and materials with high recycled content are encouraged. Vinyl composition tile (VCT) is discouraged.

b. Carpeting

For health and maintenance reasons carpeting is discouraged. Alternative flooring should be considered wherever suitable, and in those situations where carpet must be used, carpet tile is preferred.

c. Wood

CCA (Copper Chromium Arsenate) treated wood shall not be used.

17. INSULATION

The entire building envelope shall be carefully detailed in order to provide continuous insulation, eliminate thermal bridging, and prevent condensation and trapped moisture within wall and roof assemblies. The use of spray-in cellulose or cementitious foamed-in-place products is encouraged as an alternative to fiberglass batts. To protect air quality, loose fiberglass insulation shall never be used within air plenums or in airshafts.

18. MECHANICAL, ELECTRICAL, AND SERVICE SPACE REQUIREMENTS

a. Space Requirements

The dimensions of mechanical and electrical equipment rooms must be based on the dimensioned layout of all required equipment. All mechanical rooms, including central plant equipment rooms, must have enclosures designed to minimize noise transmission.

b. Access

i. To facilitate mechanical equipment access, maintenance, removal and replacement, an elevator stop should be provided to serve all levels housing HVAC equipment.

ii. Stairways should allow for safe transport of mechanical equipment and components. Ship's ladders for access to the roof are not encouraged.

iii. Design of service areas should preclude the need for hatchways. Do not install equipment that requires maintenance below a raised floor.

iv. In mechanical equipment rooms and service areas a minimum of 7 ft. clearance should be maintained under all ductwork and piping for maintenance purposes.

c. Vertical Clearances

Mechanical equipment rooms must have clear ceiling heights not less than 12 ft. Catwalks with stairways must be provided for all equipment (including cooling towers) that cannot be maintained from floor level. Where maintenance requires the lifting of heavy parts 100 lb. or more, hoists should be installed.

d. Horizontal Clearances

Mechanical and electrical equipment rooms must be configured with clear circulation aisles and adequate access to all equipment. These rooms should have adequate doorways, clear floor space, areaways, and staging areas to permit the replacement and removal of equipment without the need to demolish walls or relocate other equipment.

e. Equipment Placement

i. The arrangement of mechanical and electrical equipment in equipment rooms must consider the future removal and replacement of all equipment.

ii. All mechanical equipment must be installed at least 5 ft. above the 100 year flood plain elevation.

iii. Do not locate equipment with motors greater than ½ HP overhead, where it will be difficult to operate and maintain. Install equipment with motors larger than 3 HP in mechanical equipment rooms.

19. SECURITY

a. Security Plan

If required the Consultant shall create a security plan for the building.

b. Window Protection

Client Agencies may require the use of security measures on windows to guard against window vandalism and break-ins. The Consultant is encouraged to explore an improved aesthetic for these applications through the use of new materials, technologies, and strategies to meet the Client's need for security.

c. Blast Resistance

Blast resistance and higher than normal security measures are of particular importance for certain DDC projects. These may include courthouses, police precincts, and structures providing emergency services. Detailed programmatic requirements will be addressed for such projects in the Task Order, Project Objectives, Client Agency program, or subsequent directive.

20. GRAPHIC DESIGN

a. The Consultant shall prepare clear graphics for orientation, building and room identification, space usage, capacity (for public assembly spaces), and, egress, in the absence of a graphic design package determined by the Client agency.

b. Where applicable, the consultant shall include signage in the building's elevator lobby that promotes stair use.

21. NEW OR INNOVATIVE TECHNOLOGY DESIGN FEATURES AND PRODUCTS

When proposing new or innovative technology design features or products, the Consultant shall analyze and compare initial cost and long term operating costs and maintenance requirements in comparison to industry standard products and practices. Minimizing maintenance is always encouraged and expected.

22. MAINTENANCE MANUAL

For designs incorporating new or innovative technology and or complex or unusual materials, assemblies, or systems, a written manual and schedule shall be prepared by the Consultant for the Client Agency users and submitted at the completion of construction.

23. COORDINATION

The Consultant shall coordinate the work of all disciplines necessary to complete the project, as well as integrate the suggestions of the client agency and the DDC Project Manager and Team Leader. In general DDC projects are organized by trade. The construction will either be bid as a single contract or if subject to Wick's Law as multiple contracts as determined by DDC. Consequent coordination of documentation around separate prime contractors for General Construction, HVAC/Fire Protection, Electrical, and Plumbing is of special importance.

24. CONSTRUCTIBILITY REVIEW AND BID PACKAGING

Unless otherwise determined, DDC will perform Constructibility Reviews for clarity and constructibility at 50% and 100% as described in DCG Chapter V. Preparation of bid packaging will occur during both phases. Economy, availability, efficiency, clarity, accuracy, and coordination of the 100% Construction Documents submission will be confirmed on all projects.

25. REGULATORY AGENCIES

The Consultant is responsible for obtaining all design approvals from regulatory agencies, commissions, and utility companies. All projects unless directed otherwise are subject to all NYC, NYS, or Federal codes, regulations, guides, resolutions, etc. All filings as required by all governing entities are considered a part of basic services unless determined otherwise by the Commissioner.

C. Landscape Architecture and Site Design Criteria

1. LANDSCAPE CONDITIONS

The Consultant's work shall demonstrate an analysis of the functional relationships of programmed site issues, pedestrian and vehicular circulation, adjacent off-site uses and conditions, existing site amenities and constraints, environmental considerations, maintenance, and subsurface conditions based on site visits, borings, probes, and surveys.

a. Plant Selection

Plants shall be selected based on the conditions of the site such as soil characteristics, moisture, temperature extremes, acidity, wind, and light, as well as their resistance to invasive pests or pathogens The use of native plant material is encouraged.

b. Department of Parks and Recreation Review

When the Department of Parks and Recreation (DPR) has jurisdiction over a project site and for all street tree plantings, the landscape design must be reviewed and approved by DPR, as directed by DDC.

c. Arborist Report

The Consultant shall engage an arborist to undertake an inspection of trees on the project site and produce a report detailing the species, condition, expected lifespan, required maintenance, and if any infestation of invasive pests or pathogens exists. The inspection area shall extend out from the project site approximately fifty feet at campus locations. Street trees are to be included in the scope. The inspection and report shall be performed during the Schematic Design Phase.

2. SIDEWALKS, PARKING AREAS, AND ROADWAYS

Projects may require either new or repaired street sidewalks, curbs, parking areas, or roadway pavements. The Consultant is advised to confirm with the DOB at an early stage whether a Builder's Pavement Plan (BPP) will be required. Non-standard sidewalks require PDC and DOT approval.

a. In general, the use of impervious surfaces should be minimized, and tree cover over paved surfaces should be maximized.

b. Porous pavement and pavements with a high solar reflectivity index (SRI) are desirable when budget and site conditions allow.

c. Tree plantings and landscape treatments are encouraged in all parking areas to provide both "green" infrastructure and shade for the pavement.

3. DRAINAGE

All surface storm water runoff shall be collected on site. Connection to City storm or combined sewers shall conform to current DEP regulations. Surface grading shall provide for drainage away from buildings. Reduce runoff by minimizing impervious surfaces; consider "green infrastructure" such as green roofs, enlarged tree pits, and bioswales; consider gray infrastructure" such as blue roofs, porous pavement, and below-grade stormwater storage and filtration. See Plumbing Design Criteria, Section I for additional drainage requirements

4. PLANTINGS

Plans may include lawns, trees, shrubs, ground covers, climbing plants, and seasonal plantings. Mature plants are recommended. Plantings shall be maximized as an aid to environmental quality, and to serve in the effort to contain and eradicate damaging pests and pathogens.

a. Street Trees

Projects shall provide for new or replacement street trees. Approval for street trees is required from DPR and from DDC. Tree pits shall comply with all current DPR requirements.

b. Maintenance Manual

For substantial planting designs, a written manual and schedule shall be prepared by the Consultant for the Client Agency users and submitted at the completion of construction.

c. Invasive Plant Species, Pathogens, and Pests

Site design and site construction must conform to all regulations regarding control of invasive plant species, pathogens, and pests. For the current list of permitted, prohibited, and restricted plants, contact DPR Central Forestry and Horticulture Division at http://nyc.gov/parks.

5. SITE FURNISHINGS

Site furnishing may include benches, tree guards, railings, bicycle racks, fences, gates, waste bins, light fixtures, signage, kiosks, art installations, trellis work, and play equipment. Site metal elements shall generally be solid rather than tubular.

a. Fences

The design of site fencing should be appropriate to the building and the surrounding context. For historic buildings, restoration or replication of original fencing and gates should be considered, subject to current code requirements.

b. Playgrounds

Playground and resilient play surfacing design shall meet the requirements and guidelines of the Client Agency, the United States Consumer Products Safety Commission (CPSC), ASTM F1487, and the NYC Building Code. Safe fall-zones shall be provided. Playground design shall comply with accessibility requirements.

c. Indoor/Outdoor Bicycle Parking

Secure bicycle parking shall be provided in compliance with applicable zoning requirements. This parking shall be in view of building security personnel.

6. IRRIGATION

a. When required by the Task Order or Project Objectives, irrigation shall be provided sparingly for maintenance, cleaning, and watering of plantings.

b. Hose bibs are preferable and shall be provided at spacing that allows a one hundred foot long hose to reach all parts of the site generally without crossing entrance approaches.

c. Use non potable water wherever feasible.

d. Irrigation using groundwater or stormwater, treated, stored, and distributed per DEP regulations is encouraged.

e. The irrigation system shall be designed to provide water to plants only when needed. Use rain sensors or soil moisture sensors to prevent unnecessary watering. Avoid overspray onto paved surfaces. Drip irrigation systems can be used.

f. Install all major components in protected, accessible locations. Provide freeze sensors as required. Irrigation controllers and remote sensing stations must be placed in vandal-proof enclosures. Above ground components, such as backflow preventers, must be placed in unobtrusive locations and protected from freezing.

g. Install quick coupling valves throughout the system so that hoses can be connected to the system. Locate drain valves to permit periodic draining of the system.

h. Provide irrigation water meter separately from domestic water meter.

i. Provide automatic controls so watering can be scheduled at night or in the early morning to reduce water losses from evaporations. Use zone irrigation systems so that different areas can be watered at different times.

j. Irrigation systems must be provided with Smart Controller that incorporates an on-site rain or moisture sensor that automatically shuts the system off after a predetermined amount of rainfall or sensed moisture in the soil.

k. The irrigation system must be part of the commissioning plan and training must be specified for operations and maintenance personnel.

l. Allow for expansion of the irrigation system, both in area and in flow rate, so the system can be adjusted as plants mature.

7. FOUNTAINS AND POOLS

When proposing decorative fountains and pools, the Consultant shall identify the required maintenance, water consumption, shut down, cost of operation, and winter season issues.

8. SITE LIGHTING

a. The Consultant shall provide for outdoor lighting and electrical power systems and building illumination where required. Generally, unobtrusive lighting designs and luminaire placement is preferred. Site luminaires should complement and be integrated with other site elements. Place luminaires to reduce glare and light pollution. Provide fixture lamping, color and durability information, and catalog cuts for selection when specifying site lighting. Neutral white illumination is preferred. Luminaires must be resistant to vandalism and easily replaceable. Consider photovoltaic site lighting in lieu of hard wired where cost-effective.

b. Full cut-off fixtures and other technologies and methods that reduce nighttime light trespass are strongly preferred. Where feasible, using a larger number of shorter, more closely spaced, lower wattage fixtures is preferable to using a smaller number of higher, widely spaced, high wattage fixtures. For more information see Section H of this appendix, Electrical Engineering Design Criteria.

9. RECYCLED MATERIALS

The use of recycled materials is encouraged where practical. Where feasible, recycle demolished and removed material, salvage existing topsoil, and reuse removed plants.

10. EASE OF MAINTENANCE

Sites shall be as maintenance free as possible.

D. Sustainable Design Criteria

Local Law 86 of 2005 (LL86) requires City-funded projects that meet certain scope and construction cost criteria to attain specific sustainable design and construction objectives, with an emphasis on reducing energy consumption and conserving potable water. Other projects may be subject to the City's Environmentally Preferable Purchasing (EPP) standards.

Under LL86, many projects involving new construction, building additions, or substantial reconstruction must achieve at least Silver certification under the current LEED (Leadership in Energy and Environmental Design) rating system administered by the U.S. Green Building Council (USGBC), as well as additional energy cost and potable water use reductions. To ensure the effective use of City resources, some of these requirements may be based on life-cycle cost analyses and cost-benefit comparisons to be performed by the Consultant.

Whether or not they fall under LL86 or EPP, all DDC projects are expected to pursue the objectives outlined below.

1. INTEGRATED DESIGN

Consultants on all DDC projects are expected to initiate a high level of Sub-consultant coordination from the beginning of design, and sustain this level of coordination through construction. Consultants on LL86 projects are expected to develop mechanical, plumbing, stormwater, electrical, and lighting systems in step with architectural, structural, and site/landscape design. For LL86 projects, the Consultant shall convene a workshop during Schematic Design to identify and assign responsibility for specific design strategies to fulfill the targeted LEED certification level and other City sustainability requirements.

2. ENERGY USE

PlaNYC has committed the City to a 30% reduction in greenhouse gas emissions from City operations by 2017. Since buildings are responsible for 75% of greenhouse gas emissions and 94% of electricity consumption in New York City, energy use reduction is a high priority for DDC. The Consultant shall:

a. Model Environmental Conditions

i. Develop an environmental program matrix to establish detailed heating, cooling, ventilation, electrical, and lighting requirements for each space.

ii. Use energy modeling to optimize siting, building envelope and fenestration design, HVAC and lighting systems, and systems control options.

b. Reduce Energy Use and Demand Through Building Design

i. Use siting, fenestration design, and space planning to maximize the natural light potential of the building envelope and reduce the need for artificial lighting.

ii. Maximize insulation, thermal mass, and wintertime solar exposure, and minimize air infiltration, thermal bridging, summertime solar exposure, and distribution losses, to reduce the need for artificial heating and cooling.

c. Minimize HVAC Energy Consumption

i. Use passive pre-heating, air displacement, demand-controlled ventilation, economizers, energy recovery, and modular systems.

ii. Specify only gas-fired condensing boilers for new construction and substantial reconstruction projects. .

iii. Where feasible, consider the use of unconventional technologies such as distributed electricity generation, combined heat and power, absorption chillers, and thermal storage.

d. Utilize Renewable Energy Sources

i. Where feasible, consider the use of renewable energy technologies such as solar hot water, photovoltaic cells, fuel cells, and ground-source heat pumps..

ii. Provide supportive information to enroll the project in the City's Renewable Energy Credits Program to purchase power from Green-E certified sources.

e. Meet or Exceed Code Requirements

Conform, at minimum, to the latest revision of the requirements of the New York City and New York State Energy Conservation Codes, including:

i. Energy Analysis: Part 3, 7812, "Alternative Building Design Annual Energy Analysis".

ii. Component Performance: Part 4, 7813, "Building Design by Component Performance".

iii. Compliance Documentation: Part 1, 7810, "Compliance Documentation".

iv. Support Material: Analyses, calculations, vendor information, and other data developed by the Consultant in support of recommended systems, components, equipment, and materials, shall be submitted to DDC as part of the project review during each appropriate phase of Design.

v. Financing: In the event that DDC or the Client Agency elect to seek Energy Cost Reduction (ENCORE) financing from the New York Power Authority, design services shall include a simple payback analysis for proposed energy efficiency measures and participation in related meetings. Note that this analysis is also required for Local Law 86 projects meeting certain criteria.

3. INDOOR ENVIRONMENTAL QUALITY

a. Protect Air Quality

i. Eliminate or control unhealthy emissions such as volatile organic compounds (VOCs) from building materials, products, and furnishings (see "Low Toxicity" below).

ii. Monitor carbon dioxide levels to trigger increased supplies of outside air when necessary, and employ high-efficiency filters to control pollutants.

iii. Provide negative or positive pressurization and/or dedicated exhaust for spaces that produce or need to be protected from fumes, odors, and air pollutants.

b. Maximize Natural Light and Views

i. Maximize the use of natural light in occupied spaces and augment it with high quality artificial lighting controlled by photostat, occupancy sensor, or time clock. For more information see Section H of this Appendix, "Electrical Engineering Design Criteria."

ii. Minimize glare from both natural light and artificial lighting.

iii. Utilize skylights, preferably north-facing, when site constraints preclude exterior-wall glazing.

iv. Consider energy efficiency as well as cost and means of glass replacement when specifying window sizing and configuration as well as glazing selection.

v. Provide full-time occupants with views to the exterior, preferably to natural or landscaped settings incorporating water and/or movement.

c. Provide Comfort and Controllability

i. Improve the thermal qualities and comfort levels of all occupied spaces.

ii. Wherever possible, offer occupants the ability to regulate personal comfort. Operable windows are desirable.

iii. Provide acoustic control of equipment noise and vibrations and, where it is needed, provide acoustic separation between adjoining occupied spaces.

4. CRITICAL NATURAL RESOURCES

The design of DDC projects should take into account the impact of the City's built environment on the immediate, local, and regional natural environments. The use of vegetated ("green") roofs can help accomplish all of the following objectives, as well as increase the longevity of underlying roofing materials and reduce solar heat gain through a building's roof.

a. Protect Open Space and Trees

i. Where feasible, minimize site disturbance and provide usable open space, particularly landscaped open space with native species and the capacity to absorb and filter stormwater. Refer to DDC's "Sustainable Urban Site Design Manual".

ii. Do not remove healthy existing trees, particularly mature native species. In some situations, tree removals must be compensated for by the planting of new mature trees elsewhere on the site or nearby. See Appendix A-2 for more information.

b. Protect Water Resources

i. Design plumbing, cooling, and irrigation systems to minimize the use of potable water. Where feasible, consider the re-use of filtered stormwater from roofs for cooling or irrigation systems, in compliance with DEP standards.

ii. Collect all site stormwater onsite and, where required by Department of Environmental Protection (DEP) regulations, either temporarily store stormwater onsite for delayed release, or divert it entirely from the sewer system.

iii. Whether or not it is required by DEP, where feasible, divert stormwater into "gray" or "green" infrastructure that disperses water onsite through re-use, infiltration, evaporation, or transpiration.

iv. For more information see Section I of this Appendix, "Plumbing Engineering Design Criteria," and refer to "Water Matters", DDC's design manual for water conservation in buildings, and to DDC's "Sustainable Urban Site Design Manual".

c. Reduce Bird Mortality

i. Utilize patterned or fritted glass, louvers and screens, or articulated facades to discourage bird collisions into large expanses of glass. Do not use reflective glass.

ii. Pay particular attention to facades facing parks or other open space, and at fenestration arrangements that allow views through a part of the building, such as wrap-around corner windows.

iii. Control nighttime interior lighting of perimeter spaces (see "Maximize Daylighting and Views" above).

d. Prevent Pollution

i. Implement erosion and sedimentation prevention and management strategies. Refer to DDC's "Sustainable Urban Site Design Manual".

ii. Implement construction and demolition waste prevention and management strategies including, where appropriate, selective onsite sorting of materials for salvage, recycling, or disposal (see Construction and Demolition Waste Management below).

iii. Comply with City regulations for the safe disposal of waste materials such as concrete wash water (Local Law 70 of 2011).

5. MATERIAL RESOURCES

a. Reuse Existing

Reuse existing buildings and building elements wherever possible.

b. Specify Materials for Performance

Where equivalent in quality, cost, and performance, specify building materials and interior furnishings that are made from recycled or rapidly renewable resources, are themselves recyclable, and have been extracted, manufactured, and transported in a manner least damaging to the environment. Note that while NYC procurement rules prohibit any requirement to use regionally sourced materials or certified wood products, specifications for DDC projects can require – and, for some LL86 projects, will require – the Contractor to track material purchases according to these characteristics.

c. Specify Materials with Recycled Content

When a DDC project requires the use of one of the material categories listed below, the Specifications must incorporate language that requires a minimal level of recycled content. This language should be downloaded from the internet at www.nyc.gov/buildnyc. Consultants having difficulty in identifying products that meet these Specifications should contact greeninfo@ddc.nyc.gov. Additional language related to product emissions, toxicity, and other criteria are included in these Specifications where appropriate.

i. Athletic and recreational surfaces

ii. Plastic & plastic/wood composite lumber

iii. Fiberglass building insulation

iv. Spray-on fireproofing

v. Gypsum wallboard

vi. Ceramic tile

vii. Acoustical panel ceilings

viii. Carpet tile

ix. Plastic toilet compartments and related products

x. Pozzolans in concrete: When a denser or impermeable concrete is required, such as in basement walls and decks of parking garages, the Consultant shall use fly ash as an admixture. For parking garages the fly ash should be in conjunction with silica fume. Use of fly ash is encouraged in all concrete with the exception of cold weather concrete and early strength concrete. See Section F of this Appendix, "Structural Engineering Design Criteria," for more information.

6. LOW TOXICITY

The Specifications for some categories of materials, when used on a DDC project, must incorporate language that limits the allowable level of certain chemical components. This language should be downloaded from the internet at www.nyc.gov/buildnyc. For some other material categories, the use of DDC Specifications is strongly recommended but nor required; these are also provided at the DDC website. Consultants having difficulty in identifying products that meet these Specifications should contact greeninfo@ddc.nyc.gov.

a. Required DDC Specifications:

i. Adhesives

ii. Concrete Curing Compound

iii. Rot-Resistant Lumber

iv. Carpet Systems

v. Paints

vi. Polyurethanes and Varnishes

b. Recommended DDC Specifications:

i. Sealants

ii. Linoleum

iii. Polyurethane and Varnishes

iv. Wood Stains

v. Systems Furniture

7. CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

The Specifications for construction and demolition waste management on all DDC projects must incorporate language that requires the preparation of a Construction and Demolition Waste Management Plan that seeks to divert materials from landfills. This language, and a sample Construction and Demolition Waste Management Plan, are provided in Section D of this Appendix and can be downloaded from the internet at www.nyc.gov/buildnyc. Further information, including a directory of eligible mixed-waste processors, is available upon request at greeninfo@ddc.nyc.gov.

8. BUILDING OPERATIONS

Design to facilitate good building operations practices.

a. Accommodate Core Operations

i. Incorporate into the design adequate space for temporary storage of materials recycled by building occupants.

ii. Incorporate into the design adequate space for central control, monitoring, and metering of energy and water systems.

b. Facilitate Cleaning

i. Specify durable, non-absorbent materials that can be cleaned without harsh or toxic chemicals.

ii. Provide adequate access to hidden building components that require periodic cleaning and maintenance. See "Mechanical, Electrical, and Service Spaces" in Section B of this Appendix, "Architectural Design Criteria," and "Mechanical Equipment Room and Mounting Requirements" in Section G of this Appendix, "HVAC and Fire Protection Design Criteria."

c. Future-Proof by Design

i. Do not oversize mechanical equipment; instead, allow for the insertion of additional capacity. See Section G of this Appendix, "HVAC and Fire Protection Design Criteria."

ii. Where appropriate, incorporate flexibility and capacity into building spaces and systems to allow for future changes and/or expansions in program.

9. ENVIRONMENTALLY PREFERABLE PURCHASING (EPP)

With some exceptions, all construction projects in City-owned space that require a permit from the Department of Buildings, affect 15,000sf or more of space, and are not LL86 projects, must follow the City's EPP rules. The EPP Minimum Standards for Construction Projects establish required levels of energy efficiency for appliances, light fixtures, HVAC equipment, doors, windows, skylights, and roofing; required levels of water efficiency for plumbing fixtures; minimum recycled content percentages for select building products; and maximum emissions levels for admixtures, adhesives, sealants, coatings, and finishes.

10. SUSTAINABILITY SUB-CONSULTANTS

The Consultant shall provide a full range of sustainable design services by qualified experts, who may be employed by the Consultant or contracted as Sub-consultants. These experts shall be used wherever appropriate, in all phases of the project, including Construction. The level of their participation and the extent of their responsibility shall be clearly defined at the beginning of the project. Required services may include, but are not limited to: LEED analysis, tracking, and submittal; storm drainage calculations; restorative and functional landscape design; energy modeling; building systems integration; cost-benefit analysis; return-on-investment calculations.

11. SPECIAL EXPERIENCE REQUIREMENTS

The Consultant shall assist the DDC team in the specification of special experience requirements for the Contractor and/or Sub-contractors and for all highly specialized trades. When finalized and approved, these requirements shall become part of the Bid Package. During the Bid and Award phase, the Consultant shall assist in the review and verification of the special experience qualifications submitted by the Contractor and/or proposed Sub-contractors.

E. Historic Preservation Design Criteria

Historic preservation design criteria apply to work on structures, interiors, sites, streetscapes and works of art that fall into two categories:

- Designated landmarks and properties in designated historic district are those that are designated as landmarks and subject to regulatory oversight by the NYC Landmarks Preservation Commission (LPC) and by other state or federal agencies having jurisdiction.
- Landmark quality properties are either eligible for designation or as have significant historic, cultural, architectural or landscape features. Criteria and a list of landmark Quality properties were established by the Landmarks Conservancy in 1977. The criteria may apply to an entire project or to part of a project, and may apply to the work of any trade or engineering discipline.

The extent of services will vary with the scope of work. Other services may be described in the Project Objectives or Task Order. Typically, required services include:

1. STANDARDS AND GUIDELINES

The Consultant must obtain from the DDC Historic Preservation Office (HPO) the latest update of published guidelines, standards, rules, application forms and instructions pertaining to historic preservation from any agency having jurisdiction over a designated property. When a landmark quality property is not designated, the Secretary of the Interior's Standards for the treatment of Historic Structures will be the guiding standards. The scope of the project will determine which section of the standards will be most appropriate. The standards are written for specific project goals: protection, stabilization, rehabilitation, restoration or reconstruction. Every effort shall be made to achieve full compliance and to protect the future eligibility of the property for designation status.

2. CONSULTANT SERVICES

The extent of services described below may vary according to the overall scope of work. Other services may be required and may be more fully described in the Specific Requirements or Task Order. Typically, required services include:

a. Research

These projects require documentary, historical and field research sufficient to inform the project scope and intent. Research will provide a sound basis for design decisions and verify conditions exposed during probes and/or construction.

b. Evaluation of Significance

The Consultant of expected to prepare an evaluation of the relative importance of features relevant to preservation. The evaluation shall be based on research, and on an inventory of features such as spaces, materials, structural and other building systems, equipment, furnishings, stylistic details, craftsmanship, works of art, as well as historic or cultural significance.

c. Existing Conditions

The Consultant shall provide a conditions report based on observation, interviews, probes and tests. The Consultant is expected to identify, plan and oversee probes and tests, to provide detailed reports, and to incorporate results into the design strategy.

d. Salvage of Historic Artifacts

For appropriate elements, the Consultant is to identify building or site components for inclusion in the capital work. If a reuse cannot be found the Consultant is to arrange for their relocation or reuse by the Client agency. If not practical, the Consultant is to arrange for their sale and credit in the contract documents. Items to be considered include sculpture, decorative elements, doors, and woodwork, furniture.

e. Documentation

In the absence of existing measured drawings, the Consultant shall produce a set of base measured drawings of historical features in the areas of work included in the scope. Throughout the project, the Consultant shall keep a record of all changes to existing and original features including materials, methods, design intent, and detailing. The Consultant shall provide photographic documentation of conditions and activities throughout the project.

f. Historic Structures Reports

Preservation services rendered as part of the project shall be documented in a way suitable for inclusion in a Historic Structures Report (HSR), noting all sources of information, both written and graphic. The Task order or Project Objectives for a project may require the Consultant to produce a complete HSR as part of the project scope.

g. Application for Eligibility

The Consultant may be required to prepare an application for eligibility for the National or State Historic Register as an additional service.

h. Special Experience Requirements

The Consultant shall assist the DDC team in the specification of special experience requirements for the Contractor and/or Subcontractor and for all highly specialized trades. When finalized and approved, these requirements shall become part of the Bid Package. During the Bid and Award phase, the Consultant shall assist in the review and verification of the special experience qualifications submitted by the Contractor and/or proposed subcontractors. The Consultant may be required to participate in site visits in order to view qualifying work.

i. Multiple Design Options

Design options should include at least one proposal that addresses complete conformance with the Secretary of the Interior's Standards. Each scheme must fully explain the approach and the consequences as they relate to preservation issues. Each such scheme must also be accompanied by a cost estimate, and must include a life-cycle analysis with long-term cost/benefit scenarios.

j. Historic Preservation Specialists

The Consultant shall provide a full range of preservation and conservation services by qualified experts. These experts shall be used wherever appropriate, in all phases of the project, including construction. The level of their participation and the extent of their responsibility shall be clearly defined at the beginning of the project. Specialists who may be required include, but are not limited to: historians, archaeologists, architectural and art conservators, materials specialists, historic structural and systems engineers, historic landscape architects, and advisors on special crafts associated with historic properties.

k. Preservation Plan

The Consultant must develop a preservation plan, based on well-documented information and integrated with overall project objectives.

F. Structural Engineering Design Criteria

Building superstructures, foundations, site structures, façade and masonry repairs, building inspection, equipment attachments, and miscellaneous architectural work shall be designed by a Structural Engineer. The work shall be in accordance with the latest NYC Building Code and all currently approved local laws. Steel and concrete design shall be based on the latest edition of the AISC and ACI codes. NYC Building Code design load criteria shall be supplemented by ASCE 7-05: Minimum Design Loads for Buildings and other Structures, including Appendix C. For descriptions and analysis of existing conditions of buildings, use the standard language provided in the ASCE 11-99 Guidelines for Structural Condition Assessment of Existing Buildings.

1. GENERAL CRITERIA

a. Structural Integrity

Both foundation and superstructure systems shall be designed to meet all structural integrity, strength, serviceability, and appearance criteria as defined by code or shall surpass them if required by DDC. Serviceability criteria include floor vibrations, deflections, floor to floor drift, and water tightness. The structural design shall provide for crack control, and resistance to corrosion or to other aging factors. The design shall eliminate detrimental effects of any anticipated settlement.

b. Coordination

The Structural Engineer shall coordinate work with that of all other Consultants to accurately show on drawings all major openings through structural walls, roofs, and floors with the necessary dimensions and framing. No openings shall be determined in the field with the exception of minor openings drilled by the respective contractor.

c. Economy

While meeting all strength and serviceability criteria, the design is expected to minimize use of material and be economical.

d. Probes and Other Investigations

The Consultant shall request borings, probes, and other exploratory studies as needed for a safe design and a construction operation with minimal uncertainties. For additional information regarding probes and subsurface conditions; see Section K, Investigative Design Criteria for Structures and Soils, of this appendix. The Consultant is responsible to monitor the execution of the probes.

e. Fire Protection

The Structural Engineer shall collaborate with the Architect on the design and specification of proper fire protection of all materials specified in the structural design.

f. Construction Tolerances

The Construction Documents shall indicate specific tolerances for all structural materials used in the project. The tolerances shall be in accordance with ACI 117, AISC Code of Standard Practice and other national standards.

g. Other Codes

At the direction of DDC, the requirements of the Code may be supplemented by more stringent provisions of the latest editions of the International Building Code, AASHTO, and the NYC or NYS Departments of Transportation.

h. Calculations

Calculations are required. The Consultant shall submit a comprehensive set of structural design calculations, including any working drawings or sketches that may be required for their proper supplementation, showing detailed stress analysis of all members. If RAM Steel or STAAD analysis/design programs are used for the designs, DDC may request the computer models to be submitted as part of the review submission. The calculations/ design notes shall be arranged in a logical sequence, with sheets sequentially numbered and properly indexed.

i. Progressive Collapse

Designs that facilitate or are vulnerable to progressive collapse must be avoided. Consultants may apply static and/or dynamic methods of analysis to meet this requirement. In recognition that a larger-than-design explosive event may cause a partial collapse of the structure, new facilities with a defined threat must be designed with a reasonable probability that, if local damage occurs, the structure will not collapse or be damaged to an extent disproportionate to the original causer.

2. FOUNDATION DESIGN

a. Foundation Type

The Consultant shall evaluate the boring data provided by DDC to determine the most suitable and economical type of foundation. The foundation shall be properly designed, detailed, and specified on the structural drawings and specifications.

b. Geotechnical Report

When required by the scope of work, the Consultant shall retain a geotechnical subconsultant as part of basic services to prepare a report with recommendations for the foundation including instruction for seismic design. In this geotechnical report the potential for liquefaction and other data to be used in seismic design shall be identified. The geotechnical report shall be based on the boring location plan issued by the Consultant and submitted at the Pre-Schematic and/or the Schematic Design Phases of the design, if applicable. Refer to Section K of this Appendix “Investigative Design Criteria for Structures and Soils” for additional information.

c. Need for Underpinning

The Consultant shall evaluate the site wherever project scope is adjacent to existing structures, and shall prepare a foundation design that eliminates or minimizes underpinning.

i. The consultants shall identify and indicate on the drawings the extent and generic details for underpinning of any structures adjoining or adjacent to the area of work.

ii. The drawings shall provide a clear illustration to the contractor as to the conditions for underpinning.

iii. Executable instructions to the contractor shall be provided, including, but not limited to, tolerances, maximum depth for stepping, shoring, and life safety.

iv. The design of the underpinning is the responsibility of the contractor. The design has to be produced, signed and sealed by a Professional Engineer licensed in the State of New York.

v. The contractor is also responsible for monitoring the conditions of the adjacent buildings and other structures affected by the underpinning.

vi. Underpinning shall be identified as a special inspection and shall be listed under the special inspections.

vii. The Engineer of Record shall review the Contractor's Underpinning designs.

d. Ground Water

The Consultant shall evaluate the boring data provided by DDC to determine ground water conditions. See Section K of this Appendix, "Investigative Design Criteria for Structures and Soils". The boring data shall contain sufficient water level readings to provide comprehensive information on site conditions. If subsurface waterproofing is recommended by the Consultant, all pertinent waterproofing details shall be shown on structural drawings and stated in the specifications. Guarantee and testing methods for subsurface waterproofing shall be indicated.

e. Settlement

Adequate foundation support shall be designed to prevent any differential settlement for all site structures and utility lines where such settlement could have detrimental effects on facility operations, health, and safety.

f. Unsuitable Soils

Where soils are unsuitable for supporting ground floor slab on grade, such floor systems shall be structurally framed and supported on foundations or on properly compacted controlled fill.

3. PILES

a. Consolidating Soil

Piles shall be designed for any negative skin friction for actively consolidating soil.

b. Pile Type

Pile types not mentioned in the NYC Building Code shall be specified only after appropriate design analysis is performed and approval from the DOB is obtained. DOB determination is required prior to Design Development Phase kick-off.

4. LOADS

The structural drawings shall clearly indicate all the vertical and lateral loads for which the structure has been designed. The dead, live, equipment and all other applicable loads shall be listed in a tabular form for each floor of the building. The following data are required:

a. Stress

All stress information required for the proper development of all members and for the detailing of the connections.

b. Support End Reactions for Girders.

c. Column Schedule

The schedule shall indicate the total cumulative load at the base of each column.

5. EXTERIOR CLADDING AND MASONRY

The Structural Engineer shall advise the Architect on the location of joints and anchorage of cladding. The cladding shall accommodate drift, deflection and other movement of the base structures. The Consultant is responsible for the strength and code compliance of all masonry elements, including brick, block, stone, and mortar. The Structural Engineer shall advise the Architect on the ASCE wind requirements for glazing and roofing design and specifications. Attachment and reinforcement of all masonry areas, especially parapets, shall be clearly detailed on the drawings. Significant structural investigation shall be conducted on landmarks and landmark quality structures; see Section E of this appendix.

6. BUILDING MATERIALS

All building materials and construction types acceptable under the Building Code are allowed. However, special consideration should be given to materials that have inherent ductility and are better able to respond to load reversals (i.e. cast-in-place reinforced concrete and steel construction). Careful detailing is required for material such as pre-stressed concrete, precast concrete, and masonry to adequately respond to the design loads.

7. SEISMIC DESIGN

New buildings and additions to existing buildings shall be designed for seismic forces. When required, the Consultant shall also perform seismic design according to the latest Code requirements. The design shall meet the latest code provisions for seismic design for all specialties, including electrical, plumbing, and mechanical design.

a. Critical Infrastructure

Special consideration shall be given to structures for police, fire, and emergency medical services and emergency management.

b. New Additions

For new additions, any items in the existing building that are integrated with the life safety systems in the new addition shall also meet the seismic requirements.

c. Existing Buildings

If an existing building is required to meet the requirements of the NYC Seismic Code (Local Law 17 of 1995) and a waiver cannot be obtained, the retrofit work must meet such requirements. Seismic retrofit design shall be in accordance with NEHRP guidelines (FEMA 273) and with the provisions of ASCE standard ASCE/SEI 41.

d. Seismic Evaluation and Mitigation of Existing Buildings

Not all seismic deficiencies warrant remedial action. Seismic upgrading is an expensive and often disruptive process, and it may be more cost effective to accept a marginally deficient building than to enforce full compliance with current standards. Evaluation of existing buildings must be in accordance with the provision of the ASCE standard ASCE/SEI 31-03.

e. Existing Parapets and Exterior Walls

Parapets that are entirely rebuilt, and any complete floor to floor reconstruction of an exterior wall, must include all reinforcement and anchorage as required by the seismic code.

f. Restraining Devices

All restraining devices shall be approved by an independent testing agency. Calculations (including combining of tensile and shear loadings) for seismic restraint designs must be stamped by Contractor's registered professional engineer with at least five years of seismic design experience in New York State.

g. Seismic Strengthening for Non-structural Elements

Where deficiencies in the attachment of elements of structures, non-structural components, and equipment pose a life-safety risk, they must be prioritized and those elements with the greatest life-safety risk strengthened first to meet current standards.

h. Generic Details

Generic seismic restraint details shall be shown on the Contract Documents. A note shall be added stating; "Details are shown to illustrate the scope of work. Contractor's Registered Professional Engineer shall provide calculations and be responsible for providing signed/sealed Shop Drawings indicating locations of seismic restraints and the required connection details to file with DOB."

i. Seismic Calculations

Local NYC accelerations are to be used when computing seismic inertia forces even though OSHPD of California provides pre-approval number. Calculations (including combining of tensile and shear loadings) for seismic restraint designs must be stamped by Contractor's Registered Professional Engineer with at least five years of seismic design experience in New York State.

8. CONCRETE

a. Concrete Strength

Structural concrete shall have a minimum compressive strength of 4000 psi at 28 day. All concrete exposed to the weather or soil shall be air entrained.

b. Durability

Where concrete is used, the specification shall follow, at a minimum, instructions and guidelines of the latest American Concrete Institute publication on durability of concrete.

c. Concrete Specification

The concrete specification shall indicate the optimal quantities of water, cement, aggregates and admixtures, along with acceptable levels for slump and air content.

d. Reinforcement

i. Epoxy coated reinforcing bars shall be specified for all concrete foundations and other structural elements subject to water and chloride penetration, such as in garages and firehouse apparatus floors.

ii. Structural synthetic macro fibers shall be used in lieu of welded wire meshes where reinforcement is required to be provided for temperature and shrinkage control.

e. Testing

The Consultant shall be capable of interpreting the tests and statistical data on materials specified in the structural design.

f. Joints

A joint location plan shall be prepared and submitted clearly identifying the locations for all shrinkage and temperature crack control joints in all concrete construction – especially for slabs on grade. Sections shall be provided detailing the joints and their reinforcement requirements.

g. Slab on Grade

The Consultant shall design, detail, and adequately specify all new slabs on grade to minimize or eliminate cracking and curling. Structural Synthetic Macro-Fibers should be used as a substitute for welded wire fabric reinforcement to minimize cracking in concrete from both plastic shrinkage and temperature shrinkage. The design shall meet the requirements of ACI 360 R, Design of Slabs on Grade, and other applicable guidelines.

h. Pozzolans in Concrete

Use pozzolans (fly-ash and blast-furnace slag) in concrete in accordance with ACI 318 Chapter 4. See Section D of this appendix, Sustainable Design Criteria.

9. STEEL

a. Connection Calculations

Drawings shall have sufficient information for the calculation and preparation of shop drawings for steel connections.

b. Weldability

The Consultant shall require weldability tests for all existing steel that might have been manufactured prior to 1920.

10. PROBES

For information pertaining to probes and subsurface conditions please refer to “Section J” of this appendix. The Consultant must monitor the execution of probes.

11. STRUCTURAL CONDITION RATING

All structural inspection reports, including those pertaining to building facades, shall use a rating system to classify the results of the inspection. The rating system definitions shall be indicated in each report. The first two categories of any such rating system shall use the following definitions:

a. Hazardous Condition (Rating 1)

All conditions deemed to present an imminent danger to life and safety of the public or an imminent danger of blocking emergency rescue operations. Such conditions require immediate protective action and shall be communicated without delay to an Assistant Commissioner at the DDC.

b. Emergency Condition (Rating 2)

All conditions deemed to become hazardous or induce hazardous conditions in the six months following the inspection if no action is taken.

c. Other Conditions and Definitions

Further rating definitions shall be established in agreement with the scope of each project. When performing building inspections the conditions of windows, railings, fences, and pavements shall be included in the scope of work.

12. ANCHORING SYSTEM

All designs requiring anchoring systems in existing construction shall specify manufacturer, type, size, depth of embedment, and load to be attained. Where the Consultant has doubts about the capacity of specified inserts, instructions for inspection and field testing during installation shall be provided. Anchors exposed to weather should be protected against corrosion.

13. DEMOLITION

The Consultant shall prepare and or review demolition and selective removal drawings and ensure that the proposed work is feasible. The Consultant shall indicate phasing of demolition in accordance with the NYC Building Code.

14. TENANT SAFETY PLAN

For all work in existing structures that will continue to be occupied during construction, the Consultant shall prepare a tenant safety plan for approval by DDC.

15. TEMPORARY STRUCTURES

The Consultant is responsible for reviewing the contractor's shop drawings for the installation of temporary structures or equipment.

G. HVAC and Fire Protection Design Criteria

HVAC and Fire Protection systems and equipment shall be designed and engineered. All work shall comply with Code and utility requirements. Energy and water conservation is a requirement of all mechanical systems. All Mechanical Engineering Drawings are to be coordinated with all disciplines; mechanical and fire protection systems shall be designed to avoid inappropriate juxtaposition with other utilities. The services of specialty Sub-consultants shall be made available when required by the nature of the work.

1. GENERAL

a. Mechanical systems must be designed to support the performance objectives defined for the project's program requirements.

b. The Consultant must select and design an HVAC system that meets the performance criteria noted under 'HVAC Performance Characteristics' below and is optimized for the building type and program requirements.

c. Maintainability, efficiency, and reliability are prerequisite requirements for public buildings. **Accessibility -** The design and installation of all mechanical systems and equipment must allow for their access, service, repair, and eventual removal and replacement, including major system components such as boilers, chillers, cooling towers, pumps and air-handling units. Comply with the manufacturer's recommended clearances around installed equipment, unless otherwise directed by the Client Agency.

d. Equipment Capacities/ Peak and Part-Load Performance

The design must be capable of achieving the peak and part-load performance objectives associated with the project program requirements. Installations for which DDC and/or the Client Agency requires 100% plant capacity redundancy will be designed so that the plant capacity will remain at 100% in the event of loss of one unit. For all other installations, utilize modular boilers or chillers for base peak and part-load operation. All equipment capacities and redundancies shall be reviewed during Schematic Design and Design Development, and must be approved prior to proceeding with Construction Documents.

e. Equipment Location

HVAC systems and equipment shall be integrated into the architectural design for both exterior and interior locations. In general, HVAC equipment shall not be visible from the street. All roof and outdoor locations for equipment must be installed to applicable Client's Agency security standards and the Noise Control Code. For interior equipment, consideration must be given to aesthetic compatibility with the spaces and noise levels. For mechanical room space and equipment placement requirements, see Section B of this Appendix, "Architectural Design Criteria".

f. Equipment Schedules

Heating elements and fin-tube schedules shall include length and capacity. Cooling equipment schedules shall include physical size, performance and capacity. Mechanical equipment schedules shall indicate motor brake horsepower, motor horsepower, voltage, phases, frequency, manufacturer and model number.

g. Sustainability

Balancing occupant comfort and fresh-air ventilation with effective energy conservation, water conservation, and other measures of mechanical system sustainability can only result from an integrated design approach. For more information, see Section D of this Appendix, “Sustainable Design Criteria”.

2. APPLICABLE CODES AND STANDARDS

An analysis shall be made of all applicable codes and standards, local laws, and regulatory agency requirements as they pertain to the provision of a complete system of fire protection and HVAC for the project. This will include seismic restraint and energy codes as required. At a minimum, the Consultant shall design the mechanical systems to meet the following:

a. NYC Building Code

b. NYC Mechanical Code

c. NYC Fuel and Gas Code

d. NYC Electrical Code.

e. NYC Fire Code

f. NYC Local Law 86 of 2005

g. NYC Local Law 113 of 2005 (Noise Code)

h. NYC Energy Conservation Code.

i. Regulations of the New York State Department of Environmental Conservation Code

j. NYC Department of Environmental Protection (DEP) regulations, rules and guidelines.

k. All applicable rules, regulations and requirements of Federal, State and Other Authorities having jurisdiction and local utility companies having jurisdiction.

l. The following reference standards of the NYC and NYS codes, as adapted, including but not limited to:

- **i**. American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE), All latest Standards and Handbooks
- **ii.** Sheet Metal & Air Conditioning Contractors’ National Association, Inc. (SMACNA) Standards.
- **iii.** National Fire Protection Association (NFPA) Standards.

3. COMPLIANCE WITH LOCAL LAW 86 OF 2005

a. New Construction, Additions, and Substantial Reconstruction

The following provisions are required to support LEED certification and, for projects with a construction cost greater than $12M, the 20-30% energy cost reductions required by LL86:

- **i.** The HVAC systems of new buildings, additions, and existing buildings undergoing substantial reconstruction shall comply with ASHRAE 90.1 ‘Energy standard for Buildings except Low-Rise Residential Buildings’ or the NYC Energy Conservation

Code, whichever is more conservative as applied to the project. The Code requires minimum equipment performance, minimization of distribution losses, optimization of controls, and the ability to take advantage of "free cooling", i.e., the usage of an economizer.

ii. The Consultant shall submit to DDC the following written statement: "To the best of my knowledge, belief, and professional judgment, the Drawings and Specifications comply with the more stringent requirements of the NYCECC as compared to ASHRAE 90.1."

iii. HVAC comfort controls: Central heating and venting units being replaced or retrofitted shall operate during occupied periods with demand controlled ventilation and must be provided with provisions for heating setback and cooling setup or morning purge during unoccupied periods.

iv. Boilers: Gas fired condensing boilers must be used, regardless of the gas utility connection fee.

b. Capital Improvement Projects: HVAC Comfort Controls

The following provisions are required to support the 5% energy cost reductions required by LL86 for HVAC comfort control projects with a construction cost greater than $2M:

i. Heating and ventilation Air Handling Units that recirculate air shall be provided with Carbon Dioxide (CO2) sensors for demand controlled ventilation. The sensors shall control the outside air, spill exhaust and recirculating dampers.

ii. 100% outside air handling units shall be provided with Carbon Dioxide (CO2) sensors and Variable Frequency Drives (VFD). Provide VFDs for supply and remote exhaust fans. Synchronize operation of the heating and ventilation unit with the supply and remote exhaust fan and operation of the dampers.

iii. If the Air Handling Units are retrofitted, the existing controls (typically pneumatic) will be replaced with stand-alone Direct Digital Controllers (Ddc) with integral operator display device. The Temperature Controls Contractor shall furnish and field install the controls. The operator will be able to change setpoints, set schedules of operation (occupied on/occupied off), and make other such adjustments.

iv. It is preferable to provide native Lon controls for retrofitted and/or replaced units. If provided controls are not Lon, a gateway to Lon must be available for integration into a possible future BAS/Ddc Lon network. The gateway will not be provided at the time of the Capital Improvement Project's construction.

c. Capital Improvement Projects: Boilers

The following provisions are required to support the 10% energy cost reductions required by LL86 for boiler projects with a construction cost greater than $2M:

i. Where existing conventional boilers with oil burners are to remain, it is preferable to provide new burners designed for natural gas, which produces lower pollutant levels.

i. The Consultant must perform and present an analysis reflecting the current differential operating costs associated with each type of fuel and the capital expenditures required in order to utilize a given fuel type. Capital expenditures for new gas burners may include the gas utility company hook-up fee, the costs of a stainless steel liner for the existing chimney, and possible repair costs to the existing tanks mounted in concrete vaults.

ii. Buried tanks shall not be reused and shall either be left in place and filled with inert foam, or removed if a soil study indicates that a soil remediation is required.

4. EXISTING CONDITIONS

a. Surveys

The survey shall record all equipment and conditions, including the age and condition of all heating and cooling equipment such as boilers, AC units, fans, piping, and insulation, and the operating results achieved through their use.

b. Existing Systems Assessment

For existing systems the Consultant shall assess the Fire Protection and HVAC equipment, and where necessary, propose recommendations in order to obtain an efficient and safe operating condition.

5. EQUIPMENT CONNECTIONS

a. New Equipment Connected to Existing System

For existing buildings, the report shall state if the new equipment installation is connecting to an existing system, and, if so, whether the existing equipment is to be refurbished before the new connections are made.

b. Schedule of Equipment to be Overhauled

For existing equipment to be overhauled or replaced, the Consultant shall make a complete schedule of all HVAC equipment. The schedule will list working condition, requirements for repair, and appropriate remaining potential useful life.

6. ALTERATIONS IN EXISTING BUILDINGS AND HISTORIC STRUCTURES

HVAC work in alteration projects should seek to meet the standards described in this section of the Appendix for new projects. Compliance with all HVAC design criteria is required whenever feasible.

a. Equipment/Systems Replacement

Equipment/systems aged 20 years and older, or beyond their useful service lives, should be evaluated for possible replacement with new systems designed to meet the proposed usage of the facility. Remodeling must make building systems become more flexible; renovation and rehabilitation designs must satisfy immediate occupancy needs as well as anticipate additional future changes. Parameters of reuse and disruption of service must be clearly specified in Construction Documents. The result of these projects should be enhanced performance, not just equipment replacement.

b. Objectives of Alteration Projects

The objectives of HVAC design will differ for three basic types of alteration:

i. Refurbishment of an area within a building, such as a floor or suite, should seek to satisfy the new requirements within the parameters and constraints of the existing systems. The smaller the area in comparison to the overall building, the fewer changes to existing systems should be attempted.

ii. Major renovation of an entire structure provides the opportunity to significantly upgrade the mechanical, electrical, and communication systems. The upgraded mechanical services should achieve performance close to that of systems that would be designed for a new building, within the obvious limits of available physical space and structural capacity.

iii. Work on a designated landmark or landmark quality property shall be guided by criteria provided by the DDC Historic Preservation Office, including the latest updates of published guidelines, standards, and rules pertaining to historic preservation. Re-use of historic HVAC system elements is permitted only with approval from DDC A+E unit. See below and Section D of this Appendix, "the Historic Preservation Design Criteria", for additional information.

c. Guidelines for HVAC Work in Historic Buildings

It is important to anticipate how the system will be installed, how damage to historic materials can be minimized, and how to minimize the visibility of the system within the restored or rehabilitated space.

i. Design HVAC systems to avoid impacting other systems and historic finishes, elements, and spaces. Select system types, components, and placement to minimize alterations to significant spaces. In spaces previously altered, design systems to allow historic surfaces, ceiling heights, and configurations to be restored.

ii. To the greatest extent possible, ensure that space is available to maintain and replace equipment without damaging significant features. Select components that can be installed without dismantling historical window or door openings.

iii. Place exterior equipment where it is not visible, particularly from public streets. Recess equipment from the edge of the roof to minimize visibility from grade. Alternatively, consider creating a vault for easier access to large mechanical equipment. If equipment cannot be placed out of sight, specify equipment housings or screens in harmony with existing building and site elements.

iv. Locate equipment with particular care for weight and vibration. Some older building materials and construction assemblies cannot accept the same stresses as newer construction.

v. If new ceilings are to be installed, ensure that they do not block any light from the top of existing windows or alter the appearance of the building from the exterior. Original plaster ceilings in significant spaces, such as lobbies and corridors, must be retained to the extent possible and modified only as necessary to accommodate horizontal air distribution. Use soffits and false beams only where necessary to avoid the need to reduce ceiling heights.

vi. In buildings containing ornamental or inaccessible ceilings, piping and ductwork should be routed in furred wall spaces or exposed in the occupiable building area. However, exposed piping and ductwork should be considered in historic industrial buildings with open plan, high ceilings, and tall windows.

vii. If new vertical distribution ductwork or piping is required, it should reutilize or be located adjacent to existing shafts.

viii. Retain decorative elements of historic systems where possible. Ornamental grilles and radiators and other decorative elements should be retained in place.

ix. Retain elements of the original system where a new system cannot be totally concealed or would be historically inappropriate. For example, reuse existing radiator enclosures for modern heating and cooling units, rather than adding another type of system that would require the addition of ceilings or other non-original elements.

x. Select temperature and humidity setpoints that do not accelerate the deterioration of historical building materials.

7. HVAC PERFORMANCE CHARACTERISTICS

Sustainability is integral to any HVAC design and is accomplished by integrating the performance characteristics listed below through a design methodology involving all design team members. For more information, see Section D of this appendix, Historic Preservation Design Criteria.

a. Program Compliance

All Client Agencies' program requirements for HVAC design must be met. The design shall comply with the Client's Agency design standards and the user's needs.

b. Thermal Comfort and Humidity Requirements

The HVAC systems shall be designed in accordance with NYC ECC (Ref. Std. ASHRAE 183) and the following table. Other criteria may be substituted only with DDC approval.

i. Outside design conditions will be based on Code and/or as per Client Agency requirements and as follows:

Outside Design Conditions	
Summer	Winter
85ºF - 95ºF DB 71ºF - 75ºF WB 7.5 MPH wind	5ºF - 15ºF DB 15 MPH wind

ii. Indoor design conditions will be based on Code and/or as per Client's Agency requirements and as follows:

Type of Area	Summer		Winter	
	DB	RH	DB	RH
Habitable and Occupied Spaces	71ºF	40-60%	72ºF	40-60%
Storage Areas	85ºF	-	65ºF	-
Lobbies, Atriums, Corridors, and Circulation areas	75ºF		72ºF	
Mechanical/Electrical Rooms	95ºF	-	55ºF	-
Elevator Machine Rooms	78ºF	-	55ºF	-
Computer and IT Rooms	70ºF	50%	72ºF	40%
Telecommunication Rooms	70ºF	50%	72ºF	40%

c. Ventilation

The consultant shall evaluate whether a ventilation system as recommended by the ASHRAE method of design is more energy efficient than a system conforming to Code. To provide for such a determination during Schematic Design, the Consultant shall clearly identify the impact on heating and cooling loads, and initial and operating costs of conforming to the ASHRAE recommendations. DDC shall review the Consultant's recommended system, including outdoor air quantities, prior to proceeding with Design Development.

d. Air Quality

To provide health and comfort of the building occupants, design the mechanical system to meet the requirements of the Code or an approved method of engineering analysis

i. Filtration – Air filtration must be provided in every air-handling system. Air handling units must have the capability to pre-filter and a final filter (as required), each located at the cooling and heating airstreams.

ii. Contaminant Control – The Ventilation and Exhaust systems must prevent occupant exposure to noxious and harmful levels of indoor air contaminants. This includes but is not limited to: Carbon Dioxide, Carbon Monoxide, Formaldehyde, Ozone, Particulates and Radon.

iii. Pressurization Control – Unless otherwise required, for specialty occupancies, to reduce the infiltration of unconditioned outdoor air, the ventilation system must continually provide positive pressure in the perimeter zones with respect to outdoor air pressure.

iv. Occupant Controls – Limit the size of thermostatically controlled zones to provide tenants with more direct control over their thermal comfort and to reduce impacts of variable loads to tenants. System zoning shall be defined by the requirements of occupancy schedule, energy conservation and back-up capability. Off hours operations should reset the control sequence to energy conserving conditions.

e. Interior Noise Control

Limit occupant exposure to excessive mechanical noise and vibration. Any equipment generating indoor noise shall meet the requirements of the NYC Codes and applicable Reference Standards and Maximum Noise Criteria (NC) indicated in the table below:

i. Consultant's Responsibility

The Consultant is responsible for providing for acoustical design services and testing, as required, to assure that the mechanical systems perform within the guidelines set forth by ASHRAE in the "Recommended Indoor Design Goals for Air Conditioning System Sound Control". If, in the opinion of DDC, the Consultant does not have adequate noise control experience or expertise in-house, DDC reserves the right to direct the Consultant to engage an approved acoustical consultant to perform the required design services.

ii. Special Use Areas

Special attention shall be paid to certain special areas which require sound isolation and minimized cross-talk.

iii. Maximum Noise Criteria (NC):

Space	Max Noise Criteria (NC)
Office Space (confidential speech privacy)	**30**
Office Space (normal speech privacy)	**35**
Open Plan Office	**40**
Meeting Rooms	**25**
Auditorium	**25**
General Circulation/Lobby Area	**40**
Courtrooms, judges' chambers, jury rooms, prisoner consulting rooms, and prisoner detention areas:	Noise transmission to and from areas requiring confidentiality must be attenuated to meet the acoustics requirements in the DCG and the Client's Agency Design Standards.

iv. HVAC Ductwork and Fan Noise

The ductwork design must address airborne equipment noise, and vibration, duct-borne fan noise, airflow-generated noise, and duct borne crosstalk noise.

1. Duct noise control must be achieved by controlling air velocity and/or by the use of sound attenuators such as duct silencers.
2. Acoustically lined ducts may only be used (in addition to duct silencers) if the usage of duct silencers alone fails to provide acceptable noise levels or if space constraints preclude the sizing of the ducts to provide low velocity levels. If fiberglass duct lining is used, it shall be covered with an antimicrobial coating and sealed with an acrylic polymer. Fibrous materials must not be exposed to the airstream.
3. Where possible, all volume dampers and VAV boxes shall be located 5 to 10 duct diameters downstream/upstream of the volume control device inlets and outlets, with a minimum distance of 2 ft.
4. Ceiling diffusers and ceiling return grilles shall not be provided with opposed blade dampers when a lay-in acoustical ceiling or gypsum ceiling equipped with access doors is provided. Each ceiling diffuser and ceiling return grille shall have a dedicated accessible volume damper installed in its branch. Ceiling diffusers and ceiling return grilles shall only be equipped with opposed blade dampers (in lieu of branch volume dampers) when it can be demonstrated that space constraints preclude the installation of branch volume dampers. Wall supply and return registers may be equipped with opposed blade dampers in lieu of branch volume dampers if access cannot be provided for branch volume dampers.
5. Consultant shall determine the maximum CFM allowed for non-fan-powered boxes. Non-fan-powered boxes (conventional) shall be utilized as the standard. Custom air conditioning units shall be provided with integral acoustically lined plenums on the return and supply sides. Plenums shall be double walled and lined with rigid fiberglass boards that shall not erode. Inner walls shall have perforations to absorb the sound energy.

6. Use acoustical lining or external wrapping on the ductwork to impede fan-generated noise immediately outside of any mechanical room wall.

7. Acoustic lining in the supply and return air ductwork in courtrooms, judges' chambers, conference rooms and similar spaces is permitted provided that fibrous materials are not exposed to the airstream

8. If linear supply diffusers are used, their integral plenums shall be provided with factory applied internal acoustical lining.

v. **HVAC Equipment Vibration**
Design to prevent propagation of vibration to the building structure shall follow the requirements of the ASHRAE Applications Handbook, Sound and Vibration Control. In addition, the entire mechanical installation, including all exterior and roof mounted equipment including air cooled chillers, air cooled refrigerant condensers, cooling towers, fans, and air-handling units, shall meet all noise control requirements of the Code and DEP

1. All rotating equipment in the building must be isolated. Inertia bases must be provided for reciprocating and centrifugal chillers, air compressors, all pumps, axial fans, and centrifugal fans.

2. Isolators must be specified by type and by deflection. Specifications must be worded so that isolation performance becomes the responsibility of the equipment supplier.

3. Consultant shall determine if factory provided isolators sufficiently attenuate the vibration considering the flexibility and nature of the floor or structural roof. If it is determined that the factory provided isolators are insufficient, the Consultant shall specify the required field erected vibration isolators (stiffness, static deflection, etc.) and indicate them on the Construction Documents. A vibration analysis shall be submitted for review.

4. Flexible duct and piping connectors shall be provided at equipment joints. All ductwork connections to equipment having motors or rotating components must be made with a 6 ft. length of flexible connectors. Use airtight flexible connections at the inlet and at the outlet of all air handling units, supply and exhaust fans, and at other locations where duct and piping connects to vibration isolation equipment.

5. All ductwork within the mechanical room or serving courtrooms must be supported with isolation hangers.

6. Ducts and pipes must also be isolated as they penetrate shafts and chases. All openings for ducts and piping must be sealed.

vi. **HVAC Piping Vibration**
Spring/neoprene isolation hangers are required for all piping in mechanical rooms and adjacent spaces, up to a 50 ft. distance from vibrating equipment.

1. In mechanical rooms, the pipe hangers closest to the equipment must have the same deflection characteristics as the equipment isolators. Other hangers must be spring hangers with ¾ in. deflection.

2. Positioning hangers are required for all piping 8 in. and larger throughout the building. Spring and rubber isolators are required for piping 2 in. and larger that is hung below noise-sensitive spaces.

3. Floor supports for piping must be designed with spring mounts or rubber pad mounts.

4. Anchors and guides for vertical pipe risers must be attached rigidly to the structure to control pipe movement. Flexible pipe connectors must be designed into the piping before it reaches the riser.

5. Channel supports must be provided to support multiple pipes and heavy-duty steel trapezes.
6. Hanger and support schedules must specify the size, type, location, and manufacturer's number.

vii. Interior Acoustical Design Compliance Report

If required, the Consultant shall prepare a report on acoustical design compliance addressing the possible need for the following (including but not limited to):

1. Usage of sound traps or acoustical lining upstream and downstream of the air handlers and air conditioning units.
2. Mounting of rooftop equipment on dunnage (in lieu of curb mounting).
3. Usage of integral elbow type sound attenuators in the supply and return air plenums of the air conditioning units.
4. Usage of elbow type sound attenuators connected to the return grilles.
5. Locating the units over non-critical spaces where possible (e.g., corridors, storage rooms, etc.).
6. Usage of 16 gauge reinforced steel ductwork both upstream and downstream of the air handlers and air conditioning units.
7. Usage of performance based acoustical lining material in lieu of standard 1 in. thick lining.
8. Running commercial rooftop unit ductwork externally on the roof.
9. Enclosing ducts within gypsum construction.
10. Providing acoustic noise barrier walls around the rooftop units.
11. Providing floating slabs.
12. Usage of VAV boxes with better 'ADC Testing' or, as an alternative, lowering the nominal maximum flow of 1200 cfm per fan-powered VAV box based on box location.
13. The possible acceptability of exceeding the nominal maximum flow of 1200 cfm per fan-powered VAV box.
14. Usage of gypsum suspended ceilings with adhesively applied acoustical ceiling tiles in lieu of lay-in suspended ceilings.
15. Usage of double layer gypsum suspended ceilings in lieu of lay-in suspended ceilings.

f. Exterior Noise Control

The design and installation of new or replacement mechanical/electrical equipment on City owned facilities or properties, and the modification of existing fixed mechanical/electrical equipment, when located outside of the building – in a yard, court, on a roof, or where the equipment opens to the exterior of the building – shall be subject to the requirements of the Noise Code and DEP noise control regulations.

i. Objectives

The consultant shall provide a proactive design approach, to assure compliance with the Code. It shall be the goal of the Consultant to specify manufactured equipment with the least available sound output and/or with sound mitigating accessories.

ii. Outdoor Noise Propagation

In the development of HVAC design, the Consultant shall take into consideration the effects of outdoor noise propagation from the site property to nearby "sensitive receiver" properties, and make recommendations for the further evaluation of existing noise conditions at the site and/or the selection of Noise Control Measures (NCM) designed to adequately address Code requirements.

iii. Exterior Acoustical Design Compliance Report

Where further evaluation is required, the Consultant shall perform a project site condition acoustical assessment, and submit an Acoustical Design Compliance report to DDC. The report shall be included in the Consultant's project contract deliverables. As part of the report, the Consultant shall:

1. Determine whether an Acoustical Sub-consultant will be required to perform the evaluation, and, if approved by DDC, retain the services of an Acoustical Sub-consultant with qualifications and experience as set forth in the rules of the Department of Environmental Protection (DEP).
2. At project initiation, perform an initial walkthrough inspection and evaluation to identify location and distance from the project site of any potential line of sight sound receptor location that may be affected by the proposed work, particularly "sensitive receiver" properties.
3. Establish and document existing baseline ambient noise level conditions, advise DDC of any observed sound produced by existing exterior equipment that exceeds Code threshold, and request from DEP a history of violations and/or complaints.
4. Prepare and submit an acoustical analysis of the maximum resultant Sound Pressure Levels resulting from the proposed work, including noise level testing data and manufacturer's equipment operating performance documentation.
5. Confirm that the proposed system design will comply with Code, identify an alternative design approach, or recommend supplementary noise control measures (such as compressor sound blankets, ultra quiet fans, unit lagging, external silencers, and sound barriers) that will limit acoustical energy propagation beyond the site property limits to Code compliant levels.
6. Specify the required Noise Controlled Inspections to be performed by the testing agency of the operating noise level (ambient, directional) after new or replacement of exterior mechanical equipment is installed.
7. Define the maximum permissible rooftop unit and air-cooled packaged chiller Sound Power Levels for each unit and reflect these dB values in the Unit Specifications for the project. The maximum Sound Power Levels shall comply with Code requirements and shall be based on specific project conditions such as the nature of unit mounting (curb or dunnage), deck construction, noise reduction coefficient of suspended ceiling, ductwork routing, ductwork acoustical lining, sound trap attenuation characteristics, etc.

iv. Noise Control Measures

Air handlers and air conditioning units shall be provided with the following if identified in the Acoustical Design Compliance Report:

1. Condenser fans with low rpm ultra-quiet fan.
2. Internal isolation of all rotating components if acceptable considering the floor or roof flexibility.
3. Insulation of void spaces within roof curbs (where curbs are used in lieu of dunnage).
4. Condenser fan attenuators.
5. Acoustically lined double walled outdoor air intake, condenser air intake, and exhaust air hoods.
6. Individual acoustical jacket/sound cover/blanket for each compressor.

v. **Limitations on Noise Control Measures**
Any proposed supplementary noise control measures shall include consideration of the following:

1. Required clearances to equipment for airflow, heat transfer and maintenance access.
2. The physical and structural limitations of equipment apparatus housing and building construction assembly elements (roof, parapet, wall) for supporting accessory sound barrier assemblies.
3. Aesthetic limitations for arranging sound barrier assemblies.

g. Energy Efficiency

Although the HVAC system uses energy to heat, cool and ventilate the building, many of the loads that create the need for heating and cooling are not generated from the HVAC components. Lighting design, fenestration, envelope design, solar orientation, equipment loads, and tenant activity all affect the loads that must be controlled by the HVAC system. Effective energy conservation can only result from an integrated design approach. Nevertheless, the HVAC system must be designed to address the building loads in the most energy efficient manner possible.

h. Conservation of Water

Design the HVAC system to conserve the use of domestic water (as required by the NYC Plumbing Code LL 86/05).

i. Operation and Maintenance

i. **Accessibility**
Design installation of equipment so that it can be safely and easily inspected and maintained. Comply with the manufacturer's recommended clearances around installed equipment, unless otherwise directed by the Client's Agency. Refer to Section B of this appendix for additional requirements regarding access to equipment.

ii. **Operability**
The sequence of operation for the control systems must be clearly described and properly documented. The HVAC system design should simplify control and minimize the need for overly complex control systems.

iii. **Reliability**
Design the HVAC system so that equipment failures and normal maintenance have minimal impact on the users. Failure of one piece of equipment should not negatively impact large portions of the building. Install piping and valves so that different combinations of equipment can be used during replacement and overhaul. Equipment components, spare parts, and materials should be readily available and the equipment should be serviceable, repairable by resources available locally.

iv. **Recapitalization**
DDC often upgrades HVAC systems in large buildings in phases over many years while parts of the building are occupied. The system's design should consider how equipment elements will be replaced in the future. Vertical and horizontal distribution should allow parts of the system to remain in operation and zones of the building to be occupied during equipment replacement.

j. Longevity

Public buildings have a longer life expectancy than most commercial office buildings; many buildings are over 50 years old and are expected to continue in service for decades to come. HVAC systems are expected to have extended service lives. They will be used by many different tenants, operated by many different maintenance providers, and modified many times over the life of the building. Selection of robust, reliable, energy efficient equipment that can be reliably operated over the long term is required.

8. HVAC DESIGN CRITERIA

a. Outdoor Design Criteria

b. Indoor Environmental Criteria

i. **Temperatures and Relative Humidity**
Indoor design temperature and relative humidity requirements noted under 'HVAC Performance Characteristics' above must be maintained in the occupied zone. The Relative Humidity (RH) within areas where artwork is stored or displayed, or where building materials and furnishings are likely to be damaged by changes in moisture content, as defined in the Scope of Work, must be maintained in accordance with the Client Agency requirements.

ii. **Indoor Air Quality**
The ASHRAE Standard 62-.1 Ventilation Rate Procedure or an approved engineering analysis must be used as the basis for design. In addition, compliance with the following maximum levels of continuous occupant exposure to contaminants during full-load and part-load conditions must be demonstrated at each phase of the design:

1. Carbon Dioxide (CO2): Not to exceed 1000 ppm.
2. Carbon Monoxide (CO): Not to exceed 9 ppm.
3. Formaldehyde (HCHO): Not to exceed 0.05 ppm.
4. Ozone (O3): Not to exceed 0.05 ppm.
5. Particulate Matter: Not to exceed 15 µg/m3 for particles less than 2.5 µm (PM2.5), and not to exceed 50 µg/m3 for particles less than 10 µm (PM10).
6. Radon (RN): Not to exceed 4 picocuries/liter.

c. Envelope Load Criteria

i. Heat and Moisture Transfer

ii. The elements and components of the building envelope design must comply with the heat transfer requirements of the code.

iii. Building Pressurization

As required by code, the following areas must be kept under negative pressure relative to the surrounding building areas: Toilets, Showers, Locker rooms, Custodial spaces, Mail rooms, Battery charging rooms and Kitchen areas. Additional areas may be required by NYS Health Code and Client Agency requirements to operate under negative.

d. Internal Load Criteria

i. **Occupancy Load**
Occupancy loads must be determined as follows:

1. Determine occupant density (persons/sq. ft.) from the occupancy schedule of the Client's Agency's Design Standards and ASHRAE Standards.
2. In the event this information is not available, use the occupancy density values in the Code.
3. For dining areas, auditoriums, and other high-occupancy spaces, occupancy densities must represent the number of seats available.

4. Sensible and latent loads per person must be based on expected levels of activity and representative of values stated in accepted industry standards (i.e., the latest edition of ASHRAE Handbook of Fundamentals).

ii. Equipment Power Densities

1. Evaluate internal heat gain from all appliances-electrical, gas, or steam. Base the rates of heat gain from equipment on the manufacturer's data and mechanical design criteria.
2. Coordinate internal heat gain from equipment with the electrical power design, the electrical load analysis and the estimated receptacle demand load outlined in the Electrical Design Criteria, see Section H of this appendix.

iii Lighting Power Densities
Coordinate heat gain from electric lighting systems with the electric lighting design and based on the Electrical Design Criteria.

e. HVAC Zoning Criteria

i. Thermostatic Zoning Design Criteria
Interior Thermostatic control zones must not exceed 1500 sq. ft. per zone for open office areas, or a maximum of three offices per zone for closed office areas. Perimeter thermostatic control zones must not exceed 300 sq. ft. or one column bay width, and must be no more than 15 ft. from an outdoor wall along a common exposure. Each corner office and conference room must be on a separate zone.

ii. Air Handling Unit Zoning Criteria
Air handling units must be selected to serve areas with similar functions and operating hours.

iii. Ventilation Load Criteria
Outdoor air ventilation for the thermostatic control zones must be in accordance with code and the load of the ventilation air quantity must be calculated based on the outdoor design Dew Point and Coincident Dry Bulb temperatures. Full-load and part-load calculations must be conducted as required in the submission requirements and must include the impacts of heat recovery equipment.

iv. Diversity
Where applicable, a diversity factor will be determined and applied for loads at the air-handling units, based on simultaneous peak loads of the thermostatic zones served by each air handler. Central Plant equipment must be designed based on maximum occurring whole-building simultaneous peak load.

v. HVAC Load Calculation Method
The HVAC load calculations must be performed using accepted methods such as ASHRAE Handbook of Fundamentals Cooling Load Temperature Difference (CLTD) method, Heat Balance (HB) Method, Radiant Time Series (RTS) Method, or Transfer Function Method (TFM), developed for the analysis of heating and cooling loads in commercial buildings. The method of analysis must be capable of calculating each zone's peak heating and cooling loads as well as the whole building simultaneous peak load. Variables including solar gains through fenestration, internal gains from occupants, including latent heat for cooling purposes, internal gains from lighting and equipment, outside air loads (sensible and latent) from ventilation and infiltration, and heat and moisture gains or losses through fenestration, walls, floors, and roofs shall be incorporated in the method of analysis. The heating load calculations must be done without credit for lighting equipment, occupants and other sources of internal heat gains. The HVAC load calculations must clearly indicate additional safety factors included in the analysis for review/approval by the applicable Client Agency.

vi. **HVAC Load Calculation Report**
Provide HVAC load calculations at each design phase as required in the submission requirements. The HVAC load calculations report must include all input and output used in the heating and cooling calculation program. The report must also include zone peak heating and cooling loads results and whole-building simultaneous peak load, air-handling unit coil selections, and psychometric charts that show the complete cycle of all of the processes in the HVAC system.

f. Energy Analysis Criteria

i. **Performance Goals**
A building energy analysis must be performed at each phase of the design to demonstrate that the building design meets or exceed the code and the energy performance goals established for the project.

ii. **Methodology**
The compliance methodology must be in accordance with code, and in accordance with the project's submission requirements.

1. The optimization of envelope and massing must be completed during the Schematic Design. Systems and sub-systems must be finalized during Design Development. The energy analysis done for the construction documents must use actual design parameters.
2. Each analysis must be based on the actual parameters and values defined in the project's program requirements and not simply on defaults assigned by the simulation program. Such requirements shall include the operational program for each day of the week and holidays, the number of required HVAC zones, part-load performance curves for mechanical equipment, capacity and efficiency corrections curves for mechanical equipment, and the use of airside and waterside economizers, heat recovery, and/or automatic control systems, if applicable. Any variations in the input summary must be documented.
3. Simulation must be based on 8,760 hours per year, with hourly variations in occupancy, lighting power, miscellaneous equipment power, vertical transportation, thermal mass effects, and thermostat setpoints.
4. The simulation program must be a computer-based program for the analysis of energy in buildings. Use one of the following public domain or commercial software programs: Energy-Plus, Trane Trace 700, Carrier HAP, Elite.

iii. **Reports**
The energy analysis report for each phase of design must include a narrative describing how the project's energy goals are to be achieved. Include a statement of the expected error in the energy analysis.

9. COMMON HVAC COMPONENTS

Generally the HVAC system will consist of a central system, a distribution system and a terminal control system (Building Automation System [BAS]).

a. General Requirements

i. Where feasible and as otherwise required, all central plant equipment shall be selected to provide efficient part-load operating performance. The term "central plant" refers to systems that are located within the building in designated equipment areas such as chiller or boiler room.

ii. All central plant equipment must have Direct Digital Control (Ddc) self-contained controls that have the capability to interface with the Building Automation System (BAS).

iii. All central plant equipment with electric motors must have the capability to interface with metering devices for determining energy consumption data, and reporting the data to the BAS.

b. "Green" Central Plant Systems

i. Ground-Source and Water-Source Heat Pumps
The geotechnical survey and test wells (see Section K of this Appendix, "Investigative Design Criteria for Structures and Soils") shall establish the feasibility of using a ground-source or water-source heat pump system. Refer to the DDC Geothermal Heat Pump Systems Manual for more information.

ii. Thermal Storage
Ice on coil thermal storage systems must include prefabricated tanks with glycol coils and water inside the tank. The tank must be factory insulated and the vendor must guarantee its capacity and performance. Other types of thermal storage systems may be considered.

iii. Renewable Energy Alternatives
Where feasible, solar thermal, photovoltaic, geothermal, wind, bio-waste, and biogas systems shall be investigated and may be proposed if supported by Life Cycle Cost analysis. DDC has a strong interest in demonstrating the feasibility of near-net-zero City facilities. See Sustainable Design Criteria in Section D of this Appendix.

iv. Combined Heat and Power (CHP)
Based on an analysis of the coincidental power and thermal loads, an on-site CHP system may be considered if the site baseline thermal load can be served continuously from the generation of onsite power. The Life Cycle Cost (LCC) analysis must include all expected service and overhaul costs.

v. Combined Heat and Cooling (Absorption Chillers)
Where a suitable source of building or utility steam/fossil fuel is available, an absorption refrigeration system may be proposed if supported by Life Cycle Cost (LCC) analysis. Systems that make use of surplus heat from industrial processes, solar thermal systems, or the onsite generation of heat and/or power (see CHP above) are encouraged. Short distances between major system components are required.

c. Air Handling Units

i. AHU Capacities
Where possible, air handling units shall be sized such that a Refrigeration System Operating Engineer is not required to be on site to facilitate flexible zone control, particularly for spaces that involve off-hour or high-load operating conditions.

ii. Outdoor Air Intake Locations
The placement and location of outdoor air intakes must be in compliance with the Code. Intakes must be located as high as practical on the roof or wall. Outdoor air intakes must be ducted directly to the AHU cabinet; the equipment room must not be used as an outdoor air intake plenum.

iii. Temperature and Airflow Control
Psychometric process charts must be prepared for each AHU application, characterizing full-load and part-load operating conditions for all processes in the system, in accordance with this Guide. AHU/coil designs must ensure that conditioned space temperatures and humidity levels are within acceptable range, per program requirements and the indoor design conditions noted above.

iv. Limitation of Supply Air Temperature
Comfort HVAC systems with supply air dry bulb temperatures below 500F are not permitted. Supply air must be no lower than 500F dew point temperature to prevent condensation on the duct surfaces.

v. **Supply, Return, and Relief Air Fans**
The performance of the fans must be tested in accordance with AMCA Standard 210. Fans must be selected on the basis of the system power and sound requirements for full-load and part-load conditions. Fan motors must be sized so they do not run at overload anywhere on their fan operating curves. A Variable Frequency Drive (VFD) (where required) must be provided for each fan motor and located within the mechanical equipment room for the AHU. Fan systems shall be designed such that failure of the fan will not result in significant impacts on the performance of the building HVAC system. Where compliance with NYC Energy Conservation Code is required, metering devices for determining energy consumption data for each fan motor must be provided that are capable of transmitting the data to the central BAS.

vi. **Cooling and Heating Coils**
Select finned-tube cooling coils to ensure that the coils can be cleaned. Dehumidifying coils must be selected to prevent water droplet carryover beyond the drain pan at design conditions. All hot water heating and chilled water cooling coils must be copper tube and copper finned materials. Equipment and other obstructions in the air stream must be located sufficiently downstream of the coil so that it will not come in contact with the water droplet carryover. Cooling coils must be selected at or below 500 fpm face velocity to minimize moisture carryover. Heating coils must be selected at or below 750 fpm face velocity.

vii. **Drains and Drain Pans**
Drain pans must be made of stainless steel, adequately sloped and trapped to ensure drainage. Overflow connections must be provided and connected to the sanitary or storm line in accordance with Code.

viii. **Filters and Filter Sections**
Air filtration must be provided in every air handling system. AHUs must have a prefilter and a final filter, each located upstream of the cooling and heating coils.

1. Differential pressure gauges and sensors must be placed across each filter bank to allow quick and accurate assessment of filter loading as reflected by air-pressure loss through the filter, and the sensors must be connected to the BAS (where applicable).
2. Where occupancy requirements or building functions are likely to generate airborne particles, vapors, or gases that result in concentrations exceeding those noted above (“HVAC Performance Characteristics”), special air filters or air cleaning components must be provided for the supply and return air, or dedicated and localized exhaust systems must be used to contain these contaminants.

ix. **Make-up Air for Exhaust Fans**
Provide make-up air source for each exhaust fan.

d. Variable Air Volume (VAV) Terminal Units

VAV terminal units must be certified under the ARI Standards 880 Certification Program and must carry the ARI seal. If fan-powered, the units must be designed, built, and tested as a single unit including motor and fan assembly, primary air damper assembly, and any accessories. VAV terminal units must be pressure-independent-type, and selected to provide the airflow rate required for the full-load thermal capacity of the zone and for the noise requirements for the space.

e. Fan-Powered Terminal Units

i. Fan-powered terminal units must have Electrically Commutated Motors (ECM) for speed control to allow continuous fan speed adjustment from maximum to minimum, as a means for setting the airflow.

ii. Fan-powered terminal units must have a filter/filter rack assembly with the filters having a MERV (Minimum Efficiency Reporting Value) of 10 as defined in ASHRAE Standard 52.2. Filters must be sized at 500 fpm maximum face velocity.

iii. The return plenum box for a fan-powered terminal unit must be a minimum of 24 in. in length and must be double walled with insulation between the walls, or contain at least one elbow where space allows.

iv. For interior zones, re-heat coils are not permitted in VAV terminal units except for areas below the roof or on the floors above unheated exposed spaces. Fan-powered terminal units may have hot water heating coils used for maintaining temperature conditions in the space under partial-load conditions.

f. Fan Coil Units

Fan coil units must be certified under the ARI Standards 880 Certification Program and must carry the ARI seal. For perimeter spaces, four-pipe fan coil units must be equipped with cooling and heating coils with copper tubes and aluminum fins, filters, internal condensate drain, and overflow drain pan. For interior spaces, two-pipe fan coil units for cooling only are permitted. Installation of fan coil units above ceilings should be avoided. Fan coil controls must use three-speed motors. Two-way control valves must be used wherever variable-speed water flow devices are used in the system.

g. Motors

Motors that are ½ HP and larger must be three (3) phase.

h. Controls for HVAC Components

Each AHU, fan-powered VAV terminal unit, fan coil unit, boiler, hot water pump, chiller, cooling tower cell, waterside economizer, chilled water pump, or combination of pumps must have a Ddc (BACnet or LonTalk) self-contained controller capable of being interfaced to the Building Automation System (BAS). Each piece of equipment must have a metering device for transmitting energy and water consumption data to the BAS and, if applicable, a current-sensing device for transmitting fan and/or pump motor energy consumption data to the BAS.

i. Circulation Systems

All hydronic circulation systems must be designed for variable flow, in accordance with the code and as otherwise required.

10. PRIMARY HEATING SYSTEMS

a. General

In general, to conserve energy, electric heating coils and electric boilers are not recommended.

b. Hydronic Heating Systems

The following types of hydronic heating equipment are acceptable: fan coil units, convectors, radiators, baseboard units, finned-tube radiation, radiant flooring, radiant ceiling panels, unit heaters, cabinet heaters, and air source and water source heat pumps.

i. The system shall preferably be two-pipe forced circulation hot water, zoned as required, with each zone having its own circulating pump or other means of providing independent control for each exposure and occupancy. Provide stand-by pumping capacity.

ii. Provide thermostatic control valves for each interior and perimeter control zone. Install valves on hydronic units so that they can be easily calibrated, maintained and replaced.

iii. If piping is installed under raised floors, provide moisture-detecting devices connected to the BAS and self-priming floor drains, to prevent flooding and excessive loading of the raised floor cavity.

iv. Radiant heating is permitted in ceilings or embedded in the floors of perimeter zones, in ceilings of interior zones that are below the roof, and in the floors above unheated exposed spaces. Radiant (hot water) heating systems may be overhead or under-floor type. Electric radiant heating is only permitted for small, remote areas.

c. Low Temperature Hot Water Heating

Low temperature systems shall be designed with the lowest working pressure suitable for the system and a maximum temperature limitation of 2000F. Supply temperatures and the corresponding temperature drops for space heating hot water systems must be set to best suit the equipment being served. Total temperature drop must not exceed 300F. The temperature drop for terminal unit heating coils must be 200F. The design water velocity in piping must not exceed 8 fps, or the design pressure friction loss in piping systems shall not exceed 3 ft. per 100 ft., whichever is smaller, but not less than 4 fps.

d. Low Pressure Steam Heating (below 15 psi)

Burners can be no. 2 oil or dual fuel (no. 2 oil or natural gas). Using one or two pipe system arrangements, steam shall be supplied to radiators, convectors, or fan coil units; give up its heat to the space; and shall return via condensate piping or vacuum pumps to a feed water receiver which pumps the condensate back to the boiler.

e. Boilers

Boiler systems must be provided with but not limited to expansion tanks, water treatment, and air separators, as required. Boilers must be installed in a dedicated mechanical room with all provisions made for breaching, flue stack, and combustion air, as noted above.

i. **General**

Where feasible and as otherwise required, central heating plant equipment such as steam boilers, hot water boilers, deaerator/condensate return units, plate frame/shell/tube heat exchangers, fuel oil handling equipment, hot water pumps, and vacuum pumps shall be selected to provide efficient part-load operating performance.

System design shall include modulating combustion equipment and variable air water flow capability.

ii. **Modular Units**

Where feasible, boilers for hydronic heating applications shall be modular units, with efficiencies that comply with Code. The modular units must be packaged, with all components and controls factory preassembled. Controls and relief valves to limit pressure and temperature must be specified separately.

iii. **Boiler Sequence**

Boilers must be piped to common heating water header with provisions to sequence boilers online to match the load requirements. All units must have valving to provide isolation of offline units without interruption of service.

iv. **Gas and Fuel Oil Trains**

Boiler gas trains and fuel oil systems must be per Code. Installation of gas piping shall be per NYC Fuel and Gas Code.

v. **Dual Fuel Burners**

Where applicable the Consultant shall, during Schematic Design, investigate the feasibility of providing dual fuel burners for all new boiler equipment and for existing boilers with burners to be replaced.

vi. **Renovation Projects**
For renovation projects, boiler selection shall be determined based on space access conditions, available fuel type, energy efficiency, and simplicity of operation. The Consultant shall analyze standard or modular type boilers depending on the building use, initial and operating costs, and Client Agency preference. The Consultant shall fully coordinate requirements prior to final selection. The use of alternate space heating systems shall also be analyzed as an option to direct replacement.

vii. **Chimney and Vents**
Chimney and vents selection shall be based on boiler requirement, distance and location.

viii. **Domestic Water Heater**
Domestic water heater requirements are described in Section I of this Appendix, "Plumbing Engineering Design Criteria".

f. Finned Tube Radiation

Hot water finned-tube radiation must have individual zone thermostatic valve, actuator, temperature sensor, and zone control device capable of connecting to a self-contained microprocessor that can interface with BACnet or LonTalk Ddc BAS (where applicable).

g. Hot Water Piping and Pumps

Pumps must be of a centrifugal type and must generally be selected to operate at 1,750 rpm and at 80% to 85% pumping efficiency. Both partial-load and full-load performance must be shown on the pump curve, and the specified pump motors must not overload throughout the entire range of the curve. The number of primary hot water pumps must correspond to the number of boilers, and a standby pump must be designed to supply any of the circuits. Variable volume pumping systems are required for all secondary piping systems. Pumps for each boiler group must be arranged with piping, valves, and controls to allow each boiler group to operate independently of the other boiler groups.

h. Freeze Protection

Anti-freeze agents manufactured specifically for HVAC systems can be used to protect hot water systems from freezing where coils or extensive runs of piping are exposed to weather, or where heating operations are intermittent. Freeze protection circulation pumps must be provided along with polypropylene glycol. Heat tracing is not acceptable for systems inside the building. Glycol solutions must not be used directly in boilers, because of corrosion caused by the chemical breakdown of the glycol. The water makeup for the glycol system must be provided with an inline water meter to monitor and maintain the proper percentage of glycol in the system. Provisions must be made for drain down, storage, and reinjection of the glycol into the system.

i. Heat Recovery Equipment (Enthalpy or Sensible)

Heat recovery equipment must operate at a minimum of 70% efficiency at winter and summer outdoor design conditions. Filters having a MERV of 10, as defined in ASHRAE Standard 52.2, must be provided in all heat recovery equipment. Filters must be sized for 500 fpm maximum face velocity. The type of heat recovery equipment may be selected from the following alternatives:

i. **Sensible Heat Recovery**

1. Plate frame heat exchangers.
2. A runaround-type heat pipe system with solenoid valve control to operate under partial-load conditions.
3. A cross flow, air-to-air (z-duct) heat exchanger. Z-ducts must be constructed entirely of non-corrosive sheet metal.

4. Sensible heat-wheels with variable-speed drives for controlling the temperature leaving the unit.
5. A propylene glycol runaround coil with control valves and a pump for part-load conditions. The runaround coils, if selected, must be installed at the exhaust or relief discharges from the building and at the outdoor air intake into the building.

ii. Total Heat Recovery
Enthalpy wheels must have a minimum purge area of 2% and variable-speed drives for controlling the enthalpy leaving the unit.

j. Oil Storage for Heating

The parameters of each oil storage project must be reviewed and approved by DDC and the Client Agency prior to proceeding with the Construction Documents phase. The Consultant shall review fuel storage space limitations and budget constraints during Schematic Design. Design for buried fuel tanks and related ancillary equipment such as piping and cathodic protection shall be based on manufacturer's data for either double wall steel or double wall fiberglass tanks. Consultant may substitute steel tanks for fiberglass or fiberglass tanks for steel. Oil storage for heating shall be sufficient for a one month supply, unless otherwise required by the Client Agency, and shall be designed per Code including the latest NYC Department of Environmental Protection (NYCDEP) regulations and NYS Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage Requirements and all other applicable codes.

11. PRIMARY COOLING SYSTEMS

The cooling system shall include chillers, chilled water, and condenser water pumps; cooling towers; piping; and piping specialties.

a. Hydronic Cooling Systems

The following types of hydronic cooling systems are acceptable: fan coil units, fan powered VAV units with cooling coils, air-source and water-source heat pumps, unit ventilators, active chilled beams, floor mounted induction units, and combination hydronic heating/cooling systems.

i. The chilled water system must have a design supply water temperature between 400F and 450F.

ii. For HVAC systems that primarily use fan coil units, the temperature differential must be between 100F and 120F.

iii. For HVAC systems that primarily use air handling units, the temperature differential must be between 120F and 160F.

iv. Design water velocities must not exceed 8 fps.

v. Pressure drop must not exceed 3 ft. per 100 ft. of pipe.

b. Chillers

All required auxiliaries for the chiller system must be provided, such as expansion tanks, heat exchangers, water treatment, and air separators, as required.

i. Chiller system design shall include variable air, water and refrigerant flow capability with modular equipment selection.

ii. Chiller efficiencies for full-load and part-load operations must be in accordance with NYC Energy Conservation Code.

iii. For chilled water systems of 500 tons and larger, centrifugal chillers must be used. Below 500 tons, reciprocating compressor, scroll, and rotary screw chillers are permitted. Below 65 tons, air cooled chillers are permitted. Variable frequency compressors or head pressure control, if used, must be demonstrated on a Life-Cycle Cost basis.

iv. Chillers must be piped to a common chilled water header with provisions to sequence chillers online to match load requirements. Each chiller must have an automatic shutoff valve.

v. Chiller condenser piping must be equipped with recirculation/bypass control valves to maintain incoming condenser water temperature within the chiller manufacturer's recommended minimum set point.

vi. The design of refrigeration machines must comply with DEP regulations and Federal EPA Clean Air Act.

vii. CFC refrigerants are not permitted in new chillers. Commonly used refrigerants such as HCFC-123, HFC-134a, and HFC-410a are acceptable.

viii. Chillers must be easily accessible for internal inspections and cleaning. Refrigeration machines must be equipped with isolation valves, fittings, and service apertures as applicable for refrigerant recovery during servicing and repair, as required by EPA Clean Air Act.

ix. BACnet or LonTalk microprocessor-based controls must be used. The local control panel must have self-diagnostic capability; integral safety control; and set point display with run time, operating parameters, electrical low voltage and loss of phase protection, current and demand limit control, and output/input - COP (Coefficient of Performance - input/output kw/tons) information.

c. Cooling Towers

Cooling tower basins and housing must be constructed of stainless steel. Wind and seismic design must be incorporated. If the cooling tower is located on the building structure, vibration and sound isolation must be provided. Cooling towers must be equipped with makeup and blowdown meters, conductivity controllers, and overflow alarms.

i. Each chiller must have its own matching cooling tower or cell, and condenser and chilled water pump. Multiple cooling towers must have equalizing lines and the necessary automatic control valves for individual chiller/cooling tower operation.

ii. Cooling towers must be elevated to maintain required net positive suction head on condenser water pumps and to provide 4 ft. minimum clear space beneath the bottom of the lowest structural member, piping, or sump, to allow for reroofing or other building maintenance access beneath the tower. Cooling towers must have ladders and platforms for ease of inspections and replacement of components.

iii. Induced draft cooling towers must be provided with multiple-speed or variable-speed condenser fan controls. Induced draft towers must have a clear distance equal to the height of the tower on the air intake side to comply with air velocity requirements of the manufacturer.

iv. Multiple-cell towers and isolated basins are required to facilitate operations, maintenance, and redundancy. The number and capacity of cells must match the number and capacity of chillers. Supply piping must be connected to a manifold to allow for any combination of equipment use. Variable-speed pumps for multiple cooling towers must not operate below 30% of rated capacity.

v. Multiple towers must have equalization piping between cell basins. Equalization piping must include automatic isolation and shutoff valves between each cell to control water flow only over those towers that are in use. The piping arrangement, strainer and filter placement must provide for removal of accumulated solids and sediments from the system. Cleanouts for sediment removal and flushing from basin and piping must be provided.

vi. Special consideration must be given to de-icing cooling tower fills if they are to operate in subfreezing weather. A manual shutdown for the fan must be provided. If cooling towers operate intermittently during subfreezing weather, provisions must be made for draining all piping during shutdown periods, using indoor drain-down basins. Cooling towers with waterside economizers that are designed for year-round operation must be equipped with basin heaters. Condenser water piping located above grade and down to 3 ft. below grade must have heat tracing.

vii. Refer to Fire Protection Section below for fire protection requirements.

d. Economizers

Airside economizers shall be provided as per Code. Waterside economizers must be piped in parallel and sequenced with chillers online to match the load requirements. They must have automatic control and shutoff valves.

i. Plate heat exchangers, designed and manufactured specifically for use as waterside economizers, must have a 20F approach between the (entering) condenser water and (leaving) chilled water temperatures. The waterside economizer must be capable of providing 420F chilled water at the heat exchanger and must have a dedicated pumping system. Cooling towers used for the waterside economizer cycle must have complete freeze protection and be capable of operation at design winter conditions.

ii. BACnet or LonTalk microprocessor-based controls must be used. The local control panel must have self-diagnostic capability, integral safety control, and set point display.

e. Chilled Water and Condenser Water Piping and Pumps

Pumps must be centrifugal type and must generally be selected to operate at 1,750 rpm and 80% or greater pumping efficiency. Both partial-load and full-load performance must be shown on the pump curve, and the specified pump motors must not overload throughout the entire range of the curve. The number of primary chilled water and condenser water pumps must correspond to the number of chillers and a standby pump must be provided for each chilled water and condenser water circuit. Variable-volume pumping and variable-speed drives are permitted.

f. Freeze Protection

Propylene glycol manufactured specifically for HVAC systems must be used for freeze protection. The concentration of antifreeze must be kept to a practical minimum because of its adverse effect on heat exchange efficiency and pump life. The water makeup for glycol systems must be provided with an inline water meter to monitor and maintain the proper percentage of glycol in the system. All coils exposed to outside air must be provided with freeze protection thermostats and control cycles. Provisions must be made for drain down, storage, and reinjection of the glycol into the system.

12. AIR DISTRIBUTION

a. General Design Requirements

For dedicated zones of control, Constant Volume (CV) systems are acceptable. For multiple zones of control, separate Variable Volume (VV) systems are required.

i. Use diffusers and registers in lieu of grilles for supply air.

ii. Use sheet metal ductwork only; do not use fiberglass ductwork.

iii. Use external thermal duct insulation in lieu of internal insulation.

iv. Turning vanes shall comply with SMACNA's HVAC Systems duct design standard.

v. Use quadrant opposed blade dampers for balancing in lieu of splitter dampers. All supply and return branch ductwork shall be provided with opposed blade dampers.

vi. Provide motorized dampers at each exterior wall louver, at each roof penetration for HVAC units, and in lieu of backdraft dampers.

vii. Locate all duct smoke detectors, fire and smoke dampers on plans. Provide fire dampers adjacent to each intake louver, gooseneck, and penthouse.

viii. Provide complete firestopping details.

ix. Use ten gauge black iron for kitchen range hood exhaust ductwork. Ductwork connections shall be welded. Provide required duct insulation as per Code.

x. Review security requirements with Client Agency. For security applications, use framed security bars for HVAC openings or ducts 6" or larger in any dimension.

b. System Layout

Both overhead and underfloor air distribution systems are acceptable.

i. Install air distribution system equipment such as ducts, balancing dampers, fire/smoke dampers, filters, fans, VAV boxes, heating/cooling coils, humidifiers, condensable materials drain pan/traps, sound attenuation devices and other treatment/control devices in accessible overhead/underfloor locations.

ii. When using VAV heating and cooling systems, horizontally zoned AHUs for each floor are preferred, located on the floor they serve, the floor above, or the floor below depending on site/building constraints. Where ducted returns are feasible and/or as otherwise required, return air from a given floor must be ducted directly to the AHU serving that floor.

iii. The use of mechanical rooms as return air or relief plenums is discouraged.

iv. Un-ducted supply is allowable only in data processing centers.

c. Under-Floor Air Distribution

Where feasible consider a fully ducted under-floor air distribution (UFAD) system or displacement ventilation system. Equipment such as air-handling units, VAV boxes, or other equipment that require maintenance, are not permitted below a raised-access floor. Under-floor systems are not permitted in courtrooms, restrooms, cafeterias, kitchens, laboratories, loading docks, mail rooms, or detention areas.

d. Air Delivery Devices

Air is to be supplied through diffusers or registers mounted in ceilings, sidewalks, sills, or floors. Air is to be returned or exhausted through grilles, slots, and other openings located in sidewalls and ceilings.

i. Adequate space ventilation requires that the selected diffusers effectively mix the total air in the room with the supplied conditioned air.

ii. The locations of the air delivery devices and the ranges of their outlet airflow rates must be selected to ensure that the Air Diffusion Performance Index (ADPI) values remain above 80% during all full-load and part-load conditions, and below the specified noise level to achieve the background noise criteria, in accordance with the test procedures specified in Appendix A of ASHRAE Standard 113

iii. Variable air volume (VAV) terminal units or constant air volume (CAV) terminal units, including series-type-fan-powered VAV terminal units, may be used. Ceiling diffusers or booted-plenum slots must be specifically designed for VAV air distribution if used.

iv. Booted plenum slots must not exceed 4 ft. in length unless more than one source of supply air is provided.

e. Sizing of Ductwork

Energy consumption, security, and sound attenuation shall be major considerations in the routing, sizing, and material selection for air distribution ductwork.

i. Air supply, return, and exhaust ductwork must be sized using accepted industry duct sizing practices. Pressure drops must not exceed 0.1 inch w.c. for every 100 ft.

ii. Supply, return, and exhaust air ductwork must be sized to limit the design static pressure to values that will minimize fan power, consistent with functional requirements of the zones being served.

iii. When noise generation is a controlling factor, design air velocities must not exceed the values shown in the table below.

Recommended Air Velocities for Supply, Ducted Return, and Exhaust

	Controlling Factor-Noise Generation	
	Main Ducts	Branch Ducts
Space / Application	fpm	fpm
Private Offices, Conference Rooms and Libraries	1200	800
Theaters and Auditoriums	800	400
General Offices	1500	1000
Cafeterias	1800	1200

iv. Sizes, pressure, and seal classification of all ductwork must be identified, labeled and specified in the Construction Documents as per SMACNA standards.

f. Plenum and Ducted Return Air Distribution

i. All multi-floor-type return air risers must be ducted.

ii. No more than 2,000 cfm should be collected at any one return register.

iii. The maximum horizontal distance from the return air register in the farthest zone in a plenum to a return duct is 50 ft.

iv. For areas where special conditions or noise criteria are to be met, such as auditoriums, judge's chambers, and courtrooms, return air must be ducted from each return air register.

v. Where fully ducted return systems are used, consider placing return grills low in walls or on columns to complement ceiling supply air.

vi. Return air ducts in a ceiling plenum below the roof must be insulated.

g. Testing of Air Distribution Systems

Air distribution systems must be tested twice for leakage; during the construction process, before the installation of insulation and after all connections to terminal units, air delivery and return devices, and return air and exhaust air fans have been made.

h. Louvers

Door louvers or a door undercut shall be provided for each room being exhausted or ventilated, except where positive pressure must be maintained. Use a door undercut for less than 75 cfm and a door louver for 150 cfm or greater. All outdoor louver designations shall indicate gross and net free area. Exterior louvers, including outdoor air intake louvers and fan discharge louvers, should be positioned to deter potential vandalism.

i. Humidification

Where humidification is necessary, electronic or steam-to-steam generators must be used to produce atomized hot water, clean steam, or ultrasound vapor.

i. All equipment and steam dispersion piping associated with humidification equipment must be stainless steel.

ii. Humidifiers must be centered on the air stream to prevent stratification of the moist air.

iii. When steam is required during summer seasons for humidification or sterilization, a separate clean steam generator must be provided and sized for the seasonal load.

iv. Makeup water for direct evaporation humidifiers must originate directly from a potable source. Chemically treated water must not be used for humidification. Humidifiers must be designed so that microbiocidal chemicals and water treatment additives are not emitted in ventilation air.

v. Each humidifier must have a Ddc (BACnet or LonTalk) self-contained controller that is capable of being connected to the BAS. Each humidifier must have a metering device for transmitting energy and water consumption data to the BAS.

13. SPECIAL PURPOSE AREA HVAC SYSTEMS

Special use areas such as atriums, laboratories, kitchen/cafeterias, process rooms, computer and server rooms, elevator machine rooms, fire pump rooms and fire command centers and the following special purpose areas may require dedicated air handling units, separate from all other air handling units in the building, with individual controls to condition these spaces as required. The energy requirements for these special areas can be significant and must be included in the building energy analysis. Some of these areas require positive or negative air pressurization relative to adjacent areas. Pressurization design strategy shall consider the effects of the building envelope and mechanical, riser, and elevator shafts.

a. Lobbies and Entrance Vestibules

Consultant shall evaluate pressurization requirements to control infiltration and contaminant intrusion into the building. Radiant floor cooling is not permitted in these types of areas.

b. Areas of Refuge

Where required by the program or the Client Agency, areas of refuge for emergency conditions (anti-terrorism, civil defense, and fire emergency smoke control) must be provided with dedicated AHUs, connected to emergency power to maintain positive air pressure relative to surrounding spaces.

c. Public Assembly Spaces

In general, assembly spaces shall be heated with ventilation air tempering as well as space heating, and cooled with all-air variable volume zoned gas-fired DX air conditioning.

i. Carbon Dioxide occupancy sensors shall be provided, as required (with the exception of cafeterias served by a combination/kitchen unit).

ii. Relative humidity shall be maintained at 40-60% (+/-2%) during occupied periods. Return duct humidity sensors shall be utilized during occupied periods. Space humidity sensors shall be utilized during unoccupied periods.

iii. Auditoriums must have dedicated air handling units. The use of economizer cycles must be determined.

d. Conference Rooms

Each conference room must constitute a separate thermostatically controlled zone. The outdoor air ventilation rate for each conference room must be designed in accordance with the NYC Mechanical Code.

e. Courtrooms

Each Courtroom must have its own dedicated AHU, if applicable, and must be provided with a minimum of three thermostatic zones.

f. Kitchen/Cafeteria Areas

A separate AHU must be provided for the kitchen whenever makeup air from adjacent spaces is inadequate to meet kitchen exhaust and pressurization requirements. In general, combined cafeteria/kitchen areas are to be designed with a single air handling unit with supply and return fans, economizer dampers, self-contained DX cooling, hot gas reheat (where applicable) and modulating gas-fired duct furnace heating.

i. Kitchens and Dishwashing Areas

Kitchens with cooking ranges, steam kettles, ovens, and dishwashers must be provided with dedicated make-up air and exhaust hoods for exhaust systems.

ii. **Pressurization**
Kitchens must maintain negative air pressure relative to adjacent areas. The operation of the kitchen exhaust systems must not affect the pressure relation between the kitchen and surrounding spaces.

iii. **Air Handling Unit**
The AHU shall operate in several modes: unoccupied, occupied-cooking, and occupied-non-cooking. During occupied mode, air shall be returned to the AHU solely from the cafeteria area, while air from the kitchen shall be exhausted as indicated above. Makeup air for the kitchen exhaust fans shall be supplied by the AHU via supply diffusers and a transfer grille in the wall above the ceiling between the cafeteria server and kitchen.

iv. **Sensors**
During unoccupied mode, a space temperature sensor and space relative humidity sensor(s) in the cafeteria shall control the AHU. During occupied mode, a temperature sensor and relative humidity sensor mounted in the return duct shall control the AHU.

v. **Supply Air**
Since the AHU's total outside air intake ventilation rate must satisfy the cafeteria and kitchen requirements, this rate shall never drop to less than the kitchen's requirements.

vi. **Diffusers and Grilles**
Ceiling diffusers and wall grilles shall be spaced so as to avoid air stagnation and stratification and to provide a maximum of 40 fpm air impingement velocity when the air moves past occupants, in order to comply with ASHRAE 55. Standard diffusers shall not be used in the immediate area of the kitchen exhaust hood in order to maximize the capture and containment of cooking grease laden vapors/odors and minimize effluent spillage.

vii. **Exhaust**
Cooking appliance products of combustion and cooking operation contaminants must be discharged directly from the building to outdoor air through the use of kitchen ventilation systems involving exhaust hoods, grease ducts, and makeup air systems where required. Commercial kitchen equipment applications constructed in compliance with UL 710 must be served by a Type I hood. Grease ducts must be constructed in accordance with all requirements. Both supply air and makeup air must be exhausted through the hood. The velocity of the exhaust air must comply with applicable NFPA 96 requirements.

viii. **Energy Conservation**
In order to reduce the fan HP requirements for energy conservation, cafeteria supply and return fans and air distribution ductwork shall be designed for 1.5 inch of w.c. external static pressure for supply air, and 1.0 inch of w.c. external static pressure for return air. Where feasible or as required, both supply air and makeup air should be supplied and exhausted through the kitchen heat recovery system.

ix. **Prohibited Equipment**
Exposed cabinet heaters, unit heaters, fan coil units, or any other ceiling suspended heating and/or cooling apparatus shall not be installed inside the kitchen area.

g. Indoor Mail Rooms, Loading Docks, Receiving/Shipping Areas, and Warehouses

A separate dedicated AHU must be designed for each of these spaces. These spaces must be maintained at negative air pressure relative to adjacent spaces. Overhead radiant heating or unit heaters shall be provided for spaces featuring large openings (e.g. garages, loading docks).

h. Enclosed Vehicle Garages

As required by Code, vehicle garage exhaust fans must be activated based on carbon monoxide sensors within the garage. Carbon monoxide sensors must also be located in all floor areas where vertical shafts penetrate the garage areas. Outdoor air intake and exhaust location shall comply with the requirements of the Code.

i. Firing Ranges

A firing range must be provided with a dedicated air handling system capable of continuous operation, isolated from other building systems. Heating and cooling supply air must be delivered to the area along and behind the firing line for occupant comfort and to maintain a positive pressure in this area relative to down range and target areas. Powered exhaust air must be extracted from down range and target areas in sufficient quantity to remove smoke and maintain a clear line of vision to the target. 60% of the total exhaust must be extracted at a point approximately one-third the distance from the firing line to the target area, and 40% from above the target area. All exhaust air must be filtered to preclude the emission of lead particulates and gunpowder residue into the atmosphere. The discharge of firing range exhaust air to the outdoors must be carefully located to prevent recirculation into the outdoor air intake of any HVAC system. Design must include High-Efficiency Particulate Air (HEPA) pre-filters and final filters.

j. Twenty-Four-Hour Spaces

Areas designated by Client Agencies as requiring 24-hour operations must be provided with dedicated HVAC systems supported by emergency power (if applicable). The use of the building central heating and cooling system is permitted during normal operating hours. Among these areas are: command centers, computer and server areas, BAS computer processing areas, etc.

k. Information Technology Equipment Rooms

Information Technology equipment rooms must maintain neutral or positive air pressure relative to adjacent areas. Provide self-contained critical environmental control units specifically designed for this purpose.

- **i.** As determined by the Client Agency, the design shall incorporate redundant equipment capacity and/or equivalent method of backup system operation. At a minimum, provide an inline type exhaust fan with thermostat as a back-up in the event the air conditioning system fails. If the computer room houses critical components, as defined in the project's program, the HVAC systems must be connected to the emergency generators (if applicable).
- **ii.** In large information technology equipment rooms of 5,000sf or larger, cooling of the sensible load (computer load) and control of the outdoor air ventilation and space relative humidity must be provided by separate air handling systems.
- **iii.** For cooling loads greater than 80 tons, chilled water air handling systems must be provided, utilizing a dedicated chiller with redundant backup, either by multiple machines or through connection to the facility's chilled water plant.
- **iv.** Where feasible, airside/waterside economizers should be applied.

l. Communication Equipment Rooms

Communications equipment rooms must be cooled in accordance with the requirements of the Client Agency's IT equipment manufacturer and EIA/TIA Standard 569. Rooms that house critical communications equipment must be provided with dedicated 24-hour air conditioning systems that must be connected to the emergency power distribution system, where applicable.

m. Elevator Machine Rooms

A dedicated HVAC system must be provided to maintain room temperature conditions required by elevator equipment manufacturer specifications, and in accordance with the indoor design conditions.

n. Hydraulic Elevator Machine Rooms

Hydraulic elevator machine rooms shall be provided with means of natural ventilation and/or mechanical exhaust to prevent the accumulation of smoke and hot gases in case of fire. Smoke exhaust fan system shall be rated for elevated operating temperature and be supplied with emergency power (where applicable) and shall provide a system of mechanical ventilation of sufficient capacity to exhaust at least twelve (12) air changes of the volume of the elevator machine room through the roof or an approved location on an exterior wall other than the lot line wall.

o. Mechanical Rooms

All mechanical rooms must be ventilated in accordance with accepted industry standards. Maintain minimum temperature and the control of contaminant conditions. Unless required or as otherwise approved mechanical rooms should not be used as return air, outdoor air, or mixing plenums.

p. Chiller Equipment Rooms

All rooms for refrigerant units must be constructed and equipped to comply with the Code, including engineering and safety controls as required in the event of a catastrophic refrigeration system leak within the building. Chiller operating controls shall be capable of Ddc communication to the central building energy management system.

q. Combustion Equipment Rooms

All rooms that contain fossil fuel burning combustion equipment must comply with the requirements in the code. At a minimum, combustion equipment rooms must provide the required amounts of outdoor air for the combustion equipment through the motorized dampers that interlock with the combustion equipment control system, and the room must be ventilated to control excessive temperature and indoor contaminant levels. Maintain minimum temperature conditions in the combustion equipment room in accordance with the design conditions listed above.

r. Emergency and Standby Generator Rooms

The emergency generator room ventilation system shall be capable of providing sufficient air for generator cooling and combustion. See ‘Venting of Boilers and Emergency Generators’ below for more information.

i. The room must be maintained under negative pressure.

ii. The location of the air intakes and exhausts must be in compliance with Code. The supply and exhaust louvers must be located to prevent short circuiting.

iii. The ventilation system shall include motorized dampers and thermostatically controlled bypass for emergency generator room temperature control.

iv. Rooms must be ventilated sufficiently to remove heat gain from equipment operation. Provide self-activating exhaust fan in connection with the emergency generator room, including fresh air and discharge ductwork for an emergency generator radiator.

v. The ventilation systems must meet the combustion air requirements of the emergency generator equipment manufacturer. When generator is located at roof level, generator combustion exhaust must be discharged at a minimum of 10 ft. above the roof level and in compliance with the generator manufacturer’s installation guidelines and code requirements.

s. UPS Battery Rooms

The battery rooms must be maintained at a neutral to negative pressure with respect to adjacent spaces and must be exhausted directly to the outdoors at a rate calculated to be in compliance with Code and manufacturer's recommendations. Fans must be spark resistant and explosion proof, with motors placed out of the air stream. A dedicated exhaust air system must be provided to maintain negative pressure in the ductwork. The ductwork and accessories must be noncorrosive. The exhaust fans must be connected to the emergency distribution system.

14. VENTING OF BOILERS AND EMERGENCY GENERATORS

The venting of all gas and oil-fired appliances shall comply with Code requirements. The venting of natural gas fired boiler plants and No. 2/4/6 oil firing plants shall be in accordance with the requirements of the NYC Department of Environmental Protection (DEP) and the Division of Air Resources at the NYS Department of Environmental Conservation (DEC).

a. Boiler Breeching

i. Single wall breeching for traditional non-condensing firetube/watertube boilers may be 12 gauge black steel with 1-1/2 in. calcium silicate. Longitudinal seams shall be welded.

ii. Single wall breeching for traditional non-condensing firetube/watertube boilers in existing masonry chimneys, where repair is required, and in new non-combustible chase enclosures from the boiler room to the roof, may be 10 gauge corrugated stainless steel liner with 3-1/2 inch calcium silicate.

iii. Double wall breeching for condensing boilers shall utilize positive pressure (category IV) UL listed and AGA (American Gas Association) approved AL-29-4C stainless steel.

b. Emergency Generator Venting

Double wall insulated metal vents (in lieu of insulated schedule 40 black steel pipe) may be used downstream of an emergency generator silencer. All venting upstream of emergency generator silencer shall be insulated schedule 40 black steel pipe. Piping system to be designed and installed for generator back pressure.

c. Fire Ratings

i. Stack systems extending through any story above the boiler room require a minimum 2-hour rated non-combustible chase enclosure from the boiler room to the roof and a penetration assembly or roof support assembly at the roof level.

ii. Rooms containing boilers or other equipment of similar or greater explosion hazard shall not be located within 50 ft. of any place of assembly, unless separated from such place of assembly by a minimum of 3-hour fire rated construction. In this event, chase enclosure from the boiler room to the roof shall also be a minimum of 3-hour fire rated.

d. Cleaning and Inspection Requirements for Boilers and Chimneys

i. Construction Documents for boiler and burner replacement projects shall specify cleaning and inspection requirements for the boiler, boiler breeching and chimney.

ii. Construction Documents for burner replacement projects shall also include soot cleaning of boiler firetubes.

iii. No boiler, burner, or vent from a gas appliance shall be connected to an unlined chimney or to a chimney having a damaged lining.

iv. Construction Documents shall specify lining installation and repair requirements, as appropriate.

15. SMOKE PURGE SYSTEMS

A dedicated smoke purge system (i.e., one that purges the non-assembly spaces through the corridors) is preferred to one that is integrated with the HVAC system for non-assembly spaces. A dedicated system allows the HVAC systems for non-assembly spaces to use non-purgeable fusible link fire dampers.

a. Performance

The smoke purge system shall be sized to exhaust six (6) air changes per hour or 1cfm per sf of floor area, whichever is greater, one floor at a time.

b. Zoned System

Public assembly spaces may be purged separately and independently from each other and from other spaces in order to downsize the dedicated purge ductwork and exhaust fans for the other spaces. If a public assembly space is separately purged, the return fans of the space's dedicated air conditioning unit may be used for purging.

c. Fire-Smoke Dampers

The combination fire-smoke dampers necessary for operation of the purge system shall be provided with a manual override feature, which shall be activated by the NYC Fire Department at the smoke purge panel.

16. WATER DISTRIBUTION

All HVAC piping systems must be designed and sized in accordance with the latest editions of the ASHRAE Fundamentals Handbook and the ASHRAE HVAC Systems and Equipment handbooks. All hydronic circulation systems must be designed for variable flow, in accordance with Code and as otherwise required.

a. Piping

i. Hot water and chilled water systems must use a four-pipe main distribution system. Dual temperature piping systems are not permitted. Heating coils shall temper all outdoor air intakes. Condensate drain piping must be provided for all cooling coils, with a deep seal self-draining trap. Reverse return piping must be provided for hot water heating elements. Drain piping must be provided for each pre-action valve assembly and each sprinkler control valve assembly. Use Schedule 80 piping for condensate drains and Schedule 40 piping for sprinkler work: do not use schedule 10.

b. Valves

Loop piping for terminal or branch circuits must be equipped with automatic flow control valves. Each terminal unit or coil must be provided with a flow-indicating balance valve on the return line, a two-way control valve, and either variable primary pumping or constant primary/variable secondary pumping. Three valve bypass must be provided for each control valve and for each float and thermostatic and bucket type trap. "Warm-up" valves must be provided for all steam services. Blow-off valves must be provided for all strainers.

c. Isolation of Piping at Equipment

Isolation valves, shutoff valves, bypass circuits, drain valves, flanges, and unions must be provided for piping at equipment, including boilers, chillers, pumps, coils, terminal units, and heat exchangers, to facilitate equipment repair and replacement. Isolation valves must be provided on all major pipe branches, such as at each floor level, building wing, or mechanical room, and for zones off vertical risers, including drain valves.

d. Flexible and Rigid Pipe Connectors

All pumps, chillers, cooling towers, and other rotating equipment must have flexible connectors, sized one size larger than the size of the connected piping. Connections to terminal units shall be with rigid piping; flexible piping or hose is not permitted.

e. Additional Components

Use steam or hot water unit heaters, cabinet heaters, and air curtains; do not use electric. A thermostat or aquastat must be provided for each unit heater, cabinet heater, VAV box, and air curtain.

f. Freeze Protection

Heat trace all piping subject to freezing temperature. All steam coils shall be of the freeze proof construction type. Provide circulating pump freeze protection for all hot water heating coils.

g. Cathodic Protection

The need for corrosion protection for underground metallic piping must be evaluated by a soils resistivity test. Cathodic protection or another means of preventing pipe corrosion must be provided, if required by the geotechnical report.

h. Water Treatment

Provide complete systems for water treatment, with one year service contract. The methods used to treat makeup water must have demonstrated prior success in existing facilities using the same municipal water supply and must follow the guidelines outlined in the ASHRAE Applications Handbook. The design of the water treatment for closed and open hydronic systems shall take into consideration the operational and maintenance needs of all system equipment including such components as boilers, chillers, cooling towers, other heat exchangers, pumps, and piping. The design must address all aspects of water treatment: biological growth, dissolved solids and scaling, corrosion protection, and environmental discharge regulations. The chemical feed system must have BACnet or LonTalk self-contained controls.

i. Air Control

Pressurized diaphragm expansion tanks must be appropriately sized for closed piping systems. Air separators and vents must be provided on closed hydronic systems to remove accumulated air within the system. Automatic bleed valves must only be used in accessible spaces in mechanical rooms, where maintenance personnel can observe them, and they must be piped directly to open drains. Manual bleed valves must be used for terminal units and other less accessible high points in the system. Air vents must be provided at all localized high points of the piping systems and at each heating coil, and system drains must be provided at all localized low points of the piping systems and at each heating coil.

j. Hydronic Criteria for High Rise Buildings

All HVAC systems in buildings that exceed 75 ft. in height or have operating pressures exceeding 125 psi at the pump discharges must be designed to perform in accordance with the high pressure piping criteria in ANSI/ASME Standards, and to be dynamically tested at 1.5 times the operating pressure.

k. Piping System and Equipment Drawings

Pipe routing to and from interconnected pieces of equipment shall be sized and shown on the HVAC Drawings. Indicate all filter dryers, solenoid valves, strainers, pressure relief valves, flexible connections, receivers, and sight glasses. Provide refrigerant piping schematic flow diagrams.

l. Piping System and Equipment Identification

All pipes, valves, and equipment in mechanical rooms, shafts, ceilings, and other spaces accessible to maintenance personnel must be identified with color-coated piping or color-coded bands, and permanent tags indicating the piping system type and direction of flow, or the equipment type and number, in accordance with ASHRAE handbooks. The identification system must also tag all valves and other operable fittings in accordance with ASTM Standard A13.1.

17. METERS, GAUGES, AND FLOW MEASURING DEVICES

Each piece of mechanical equipment must be provided with instrumentation or test ports to verify critical parameters such as capacity, pressure, temperatures, and flow rates. Each meter, gauge, and flow measuring device must be calibrated before start-up and must have provisions for periodic calibration at its location. For further information on advanced metering see Section H of this Appendix, “Electrical Engineering Design Criteria”. Following are the general instrumentation requirements.

a. Monitoring and Control

All metering devices must be capable of transmitting information to the central BAS for monitoring and control.

b. Thermometers and Pressure Gauges

Thermometers and pressure gauges are required on the suction and discharge of all pumps, chillers, boilers, heat exchangers, cooling coils, heating coils, and cooling towers.

i. Duct static pressure gauges must be provided for the Dedicated Outdoor Air Ventilation System (DOAVS) and AHU air supply fan discharge, branch takeoffs of vertical supply risers, and all duct locations at which static pressure readings are being monitored to control the operation of a VAV system.

ii. Differential static pressure gauges must be placed across filters in air handling units. A temperature gauge is required at the outdoor air intake to each air handling unit.

c. Flow Measuring Devices

i. Airflow

Airflow measuring grids are required for all DOAVSs and AHUs. Measuring grids must be provided at the supply air duct, return air duct, and outdoor air duct. Airflow measuring grids must be sized to give accurate readings at minimum flow.

ii. Water Flow and Energy Consumption

1. Where compliance with Local Law 86-2005 is required, measuring devices are required for all energy and water consuming equipment.
2. HVAC equipment serving tenant spaces must be provided with energy and water consumption measuring devices.
3. Measuring devices shall conform to NYC Energy Conservation Code requirements.

d. Testing Stations

Permanent or temporary testing stations must be provided for startup and testing of building systems. Connections must be designed so that temporary testing equipment can be installed and removed without shutting down the system.

18. LEAK DETECTION AND ALARM SYSTEMS

a. Gas and Carbon Monoxide: New Buildings, Additions, and Major Renovation

i. Multiple-Station Systems

Provide multiple-station natural gas and carbon monoxide detector/alarm system with detectors adjacent to all gas-fired equipment located within the building (water heater, unit heaters, duct furnaces, etc.); between boilers; and (natural gas detector only) in the gas meter room and gas booster room, if applicable. Multiple-station system operations shall be as follows:

1. Upon detection of combustible gas and/or carbon monoxide, the individual leak detector shall signal the alarm control panel.
2. The alarm control panel shall then institute the following:
    a) Close the main gas valve on the gas service (isolation valve with fusible link).
    b) Electrically shut down all equipment.
    c) Start the explosion proof exhaust fan in the gas meter room, where applicable.
    d) Digitally signal the BMS/Ddc system (if provided); and
    e) Activate the audio/visual alarms in the boiler room (or mechanical room, for projects without boiler) and the Engineer's office, as applicable.

ii. Standalone Single Stations

Provide standalone single station carbon monoxide detectors/alarms (in addition to multiple-station detectors as specified above) for all remaining spaces containing fossil fuel burning equipment (spaces with gas stoves or dryers, labs, auto shops, generator room, indoor loading dock, etc.). Such carbon monoxide detectors/alarms shall annunciate locally by both visual and audible means. Standalone single station carbon monoxide detectors/alarms shall not shut down the generator, close the main gas valve, or automatically energize the exhaust fan in the gas meter room.

iii. Power

Primary power for single station detectors/alarms and for the multiple-station alarm control panel shall be hard wired, supplied from a dedicated branch circuit, and connected to emergency power (where applicable). The multiple station alarm control panel shall be located in the boiler room (or mechanical room, for projects without boiler) and contain power supplies to feed the gas and carbon monoxide leak detectors, control valves, and the audio/visual alarms.

b. Gas and Carbon Monoxide: Existing Buildings

i. Standalone Single Stations

Provide standalone single station carbon monoxide detectors/alarms adjacent to all gas-fired equipment located within the building (water heater, unit heaters, duct furnaces, etc.); between boilers; and for all remaining spaces containing fossil fuel burning equipment (spaces with gas stoves or dryers, labs, auto shops, generator room, indoor loading dock, etc.).

ii. Power

Primary power for single station detectors/alarms shall be hard wired, supplied from a dedicated branch circuit, and connected to emergency power (where applicable).

c. Cooling Systems

Mechanical rooms for cooling system equipment (refrigeration, chiller machine rooms) must be designed in accordance with the requirements of ASHRAE Standard 15: Safety Code for Mechanical Refrigeration and shall contain a refrigerant leak detector with audible and visual alarm. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be sent to the BAS/Ddc system, if provided.

d. Pumps

Provide leak detectors for pumps, connected to a local audible alarm in the pump room and to a remote alarm panel located in the supervising station.

e. Fuel-Oil Burning Equipment

Provide leak detectors and level sensors for fuel-oil, level and capacity, high and low levels, adjacent to fuel-oil tanks and in rooms containing fuel-oil burning equipment, connected to a local audible alarm and to a remote alarm panel located in the supervising station.

f. Sprinklers

Upon activation, sprinkler system water flow indicators and tamper switches for the fire alarm or sprinkler system shall transmit a signal to the fire alarm system. For more information see “Fire Protection” below.

g. Ducts

Upon activation, duct smoke detectors shall transmit a signal to the fire alarm station, automatically shut down fan systems, and activate a visible and audible supervisory signal in the supervising station.

19. FUEL OIL SYSTEMS

a. Fuel Oil Piping

Fuel oil piping located underground or outdoors must be schedule 40 black steel or black iron double-wall containment pipe (pipe-in-pipe). Fittings must be of the same metal grade as the pipe material. Valves must be bronze, steel, or iron and must be screwed, welded, flanged, or grooved. Duplex fuel-oil pumps with basket strainers and exterior enclosures must be used for pumping fuel oil to fuel burning equipment.

b. Underground Fuel Oil Storage Tanks (UST)

Underground fuel oil storage tanks (UST) installation must comply with all Code requirements as well as Environmental Protection Agency (EPA), or any authority having jurisdiction.

20. EMERGENCY GENERATOR FUEL TANK

a. Oil storage shall be designed as per the latest NYC Department of Environmental Conservation (NYCDEC) regulations and the Code.

b. The parameters and the oil storage capacity must be reviewed and approved by DDC and the Client Agency prior to proceeding with the Construction Document Phase.

c. Unless otherwise directed, the Consultant shall provide for an independent storage tank for emergency generator fuel storage.

d. The fuel supply system shall include an electric transfer pump, an emergency hand pump, a day tank, and an alarm activated by high and low level switches in the day tank.

e. New construction projects and major renovation projects shall be provided with a minimum of 275 gallon diesel oil storage tank that is integral with the emergency generator.

f. The Consultant shall review fuel storage space limitations and budget constraints during the Schematic Design Phase.

g. Design for buried fuel tanks and related ancillary equipment such as piping and cathodic protection shall be based on manufacturer's data for either double wall steel tanks or double wall fiberglass tanks. Consultant may substitute steel tanks for fiberglass or fiberglass tanks for steel.

21. HVAC SEISMIC DESIGN

a. General

For more information refer to Structural Engineering Design Criteria in Section F of this Appendix, the SMACNA Seismic Restraint Manual, and the ASHRAE Application Handbook. New buildings and additions to existing buildings shall be designed for seismic forces as per code and the following:

i. If an existing building is required to meet the requirements of the NYC Seismic Code, it is the consultant's responsibility to apply for a waiver and if a waiver cannot be obtained, the HVAC retrofit work must meet such requirements.

ii. For new additions, any items in the existing building that are integrated with the life safety systems in the new addition shall also meet the seismic requirements.

iii. Generic seismic restraint details shall be shown on the contract documents. A note shall be added stating; "Details are shown to illustrate the scope of work. Contractor's registered professional engineer shall provide calculations and be responsible for providing signed/sealed shop drawings indicating locations of seismic restraints and the required connection details to file with DOB"

b. Items Requiring Restraint

Seismic restraints shall be provided for the following HVAC items:

i. All fuel oil and diesel oil piping 1" diameter and larger.

ii. Sprinkler system piping as required by NFPA 13 as modified by the Code.

iii. Ductwork

1. All rectangular ductwork with cross sectional area over 6sf, where there is more than 12 in. from the bottom of the slab or structural member to the top of the duct for any portion of the duct run.

2. All round ducts with diameter of 28 in. or larger, where there is more than 12 in. from the bottom of the slab or structural member to the top of the duct for any portion of the duct run.

3. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.

4. All smoke purge exhaust ducts, emergency generator vents, and gas meter room exhaust ducts, regardless of size and distance to above slab or structural member.

iv. All HVAC piping (other than fuel oil piping, diesel oil piping, and sprinkler piping) 2-1/2 inch diameter and larger (1-1/4 inch and larger in boiler and mechanical rooms) where there is more than 12 inch from the bottom of the slab or structural member to the top of the pipe for any portion of the pipe run.

v. Any new floor or roof mounted equipment that exceeds 400 pounds in weight. New floor or roof mounted equipment that is not part of life safety system, is not related to hazardous systems, and weighs less than 400 pounds need not be seismically restrained.

vi. All new wall mounted or suspended equipment. Suspended fans, VAV boxes, and suspended fan coil units that weigh less than 50 pounds, and are independently supported with a minimum of four hanger rods or rigidly connected to ductwork (which in turn must be seismically braced), need not be restrained.

vii. The following equipment, without limitation (equipment exclusions based on size or distance from above slab or structural member do not apply; however, equipment exclusions based on weight as defined above do apply):

1. AC unit chillers
2. VAV boxes
3. Heat exchangers
4. Condensers
5. Pumps
6. Unit ventilators
7. Fans
8. Air compressors
9. Unit heaters
10. Boilers
11. Cabinet heaters
12. Gravity ventilators
13. Tanks
14. Air handling units
15. Air separators
16. Cooling towers
17. Rooftop units

c. Restraining Devices

All restraining devices shall be approved by an independent testing agency. Calculations (including combining of tensile and shear loadings) for seismic restraint designs must be stamped by Contractor's registered professional engineer with at least five years of seismic design experience in New York State.

d. Attachments

All attachments of hangers and bracing shall be positive attachments that shall be cast in place anchors, drill in wedge anchors, or a welded or bolted connection to structure. Stud wedge anchors and female wedge anchors shall have an evaluation report number from ICBO (International Conference of Building Officials) verifying their allowable loads. Double sided beam clamps are preferred. Single-sided beam clamps are not acceptable unless they are equipped with a safety hook or strap. Single-sided beam clamps for bracing, with or without safety straps or hooks, are not acceptable on sprinkler piping per NFPA 13.

e. Drawings

Incorporate the following note on the Drawings in relation to mechanical HVAC items: "For all items that are required to have seismic supports or restraints, Seismic Drawings and seismic restraints calculations shall be prepared, sealed, and submitted by a Professional Engineer licensed in the State of New York and engaged by the Contractor. The Contractor's Engineer shall provide installation supervision of all seismic supports and restraints, and submit signed and sealed affidavit stating that the installation is in full compliance with the signed/sealed Shop Drawings".

22. THERMAL INSULATION

Insulation must be provided. Insulation that is subject to damage or reduction in thermal resistivity must be contained within a metallic jacket. If subject to becoming wet, it must also be enclosed with vapor seal (such as vapor barrier jacket). All insulation materials and accessories such as adhesives, mastics, cements, and tapes must comply with the flame spread and smoke-developed ratings in accordance with the requirements in the ASTM E84.

a. Duct Insulation

All exposed ductwork and accessories such as adhesives, mastics, cements, tapes, etc. must have sealed canvas or rigid fiberboard jacketing. All concealed ductwork and accessories must have foil face jacketing.

i. Supply Air and Outside Air Ductwork

All supply air and outside air ducts must have external insulation of sufficient thermal and moisture resistance to prevent condensation formation on the surface of the ductwork. The use of ductboard or internal duct lining is not permitted in outside air ductwork.

ii. Return and Exhaust Air Ductwork

The insulation of return air and exhaust air ducts must be evaluated for each project and for each system, to guard against condensation formation and, for recirculating or heat recovery systems, heat gain/loss.

b. Piping Insulation

All piping systems, including hot water, steam and steam condensate, domestic hot and cold water, chilled water, condenser water, brine, and refrigerant must be insulated.

i. Exposed and Concealed Piping

All exposed piping must have PVC jacketing, and concealed piping must have all-purpose jacketing.

ii. Permeability and Condensation

All piping systems, with surface temperatures below the average dew point temperature of the indoor ambient air must be insulated with vapor barrier to prevent condensation formation, regardless of whether piping is concealed or exposed. Chilled water, condenser water piping for waterside economizers, and domestic cold and/or chilled water piping systems must be insulated with non-permeable insulation.

c. Equipment Insulation

All equipment, including air handling units, chilled and hot water pumps, and heat exchangers, including hot water and chilled water heat exchangers, must be insulated. All pumps must have removable jacketing.

23. MECHANICAL EQUIPMENT ROOM AND MOUNTING REQUIREMENTS

a. Space Requirements

i. Refer to the Architectural Design Criteria in Section B of this Appendix for space requirements for mechanical equipment rooms.

ii. Large central equipment must be situated to facilitate service, repair and replacement.

b. Service Access

Refer to the Architectural Design Criteria in Section B of this Appendix for additional information regarding service access requirements.

i. Access Doors and Panels
Space must be provided around all HVAC system equipment as recommended by the equipment manufacturer for service and routine maintenance. Factory access door panels are to be provided in HVAC equipment. Field/shop installed access doors/panels shall be provided for ductwork and plenums as required for on-site inspection and cleaning. Equipment access doors/panels must be readily operable and sized to allow full access for replacement or repair. Ensure that access doors and panels are fire rated and self-close where installed in a fire rated enclosure.

ii. Equipment Access
Adequate means of access must be included for items such as chillers, boilers, air handling units, heat exchangers, cooling towers, reheat coils, VAV terminals in ceiling spaces and in equipment rooms, pumps, water heaters, and all devices that have maintenance service requirements. The consultant must ensure that provisions are made for removal and replacement of the largest and heaviest equipment component that cannot be further broken down, without damage to structure.

c. Vertical and Horizontal Clearances

Refer to the Architectural Design Criteria in Section B of this Appendix for additional information regarding vertical and horizontal clearance requirements.

i. Sufficient space for maintenance and removal of coils, filters, motors, and similar devices must be provided. Boilers and chillers must be arranged to permit the pulling of tubes from all units. The clearance must be equal the length of the tubes plus 2 ft. Air handling units require a minimum clearance of 2 ft. 6 in. on all sides, except on the sides where filters and coils are accessed, where clearance must be equal to the length of the coils plus 2 ft.

ii. Maintenance Plan Drawings must be prepared on separate sheets that indicate the paths for removal and replacement of major equipment items. These maintenance plans must also show clearances and, where applicable, access panels.

d. Roof-Mounted Equipment

Mechanical equipment other than cooling towers, air cooled chillers, evaporative condensers, packaged rooftop units (RTU), and exhaust fans, is not permitted on the roof of the building. Access to roof-mounted equipment should be by stair or elevator; ship's ladders should be avoided.

e. Housekeeping Pads

Housekeeping pads must be at least 6 in. wider on all sides than the equipment they support and must be 4 to 6 in. thick. Consultant is to coordinate location and size of pads across all disciplines.

24. BUILDING AUTOMATION SYSTEM (BAS)

The determination of the type and complexity of control systems to be selected shall include an analysis of the operational preferences and budgetary constraints of the Client Agency's maintenance staff. When implementing a BAS, a comprehensive training program must be developed and provided for the operating staff.

a. General

For new construction and substantial reconstruction projects, provide Direct Digital Control (Ddc) with an open BACnet or LonTalk communication protocol. For repair and alteration projects and new additions to existing projects, the following options are permitted: installation of Ddc with BACnet or LonTalk protocol; or integration of the existing system with customized gateways to the BACnet or LonTalk protocol.

i. The Building Automation System (BAS) must be of the Direct Digital Control (Ddc) type. The BAS must be capable of scheduling building lighting and HVAC equipment operations and maintenance, and adjusting building systems to optimize their performance to minimize overall power and fuel consumption of the facility.

ii. The BAS must use BACnet or LonTalk open communication protocols to provide integration and interoperability between building systems and control vendors. The Consultant must specify and include a functional design manual, a hardware manual, a software manual, an operation manual, and a maintenance manual. The BAS must have energy management and monitoring software.

iii. The BAS must consist of a series of Direct Digital Controllers (Ddc) interconnected by a local area network. The BAS must be accessible through a Web Browser. The BAS must have a graphical user interface, and provide trending, scheduling, downloading memory to field devices, real-time "live" graphic programs, parameter changes of properties, setpoint adjustments, alarm/event information, confirmation of operators, and execution of global commands. The BAS must record and archive all collected energy consumption data as described in this Section.

iv. BAS designs that integrate with other Information Technology (IT) systems are preferred to minimize costs and improve operations. Digital building control systems such as utility metering, HVAC building automation systems, lighting controllers, and renewable energy systems can share common communication protocols, compatible equipment, and uniform standards with other building IT services. Since this technology is in a constant state of improvement, the Consultant and Project Manager must coordinate the design of controls and monitoring systems with the Client Agency's IT group at the beginning of design.

b. Direct Digital Control (Ddc) System Design Criteria

i. Level of Integration

Central operator station monitoring and control must be provided in the building.

1. Central equipment (AHUs, rooftop units, boilers, chillers, etc.) shall be provided with Human Machine Interface (HMI) Liquid Crystal Display that can display diagnostic error codes and system information. Consultant shall include in the Bid Set one (1) Portable Operator's Terminal (POT) to permit operator interface to facilitate controller management (and central unit controller management in addition to the central unit controller HMI interface), commissioning, diagnostics and general operator interface with the installed control system. The POT shall be able to connect to all controllers.

2. Lighting systems controlled by a BAS must have independent power and control panels and networks. The BAS must monitor the status and energy consumption of the lighting systems.

3. Fire alarm systems, security systems, and elevator systems must not be controlled by a BAS. These systems must have independent control panels and networks. The BAS system must monitor the status of these systems only, in order to prompt emergency operating modes of HVAC and lighting systems.

ii. Automatic Temperature Controls

1. Standalone, programmable single or multiple loop microprocessor PID controllers must be provided to control all HVAC subsystems.
2. PID control loops must be used. All chillers, boilers, terminal units, and air handling units must have self-contained BACnet or Lon Talk controllers, which communicate with the BAS.
3. The control heating and cooling equipment in each zone shall be provided by a thermostat or temperature sensor located in that zone. Perimeter systems must have at least one thermostat or temperature sensor for each perimeter zone.
4. Night setback and setup controls must be provided for all comfort conditioned spaces, even if initial building occupancy plans are for 24-hour operation. Air side economizer, morning warm-up or cool-down options must be part of the control system. Controls for the various operating conditions must maintain pressurization requirements during occupied and unoccupied periods.

iii. Automatic Humidity Controls

Indoor and outdoor enthalpy and/or humidity sensors shall be provided. Sensors must be calibrated in-place during system startup and at least annually thereafter. Where precision humidity control is required, provide dew point control, for comfort control applications, RH sensors are permitted, provided they have been calibrated in-place and interfaced with dry bulb sensors so that the BAS can convert these two signals to a dew point value for control purposes.

iv. IAQ Controls

Measurement and control instrumentation must be provided to ensure outdoor air intake rates are maintained during occupied and unoccupied hours.

v. Setpoint Reset Controls

1. Air Systems
   Systems supplying heated or cooled air to multiple zones must include controls that automatically reset supply air temperature required by building loads or by outdoor air temperature.
2. Hydronic Systems
   Systems supplying heated and/or chilled water to comfort conditioning systems must include controls that automatically reset supply and return water temperatures as required by changes in building loads or by outdoor air temperature.

vi. AM Startup

Morning startup cycles shall minimize the outside air intake dampers during the summer/winter morning pick up period. If outside conditions are favorable, morning startup shall purge the building with cool dry outside ambient air before the initiation of the air-conditioning cycle.

vii. Energy Management and Conservation

The BAS must have the capability to allow building staff to monitor system performance and determine energy consumption.

1. HVAC control algorithms must include optimized start/stop for chillers, boilers, pumps, air handling units, exhaust fans, fan powered VAV and fan coil units, and all associated equipment. Control algorithms based on predicted weather patterns may be utilized if they are adaptive and self-correcting. A condenser water optimization control is required to optimize the chiller, tower, and pump energy consumption.

2. Electrical power parameters, such as V, A, KW, KVAR, KVA, PF, KWH, KVARH, frequency, and percent THD, must be measureable for monitoring. See also Electrical Section for separate metering of power consumption monitoring requirements.

3. Energy management measurements must be totalized and trended in both instances and time-based numbers. Energy monitoring data must be automatically converted to standard database and spreadsheet format and transmitted to a designated workstation. The measured energy data must be capable of being analyzed and compared with calculated energy consumption estimated during design.

viii. BAS Control and Monitoring Capabilities

The systems and components that must be controlled or monitored by the central BAS include chillers, boilers, air handling units, cooling towers, exhaust fans, heat exchangers, pumps, VAV terminal units, fan coils, finned tube radiation, air conditioners for computer rooms and other special spaces, building pressurization, lighting, electrical power, and emergency generators.

1. The BAS must be capable of scheduling the operations of the systems and equipment for occupied hours, unoccupied hours, and weekends and holidays. Scheduling of equipment shall be determined by standalone Ddc controllers with scheduling function or through the use of time clocks as digital input into the Ddc controller when the controller is an application specific controller without scheduling function

2. All automatic valves and dampers must have positive positioners installed to indicate operational status.

3. The BAS must be capable of receiving current sensor based digital signals from all field-installed controllers and calculating the electric energy, fuel, and water consumption by using appropriate voltages and phases.

4. The BAS must provide for standalone operation of subordinate components. The primary operator workstation must have graphical user interface. Standalone control panels and terminal unit controllers can have text-based user interface panels, which are hand held or fixed.

5. The BAS monitoring capability must include logs of data created by user-selectable features.

6. In new buildings and major renovations, the BAS must have approximately 20% spare capacity for future expansion.

ix. Maintenance Schedules

The central BAS must include application programs for scheduling maintenance of the mechanical and electrical equipment, including information on what parts and tools are needed to perform each task.

c. Retrofit/Repair Projects of Existing Buildings

Some retrofit/repair projects involve replacing essentially all of the HVAC equipment. For such projects, the Consultant shall verify if a full BAS/Ddc system is warranted and if the project funding is adequate to cover such expenses. In retrofits of buildings with an existing conventional control system or BAS/Ddc proprietary system in place, the Consultant must conduct a life-cycle cost analysis to determine between the complete replacement of the existing system or integration of the existing system with customized gateways.

i. **BAS Retrofit/Repair with Existing Terminal Units to Remain**
In the case of retrofit/repair work on conventional or BAS/Ddc control systems whereby the terminal units in the spaces are to remain and are controlled by electric or pneumatic controls, the new Ddc system shall be a hybrid of standalone central unit digital controls (boilers, chillers, rooftop units, air handling units, etc.) and the terminal units shall be electrically or pneumatically controlled.

1. If the terminal units in the spaces are controlled by pneumatic zone control valves (i.e., pneumatic thermostats are not located in each space) the climate control Scope of Work shall include removing the pneumatic zone control valves and providing digital thermostats (or sensors/controllers) and control valves in each space.
2. The existing terminal equipment pneumatic system shall be analyzed to determine if it is salvageable/repairable. Commissioning type diagnostic testing (equal to field contractor testing defined in the testing section of the Specifications), shall be performed during the scoping cycle.
3. Those portions of the pneumatic system that are not salvageable shall be replaced in kind with new pneumatic lines/equipment. Defective terminal systems' sensors, thermostats, actuators (i.e., those associated with terminal radiation control valves, any pneumatic VAV boxes, etc.) shall be replaced with new pneumatic components. Any defective pneumatic compressors, dryers, PRV stations, pneumatic main lines and branch lines shall be replaced as required. Consultant shall identify an allowance in the Bid Set for specific length of branch tubing to be replaced, estimated based on field inspection during Design.
4. The Consultant Commissioning Protocol testing conducted during Design will be repeated by the successful Contractor to verify the Bid Set work scope. The Contractor's field test is done for the purpose of verifying the work scope baseline of the Bid Documents so as to minimize the cost of field Change Orders. Contractor shall field test the existing pneumatic system to determine if there are any additional required repairs beyond that defined in the Bid Set. The Contractor's performance testing will be applied to work in progress where notices of direction for repairs have not been issued and when work has not commenced to replace the pneumatic air system beyond the Contract defined work scope.
5. The Contract Documents will call for the branch lines to be replaced by the Contractor on an as needed basis after the Contractor's demonstration of any faulty branch lines.
6. After the existing pneumatic system has been tested/repaired and after the pneumatic devices (thermostats, control valves, etc.) have been replaced, the Contractor shall demonstrate any lack of control due to faulty branch lines and these branch lines shall be replaced on an as needed basis.

ii. **New BAS with New Terminal Units**
In the case of installation of new terminal units (i.e. a new air conditioning unit for an existing building), the new Ddc only control system shall be a totally digital standalone system without an interconnecting network.

1. Salvaged air handling units shall have their pneumatic controls replaced with standalone electric direct digital control (Ddc only).
2. New air handling units shall be provided with new standalone electric direct digital controls (Ddc only).
3. Boilers, chillers and commercial rooftop units shall also be provided with standalone direct digital controls (Ddc only).

25. TESTING, ADJUSTING, AND BALANCING

The Consultant must specify the following in the Construction Documents:

a. Startup

Manufacturer's representatives shall be present for the startup of all major equipment, such as boilers, chillers, cooling towers, heat exchangers, air handling units, exhaust fans, packaged pump systems, and BAS.

b. Contractor Qualifications

The Contractor(s) performing the testing, adjusting, and balancing and the performance testing must have up-to-date certifications by the Associated Air Balance Council (AABC), the National Environmental Balance Bureau (NEBB), or the Testing, Adjusting and Balancing Bureau (TABB).

c. Testing, Adjusting, and Balancing

Testing, adjusting, and balancing (TAB) procedures shall include the operation of individual pieces of equipment as well as the operation of the overall HVAC and plumbing systems, in accordance with design intent.

d. Performance Testing

i. Performance testing of all systems and equipment, including chillers, boilers, air handling units, exhaust fans, water heaters, and related systems, shall simulate part-load and full-load conditions during summer, fall, winter and spring seasons, per the schedules specified by the Engineer.

ii. The Consultant must specify the services of an organization-certified NEBB, AABC, or TABB contractor to conduct this performance testing.

e. Air Distribution Systems

i. Airflow rates together with thermal and acoustic conditions must be tested, adjusted and balanced in all supply, return, and exhaust air pathways, and as a total system.

ii. Performance testing of the air distribution system and its components must be conducted after TAB has been completed.

f. Hydronic Systems

i. Leak testing must be conducted at static pressures as required by Code (or, where no code requirements exist, at 150% of maximum design working pressure of piping systems), with maximum permissible leakage.

ii. Water flow rates together with thermal and acoustic conditions must be tested, adjusted, and balanced in all hydronic systems after compliance with leakage test has been achieved.

iii. Performance testing of the hydronic system must evaluate remote outlet temperature maintenance, system and circuit pressure equalization, control of water hammer at peak draw, and compliance with the design intent and Specifications for the operation of water heaters, mixing valves, circuit setters/balancing valves, return pumps, and pressure reducing/regulating valves.

g. Reporting and Testing Results

i. The Consultant must specify that the Contractor(s) shall submit written reports on the procedures and results of the TAB and the performance testing.

ii. Measured properties must be within +/- 10% of design values.

26. COMMISSIONING

On select projects DDC will engage a Commissioning Agent who will work with the Consultant team to evaluate and maximize the effectiveness and efficiency of building systems. The Commissioning Agent may be involved during Design to help assess options and coordinate the efforts of the engineers, during Construction to coordinate systems installation and oversee pre-functional tests, and post-Construction to oversee testing and ongoing functional operation. For projects that require Consultant participation in developing Commissioning Specifications, the ASHRAE Guidelines shall be used as the basis for establishing required minimal criteria. The Consultant shall participate in the commissioning process as required.

27. FIRE PROTECTION

Where required by Code, the Consultant shall provide a complete state-of¬-the-art fire protection system compatible and coordinated with each architectural or mechanical design scheme, including but not limited to sprinklers, Siamese connections, pumps, water supply, water reserve, emergency power, smoke purge, and fan shutdown. For coordination of water supply work, including sprinkler and combined sprinkler/standpipe systems, between trades, see Appendix A-3 of this Guide.

a. Alarm and Flow Switches

An alarm valve shall be installed on the main service. Flow switches shall be installed on floor branches. System shall produce a water flow alarm and be capable of indicating the floor where sprinkler was activated.

b. System Design

System shall be hydraulically designed utilizing the most cost effective of the ‘tree’ or ‘loop’ type configuration. Minor alterations to an existing system may be done by the pipe schedule method. Whether hydraulically designed or designed by the pipe schedule method, the system shall comply with the requirements of NFPA-13 as modified by the Code. Schedule 10 piping may be utilized where allowed by Code.

c. Booster/Fire Pump

A sprinkler booster pump or fire pump system shall be provided if the hydraulic calculations indicate that street pressure is inadequate to properly pressurize the highest floor sprinkler heads. The Consultant shall submit hydraulic calculations, complete with a hydrant flow test letter from DEP. A five (5) psi safety factor shall be used in the calculations.

d. Drawings/Shop Drawings

The Consultant’s Sprinkler Drawings and the Fire Protection Contractor’s Shop Drawings shall be dimensioned, including pipe sizes, distance between heads, and distance to walls, and shall include standard sprinkler notes as required by Code. The Shop Drawings are not permitted to reduce the size of risers, mains, or sub-mains. Only branch piping may be revised by the Contractor to accommodate the need for additional sprinkler heads or rerouting of piping due to interferences. Whether or not changes are made, the Consultant shall confirm that the hydraulic calculations provided by the Contractor’s Engineer still provide for a minimum 5 psi safety factor. Upon approval of Shop Drawings and receipt of such confirmation, the Consultant shall amend the Contract Documents to match the approved Shop Drawings, and file with the Fire Department.

e. Water Service

Water service up to and including the backflow preventer device for sprinkler systems and combined sprinkler/standpipe systems are designed by the Plumbing Trade.

H. Electrical Engineering Design Criteria

Building and site electrical power and lighting systems and equipment shall be designed and engineered. All work shall comply with Code and utility requirements. Energy conservation is a requirement of all electrical systems.

All Electrical Engineering Drawings are to be coordinated with all disciplines; electrical systems shall be designed to avoid inappropriate juxtaposition with other utilities. The services of specialty sub-consultants shall be made available when required by the nature of the work.

1. DESIGN INTENT

The design of the electrical power, lighting, communication systems, and other building components must function together resulting in a building that meets the Task Order or Project Objective, as well as incorporating DDC's commitment to sustainability and energy efficiency.

a. Performance Objectives

Electrical power, lighting and communication systems must be adapted to support all performance objectives defined for the project, typically including sustainability, workplace performance (productivity and efficiency), fire safety, security, historic preservation, and improved operations and maintenance. Compliance with submission requirements is necessary to demonstrate that these systems have been adapted into the project at each phase of the design.

b. Full- and Part-Load Performance

Electrical power, lighting and communication systems must be specifically designed to meet all the defined performance objectives of the project at full-load and part-load conditions that are associated with the projected occupancies and modes of operation.

c. Flexibility

Electrical systems design shall be flexible to facilitate load growth, reliable and utilize techniques to conserve energy.

d. Maintenance

Maintainability and reliability are paramount to the operation of public buildings, therefore, the design and installation of all electrical systems and equipment must allow for repair, removal, and replacement – including major components such as switchboards, motor control centers, and etc. – without removal of exterior walls and impact on adjacent equipment and building occupants.

e. Building Automation System (BAS)

A computer based BAS that interfaces, monitors, and automatically controls lighting, heating, ventilating, and air conditioning is critical to the efficient operation of modern public buildings. The consultant shall integrate the building automation systems, with the exception of fire alarm and security systems, which must function as stand-alone systems with a monitoring-only interface to the BAS.

f. Commissioning

Commissioning of electrical power, lighting, and communication systems, if required, must be initiated at Schematic Design or, if applicable, Pre-preliminary Design and continue through all Design and Construction phases.

g. Load Shedding

Investigate costs and benefits of "load shedding". Costs will be associated with equipment and wiring. Benefits will be associated with reduced energy demand.

2. EXISTING CONDITIONS

For existing buildings, the Consultant shall survey and make recommendations for the re-use, replacement or modification of:

a. Electrical Services

Refer to new loads for suitability of Utility Company's metering and capacity of service entrance equipment, power distribution system, panel boards and consideration of non-linear loads.

b. Power Distribution Systems

The survey shall record the age and condition of all electric Normal and Emergency power distribution equipment.

c. Emergency Power

The survey shall evaluate the adequacy of the Emergency Power System

d. Lighting Fixtures

The survey shall include illumination levels, lamp bulbs, energy efficient lighting fixtures and controls. Consultant shall advise method of disposal of ballasts, bulbs, etc. that may contain PCBs or mercury.

e. Telephone Service

Evaluate the adequacy of the existing service.

f. Auxiliary Systems

Evaluate fire alarm, communications (voice and data) and security systems.

3. ELECTRIC SERVICE AND METERING

The Consultant shall request electric service for a new building or any required reinforcement of the electric service to an existing building from the utility company.

a. Economic Analysis

The Consultant must perform an economic analysis to justify the service voltage and design option selected.

b. Flexibility

Service equipment shall be designed to have adequate capacity to serve the load of the facility plus 25% future expansion.

c. Electric Service Request

Submit to the utility company a site plan showing the building property line, electric service entrance, equipment room, and a breakdown of the electric load (load letter). The request shall inquire about the available service voltage, utility short circuit current and impedance, metering requirements, charges and any other requirements. The request shall also indicate the desired voltage and Point of Entry (POE) into the building or to property line manhole or hand hole, so as to provide a reasonable route to the electrical room. Significant extra cost may result if the utility company cannot take the shortest

route for the service connection. Provide DDC with copies of all utility company correspondence.

d. Available Voltage

The available voltage generally is 120/208 volts. In some cases 265/460 volts may be available. When the available voltage is 120/208 volts, the Consultant must consider the cost effectiveness of stepping up the voltage to 265/460 volts for lighting and motor loads.

e. Transformer Vaults

When a transformer vault is required by the utility company, the Consultant shall coordinate location of vaults and shall establish a reference number with the NYC Department of Transportation (DOT) Office of Permit Management and meet with DOT to secure vault grating location approvals. The Consultant shall contact other City Agencies, as required, for coordination and securing approvals for new utility transformer vaults

f. Metering

Provisions for utility company's metering shall be made at the service entrance.

g. Monitoring

Provisions shall be made to monitor voltage, amps, kilowatt hour, power demand, and power factor.

4. LIGHT AND POWER DISTRIBUTION

Design a complete power distribution system with system and equipment grounding.

a. Distribution

Power shall be distributed to serve all interior and exterior lighting including parking lot lighting, all mechanical and plumbing equipment, fire suppression system, specialty equipment and general receptacles, elevators, dumb waiters, Fire alarm, mechanical alarms and security systems, communication equipment and miscellaneous equipment.

b. Design Parameters

Show on the Drawings short circuit calculations for all significant points.

i. Fuses and circuit breakers shall be coordinated for selective tripping and selected for the interrupting capacity required.

ii. The voltage drop shall not exceed the limits of Code.

iii. If the load is one thousand KVA or larger, comply with the requirements of the Advisory Board of the DOB.

c. Panelboards

Lighting and receptacle panelboards, power and distribution panelboards shall be located in electrical closets. Panelboards shall be located adjacent to the loads they serve.

i. Power and distribution panels shall be of the circuit breaker or switch and fuse type.

ii. Lighting and receptacle panels shall be of the circuit breaker type with bolt on branch circuit breakers and shall have door-in-door trim.

iii. Panelboards serving office receptacle load shall have 200% rated neutral.

iv. All panelboards shall include a typewritten directory describing what each individual circuit breaker protects.

d. Existing Panelboards

For existing buildings, show on Drawings all existing distribution, power, lighting and receptacle panelboards together with panel schedules. Recommend re-use, modification or replacement.

e. Computer Panelboards

Computer Panelboards shall have double-size neutrals, ground bus and built-in surge protection.

f. Panel schedules

For all panels provide complete panel schedules on the Drawings, showing circuit number, circuit breaker trip rating, load in volt-amperes for each circuit, load description and location, summary of connected load and demand load. For power panels, add conduit and cable size feeder for individual circuits. For fused switch panels, show switch and fuse rating. Show service voltage, phase, bus rating, short circuit current ratings, main circuit breaker or switch and fuse if required. Indicate panel location and type of mounting.

i. Provide twenty-five percent spare feeder capacity.

ii. Provide twenty-five percent spare circuit breakers or fused switches.

g. Feeders and Branch Circuits

Feeders and branch circuits shall be sized per code for load served.

h. Conduit and wiring

All conduits shall be ¾" minimum and shall run concealed where possible. Heavy wall, rigid, galvanized steel conduit shall be installed where exposed or where required by Code. Electrical Metallic Tubing (EMT) may be installed concealed in hung ceilings or walls. Compression fittings shall be used for EMT. Armored cable shall not be used. Aluminum conduit and wire shall not be used. Flexible conduit shall be only used for short lengths.

i. Provide a drag wire in all empty conduits.

ii. Cable connectors shall be of the copper pressure plate type. Connections to bus bars for cable sizes number 1/0 and larger, shall be made with two zinc-plated bolts.

iii. Power wiring shall be sized to limit the voltage drop in branch circuits to 2% to the farthest outlet, and to 5% total for feeders and branch circuits.

i. Transformers

All transformers shall, as a minimum, have K-13 rating and shall have 200% rated neutral.

i. Transformers for lighting and receptacle service shall be two-winding per phase, dry type of capacity to serve the lighting and receptacle loads specified.

ii. Transformers shall have 2 ½% taps, two above and two below rated voltage.

iii. Transformer windings shall be copper. Transformers shall have primary and secondary winding protection.

iv. Dry type transformers up to 45 KVA shall have dB ratings not to exceed 45 dB, and above 45 KVA shall not exceed 55 dB.

j. Motors and Motor Control centers

Design and specify power for motors and controls. Motor Control Centers (MCC) shall have combination magnetic motor starter and fused disconnect. Each starter will have hand-off auto switch, control transformer, pilot light, two auxiliary contacts, and an external manual reset button.

k. Electrical Closets

Design adequate centrally located electrical closets, which should be stacked in multi-story buildings.

5. CONTINUITY OF SERVICE

For existing buildings, specify continuity of service for power, light, fire alarm, communication, security and all other emergency systems, if the Client Agency intends to continue occupancy during alterations. Assume continuity of service unless otherwise indicated in the Task Order or Project Objectives.

6. EQUIPMENT REMOVAL AND DEMOLITION

Show on separate demolition plans electrical equipment required to be removed or relocated. Show source of power from which this equipment shall be disconnected. Provide associated specifications. Indicate staging plans, if required.

7. COMPUTER TECHNOLOGY AND OTHER SENSITIVE EQUIPMENT

Computer use and changing information technology represent increasing demand on electrical service capacity, reliability, wiring and flexibility. The Consultant should take into account Client Agency requirements/ project objectives current computer requirements and likely augmentation of equipment including peripherals and high–capacity internet lines when designing the electrical system.

a. Uninterruptible Power Supply (UPS)

Where required, a static uninterruptible power supply system shall be designed to buffer the data processing equipment against transient disturbances and enable continued operations and an orderly shutdown for the duration of a power outage lasting a period to be designated by the Client Agency, but not less than 15 minutes. Batteries for the UPS system shall be installed in a temperature-controlled environment.

b. Maintenance Bypass Switch

A manually operated external maintenance by-pass switch shall be provided for the UPS system to directly connect the critical load to the input AC power source, completely bypassing the input converter, inverter, static switch, all control and monitoring circuits, and all printed circuit boards.

c. Harmonic Filters and Surge Suppressers

Provide stand-alone transient voltage surge suppression devices with high frequency noise filtering for panel boards serving computers and other sensitive electronic equipment. Where significant nonlinear loads are present, passive harmonic mitigation devices shall be installed on transformer.

8. KITCHEN ELECTRICAL REQUIREMENTS

a. General

i. All disconnect switches in kitchen area shall be NEMA 4 enclosures to provide protection against splashing water. Surface mounted switches shall be provided with waterproof hubs.

ii. All 20 amps, 125 volt, kitchen receptacles shall be GFI protected.

iii. The kitchen power panels shall be located in an area adjacent to, but not within, the kitchen.

b. Controls and Interlocking

Electrically and mechanically operated gas valves shall be installed in kitchens and interlocked with auxiliary systems and cooking equipment to provide proper control and safe operation as well as emergency features. Provide interlocks and controls as follows:

i. Exhaust Fan Interlock with Appliances under Hood
Energy sources (gas or electric) producing heat for each appliance under hood shall be interlocked with exhaust fan.

ii. Hood Suppression System/Appliance Shutdown
When the hood suppression (Ansul) system is activated, the energy source for the appliances under hood must be shut down, and an alarm signal reported to the fire alarm system.

iii. Master Control Gas Valve
The master control gas valve shall be capable of shutting off all gas flow to the kitchen in case of emergency.

9. RECEPTACLE OUTLETS

a. Provide conduit grounding for general convenience receptacles. Ground conductor shall be provided for individual circuits to receptacles for computers and all other dedicated equipment.

b. Provide Ground Fault Interrupter (GFI) type receptacles in mechanical equipment rooms, wet locations, and near sinks in labs and lavatories.

c. Provide duplex receptacles for servicing HVAC equipment (125 volts, 20 amps, specification grade, GFCI protected) within 25 ft. of the equipment.

d. Provide duplex receptacles for maintenance (125 volts, 20 amps, specification grade) so that all areas are accessible by a 50 ft. extension cord.

e. In storage rooms, provide a minimum of one (1) duplex convenience receptacle.

f. Unless otherwise required by the Client's Agency, provide duplex convenience electrical outlets in offices (125 volts, 20 amps) spaced approximately twelve (12) ft. maximum on center around the perimeter of the room.

g. In offices a maximum of four (4) computer duplex receptacles shall be connected to a 20 amps circuit, and a maximum of eight (8) general convenience duplex receptacles shall be connected to a 20 amps circuit.

h. Separate circuits shall be designed for copiers, water coolers, fax machines, printers and other office equipment.

i. Provide TVSS duplex receptacles with LED indicator, where required, for protection of plug-in microprocessor-based equipment.

10. FIXTURE OUTLETS

On drawings, all fixture outlets shall be marked with the fixture type and control point.

11. INTERIOR LIGHTING AND LIGHTING CONTROLS

Computer generated lighting calculations are required for all building projects, and must be submitted no later than the end of Design Development.

a. Energy Efficient Lighting Fixtures

Lighting efficacy (lumens per watt) and lamp life shall be primary considerations in interior lighting design.

i. In general, interior lighting fixtures shall be fluorescent lamps operating at 265 volts (if available). Typical fluorescent lamps shall be high-performance low-mercury T8 with solid state ballasts suited for the application (see below).

ii. Consultant shall consider utilizing low-mercury T5 fluorescent lamps if the increased efficiency justifies the increase in initial and long term maintenance costs.

iii. Compact fluorescent lamps shall be used in lieu of incandescent for most general, task, and accent lights.

iv. Incandescent lamps shall be specified only where necessary, in limited applications and areas, such as theatrical lighting, track lighting for exhibits, historic interiors, and hazardous areas. Where feasible, low-voltage halogen should be used in lieu of standard incandescent.

v. Consultant shall consider utilizing the latest technology LED lights for indoor and outdoor applications where brightness, tight focus, and long lamp life are priorities.

vi. Do not exceed recommended spacing criteria for overhead ambient lighting fixtures.

b. Illumination Levels

i. Illumination levels shall comply with the Illuminating Engineering Society (IES) minimum recommended illumination levels, DDC Manual for Quality Energy Efficient Lighting, and NYC Energy Conservation Construction Code watts per square foot limitations.

ii. Lighting Power Densities (LPD) shall be determined using the space-by-space method. The maximum LPD is at or below the latest AHHRAE 90.1 levels.

c. Ballasts

i. Instant-start ballasts are preferred, except where lamp replacement is difficult.

ii. Dimming ballasts are preferred, particularly in naturally lit spaces. Dimming ballasts with minimum settings less than 5% of full output should be limited to spaces with audio/visual equipment or similar program.

iii. In spaces without full-time stationary occupants, utilize stepped ballasts, or multiple level switching, in lieu of continuous dimming ballasts.

iv. Where feasible, CFL ballasts should be electronic and hard-wired.

d. Lighting Quality

i. Color Rendering Index of lamps shall be no less than 84 unless specifically required by DDC or the Client Agency.

ii. Glare from artificial lighting shall be minimized. Particularly in areas of intensive computer use and other visual tasks, indirect lighting, baffles, louvers, diffusing overlays, and/or coves should be used. In rooms of typical ceiling height, specular reflectors must be concealed.

iii. High contrasts in light levels shall be minimized within a space. Task lighting shall be no more than twice the light levels supplied by ambient overhead lighting.

iv. Finish Schedules and Furniture Schedules (hard surfaces only) for occupied spaces shall include light reflectance values. Minimum values of 0.80 for ceilings and 0.70 for walls are recommended.

e. Lighting Controls

All interior lighting shall automatically be controlled by programmable Lighting Control Panel (LCP) with integral clock except for the emergency lighting.

i. Each area enclosed by walls or floor to ceiling partitions shall have at least one switch to control the lighting within.

ii. For spaces 2,000 sf. or less in area, lighting shall be controlled by ceiling mounted occupancy sensors and override switch.

iii. Enclosed office lighting shall be controlled by ceiling mounted occupancy sensors with override switch.

iv. Library and Places of Assembly shall generally be provided with key operated switches.

v. Corridor, Lobby and Toilet Lighting shall be controlled automatically from the Lighting Control Panel.

vi. Corridor and Stair Emergency Lighting shall be unswitched.

vii. Special light controls shall be provided for certain applications, as required.

f. Occupancy sensors and Time Clocks

Use infrared, ultrasonic, and microphonic occupancy sensors. Dual technology infrared and ultrasonic combination-type sensors are recommended. Sensors should be manual-on, automatic-off, particularly when used in naturally lit spaces. Where occupancy sensors are not practical, time controls must be used.

g. Natural Lighting

Wherever possible, natural light shall be utilized as the primary source of light, and electric light shall be supplemental.

i. Consultant shall integrate natural lighting strategies early in the design process, coordinating lighting design with architectural and HVAC design.

ii. In large interior spaces, orient ambient fixtures parallel to the longest exposure, and create separate lighting control zones for the rows of fixtures closest to windows.

12. HIGH INTENSITY DISCHARGE (HID) LIGHTING

Use metal halide lamps for high bay, exterior, and floodlighting applications. If available for the luminaires selected, use pulse-start metal halide lamps. Use quartz standby lamps to provide emergency lighting when the voltage dips. Use only electronic ballasts.

13. EXTERIOR/SITE/SECURITY LIGHTING

a. General

Exterior/site/security lighting shall be provided where required by Client Agency and Code around the perimeter of the building and at parking areas for safe passage and to deter theft and vandalism.

b. Sustainable Lighting Design

Lighting efficacy (lumens per watt), lamp life, and light trespass shall be primary considerations in exterior lighting design.

i. In general, metal halide lamps shall be used for exterior lighting. See "High Intensity Discharge (HID) Lighting" above.

ii. Lighting design shall minimize light trespass from the building and site, reduce sky glow, improve nighttime visibility through glare reduction and reduce development impact on nocturnal environment.

iii. The exterior lighting should not exceed 80% of the Lighting Power Densities as defined by the latest ANSI/ASHRAE/IESNA standard 90.1, Exterior Lighting Section.

c. Lighting Levels

Lighting levels shall be as required by the Client Agency and in compliance with the recommended IES (Illumination Engineering Society) standards, DDC Manual for Energy Efficient Lighting, NYC Energy Conservation Code, and at a minimum:

i. Main Entrance and walkways: 5.0 fc (average maintained).

ii. Building perimeter: 1.0 fc (average maintained) to a 20 foot depth from the building with 0.1 fc minimum and 5.0 fc maximum.

iii. Site (playgrounds, yards and athletic fields security lighting): 0.5 fc (average maintained) with 0.01 fc minimum and 5 fc maximum.

iv. Exterior parking – 2 fc.

v. General interior parking – 5 fc.

d. Lighting Calculations

Consultant shall provide computer generated lighting calculations for the entire project site and for the building perimeter. Calculations shall show horizontal illuminance at ground level. Light loss factor of 0.7 shall be used for calculations. In general, Illuminating Engineering Society (IESNA) standards shall apply (up to 15% deviation is permitted).

e. Drawings

Due to the aesthetics of exterior lighting, its impact on the building façade and the difficulty in describing multiple elevations on a plan, it is essential that the consultant will provide complete exterior building elevations to clearly depict the location and mounting height of each fixture.

f. Lighting Control

In new construction and substantial reconstruction, all exterior/site/security lighting shall be master controlled by the lighting management system.

g. Feeder lines

Feeder lines for site lighting shall be run underground in conduit.

14. EMERGENCY LIGHTING

a. General

Emergency lighting for means of egress must illuminate designated stairs, aisles, corridors, ramps, escalators, walkways, and passageways leading to an exit. Emergency lighting must also be provided at exit discharges extending to the public way and for safety and security as required by the Client Agency.

i. Compact fluorescent lighting fixtures are recommended. HID lighting fixtures are not acceptable for use as emergency lighting unless fixtures are equipped with integral quartz emergency lamps.

ii. Selected light fixtures shall be connected to unswitched circuits to serve as a night light and emergency lighting and shall be connected to code approved emergency power source and shall remain on at all times.

iii. Circuits for emergency lighting in an area required to be provided with emergency lighting shall be arranged so that loss of normal or emergency power supply shall not reduce the available lighting levels below the level required for emergency lighting by the applicable provisions of the Administrative Code, Reference standards or Rules of the City of New York.

iv. Illumination levels required for emergency lighting shall be at a minimum:

a. Places of Assembly:

General	1 foot-candle measured 18” above floor
Aisle	2 foot-candles measured 18” above floor
Exit Doors	5 foot-candles measured at the floor level

b. Corridors and Stairs — 2 foot-candles measured 18” above floor

b. Buildings with Generator

In new buildings, major modernizations, or major additions, where an emergency generator is called for in the Task Order or Project Objectives, or otherwise mandated by Code, provide power for emergency lighting through an Automatic Transfer Switch (ATS) and emergency lighting panel.

c. Buildings without Generator

In buildings not provided with an emergency generator, emergency lighting fixtures shall be connected to a power source recognized by the Code. The emergency lighting fixtures in a Place of Assembly and paths of egress to the outside shall be controlled by a relay with sensing circuit off the local lighting panel.

15. EXIT SIGNS

a. Locations

Means of egress shall be clearly marked by illuminated exit signs placed as required so that exits and path of egress are easily recognized from any point in a corridor or Place of Assembly. Locations of exit signs shall be designated by the Architect/Engineer of Record.

b. Design Parameters

Exit signs shall have 8" letters illuminated by light emitting diodes (LED) only. Wall mounted exit signs are preferred over pendant mounted exit signs. The use of pendant mounted exit signs is limited to meet visibility requirements, and only when wall mounted units may not suit the need.

c. Connection to Emergency Lighting Panel

For buildings with generator, exit signs shall be connected to the emergency lighting panel through transfer switch. For buildings without generator, exit signs shall be connected to an emergency lighting panel which is connected to an emergency service switch tapped ahead of the main service switch.

d. Battery Backup

Exit signs shall be provided with integral rechargeable battery packs. Batteries shall be of the nickel cadmium type.

16. EMERGENCY SYSTEMS

Design new emergency lighting and power systems or modify existing systems in place. Submit a detailed summary of the load indicating the largest size motor.

17. EMERGENCY GENERATOR

a. Capacity

An emergency generator, rated for stand-by operation, shall be provided when mandated by Code or Client Agency program and shall be sized to accommodate the following loads, as applicable, plus 25% spare capacity for future growth:

- **i.** Emergency lighting in corridors, stairs, and places of assembly.
- **ii.** Exit signs.
- **iii.** All elevators when three elevators or fewer are provided.
- **iv.** Fire pumps and sprinkler booster pumps.
- **v.** Fire alarm system.
- **vi.** Smoke purge system.
- **vii.** Public address system.
- **viii.** Telephone system.
- **ix.** Select lighting for security office, electrical and mechanical rooms.
- **x.** Sewage ejector and sump pumps.

xi. Gas leak detection system.

xii. Ddc/BAS controls.

xiii. Security systems.

xiv. Carbon monoxide detection and alarm systems.

xv. Where directed by the Client Agency, provide additional capacity in the emergency generator to support the computer equipment, back-up UPS and associated air conditioning systems.

b. Startup

Automatic Transfer Switches (ATS) shall be designed to start the emergency generator upon normal power failure and to transfer the load.

c. Load Bank

A permanently installed, 50% of rated generator capacity load bank, shall be provided for generator testing.

d. Remote Annunciators

Provide remote annunciators for the emergency generator; quantity and locations, as required.

e. Location and Enclosure

Location of the emergency generator shall be coordinated with the architect. The emergency generator shall be located indoors, roof mounted, or outdoors within close proximity to the electrical service room, in a suitable enclosure with accessibility for fueling. Special attention shall be given to Code requirements regarding fuel oil tank and fuel oil piping pressure testing, venting, fill and exhaust piping arrangement. For ventilation and exhaust requirements see Section G of this Appendix, “Mechanical Engineering Design Criteria”.

f. Noise Control

Special attention shall be given to the noise produced by the emergency generator and compliance with NYC Local Law 113 of 2005 (Noise code).

g. Fuel Storage Tank Design

i. Unless otherwise directed, the Consultant shall provide for an independent storage tank for emergency generator fuel storage.

ii. The fuel supply system shall include an electric transfer pump, an emergency hand pump, a day tank, and an alarm activated by high and low level switches in the day tank.

iii. The fuel storage tank shall be designed as per the latest NYS Department of Environmental Conservation (NYSDEC) regulations and the Code. .

iv. Design for buried fuel tanks and related ancillary equipment such as piping and cathodic protection shall be based on manufacturer’s data for either double wall steel tanks or double wall fiberglass tanks.

h. Fuel Storage Tank Capacity

i. Consultant shall review fuel storage space limitations and budget constraints during Schematic Design.

ii. Fuel storage tank shall be sized based on Client Agency’s requirements, but as a minimum shall be based on fuel consumption to provide at least eight (8) hours of running capacity at ¾ full load.

iii. New construction projects and major renovation projects shall be provided with a minimum 275 gallon diesel oil storage tank that is integral with the emergency generator.

iv. The parameters and the fuel storage capacity for all projects must be reviewed and approved by DDC and the Client Agency prior to proceeding with Construction Documents.

i. Grounding

Show grounding for the emergency generator. Determine if a separately derived grounding system will be used.

18. FIRE ALARM SYSTEM

a. General

The fire alarm system shall be fully supervised, microprocessor – based multiprocessing system, addressable type. The Fire Alarm System must be coordinated with the Fire Protection System and with the Building Automation System (BAS) for fan controls.

b. Compliance

Design the fire alarm system in accordance with the Fire Department and Code requirements for the building occupancy.

c. Remote Annunciator

A remote annunciator panel shall be provided in the central station to annunciate the status of the fire, smoke, and sprinkler alarm systems.

d. Equipment and Locations

i. Fire Alarm Control Panel (including smoke purge, where required) – at main entry lobby.

ii. Printer – In Maintenance Office or at other location, as directed.

iii. Remote Annunciator – At location as directed.

iv. Manual Pull Station – At each door leading to legal exit, in corridors, lobbies, places of assembly and as required to meet Code travel limitations.

v. Visual Annunciators (Strobes) – Wall mounted in corridors, conference rooms, places of assembly, libraries, maintenance shops, toilets and where required by Code. Visual annunciators shall be unobstructed by other objects, visible from any position in the area, and a maximum of 15 ft. from the ends of corridors.

vi. Audible annunciators (Speakers/horns) – At corridors and where required by Code. Where locations coincide with visual annunciators, use combination type.

vii. Area Smoke Detectors – In mechanical rooms (including fuel storage tank), electrical switchgear rooms, electric closets, main telecommunication rooms and closets, Audio/Video closets, elevator lobbies, elevator shaft, elevator machine rooms, non-sprinkled rooms storing combustible materials, and over compartmentalization or fire separation doors where magnetic door holders are provided.

viii. Heat Detectors – In boiler room

ix. Water flow and tamper switches for the Fire sprinkler system.

x. Elevator recall.

xi. Kitchen hood suppression system (Ansul System) – Activation shall be indicated as an alarm on the Fire Alarm System.

xii. Central Station Monitoring and, where required, Owner's designated remote monitoring station.

19. SECURITY SYSTEM

The need for a security system shall be indicated in the Task Order or Project Objectives. The type and level of security system required shall be determined by the Client Agency, DDC, and the Consultant. The security system must be integrated into the design, if a new building, or provided for in a non-intrusive way, in the case of an existing building. The system shall be provided with battery backup and connected to the building emergency generator (if applicable).

20. TELECOMMUNICATIONS, LAN AND CABLE TELEVISION SERVICES

The client agency shall request telecom/data service for a new building, or any required update of an existing service, from the provider company. The Consultant shall coordinate the telecom/data system design with the provider's specifications and requirements.

a. New Service

Submit to the telecom provider a site plan with the property line indicated together with telephone/telecommunications requirements. Request a location for the service point of entry into the building. Coordinate location and source of any additional planned or potential service, such as high-capacity internet lines. This also applies to cable television service when required.

b. Main Telecommunication Room

A main telecommunication room shall be designed to house the main control equipment of the following systems:

i. Local Area Network.

ii. Telephone System.

iii. Cable TV system.

iv. Sound, Intercom and Security Systems.

v. Closed Circuit Surveillance System.

vi. Building Automation System (BAS).

c. Communication Closets

Design adequate communications closets, to conform to the requirements of the utility company, and telecom providers. The communication closets shall be centrally located and, in multi-story buildings, stacked.

d. Empty Conduit System

Empty conduit system shall be designed for telecom, data and cable TV systems. Drag wire shall be provided in all empty conduits. Conduit size shall be a minimum of 1".

21. OTHER SPECIAL PURPOSE SYSTEMS

The following special systems will be designed as indicated in the Task Order and/or Project Objectives:

a. Audio/Visual (A/V) presentation system in conference rooms and designated areas

b. Video teleconferencing facilities in designated areas

c. Empty conduit for roof mounted satellite antenna

d. Entry door bell system

e. Entry door intercom system

f. Electric snow melting system

g. Electric heat tracing

22. GROUNDING SYSTEM

a. A grounding system shall be designed and shall consist of a buried bare copper cable and ground rods forming a loop around the building. The loop shall be connected to the main incoming water lines.

b. All transformers, switchboards and panelboards shall be designed with ground bus and shall be properly grounded.

c. The neutral of the emergency generator shall be grounded to the ground electrode.

23. LIGHTNING PROTECTION SYSTEM

a. Lightning Risk Assessment

The Consultant shall perform lightning risk assessment calculations based on the latest NFPA 780 to determine if a Lightning Protection System (LPS) is warranted for the building. If warranted, Consultant shall design a lightning protection system with UL Master Label Certificate in accordance with NFPA 780, UL 96A.

b. Equipment and Location

The lightning protection system shall be of the Franklin Rod type with air terminals along the rooftop, rooftop perimeter, and selected rooftop mechanical equipment; ground conductors, and dedicated ground rods. The lightning protection grounding system shall be bonded to the electrical grounding system.

24. SEISMIC DESIGN FOR ELECTRICAL SYSTEMS

a. New and Existing Buildings

New buildings and additions shall be designed for seismic forces. If an existing building is required to meet the requirements of the NYC Seismic Code and a waiver cannot be obtained, the electrical retrofit work must then meet such requirements.

b. Building Additions

For new additions, any items in the existing building that are integrated with the life safety systems in the new addition shall also meet the seismic requirements.

c. Drawings

Generic seismic restraint details shall be shown on the design Drawings. A note shall be added stating "Details are shown to illustrate the scope of work. Contractor's Registered Professional Engineer shall provide calculations and be responsible for providing signed/sealed Shop Drawings indicating locations of seismic restraints and the required connection details to file with DOB".

d. Items Requiring Restraint

Seismic restraints shall be designed for all equipment and machinery necessary for life safety operations. Such equipment and machinery shall be anchored to the structure for a seismic force as defined by Code. These items include, but are not limited to:

i. Pumps for sprinkler system.

ii. Motors and switchgear for sprinkler pumps.

iii. Transformers.

iv. Control panels.

v. Major conduit runs serving the equipment and machinery listed above.

vi. All life safety conduits.

vii. All conduits 2½" diameter and larger (1¼" and larger in boiler rooms and mechanical rooms).

viii. All cable trays regardless of diameter, weight and distance from the bottom of slab or structural member.

e. Calculations

Consultant to include in the design documents instructions requiring that "Calculations shall be performed by the Contractor's registered professional engineer verifying that the standard mountings for the life safety equipment can withstand seismic inertia loads. If not, Contractor's engineer shall detail additional restraints as required".

25. COMMISSIONING

On select projects DDC will engage a Commissioning Agent who will work with the Consultant team to evaluate and maximize the effectiveness and efficiency of building systems. The Commissioning Agent may be involved during Design to help assess options and coordinate the efforts of the engineers, during Construction to coordinate systems installation and oversee pre-functional tests, and post-Construction to oversee testing and ongoing functional operation. For projects that require Consultant participation in developing Commissioning Specifications, the IESNA Guidelines shall be used as the basis for establishing required minimal criteria. The Consultant shall participate in the commissioning process as required.

I. Plumbing Engineering Design Criteria

Plumbing systems and equipment shall be designed to strive to achieve the highest level of quality and engineering. All work shall comply with Code and utility requirements. Water conservation is a requirement of all plumbing systems.

All Plumbing Engineering Drawings are to be coordinated with all disciplines; domestic water, sanitary and storm drainage, and other liquid conveyance systems shall be designed to avoid inappropriate juxtaposition with other utilities. The services of specialty Sub-consultants shall be made available when required by the nature of the work.

1. DOMESTIC AND SPRINKLER WATER SERVICES

a. Separate Water Supplies

Where required by code, two (2) water services shall be provided, one for the domestic water system and the other for fire sprinkler system. The two (2) services shall be drawn from two (2) separate street water mains where available. Where two mains are not available, a take-off from the domestic water system shall supply the sprinkler system.

b. Connection of Services

Each service shall be fitted with shut-off valves immediately upon entering the building. A connection joining the fire sprinkler service with the domestic service shall be installed to ensure an auxiliary supply for the domestic water distribution. A meter, strainer and backflow prevention device (double check valve or RPZ) shall be installed in the header of each service supplying water for domestic service. The take-off feeding the fire sprinkler system shall be fitted with a strainer and a double detector check valve assembly with meter.

2. DOMESTIC WATER SUPPLY SYSTEMS

Design potable cold and hot water systems and their accessories in compliance with Regulatory Agency requirements.

a. Domestic Cold Water Service

i. Domestic cold water service must consist of a pressurized piping distribution system incorporating an independent (separate) service pipe from the tap at the exterior utility service water main to the water meter and backflow preventer equipment inside the building.

ii. Internal distribution must consist of a piping system that supplies domestic potable cold water to all plumbing fixtures, plumbing equipment, water heaters, mechanical makeup, and cold water equipment/system demands.

b. Domestic Water Service Pressure

i. The distribution water pressure must be sufficient to provide the outlet pressures required by fixtures or equipment at the hydraulically most demanding (generally the topmost/highest and most remote) outlet. The required outlet pressure must be determined as the minimum requirements of the Code or by the higher requirements of the fixture or equipment, as required by the manufacturer.

ii. Distribution water pressures must not exceed the system material, piping, and device-rated maximum working pressures, or maximum pressure at the fixture, equipment, or outlet, as required by Code. The Consultant must schedule and specify pressure regulating valves or valve stations where pressures at maximum working pressures may exceed the code maximum. Pressure Reducing Valves 'PRV' with expansion tank (for domestic hot water) must be used to regulate supply water pressures within distribution zones. Master PRV outlets must use pressure regulating valves. Pressure reducing valves must be specified to operate at peak flow within the entire hydraulic range, from low hydraulic grade line (HGL) to the maximum working pressure of the system (high HGL, plus pump shutoff head for pressure boosted systems).

c. Domestic Water Booster Pumping System

A packaged and third party tested triplex (three-pump) booster pumping system or duplex (two-pump) with a minimum of 80 gallon hydro-pneumatic storage pressure tank must be used where water flow test and water utility company low HGL water pressures do not provide required demands at peak draw.

d. Domestic Hot Water Service

The load calculations, storage capacities, insulation requirements, system types, and performance requirements of the water heating equipment must comply with the mandatory requirements in Sections 7.4.1 through 7.4.4 of ASHRAE Standard 90.1-2010

i. Domestic potable hot water may be generated by hot water heaters utilizing the most economical source of fuel such as natural gas, electricity, or steam or heating hot water (the hot water produced by the mechanical system to heat interior spaces) as the primary energy source.

ii. Cold (or preheated) water supply to water heaters must include a service valve, check valve, expansion tank (sized for expansion of storage capacity only), 27 inch heat trap, mixing valve bypass primer, and hot water return connection at a minimum. For energy savings, a minimum trap height of 27 inches must be provided at water heater cold water inlets.

iii. Instantaneous water heaters are not permitted as a primary source for potable hot water except for incidental, sporadic equipment demands or remote individual fixtures (e.g., lavatory, sink, shower, service sink). Point-of-use instantaneous water heaters are permitted for use at emergency fixtures to supply tepid water immediately at the emergency fixture or group of emergency fixtures.

iv. Domestic hot water supply temperatures must be generated and stored at a minimum of 1400F, and tempered to deliver 1100F to outlets, where permitted by Code and consistent with ASHRAE guideline 12-2000. Hand washing, lavatory, sink, and similar fixtures accessible to the disabled, elderly, or children must be tempered to deliver 850F to 1090F water temperatures at the fixture or group of battery fixtures. Bathing and showering fixtures (except emergency showering) must be tempered to deliver 850F to 1200F water temperatures at the fixture or group of battery fixtures, in accordance with ASHRAE guideline 12-2000. Individual fixture or battery thermostatic mixing valves must be provided where distributed, or zone, outlet temperatures may exceed 1100F. Hot water supply to dishwashers must be at 1400F, and the temperature must be boosted from 1400F to 1800F for the final sanitizing rinse.

v. There must be no dead legs or capped spurs within the potable domestic water plumbing system. Rubber fittings and device components are not permitted within the potable domestic hot water or return systems, as they have been associated with persistent colonization of Legionella spp.

vi. The domestic hot water distribution system must consist of a piping system that connects water heaters to all fixtures, equipment, and outlet demands requiring potable domestic hot water. Circulation return systems with circuit setters/balancing valves or temperature maintenance systems must be provided for all branches in excess of 20 feet from the water heater or circulated distribution main

vii. Domestic hot water return circuits of substantially varying pressures, as a result of pressure zoning or static head, cannot successfully be joined to a single pressure zone water heater. Locate individual pressure zone water heaters within the pressure zones, where return pressures would vary substantially causing deadhead on the lower pressure return circuits. Hot water return systems must have circuit setters (balancing valves) and test plugs at each return circuit, and systems must be balanced.

e. Domestic Water Supply Equipment

i. Domestic water supply equipment and components must include, but not be limited to, the following equipment: water meters, water heaters, water filtration, water softening, pressure booster systems, pressure regulating valves, circulating pumps, backflow preventers, circuit setters/balancing valves, thermostatic mixing valves, expansion tanks, isolation valves, hangers and supports, and thermal insulation.

ii. Water heaters and expansion tanks must be compliant with ASME standards and with Code, stamped and rated.

iii. Water hammer arrestors must be provided at each elevation change of every horizontal branch to fixture batteries, at all quick-closing automatic valves (mechanical makeup, drinking fountains, flush valves, single lever control faucets, temperature regulating valves, dishwashers, return pumps, and similar), and at each floor on each horizontal main for branches with/without individual fixture or battery water hammer arrestors, for both hot and cold water. Water hammer arrestors must be compliant with the Plumbing and Drainage Institute (PDI) Standard PDI-WH201, ANSI/ASME A112.26.1M, as required by Code, and as recommended/required by the fixture and equipment manufacturer or warranty.

iv. Domestic cold and hot water distribution systems must be insulated in accordance with the paragraph “Thermal Pipe Insulation” below.

3. WATER METERING

Meters with remote reading capability must be provided to collect water use data for each water supply source (e.g., domestic potable water, reclaimed water, rainwater). Utility company service entrance/interval meters are allowed to be used.

a. Locations

Provide sub-metering with remote metering to collect water use data for each building subsystem such as: cooling towers (meter on makeup water), evaporative coolers, steam and hot-water boilers, irrigated landscape areas with controllers, separate campus or project buildings, separately leased or rented space, and any other large water using system or process.

b. Water Meter Capabilities

All building meters and sub-meters must be configured to communicate water consumption data to a meter data management system which must be capable of electronically storing data and creating user reports showing calculated hourly, daily, monthly and annual water consumption for each meter and sub-meter.

4. POTABLE WATER USE REDUCTION

a. Mandate

All DDC building projects are expected to achieve significant water savings in comparison to typical buildings of similar size and program. Local Law 86 of 2005 mandates, at a minimum, 20% water savings for projects with a total construction cost above certain threshold levels and a domestic plumbing construction cost, including fixtures, above $0.5M. A 30% reduction is required if waterless urinals are approved by DOB. For eligible new construction, DDC may require a 40% reduction.

b. Methodology

The methodology for determining potable water reduction shall not be less stringent than that prescribed by LEED (Leadership in Energy and Environmental Design). Water performance ratings for plumbing fixtures that were established by the Energy Policy Act of 1992 (EPA 1992) shall be incorporated into the methodology to be followed for potable water use calculations.

c. Strategies

In addition to the use of water-conserving fixtures (see below) and water meter data management (see above), Consultant is expected to explore clearwater recycling, rainwater capture and re-use, and other methods to minimize potable water use. Consultants should reference “Water Matters”, DDC’s design manual for water conservation in buildings.

5. PLUMBING FIXTURES

a. Plumbing fixture accessibility clearances, installation, and accessories must be compliant with the code and ADA requirements.

b. All plumbing fixtures must be water-conserving/saving-type fixtures, faucets, and valves. Low flow water fixtures must be provided.

i. **Water Closets (Toilets) – Flushometer Valve Type**
Water closets may be either dual-flush or low-flow type, manually controlled or motion sensor controlled. Effective flush volume shall be in accordance with ASME A112.19.14 and EPA WaterSense labeled toilet tank-type High Efficiency Toilet (HET) Specification. For single flush, maximum flush volume – 1.28 gal. For dual-flush – light flush -1.1 gpf, standard flush- 1.6 gpf.

ii. **High Efficiency Toilets (HET) Water Closets -- Tank-Type**
Tank-type water closets must comply with the performance criteria of US EPA WaterSense tank-type High Efficiency Toilet specification 1.28 gal.

iii. **High Efficiency Urinals (HEU)**
Urinals must be low-flow, flush-type fixtures. Maximum flush volume shall be in accordance with ASME A112.19.2 – 0.125 gal.

iv. **Public Lavatory Faucets**
Use metered-type faucets for lavatories. Maximum water use shall be 0.25 gal. per metering cycle when tested in accordance with ASME A112.18.1.

6. WALL HYDRANT REQUIREMENTS

A freeze proof wall hydrant shall be provided every 150 feet length of the building façade so that hoses, with maximum length of 75 feet, can service the entire facility. Provide a minimum of one freeze-proof wall hydrant on each wall façade.

7. SPECIAL PURPOSE AREA PLUMBING SYSTEMS

a. Mechanical Rooms

Water lines must not be located above motor control centers or disconnect switches and must comply with the requirements of the Code. Mechanical rooms must have floor drains in proximity to the equipment they serve to reduce unsafe operating conditions from standing water or drain lines extending into aisles. All valves above 8 ft. from the floor must have chain-operated devices for ease of operation.

b. Vertical Chases and Shafts

All pipes in vertical chases and shafts must have drain valves at the bottom of the risers for ease of maintenance. A floor drain must be provided at the lowest level in each chase or shaft. Access to the valves and floor drains must be provided.

c. Electrical Equipment Rooms

No water lines are permitted in electrical rooms, except for dedicated area fire sprinkler piping.

d. Information Technology Equipment Rooms

To the extent possible, avoid any plumbing, sanitary, or storm piping in IT rooms.

e. UPS Battery Rooms

Battery rooms must be equipped with emergency eyewash and shower equipment (ANSI standard Z358.1). Floor drains required at the emergency shower (within the battery room acid containment curb) must extend with acid waste piping to an acid neutralization tank before discharge to the sanitary sewer or building drain.

8. SANITARY AND STORM DRAINAGE SYSTEMS

The Consultant shall design separate sanitary and storm drainage systems, and determine availability of public utilities. Each system shall be designed to connect to its respective street system. Design and specify duplex sewage ejectors and/or duplex sump pumps for those fixtures and/or storm drains that cannot drain by gravity. Design storm water detention or retention, where necessary and wherever feasible within the space and budget limitations, as per NYC DEP latest requirements.

a. Sanitary (Soil and Waste) and Vent System

i. Sanitary Drainage System

1. A complete sanitary building drainage system must be provided for all plumbing fixtures, sanitary floor drains, kitchen equipment, and equipment with sanitary, soil, or waste drainage/discharge.
2. Steam condensate as well as chemically treated mechanical discharge from cooling towers, boilers, chillers, and other mechanical equipment must not discharge to the sanitary drainage system without proper treatment for protection of the environment and waterways.

ii. Sanitary Floor Drains

1. Sanitary floor drains must be provided in multi-fixture restrooms, kitchen areas, mechanical equipment rooms, and locations where interior floor drainage accumulates wastes. Single-fixture toilet rooms do not require floor drains.

2. Floor drains for public toilets, kitchen areas, and other public areas must be cast iron body type with strainers. Equipment room areas require large diameter cast iron strainers, and parking garages require large diameter tractor grates rated for expected wheel loading. Drainage for ramps requires either trench drains or roadway inlets, if exposed to rainfall.
3. Floor drains must be provided at each item of kitchen equipment where accidental spillage is anticipated and to facilitate floor-cleaning procedures. Drains to receive indirect wastes from kitchen equipment must be of the floor sink-type with sediment bucket and removable grate.
4. Receptors, open-site drains, hub drains, trench drains, and similar drains must have a dome bottom strainer (in addition to pedestrian/vehicle grate strainers where required) to reduce splashing, increase free area, and prevent debris blockage. Drain body, frame, and grate strainers must be rated for expected wheel loading and must include drain adapters, extensions, receivers, deck clamps, and similar, as required by building construction.
5. Drain strainers in pedestrian areas must be heel-proof type. Every drain and system opening must have ¼-inch maximum strainer openings for rodent-proofing. Discharges must be elastomeric pinch valves or similar for rodent-proofing. Receptor drain outlets must be two times the area of combined inlet pipe areas.
6. Trap primers must be provided for all sanitary drains (floor drains, receptors, open site drains, hub drains, and similar) where drainage is not routinely expected or is seasonal.

iii. Grease Interceptors

1. Drains, fixtures, and equipment discharging fat, oil, or grease-laden waste; within 10 feet of the cooking battery; and as required by the Department of Health, must discharge to a grease interceptor before connecting to the sanitary sewer.
2. Grease interceptor(s), must meet criteria mandated by the Industrial & Acid Waste Unit at DEP. Sizing of grease interceptors must be based on the so-called volume sizing guideline, not the drainage fixture-unit technique.

iv. Sand/Oil Separator

Floor drains and/or trench drains in vehicle repair garages must discharge to a sand/oil separator before discharging to the sanitary sewer.

v. Automatic Sewage Ejectors

Sewage ejectors must be used only where gravity drainage is not possible. Only sanitary drainage from the lowest floors of the building may be connected to the sewage ejector; fixtures on upper floors must use gravity flow. Sewage ejectors must be nonclog, screenless, alternating duplex pumps, capable of passing a 2-in. solid, with each discharge not less than 4 in. in diameter. They may be connected to the emergency power system, where available, and must be properly vented.

b. Rainwater (Storm) Drainage System

A complete rainwater (storm) building drainage system must be designed and engineered for all rainwater (storm) drainage for roofs, plazas, balconies, decks, area wells, parking structures, parking garages, and similar structures. A separate and independent secondary roof drainage system must be provided in compliance with applicable codes and standards.

i. Rainwater (Storm) Management System

1. The intent of a rainwater (storm) management system is to limit the outflow from a site to adhere to the allowable rates set by DEP. The Consultant should be aware that DEP has lowered allowable rates for new development and for alterations such as additions that expand the footprints of buildings and impervious surfaces.

2. Planning, design and construction of onsite storm water shall comply with the latest NYC DEP's storm water performance standards for new buildings and existing developments, when alterations as defined by DOB, increase impervious surfaces on the lot by greater than 20% of existing imperious surfaces.
3. The design (as per DEP's Criteria for Detention Facility Design) shall reduce peak discharges to the city sewer system during rain events by requiring greater on site detention of storm water runoff and slow release to the sewer system. The performance standard is a key element of the New York City Green Infrastructure Plan.
4. In addition to the requirements of DEP's storm water performance standard, Consultant to comply with the requirements of DOB that established acceptance and maintenance criteria for rain water recycling systems.

ii. **Secondary (Overflow) Roof Drainage**
Provide secondary (overflow) roof drainage using sidewall scuppers, scupper drains, or a secondary (overflow) roof drainage system. Secondary (overflow) roof drains must be the same as roof drains, except with integral standpipe or damming weir extension 3 in. above waterproofing membrane and located within 5 ft. of (adjacent to) the primary roof drain, and extended to discharge above grade. Termination above grade must include a concealed elastomeric pinch valve or similar for rodent-proofing, near the discharge, and near the finished discharge in high finish areas. The discharge must be in non-occupied, non-pedestrian area that permits drainage away from the building and pedestrian access.

iii. **Clearwater Drainage**
Clearwater drainage (cooling coil condensate drainage, evaporation pan drainage, ice makers) and similar clear, non-chemically treated drainage should be recovered and reused for cooling tower make-up, irrigation, greywater use (such as toilet flushing), or similar purposes. Rainwater must be drained away only as a last option. In that case, clearwater drainage without chemical, vegetable, human, animal, protein, fecal, oil, grease, or similar pollutants may be discharged to the rainwater (storm) drainage system where approved by Code and the U.S. Environmental Protection Agency. Clearwater drainage may not discharge to the sanitary drainage system.

iv. **Storm Drains**
Rainwater (storm) drains include domed roof drains, secondary roof drains, hub and receptor drains (that do not receive floor drainage), deck drains, parking garage drains, trench drains, area well drains, and similar.

1. In general, drains must be cast iron body type, with nickel-bronze strainers for finished pedestrian areas, aluminum domes for roof drains, ductile iron or bronze finish for unfinished pedestrian areas.
2. Roof drains and planter drains in non-pedestrians/vehicle areas must have high dome strainers. Rainwater drains and equipment room areas must require large diameter strainers. Drainage for ramps must require either trench drains or roadway inlets, if exposed to rainfall.
3. Receptors, hub drains, trench drains, and similar drains must have a dome bottom strainer (in addition to pedestrian/vehicle grate strainers where required) to reduce splashing, increase free area, and prevent debris blockage.
4. Drain body, frame, and grate strainers must be rated for expected wheel loading and must include drain adapters, extensions, receivers, deck clamps, gravel stops, and similar, as required by building construction. The drain strainer free area must be equal to, or greater than, the free area of the calculated outlet pipe size area.
5. Drain strainers in pedestrian areas must be heel-proof type. Every drain and system opening must have 1/4 in. maximum strainer openings for rodent-proofing. Discharges must be elastomeric pinch valves or similar for rodent-proofing. House traps must be provided only on storm systems where required by code.

v. **Automatic Sump Pumps**
Sump pumps must be used only where gravity drainage is not possible. Only rainwater and clearwater drainage from the lowest floors of the building may be connected to the sump pump; drainage from upper floors must use gravity flow. Sump pumps must be alternating duplex sumps and must be connected to the emergency power system, where available.

vi. **Foundation and Subsoil Drainage**

1. The requirements of the foundation and subsoil drainage system must be identified, capacity calculated, and materials identified by the geotechnical soils engineer and identified in the geotechnical report. The layout and installation details and materials (identified by the geotechnical report) must be specified and identified in the structural foundation drawings and indicated on the architectural drawing sections and details. See Section J of this Appendix, "Investigative Design Criteria for Structures and Soils".
2. The foundation and subsoil drainage system must be provided with an emergency power source, backwater prevention, and perforated drain tile piping in washed gravel bed with filter fabric, which must extend to the duplex sump pumping system as required.

9. SPRINKLER SERVICE LINE AND STANDPIPE SYSTEMS

a. Design and specify fire standpipe in accordance with the hydrant flow test report. Provide water service up to and including the backflow preventer device for sprinkler systems and combined sprinkler/standpipe systems as indicated hereinabove.

b. Design and specify a fire pump or sprinkler booster pump where water pressure in street main is not adequate.

10. PIPING

a. Hub-Less (no hub) Cast Iron piping is permitted for the sanitary system inside the building except for underground applications. Service weight Cast Iron is allowed in either above or underground applications, but underground connections shall be Cast Iron bell and spigot pipe with a lead and oakum joint.

b. Hub-less (no hub) pipe and fittings shall not be used for the storm piping inside or outside the building. Only Service Weight with caulked joint (bell and spigot, lead and oakum) for underground application shall be used for storm drainage piping. The use of the so-called "push-on-joint" or a hub pipe with neoprene gasket is allowed for interior and above the ground storm piping.

c. Piping schedule shall comply with code requirements.

11. NATURAL GAS SYSTEMS

Design and specify a natural gas supply system. In conjunction with the utility company, determine street pressure availability. If high pressure is available specify pressure regulators. If low pressure is available, determine need for gas boosters.

a. Service Point of Entry

Natural gas service utility piping entering the building should be protected from accidental damage by vehicles, foundation settlement, or vibration. Wall penetrations are preferred above grade, where feasible, and provided with a self-tightening swing joint located upstream of the building wall penetration. Where wall penetration above grade is not possible, the gas pipe must be within a schedule 80 black steel, corrosion protected, sealed and vented, gas pipe sleeve that extends from 10 ft. upstream of the exterior face of the building wall penetration (or to the limits of excavation shoring if greater than 10 ft.) to a minimum of 12 in. downstream of the interior face of the building wall penetration.

b. Gas Piping within Building Spaces

Gas distribution piping should not be piped through confined spaces, including trenches or unventilated shafts where leaking gas could accumulate to dangerous levels or leak into the facility. All spaces containing gas-fired equipment, such as boilers, chillers, air handling units, water heaters, and generators, must be mechanically ventilated and must include CO (carbon monoxide) monitoring and alarms. Vertical shafts carrying gas piping must be ventilated. Diaphragms and regulators in gas piping must be vented to the outdoors. All gas piping inside ceiling spaces must have plenum rated fittings. Gas valves (concealed or accessible) are not permitted above ceilings. Gas meters must be located in a vented mechanical room or meter room and providing access to the local gas utility.

12. FUEL OIL STORAGE TANKS AND PIPING FOR VEHICULAR FUELING STATIONS

a. Fuel Oil Piping

i. All underground piping shall be double wall fiberglass which is slopped back to the tank manway and pitch verification is needed on all piping for underground tanks.

ii. All piping that is not sloped to the tank manway, must be provided with line leak detection.

iii. All above ground piping shall be steel.

iv. Each spill line shall be provided with spill containment and be mounted outside of the building to allow filling without disruption of service.

v. The spill containment sump must provide positive drainage back to the tank with no product residue remaining.

b. Fuel Oil Storage Tanks

Fuel oil storage tanks shall be installed above ground in bulk fluid storage room or buried underground.

i. Underground fuel oil storage tanks (UST) shall be double wall fiberglass and shall be as specified for the vehicle fuel storage tanks. All underground tanks shall be installed as per FDNY, DEC and DOB regulations.

ii. Above ground tanks shall be single or double wall steel and provided with access manhole, high cut-off valve, high level alarm and 110% containment tub.

iii. Where above ground tanks are used, the room shall be capable of containing 110% of the volume of the largest tank. In addition, a leak detection system should be provided at the lowest point in the room.

13. THERMAL PIPE INSULATION

a. All sanitary sewer vents terminating through the roof must be insulated for a minimum of 6 ft. below the roof line to prevent condensation from forming and must include vapor barrier jacket on this insulation.

b. All piping exposed in plenums, or above the ceiling, must be insulated to prevent condensation. The thermal pipe insulation for plumbing systems must comply with fire and smoke-developed index in accordance with the Code requirements.

14. CHEMICAL WASTE SYSTEM

a. Chemical waste disposal system design and sizing shall conform to DEP (Department of Environmental Protection) requirements.

b. Waste water from emergency showers and eyewash basins need not be connected to the chemical neutralizing system and may discharge directly into the sanitary system.

c. The plans for chemical waste management shall be submitted for review and approval by NYC DEP, Bureau of Wastewater Treatment (BWT).

15. PLUMBING SEISMIC DESIGN

a. New and Existing Buildings

New buildings and additions shall be designed for seismic forces. If an existing building is required to meet the requirements of the NYC Seismic Code and a waiver cannot be obtained, the plumbing and drainage retrofit work must then meet such requirements.

b. Building Additions

For new additions, any items in the existing building that are integrated with the life safety systems in the new addition shall also meet the seismic requirements.

c. Drawings

Generic seismic restraint details shall be shown on the contract documents. A note shall be added stating, “Details are shown to illustrate the scope of work. Contractor’s registered professional Engineer shall provide calculations and be responsible for providing signed/sealed shop drawings indicating locations of seismic restraints and the required connection details to file with DOB.”

d. Items Requiring Restraint

Plumbing and drainage piping equipment associated with life safety systems as well as other systems that must be operational in order to function in the aftermath of a seismic event, shall be seismically restrained.

16. PIPING SYSTEM AND EQUIPMENT IDENTIFICATION

All pipes, valves, and equipment in mechanical rooms, shafts, ceilings, and other spaces accessible to maintenance personnel must be identified with color-coated piping or color-coded bands, and permanent tags indicating the piping system type and direction of flow or the equipment type and number, in accordance with ANSI Standards. The identification system must also tag all valves and other operable fittings in accordance with ASTM Standard A13.1.

17. COMMISSIONING

On select projects DDC will engage a Commissioning Agent who will work with the Consultant team to evaluate and maximize the effectiveness and efficiency of building systems. The Commissioning Agent may be involved during Design to help assess options and coordinate the efforts of the engineers, during Construction to coordinate systems installation and oversee pre-functional tests, and post-Construction to oversee testing and ongoing functional operation. For projects that require Consultant participation in developing Commissioning Specifications, the ASHRAE Guidelines shall be used as the basis for establishing required minimal criteria. The Consultant shall participate in the commissioning process as required.

18. CIVIL ENGINEER DRAWINGS

Confirm civil engineer will show street water main, sanitary, storm, and gas connections; otherwise, include in Plumbing scope.

J. Site Civil Engineering Design Criteria

Site civil engineering systems and equipment shall be designed and engineering. Local regulations must be followed without exception in the design of systems that have a direct impact on utility systems. These include storm water runoff, sanitary sewers, storm sewers, water lines, gas lines, electrical and communication lines.

1. SITE ANALYSIS

a. A site inventory and analysis, including an on-site investigation, shall be carried out before any design effort.

b. Mechanical and Electrical Rooms in Areas Prone to Floods

i. Mechanical and electrical equipment rooms must be located 5 ft. above the level of the 100 year flood plain.

ii. Do not locate mechanical, electrical and communication room in a basement or sub-basement.

2. PHYSICAL SECURITY

Manholes must be secured from unauthorized access using tamper-proof bolts.

3. SITE UTILITIES

During site design, the location and coordination of utilities (water, sanitary sewer, electricity, gas, communications, etc.) must be coordinated with other site design features and finalized.

a. Coordination with Service Providers

i. The consultant is responsible for coordinating the utility design with local utility companies and/or other service providers.

ii. The consultant to verify the utility systems have sufficient capacity and reliability to meet the building design requirements.

iii. DDC will negotiate rates and connection charges with utility companies, where applicable.

b. Utility Location

i. The consultant must ensure that utility elements, such as electrical transformers, emergency generators, backflow preventers, and meters, are easily accessible by the utility companies.

ii. Design utility lines to avoid street trees, large trees, and signature planting areas. Locate utility lines so that future maintenance and repair will not damage trees and plantings. Storm drainage pipes should be located in unpaved areas where possible.

iii. Water lines should be located in the unpaved area behind curb lines or under sidewalks. Minimize locating water lines under streets, drives, or other areas where access is severely limited. Do not place main water lines under foundations or within the building footprint.

iv. Locate sanitary sewer lines in unpaved areas where possible. Follow code requirements on separation of water and sanitary sewer lines.

v. Manholes must not be located in the main pedestrian walkways, plazas, or entry courts.

c. Site Mechanical and Electrical Distribution Systems

Refer to HVAC, Electrical and Plumbing Design Criteria Sections for the requirements for site distribution systems.

d. Water

i. Consultant to follow the regulations of NYC DEP. The service connection between building and public water lines must be coordinated with DEP. The service connection must be placed in a secure enclosure to prevent unauthorized access and potential contamination. Requirements for water meters and backflow preventers are in the Plumbing Design Criteria Section.

ii. The building Automation System (BAS) must monitor all water meters and record water usage.

iii. Consultant to consider loop-fed systems with multiple water connections for large buildings or campuses; install dual-feed systems if required by code for the building occupancy.

iv. The water supply system must be capable of supplying the required water flow for the fire protection in accordance with NFPA 24.

e. Sanitary Sewer

i. Consultant to follow the regulations of NYC DEP.

ii. Separate storm drains from sanitary sewers within the property limits.

iii. Provide cleanouts 5 feet from the building on all service lines. Service lines should enter the main at a manhole. Provide drop manholes if the service line does not enter at the invert.

iv. In areas where no public sewers exist, use of septic tanks and leach fields is acceptable. Install the septic systems in accordance with code. Locate septic systems where they can be expanded to meet future needs of the discharge system; unless otherwise required by the client agency, plan for a 50% larger system.

f. Storm Drainage

i. Design the storm water system as required by DEP. Use gravity flow for all storm drain systems.

ii. Where possible, locate storm drainage pipes in unpaved areas; offset inlets from main trunk lines to prevent clogging.

iii. Rainwater not collected for reuse from the building roof drainage system must be discharged into the storm drain.

iv. Storm Water Runoff Requirements

1. The site design must manage storm water runoff.

2. The consultant must conform to DEP requirements for storm water management. The consultant must obtain any required DEP approvals for the storm water management plan.

K. Investigative Design Criteria for Structures and Soils

1. PROBES

When appropriate the Consultant shall develop and submit a plan for probing and testing existing structures. This plan shall indicate location, quantity, methods of probing and testing, as well as the objectives of the probes.

a. Timing

Where probes are necessary to clarify existing conditions, the Consultant shall request them at the Pre-schematic phase or at the Schematic Design phase if a Pre-schematic is not performed. Probing existing structures shall be performed not only to resolve technical uncertainty, but also to avoid delays and uncertainty during construction operations.

b. Number of Probes

The number, locations, and extent of probes should be determined to provide sufficient understanding of existing conditions. The Consultant is required to be present when these probes take place so as to note the conditions on site and direct the Contractor. When the initial probes do not offer conclusive results, additional probes shall be immediately ordered in the field to avoid delay.

c. Probing and Testing Report

A detailed inspection report on the findings of the approved Probing and Testing Plan shall be submitted to DDC. It will include location, photographs, dimensional data, sketches, and any other material necessary to support the findings.

2. SUBSURFACE INVESTIGATION

In addition to providing for a suitable foundation solution, the Consultant is expected to use best professional judgment and experience to determine a soil exploration program that will reasonably clarify soil related work. The Consultant is responsible for the geotechnical analysis and engineering of the project.

a. Bureau of Environmental and Geotechnical Services (BEGS)

At the earliest project stage the Consultant shall consult through the DDC Project Manager with the DDC Geotechnical Section to determine a preliminary number of borings, their location, and other required investigations. Contact with the Geotechnical Section shall be maintained throughout site exploration. The Geotechnical Section shall be represented at the Design Kick-off Meeting.

b. Site Visits

All projects that require excavation and foundation work will be visited at the start of Pre-Schematic or Schematic Design by the Consultant's Structural Engineer or Geotechnical Engineer. This site visit is a contractual obligation. Based on the project requirements and as result of this field visit the program of soil exploration shall be initiated.

c. Soil Exploration Program

The soil exploration program should enable the determination of the optimal foundation solution as well as the reduction of uncertainty during construction. DDC does not place a maximum limit on the number of borings to be taken. The number and type of investigations should be based on reasonable economic and engineering decisions and in accordance with the NYC Building Code.

d. Additional Borings

When the Consultant finds that the preliminary borings are not sufficient to provide information for design and construction, additional borings shall be ordered as soon as possible so as to prevent any potential delay to the project schedule.

3. NUMBER OF BORINGS

The Consultant shall be responsible for the preparation of boring Location Drawings and for the selection of any specimen soil samples for analysis by laboratory testing. As a minimum, the number of borings shall meet the requirements of the NYC Building Code and shall be determined by the Consultant. To manifest its intent of obtaining better soil information, DDC established the additional minimum conditions listed below:

a. Quantity

The minimum number of borings for a new project shall be four.

b. Maximum Distance

The maximum distance between two adjacent borings shall be one hundred feet.

c. Additional Borings

Where footings bear on rock, one additional boring will be taken for every three borings required by the NYC Building Code. For sites where a previous building was demolished, take two additional fifteen foot deep borings.

d. Building Code

The relaxation in number of borings allowed by Chapter 18, Section 1802.4, of the NYC Building Code shall not be applied or accepted.

4. FIELD CREW DECISIONS

DDC Geotechnical Section employees will monitor borings and classify soils. DDC has the latitude to perform additional borings whenever in our judgment, field conditions so require. The conditions listed below require additional borings.

a. Near Surface Footing

For proposed near surface footings, where two consecutive borings show fill levels differing by more than six feet, an additional boring halfway between the initial borings shall be performed.

b. Extreme Conditions

For every boring that did not reach its intended depth due to extreme conditions, two additional borings shall be performed.

5. WATER LEVEL

a. Update Information

For sites where there are sufficient existing borings, water level information older than ten years shall be updated.

b. Measurement Intervals

For sites in the vicinity of bodies of water, the water level shall be measured three times at intervals of approximately four weeks. For other sites it is required to have two readings spaced four weeks apart.

6. ADJACENT FOUNDATIONS

a. Information

Information on neighboring footings can be obtained by exploratory pits. Funds for such pits are provided by the individual projects. DDC has probing requirement contracts that can be used for that purpose.

b. Research

The Consultant is responsible for conducting research at the Building Department to obtain information on existing adjacent buildings. If necessary, assistance may be requested from the Permits and Approvals Unit of DDC.

c. Site Visit

During the site visit the Consultant team shall attempt to visit basements of adjacent buildings.

L. Environmental and Geotechnical Engineering Design Quality

The design process must respond to environmental concerns and the project design must incorporate measures to mitigate adverse environmental impacts whenever feasible. The environmental review process for any project will address rules and regulations established by the NYC Department of Environmental Protection (DEP), NYS Departments of Health and Labor, and applicable United States Environmental Protection Agency (EPA), and Occupational Safety and Health Administration (OSHA) standards. While the vast majority of environmental issues within buildings undergoing renovation are associated with the presence of asbestos-containing materials (e.g.; spray-on fireproofing, pipe insulation, and vinyl asbestos tiles) other hazards might be present. Examples of these include; lead based paint, polychlorinated biphenyls (PCBs), and biological contaminants (such as mold and pigeon droppings). Excavated soils may contain volatile organic compounds (VOCs), toxic metals, or other contaminants from past hazardous materials disposal practices.

DDC's Bureau of Environmental and Geotechnical Services (BEGS) has developed a strict set of special experience qualifications for environmental consultants and sub-contractors. The Consultant may be responsible for obtaining the services of a qualified firm or individuals licensed or certified to perform hazardous materials investigations in NYC. Any firm selected to provide such environmental services requires approval by DDC BEGS before they can participate in the project. When DDC provides environmental services, the Consultant is expected to support and cooperate in the Agency's efforts.

On projects for which the Consultant is responsible for obtaining these environmental services, they shall meet the standards described below.

1. ASBESTOS-CONTAINING MATERIALS (ACM)

a. Investigator Survey

All buildings scheduled for construction/renovation, including recently constructed buildings or newly renovated areas, must be surveyed by a NYC Investigator to identify the presence or absence of ACM which could be impacted during construction/renovation.

b. Abatement In Contract Drawings

With limited exceptions, contract documents shall include abatement of all ACM that can reasonably be expected to be disturbed by construction activities.

c. Outside Construction Area

When inspecting for asbestos or preparing abatement contract documents, give specific consideration to areas that may be impacted outside of the immediate construction area, nearby restricted access areas, and abatement phasing requirements.

d. Historical Reports

Historical asbestos survey reports have been compiled on a building-by-building basis. DDC BEGS maintains files of prior asbestos survey reports and must be contacted by the Consultant prior to any survey work.

2. LEAD-CONTAINING MATERIALS

a. Protect Workers

The Consultant is advised that lead-containing materials have the potential to adversely impact the health of construction workers and others located adjacent to the work area and appropriate precautions shall be specified. Such precautions shall include OSHA Safe Work Practices.

b. Identify Waste in Bid Documents

Lead-containing materials to be disposed may be designated as a hazardous waste. The Consultant will be responsible for identifying any lead waste disposal requirements and noting them in the bid documents.

c. Note Potential Lead Release in Bid Documents

The Consultant shall be responsible for identifying any construction tasks that could result in releases of lead for which the contractor may become responsible and for noting them in the bid documents.

d. Regulations on Child Occupancy

In buildings that would be considered “child occupied”, the Consultant will be responsible for developing lead control procedures in conformance with the appropriate federal and state requirements. The sub-consultants responsible to perform such work shall be EPA Lead-Safe Certified in accordance to the Lead Paint Renovation, Repair and Painting (RRP) Rule. Any work of that nature being performed in child occupied facilities must be done by an EPA Certified Renovator or by workers trained by and supervised by a Certified Renovator.

3. OTHER HAZARDOUS MATERIALS

a. Site Contamination

Performing construction in areas of known site contamination is likely to increase project costs significantly by adding follow-up environmental investigation and reporting. In the design phase, the Consultant must review existing environmental due diligence reports and other historical records to ascertain whether other contaminants might be present and to review and coordinate the hazardous material construction documents provided by DDC to assure they adequately address handling, removal, and disposal of those materials. DDC BEGS has had experience with such issues and may be consulted for assistance in developing specifications and coordinating with regulatory agencies.

b. Waste Management

Failure to adequately identify hazardous waste streams, use approved waste transporters, or use approved waste disposal facilities may expose the City to long-term liability and/or result in costly change orders. The Consultant shall ensure that all applicable hazardous waste rules and regulations are fully understood and addressed in specifications and contract documents.

c. PCB-Containing Materials

Oil-filled electrical equipment (transformers, bushings, capacitors, cooling and insulating fluids, contaminated soils, etc.) may pose a long-term liability to the City and are subject to existing EPA and state regulations. The presence of such materials must be identified before or during the Design Development phase and the Consultant shall provide appropriate guidance for handling and disposal.

d. Underground Storage Tanks

Underground storage tank systems (USTs) can threaten the environment and pose a long-term liability for the City. State and federal regulations concerning USTs must be followed. The Consultant shall identify the presence of all USTs that may be impacted by the construction work and include appropriate specifications in the contract documents.

e. Other Environmental Issues

The Consultant is responsible in the design phase for identifying any other additional environmental issues that may be created by the construction work.

Regulatory Entities

The Consultant is responsible for filing complete applications and documentation, and for obtaining all approvals for the project in accordance with current requirements of the appropriate regulatory agencies and utility companies. These include the following without limitation:

1. DEPARTMENT OF CITY PLANNING (DCP) AND THE CITY PLANNING COMMISSION (CPC)

The DCP and the CPC have overall responsibility for zoning variances, special permits, and Uniform Land Use Review Procedure (ULURP). ULURP is required for zoning changes, site selection, acquisition and disposition of City owned property, select concession contracts, select revocable consents, permits, and map changes. Consultant services in support or preparation of ULURP shall be identified in the Task Order or Project Objectives.

2. DEPARTMENT OF BUILDINGS (DOB)

The DOB has primary responsibility for the enforcement of the NYC Building, Plumbing, Mechanical, Fuel and Gas, Electrical, Energy Conservation Codes, the Zoning Resolution, portions of the NYS Multiple Dwelling Law and Labor Laws, as well as the enforcements of regulations relating to construction, alteration, maintenance, use, occupancy, safety, and sanitary conditions of buildings in New York City. The DOB also issues violations for non-compliance with the Building Code. Some NYC Building Code items and filings also require approval by the DEP, DOT, FDNY, or other agencies. Projects adjacent to waterways are reviewed by the SBS rather than the DOB.

a. Plan/Work Applications

The Consultant shall file appropriate applications and obtain approvals from DOB of plans for project work. The Consultant shall be governed by DOB application and approval procedures as related to individual application type, such as New Building, Alteration Type, Use Permits, Public Assembly, etc.

b. Hazardous Materials

When not performed by DDC, the consultant should file the appropriate documentation with the DEP and DOB.

c. Special Inspections

Special inspections are paid for and furnished by DDC. For each project DDC will identify the Registered Professional responsible for the Special Inspections. The Consultant is responsible for identifying all items that will require special inspection on the TR-1 form. This document should be provided to DDC four weeks prior to the projected pre-filing date at the DOB, in order to allow enough time to obtain all required signatures. If the Consultant fails to provide the document in advance, it will be the Consultant's responsibility to file the initial Identification of Responsibility TR-1 form. Subsequent to the application receiving approval, DDC will designate the Special Inspection provider who will perform the inspections. At that point the Consultant is relieved of any responsibilities in relation to the Special Inspection sign-offs.

d. Builder's Pavement Plan (BPP)

The Builder's Pavement Plan Unit of the DOB and DOT reviews and approves paving applications that are required for all new buildings and for some renovation projects. Paving plans must show sidewalks, street trees, curbs, roadway work, street modifications, sidewalk vaults, drainage across sidewalks, and planned legal sidewalk, road, and curb elevations as established by DOT or by official waiver of legally established grades.

e. Department of Small Business Services (SBS)

The Waterfront Permits unit at SBS, instead of DOB, reviews and approves construction on properties adjacent to the waterfront and certain other specialty projects.

3. DEPARTMENT OF TRANSPORTATION (DOT)

DOT is responsible for operations relating to streets, bridges, and tunnels, and the issuance of necessary permits. These include review and approval, as necessary, by:

a. Administrative Superintendent of Highway Operations (ASHO)

ASHO may place a hold on a permit when the proposed work location is scheduled for resurfacing by DOT in the near future, or was resurfaced within the past 18 months. ASHO may release the hold if the proposed work can be scheduled or designed in a way that does not interfere with planned or recent work. ASHO may also place a hold when the proposed work location is part of a DDC street reconstruction project, in which case DDC will review the permit and seek to coordinate the proposed work with the reconstruction

b. Bureau of Permit Management and Construction Control (the Bureau)

The Bureau issues permits relating to the maintenance and repair of public roads, streets, highways, parkways, bridges, and tunnels. Permits are required to be taken out by the Contractor for street closings, sidewalk and roadway construction, protective bridges (sidewalk sheds) and other similar construction operations. The Consultant may be required to prepare necessary drawings.

c. Office of Franchises, Concessions, and Revocable Consent(OFCRC)

Approval from the OFCRC of DOT is required for any construction extending beyond the property line, whether above or below street level, that is not exempt by provisions of the NYC Building Code, and underground tunnels, vaults, and utilities. It is required for other work, including the construction of bridges over streets and tunnels or utilities under roadways. Such approval can be withdrawn at any time (revocable consent). Any above ground work, requiring revocable consent will also require the approval of the PDC or LPC.

4. METROPOLITAN TRANSIT AUTHORITY (MTA)

If the proposed construction could infringe upon or adversely affect structures of subsurface, surface, or elevated transit systems, it will be necessary to receive the approval of the MTA prior to receiving approval by the DOB.

5. FIRE DEPARTMENT (FDNY)

The FDNY's Bureau of Fire Prevention enforces all laws and rules pertaining to the prevention of fire.

6. DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP)

The NYC DEP enforces all laws and rules pertaining to environmental conditions and hazardous materials and includes:

a. Asbestos Control Program

While DEP oversees asbestos reporting and abatement in the City, DDC has primary responsibility for identifying asbestos containing materials at DDC projects and developing Drawings and Specifications for their abatement (see Section A-1 of this Appendix, Part A, "Design Process", and Part K, "Hazardous Materials"). In most instances, the Consultant's responsibility is limited to identifying potential areas of asbestos containing material and coordinating other work with abatement work. Asbestos forms may need to be filed with DEP regardless of whether the overall project requires filing with DOB.

b. Bureau of Environmental Planning and Analysis

The Bureau supports the City and State Environmental Quality Review processes (CEQR and SEQR) through which City agencies may be required to assess, disclose, and plan for the mitigation of the environmental consequences of projects (see NYS Department of Environmental Conservation below). Consultant services in support of CEQR/SEQR, including environmental assessment statements (EAS) and environmental impact statements (EIS), shall be identified in the Task Order or Project Objectives.

c. Division of Air & Noise Policy, Permitting and Enforcement

This division regulates activities and equipment that emit atmospheric contaminants, including demolition activities that can produce airborne particulate matter, boilers that can produce noxious gases, and construction vehicles that can produce both kinds of contaminants. This division also enforces the NYC Noise Code, Local Law 113. The Consultant is responsible for ensuring that noise-producing elements of the project scope, such as outdoor mechanical equipment, are in compliance with code.

d. Bureau of Water and Sewer Operations (BWSO)

BWSO authorizes the repair or replacement of water and sewer lines, the installation of backflow prevention devices, and the connection of domestic water, sprinkler, sanitary, and stormwater systems to City water and sewer mains. BWSO also provides water pressure tests for connections to new domestic water and sprinkler systems and confirms the availability of sewer service for new sanitary and stormwater systems. If applicable to a project, BWSO approvals are required in order to obtain DOB approvals (see Appendix A-1 Section I, "Plumbing Engineering Design Criteria").

e. Bureau of Wastewater Treatment (BWT)

Construction activities such as excavations and well drilling that will discharge more than 10,000 gallons per day of ground water into the public sewers must obtain a Dewatering Permit from BWT. Projects involving well point de-watering in Brooklyn and Queens must also contact the NYS Department of Environmental Conservation (see below).

f. NYC Water Board

The Board manages DEP's Comprehensive Water Reuse Program, which offers a rate reduction for buildings that capture and use stormwater.

7. DEPARTMENT OF PARKS AND RECREATION (DPR)

DPR approves projects within parks or designated parkland, as well as removal or planting of street trees. Street tree plantings may be required for new construction or significant renovation projects as required by DCP regulations. Street tree planting approval is required prior to DOB or DOT approval. Street tree plantings must be inspected and accepted by DPR Forestry division in order to obtain DOB final sign-off or Certificate of Occupancy.

8. DEPARTMENT OF HEALTH AND MENTAL HYGIENE (DOHMH)

The DOHMH approves the operations of food service establishments and swimming pool facilities. DOHMH regulations also pertain to other types of facilities including day care centers and animal care facilities.

9. DEPARTMENT OF SANITATION (DSNY)

The DSNY approves refuse disposal methods, including disposal of special refuse.

10. ENVIRONMENTAL CONTROL BOARD (ECB)

The ECB is the division of the Office of Administrative Trials and Hearings (OATH) that hears cases on violations of City laws that protect the public's health, safety, and environment issued by agencies including, but not limited to, the DOB, DOT, FDNY, DEP, and DPR.

11. UTILITY COMPANIES AND NYS ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA)

Utility companies review and approve applications for electric, gas, and steam connections. Consultants are also expected to be aware of and help Clients apply for energy conservation incentive programs by NYSERDA and individual utility companies.

12. COMMUNITY BOARDS

Community Boards review and make recommendations pertaining to projects located within their boundaries. All projects that must undertake a PDC or LPC review must also be reviewed by the community board or committee. Consultants may need to present new buildings, major additions, and landscape projects to the appropriate board. The Consultant is responsible for all services in support of Community Board notification and review, if required or if requested by DDC.

13. NEW YORK STATE AGENCIES

a. Department of Environmental Conservation (DEC)

DEC administers and enforces the State's Environmental Conservation Law (ECL). Consultants for DDC projects will work primarily with DEC's office for Region 2, which covers New York City, and with the Division of Environmental Permits, which conducts environmental assessments and reviews projects that require DEC permits. Permit applications are processed according to the ECL's Uniform Procedures Act. The most common DEC reviews, permits, and authorizations required for DDC projects include:

i. State Environmental Quality Review (SEQR)

DDC projects that receive State funding, require a DEC permit, or require discretionary action such as a variance by a State agency, must proceed through SEQR. Under SEQR, an Environmental Assessment Statement (EAS) must be prepared to identify potential environmental impacts; if such impacts are anticipated, an environmental impact statement (EIS) must be prepared to describe how they will be mitigated. Under SEQR, projects may be designated as follows:

1. Type I Action: Projects that meet or exceed statewide or agency thresholds, typically – but not always – requiring the preparation of an EIS.
2. Type II Action: Projects that do not require further SEQR review.
3. Unlisted Action: Projects that do not meet Type I thresholds but may still require an EIS.

ii. **State Pollutant Discharge Elimination System (SPDES)**
This permit is required for construction activities involving soil disturbance of at least one (1) acre, or less than 1 acre where DEC finds a potential threat to water quality. Construction activities involving soil disturbance of more than 5 acres at a time must comply with additional requirements. To obtain approval, projects must prepare a Stormwater Pollution Prevention Plan (SWPPP) that conforms to the NYS Stormwater Management Design Manual. Because the SWPPP for a project in New York City must be approved by DEP (see above), such projects must also conform to the DEP Guidelines for the Design and Construction of Stormwater Management Systems.

iii. **Coastal Erosion Hazard Area**
This permit is required for construction activities on land along coastal waters including the Hudson, Harlem, and East rivers; the Kill van Kull and Arthur Kill; Long Island Sound; the Atlantic Ocean; and all connecting water bodies, bays, harbors, shallows, and wetlands. To obtain approval, projects must have public benefit, must not cause an increase in erosion or have adverse effects on protective features or natural resources, and must be safe from flood and erosion damage. DEC maintains maps of the State's Coastal Erosion Hazard Areas.

iv. **Tidal Wetlands and Freshwater Wetlands**
This permit is required for construction activities that could impact wetland functions. To obtain approval, projects must not degrade or destroy any wetlands. DEC maintains the State's Fisheries (freshwater wetlands) Maps and Tidal Wetland Inventory. In general, the City's wetlands are concentrated around the south shores of Brooklyn and Queens (see Critical Environmental Areas below), the north shore of Queens, the southeast shore of the Bronx, and the north and west shores of Staten Island, with small tidal and freshwater wetland areas scattered throughout the five boroughs, especially Staten Island and the major parklands of northern Queens.

v. **Critical Environmental Areas (CEA)**
The shoreline of Jamaica Bay, which includes parts of Brooklyn and Queens, is the only designated CEA in New York City. Projects subject to SEQR that are in or substantially contiguous to this area must specifically evaluate potential impacts to the unique characteristics of the CEA, which may include its benefit or threat to human health; valuable natural, agricultural, cultural, historic, recreational, or educational qualities; or an inherent environmental sensitivity to change.

vi. **Environmental Remediation**
DEC maintains the States' Registry of Inactive Hazardous Waste Disposal Sites and, together with the New York City Mayor's Office of Environmental Remediation (OER), oversees the remediation of State Superfund Sites and brownfields in the City.

b. Office of Parks, Recreation and Historic Preservation (OPRHP)

In addition to administering the seven (7) New York State parks within the City, as well as Hudson River Park, jointly administered with the City through the Hudson River Park Trust, OPRHP administers the State's Open Space Conservation Plan, which identifies conservation and historic preservation priorities on public and private property in the City and throughout the State.

c. State Historic Preservation Office (SHPO):

This office of OPRHP maintains the National and New York State Registers of Historic Places (see Landmarks Preservation Commission above) and maps of known areas of archeological sensitivity. SHPO acts as the primary reviewer of projects receiving state or federal funding that are found through SEQR (see DEC above) to have potential impacts on Register-listed properties or archeological resources. Projects receiving only City funding are reviewed by LPC.

d. Department of State

Projects located in Coastal Erosion Hazard Areas (see above) must obtain a Coastal Consistency Certification from the Department's Coastal Management Program. The certification will be incorporated into the permit decision of the U.S. Army Corps of Engineers if federal approval is required, or of DEC if no federal approval is required.

A. General Information

1. CORRESPONDENCE

Unless the Consultant is specifically directed otherwise, all correspondence shall be:

a Addressed to: (Name of Project Manager)
Public Buildings Division
Department of Design + Construction
30-30 Thomson Avenue
Long Island City, New York 11101

b Captioned with: CAPIS ID Project Number
Project Title and Location
Contract Number
Correspondence Subject

2. TELEPHONE

The agency telephone number is 718-391-1000. All staff at DDC can be reached with this number.

3. PUBLICITY/AWARDS/PRESS

General Requirements:

a. No public announcement:
Consultant shall not make any public announcement or publicity release regarding a DDC project or its services to DDC under a DDC Contract without prior written approval.

b. No public announcement:
Consultant shall not use any of the Contract documents from a DDC project or under a DDC Contract for any public relations, marketing, or promotional efforts without DDC's prior written approval.

Specific Requirements:

a. Consultant (and their employees, consultants, subcontractors, etc.) shall not issue any press release or other public announcement (on any social media platform or outlet) or otherwise make any public statements, written or oral, without the prior written consent of DDC.

b. If the Consultant (and their employees, consultants, subcontractors, etc.) does not receive written consent from DDC or if DDC does not respond to the Consultant's request, then the Consultant shall not issue any press release or other public announcement (on any social media platform or outlet) or otherwise make any public statements.

c. If any media outlet (including blogs) reaches out to the Consultant (and their employees, consultants, subcontractors, etc.), the Consultant will immediately contact the appropri-

ate person at DDC (DDC's Public Information Officer) and will not respond until DDC has approved in writing.

d. If the Consultant is interested in seeking an award on a DDC project, the Consultant shall first get DDC's written permission and agree to work with DDC's Public Information Officer on how the application and/or nomination may be presented.

e. Consultant will not include photographic or artistic representations of the design of the DDC project in Consultant's promotional or professional materials, without the prior written consent of DDC.

Request for DDC Written Pre-Approval:

a. Consultant (and their employees, consultants, subcontractors, etc.) **shall not** do the following, without first seeking and receiving DDC's written permission:

- **i.** Seek publicity for their work on DDC projects;
- **ii.** Submit DDC projects to paper or electronic media outlets, newspapers, blogs, architectural and/or engineering journals, construction and/or construction-related trade journals, design award programs, construction award programs, or competitions; and
- **iii.** Engage in any activities that may lead to publicity in any format.

b. Consultant (and their employees, consultants, subcontractors, etc.) **shall not** do the following, without first seeking and receiving DDC's written permission:

- **i.** Present any project material from a DDC project for any publication, competition, or other activities.

Public Design Commission or Landmark Preservation Commission (or any other local or state agency):

a. Consultant (and their employees, consultants, subcontractors, etc.) **shall do the following:**

- **i.** Advise DDC at least five (5) business days in advance of any meeting, presentation or hearing in front the City's Public Design Commission or Landmark Preservation Commission (or any other local or state agency) for a DDC project.
- **ii.** Submit to DDC an electronic copy of each board or image presented to the City's Public Design Commission or Landmark Preservation Commission (or any other local or state agency) for a DDC project.

4. ADDITIONAL SERVICES

The Consultant may be required to perform "Additional Services" in addition to the "Basic Services" as outlined in the Task Order or Project Objectives. Additional services are also described in the Contract, as well as the methods and amount of compensation stipulated. The "Additional Services" may include but not be limited to the following:

a. Construction Services

Construction Services include all requested activities beyond the defined Basic Services during construction. Such services may involve increased participation at site meetings, field reconnaissance, special inspections, resident engineering, and additional architectural services.

b. Full-time Project Representation

Full-time Project Representation covers the assignment of full-time site representatives to assure that the work conforms to the construction documents. Note, this may be included either as part of the Basic Services or additional services as indicated in the Task Order.

c. Planting and Tagging
Selection and tagging of plant materials, and supervision of the planting operation by a Landscape Architect.

d. Probes, Surveys, and Testing Services
Probes, Surveys, and Testing Services include probes to be performed for the purpose of investigating concealed construction, surveys performed for the purpose of verifying site conditions, and tests regarding material properties. Special testing is needed for historic and other older structures which include analysis of existing materials and finishes, treatment tests, and testing of treatment products and replacement materials.

e. Copying Contract Documents
Printing additional sets of Contract Documents beyond those stated in the Consultant Contract.

f. Travel Expenses
Authorized out-of-town travel to verify material sources, suppliers, and fabrication.

g. Percent for Art Coordination
Administering the Contract with an artist providing artwork for the project under the Percent for Art Program of DCulA, if not required as a Basic Service.

h. Value Engineering Service
Providing material for and participating in Value Engineering studies.

i. Space and Furniture Planning
Providing detailed furniture and equipment listings for purchase requisitions and installation supervision. This may be described in the Task Order or Project Objectives.

j. Documentation
Provision and reproduction of photos, drawings, and other documents, which DDC may require for the project

5. PERFORMANCE EVALUATION

DDC evaluates the performance of Consultants and sub-consultants on a periodic basis during design and construction. The evaluation becomes part of a City-wide database, and is used by DDC and other agencies in selecting Consultants. Evaluation is done by the DDC Contract Manager and the design review staff, and focuses on:

a. Design Quality

b. Technical Proficiency

c. Construction Document Quality

d. Effective Communication with DDC and other Agencies

e. Project Administration
The Consultant receives a copy of the evaluation and can respond to it. The response becomes part of the consultant's evaluation record.

B. Division of Responsibility for Multiple Contracts

1. ELECTRICAL WORK ASSOCIATED WITH HVAC AND FIRE PROTECTION

a. The Electrical Contractor shall furnish and install the power wiring to starters, motors and in-sight disconnects

b. The HVAC/Fire Protection Contractor shall furnish, and the Electrical Contractor shall install, unless integral with the equipment, all starters and disconnects.

c. Furnishing and Installation of all control devices and all control and interlock wiring for equipment furnished under the HVAC/Fire Protection Contract shall be by that Contractor, including any power required for any control device. This power is to originate from a four circuit panelette in each mechanical equipment room. If there is no electric panel in the room, the Electrical Contractor is to furnish and install this panelette.

d. The Electrical Contractor is to provide a feed terminating in a junction box or disconnect. The HVAC/Fire Protection Contractor is to do all wiring from the junction box or disconnect to the boiler.

e. Where the Electrical Contractor is to do power wiring to specific equipment, details of that electrical work are to be shown on the electrical drawings.

f. Motor Control Centers may be furnished by either the HVAC/Fire Protection Contractor or preferably the Electrical Contractor, but they must be installed and wired by the Electrical Contractor, except for external control wiring, which shall be installed and wired by the HVAC/Fire protection Contractor.

g. Sprinkler systems, including flow and temper switches are to be furnished and installed by the HVAC/Fire Protection Contractor. The Sprinkler Alarm Panel, and all wiring is to be furnished and installed by the Electrical Contractor, and must be shown on the Electrical Drawings.

2. ELECTRICAL WORK ASSOCIATED WITH GENERAL CONSTRUCTION OR PLUMBING

a. Power and control wiring for electrical equipment furnished under General Construction or Plumbing contracts is to be furnished and installed by the Electrical Contractor, and must be shown on the Electrical Drawings.

b. Luminous ceilings are to be furnished and installed by the Electrical Contractor.

c. Lighting fixture supports shall be furnished by the Electrical Contractor and installed by the General Contractor.

3. ELEVATOR WORK

a. The Elevator Disconnect near the machine room entrance, including the feeder and the controller, shall be provided by the Electrical Contractor. All other related elevator electrical and control work is to be provided by the elevator Subcontractor.

b. The Electrical Contractor is to provide an electrical outlet box and telephone junction box at the midpoint of the elevator shaft. The telephone junction box is to be connected with empty conduit to the nearest telephone strip box.

4. STANDPIPE AND SPRINKLER RESPONSIBILITIES

a. The Plumbing Contractor is to provide water service for the sprinkler, standpipe and combined standpipe /sprinkler systems, from the main up to and including the first Outside Stem and Yoke (OS&Y) valve and the detector check valve.

b. The Plumbing Contractor shall provide the standpipe system, including the fire pumps, but not the sprinklers.

c. The HVAC and Fire Protection Contractor is to provide the combined sprinkler/standpipe system and the separate sprinkler system from the detector check valve, including the fire and booster pumps. This work does not include the water service up to and including the detector check valve that is to be provided by the Plumbing Contractor.

d. The Electrical Contractor is to provide all related wiring.

e. Coordinate all requirements with DDC as these requirements relate to union jurisdiction in New York City.

5. FUEL TANKS

a. The HVAC and Fire Protection Contractor shall furnish and install the fuel tanks, associated piping and miscellaneous controls for heating oil or emergency generators.

b. The Plumbing Contractor shall furnish and install all equipment for gasoline or diesel fuel dispensers.

c. The Electrical Contractor is to provide power for any required pumps.

d. The General Contractor, HVAC/Fire Protection or Plumbing Contractor is to provide for excavation, gravel, backfill, support pads and manhole access. A determination as to which Contractor shall do the work is to be made by DDC in conjunction with the Consultant.

6. CONTRACTOR RESPONSIBILITY

Each Contractor is to perform all necessary rigging, cutting and patching, excavation and backfill for the work of their Contract, unless otherwise specifically noted on the plans and specification by the Consultant.

7. ACCESS DOORS

Access doors are to be furnished by the respective trades for installation by the Contractor for General Construction.

C. Drawings

1. PROJECT DRAWINGS

Drawings shall meet the applicable requirements of the New York City Administrative Code.

a. Building Information Modeling (BIM)

DDC may require the use of Building Information Modeling (BIM) to deliver projects. Any requirement to use BIM will be indicated in the Task Order or Project Objectives. The application of BIM to DDC projects shall be governed by the "DDC BIM Guidelines", a separate document to be used in conjunction with this Guide.

b. Computer Aided Design (CAD)

Where BIM is not required or used, Project Drawings shall be prepared using a Computer Aided Design (CAD) drawing system acceptable to DDC. Hand-drawn design drawings and sketches normally prepared during Pre-Preliminary Design or Schematic Design are acceptable exceptions.

c. Submission and Utilization of Digital Drawing Files

Consultant shall furnish CAD drawing files on CD's, in addition to the prints or mylars required, when submitting Compliance Documents for bidding or when otherwise required to do so by DDC. Provision shall be made for automatic quantity take-offs to be derived directly from the CAD drawing files. These shall be used to prepare final estimates.

d. Ownership of Documents

All BIMs, CAD files, and documents shall be the property of DDC.

2. DRAWING STANDARDS

a. Standard Sheet Sizes

Drawings shall be on sheets sized 24x36 inches, with minimum borders of two inches on the left side to allow for binding and half inch on the right side, top, and bottom. Other sheet sizes will be permitted if required by specific project needs, and approved in writing by DDC.

b. Contract Indicated by Letter

Drawing numbers shall be consecutive within each discipline or contract, and be prefixed by the letter indicating the discipline or contract to which the drawings are applicable in accordance with DOB requirements.

c. Addenda Drawings

Addenda drawings are issued prior to bids being received and are to be numbered consecutively within each discipline or contract.

d. Supplementary Drawings

Supplementary Drawings are issued after bids have been received and are to be numbered consecutively within each discipline or contract.

e. Addenda and Supplementary Drawings

Addenda and supplementary drawings shall bear the notation, "PRELIMINARY- NOT FOR CONSTRUCTION", prior to inclusion in the Contract Documents.

f. Drawing Formats

Drawing formats are available from the DDC Project Manager and Team Leader. Use DDC Standard Title Sheet on all sets of Design Drawings and use DDC Standard Title Block on all Design Drawings.

g. Legends

Legends shall accurately depict graphic symbols used on the drawing to the same scale and weight.

3. EXISTING CONDITIONS DRAWINGS

a. Consultant's Responsibility

Unless otherwise indicated in the Task Order or Project Objectives, the Consultant shall:

i. Provide Existing Conditions Drawings of all parts of the building to be affected by the proposed work. Field measurement and probing the building may be necessary.

ii. Review Existing Conditions Drawings prepared by others and provide a statement with regard to their adequacy and accuracy, verifying with field measurements and probes if necessary.

iii. Reconcile Existing Conditions Drawings with other documents listed in the Task order or Project Objectives, or issued by the DDC Project Manager., and prepare a statement with respect to their correlation.

iv. Augment Existing Conditions Drawings prepared by others, to provide a complete set to meet the stipulations of the Task Order or Project Objectives and the Code

v. One complete set of Existing Conditions drawings on CD-ROM in CAD format or image of printed drawings reviewed and found to be accurate. Provide architectural existing conditions drawings as master set to all sub-consultants.

b. Architectural Existing Conditions

Documentation of the Architectural Existing Conditions shall meet the requirements of the latest edition of the Code, for administrative and enforcement, definitions, occupancy and construction classification, building limitations, fire protection, means of egress, special uses and occupancies, and places of assembly.

c. Structural Existing Conditions

Documentation of the Structural Existing Conditions shall meet the requirements of the Code related to loads, structural work, and foundations.

d. HVAC and Fire Protection Existing Conditions

Documentation of the HVAC and Fire Protection Existing Conditions shall meet the requirements of the Code under "Plans Required" for the following:

i. Air Conditioning and Ventilating Systems – except for Index of Ventilation.

ii. Elevator Locations

iii. Fuel Burning and Fuel Oil Storage Equipment

iv. Refrigerating Systems

v. Heating Systems – all items broken down by system and subsystem

vi. Boilers – all items

vii. Standpipe

viii. Sprinkler System – show risers, pumps, and valves; designate affected area

e. Electrical Existing Conditions

Documentation of the electrical existing conditions shall indicate the following according to the accepted IEEE legend of indications:

i. Service Drop – AC, DC, Size

ii. Meters – demand AC, DC

iii. Main Switch Gear – motor controllers and motors

iv. Feeders – sizes

v. Panel Boards

vi. Fire Alarm and Smoke detectors

vii. Safety Controls, Alarms, and Systems

viii. Lighting Fixtures and Wiring Devices

f. Plumbing Existing Conditions

Documentation of the Plumbing Existing Conditions shall meet the requirements of the Code under “Plans Required” for the following:

i. Single Line Plan – except summation of loads

ii. Typical Layout – not required

iii. Riser diagram – not required

iv. New Plans – not required

v. All appurtenant equipment related to plumbing conditions

D. Bid Documents

The following requirements are standard on projects that DDC directly issues for Competitive bidding. DDC Bid Documents may be issued as a Single Contract project or a Multiple Prime Contracts (Wicks) project.

It is essential that the Consultant prepare documents that are complete, fully coordinated, and free from ambiguities or inconsistencies. Special Attention should be paid to coordination, between the Specifications and the various schedules in the Addendum to the General Conditions.

It is the responsibility and obligation of the consultant to review documents prior to submission to DDC to ensure that all the criteria listed below are met. Compliance with this mandate will be reflected on the Consultant's performance evaluation.

1. DDC BID BOOKLET DOCUMENTS

In its review of the Bid Booklet documents, the Consultant shall address the following:

a. Cost Estimate

Verify that the Consultant's Cost estimate is in CSI format, and that all specifications section numbers and titles are listed and in numerical order per Division and as per Contract as applicable.

b. Special Experience Requirements

Special experience requirements must be approved in advance by DDC. Verify that such approval has been obtained and that the requirements as specified are coordinated with the DDC Project Manager.

c. Bid Alternates

The use of Bid Alternates must be approved in advance by DDC. Verify that such approval has been obtained and that the bid forms for such alternates are in accordance with DDC's standard format. The Cost Estimate must be prepared to include the proposed Bid Alternates as per DDC requirements.

d. Proprietary Items

New York City Procurement Policy Board rules do not permit specifying proprietary items. Under exceptional circumstances if required for specific project conditions, proprietary items must be approved in advance by DDC. Written justification must be provided early in the design process by the entity requesting the proprietary item and the consultant shall provide all DDC required information on the Proprietary Items bid form.

2. ADDENDUM TO THE GENERAL CONDITIONS

a. The DDC General Conditions are included with every competitively bid project. To customize the General Conditions for a specific project, the Consultant must review the DDC General Conditions and use the Addendum to the General Conditions to revise or supplement the General Conditions articles for project specific conditions. There are two versions of the Addendum to the General Conditions: 1) for Single Contracts and 2) for Multiple Prime Contracts (Wicks Contracts).

b. The Consultant shall be provided with a blank form of the DDC Addendum to the General Conditions. The document has highlighted fields which contain instructions to the Consultant for preparing each section of the Addendum. Only the highlighted areas of the document are to be edited, and the highlighted instructions shall be deleted for the final revised document.

i. Schedule A
The Consultant shall prepare Schedule A, which provides information on contract Requirements, such as contract duration, liquidated damages, retainage, etc. The Consultant shall edit the Schedule A in accordance with the instructional material provided.

ii. Schedule B
The Consultant shall prepare Schedule B, Warranty from Manufacturer, which lists Warranties that are included in the Consultant's Specifications. The Consultant shall provide the Specifications Sections for the material or equipment for which a warranty is required and include the length of the warranty period as specified.

iii. Schedule C
The Consultant shall provide a complete list of all Contract Drawings.

iv. Schedule D
Requirements for electrical motor equipment may be included in the Specifications. If applicable, the Consultant shall complete Schedule D as appropriate for the project.

v. Schedule E
The Consultant shall prepare Schedule E (Separation of Trades) for Multiple Prime Contracts (Wicks). The Consultant shall review the Specifications and the General Conditions for each of the items listed on Schedule E and shall ensure that the correct information has been entered for each separate contract.

vi. Schedule F
The consultant shall complete Schedule F by listing all submittal requirements as specified for each appropriate section. This includes Shop Drawing and Material Sample submittals. Other submittal requirements such as LEED submittals or mock-up requirements shall also be included in Schedule F.

3. SPECIFICATIONS

The consultant must prepare the specifications using DDC standard format (available on DDC website) and review the Specifications to ensure compliance with the following:

a. Public Procurement Requirements

Specifications prepared by Consultants must comply with governmental and legal requirements regarding public procurement. They include, without limitation, the Competitive Bidding Laws of the State of New York, the Procurement Policy Board, Rules of the City of New York and the DDC Design Consultant Guide. To ensure compliance, it is essential that Consultants prepare specifications that are clear, accurate and in accordance with the criteria set forth below. Accordingly, specifications shall:

i. Permit maximum competition

ii. For Multiple Prime Contracts (Wicks), permit the separate, competitive sealed bidding of each prime construction trade

iii. Clearly describe the City's requirements without favoritism toward any contractor or supplier or to a supplier's goods and/or services. Specifications must list three alternate suppliers, and must include the language "or approved equal". Specifications may not require a proprietary item, unless approved in advance in writing by DDC.

iv. Be generic in nature, emphasizing functional or performance criteria. As DDC awards contracts to the lowest responsible bidder, it is important that functional/performance specifications are tightly written using acceptable commercial standards to help ensure the quality of the job.

b. Nomenclature

Incorrect nomenclature from the private sector or other government entities sometimes appears in documents submitted to DDC. Documents shall indicate that the owner is the City of New York. The following are some common errors and the proper replacements:

i. City of New York
References to "Owner" (or other agency or authority) as an entity should read "City of New York."

ii. Commissioner
References to "Architect," or "Engineer" should read "Commissioner.

iii. Format
Specifications must conform to the latest CSI numbering format.

iv. Incidental Asbestos
Specifications must include DDC's incidental asbestos specifications for all contracts that include demolition.

v. Insurance and Indemnification
Specifications must not include any language regarding indemnification or insurance. These items are covered in the Standard Construction Contract.

vi. Guarantees and Warranties
Specifications must include language specifying manufacturer's warranties. Such warranty requirements must also be listed in Schedule B of the Addendum to the General Conditions. The Contractor's Guaranty Obligation with guarantee periods is included in the Schedule B and does not need to be included in the specifications.

vii. Instructions to Bidders
Specifications must not include any language regarding instruction to bidders. These issues are covered by the "Information for Bidders" component of the Standard Construction Contract.

viii. Special Inspections
The City of New York retains contracts for Special Inspections. Specifications must not include any references to any other entity performing these services.

E. Furniture and Equipment

For projects involving furniture and equipment, the Consultant is responsible for:

1. SPACE PLANNING AND DESIGN

The Consultant shall provide for the analysis, planning, and design of the interior spaces. The Consultant shall be responsible for providing an acceptable and fully designed interior space using either a modular component system or loose furniture, or a combination of these in addition to all project specific equipment necessary to make the space functional. The Consultant's design shall optimize the quality of the interior space and environment; taking into account building safety, security, comfort, light, views, and quality, calibrated to the proposed budget and the user's needs. If requested in the Task Order or Project Objectives, reuse of existing available furniture and equipment must be considered.

2. GUIDELINES

The project shall be designed based on the guidelines set forth herein and in the Client Agency's requirements. The proposed furniture and equipment design shall be fully coordinated with respect to the design of the building, including all building systems.

3. QUALIFICATIONS

The Architect or Interior Designer, who performs this work, shall be approved by DDC. If experienced staff is not available in-house, the Consultant may subcontract to an Architect or Interior Designer, or a furniture management firm, which must be approved by DDC.

4. ACTIVE DDC REQUIREMENTS CONTRACTS

The Consultant shall be responsible for selecting furniture and equipment items from current NYC Furniture and Equipment Requirement Contracts whenever possible, which shall be bid by DDC.

5. BID FURNITURE AND EQUIPMENT

For those furniture and equipment items which are not available from NYC Furniture and Equipment Requirement Contracts, the Consultant shall submit three manufacturers or vendors for each item to bid.

6. SCOPE OF WORK

Copiers, computers, facsimiles, and other equipment shall be included in the Consultant's furniture layout. Work Not-In-Contract shall include movable items such as wastebaskets and desk accessories, which are the sole responsibility of the user, and are not included in this work. Specifications and acquisitions are the sole responsibility of the user.

F. Forms and Graphics

1. DDC FORMS AND GRAPHICS

The Consultant is required to use DDC's standard title blocks, graphics, and blank forms referred to in the preceding sections. The items listed below must be individually downloaded from the internet at www.nyc.gov/buildnyc . For additional information about the use and requirements of these items, contact the DDC Project Manager.

a. Title Sheet for Design Drawings

b. Title Block for Design Drawings

c. Architectural/Engineering Field Inspection Report: General Construction

d. Architectural/Engineering Field Inspection Report: Electrical Work

e. Architectural/Engineering Field Inspection Report: Mechanical Work

f. Architectural/Engineering Field Inspection report: Plumbing Work

g. Outline of Construction Meeting Notes

h. DDC Cost Estimate Form

i. DDC Contractor's Bid Breakdown Form

j. DDC Bid Form

k. DDC Standard Construction Sign

l. DDC Standard Dedication Plaque

m. DDC Standard Shop Drawing Stamp

n. Approvals Report Form PA I

o. Percent for Art Eligible Project Application Form

2. DEPARTMENT OF BUILDINGS REQUIRED FILINGS

a. The Consultant is responsible for a number of filings with the New York City Department of Buildings. The Consultant is strongly advised to review these forms as early as possible in order to be informed as to the scope of responsibilities to the DOB. It is the Consultant's responsibility to establish which filings are required for each project and to confirm which version of each form is required by the relevant DOB office before filing.

b. The Consultant must submit required forms to DOB along with a complete set of plans to start the application filing process. Depending on the type and scope of work, different forms may be required. All DOB forms can be found at the DOB website.

3. FORMS FOR APPROVALS FROM OVERSEEING COMMISSIONS

The Consultant is required to use forms provided by the Public Design Commission and the Landmarks Preservation Commission.