

XL Center – Renovation – Phase 2

Hartford, Connecticut

Mechanical, Electrical, Plumbing and Fire Protection
100% Schematic Design Narrative

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Introduction and Design Intent

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Introduction and Design Intent

The purpose of this document is to describe and define the design criteria and assumptions for the proposed construction of the second phase of the XL Center Renovation.

This document serves to ensure consistency in project intent throughout the MEP detailed design and development of construction documents through construction, commissioning and long-term system operations. The BOD is a tool to ensure that the owner and design team agree upon requirements for performance and that quality of construction are met. The intent of the BOD is to translate the project intent into specific technical and performance based requirements for the Designer, Contractor and equipment Suppliers.

The BOD that follows provides a summary description of the Project, and guidance for design details for systems and equipment that embody the Project objectives in terms of the functional uses of the buildings and site.

Building Statistics Summary

Elevation	59 feet above sea level (approximate)	
Outdoor Design Conditions		
Winter (ASHRAE 99%)	12.2 deg F dry bulb	
Summer (ASHRAE 1%)	88.2 deg F dry bulb 72.2 deg F wet bulb	
Indoor Design Conditions (General Purpose Conditioned Spaces)		
Winter	Conditioned spaces: 68 deg F dry bulb No Humidity Control	
Summer	All conditioned spaces: 75 deg F dry bulb	
Building Envelope (General Purpose Conditioned Spaces)		
(Based on code minimum where actual data is not available)		
Roof	U = 0.035	
Walls	U = 0.064	
Glazing	U = 0.45 SHGC = 0.33	
Max Infiltration	15 CFH/sqft @ 0.2" wc	
Ventilation		
(Based on Connecticut State Mechanical Code)		
Storage	0.12 CFM/SF	
Lounge/Suites	7.5 CFM/person, 0.18 CFM/SF	
Restaurant	7.5 CFM/person, 0.18 CFM/SF	
Bar	7.5 CFM/person, 0.18 CFM/SF	
Toilet Rooms	2.0 CFM/SF exhaust	
Occupancy		
Total	Per Architectural Programing	
Lighting Density		
(Based on 2015 IECC where applicable)		
Storage	0.46 w/SF	
Lounge	0.9 w/SF	
Restaurant	1.2 w/SF	
Bar	1.2 w/SF	
Toilet Rooms	0.69 w/SF	
Occupant Load Cooling Load		
Sensible	250 BTU	
Latent	200 BTU	
Design Storm Rainfall		
2.75"/hour, per CT Plumbing Code		
The data in this table is provided for the purpose of determining the capacity of systems provided by this narrative.		

General

1. Scope and Standards

- a. Plans, specifications and narratives prepared by Brisbin Brook Beynon and M-E Engineers.
- b. 2015 Connecticut State Building Code
- c. 2015 Connecticut State Mechanical Code
- d. 2015 Connecticut State Plumbing Code
- e. 2015 Connecticut State Fuel Gas Code
- f. 2015 Connecticut State Fire Code
- g. 2015 Connecticut State Energy Conservation Construction Code / ASHRAE 90.1-2010
- h. National Electric Code as modified by local Amendments
- i. Local Utility Company Requirements
- j. Local Department of Health Requirements
- k. National Fire Protection Association criteria.
- l. SMACNA Sheet Metal Contractors Association Standards for Duct Construction.
- m. ANSI – American National Standards Institute.
- n. ASME - American Society of Mechanical Engineers.
- o. ASTM - American Society of Testing and Materials
- p. AWWA - American Water Works Association
- q. UL/ULC - Underwriters Laboratories
- r. NEMA – National Electrical Manufacturer’s Association.
- s. IEEE – Institute of Electrical and Electronics Engineers.
- t. NETA – International Electrical Testing Association.
- u. ICEA – Insulated Cable Engineer’s Association
- v. Occupational Safety and Health Administration (OSHA) Parts 1910 & 1926
- w. USGBC LEED Rating Systems
- x. ASHRAE Standards as are reasonably applicable to the projects and required for LEEDS.
- y. National Fire Protection Association (NFPA) Codes & Standards.
- z. NFPA 101- Life Safety Code

HVAC

BUILDING HVAC SYSTEMS

1. Cooling shall be provided to all areas except:
 - a. Interior Toilet Rooms
 - b. Mechanical Rooms
 - c. Vehicle Areas
 - d. Storage Rooms (non-perishables)
 - e. Service Corridors, Stairs & Exits
2. Heating shall be provided to all renovated areas.
3. Air handing Systems
 - a. General:
 - i. All new internal air handlers will be packaged modular units similar to Trane, York, or Carrier.
 - ii. Units shall be double wall with internal spring isolation.
 - iii. Air handlers will use MERV 8 filters pre-filters and MERV 13 final filters.
 - iv. Fan coils will use 2" MERV 8 filters.
 - v. All new air handling units will be supplied with full outside air economizer capability unless noted otherwise.
 - vi. Existing air handlers shall be replaced or refurbished as indicated on the schedules.
 - b. New air handling units shall be provided with the following features:
 - i. Constant volume or variable air volume operation. If variable air volume is required on the modular air handlers, variable frequency drives will be used.
 - ii. Variable Frequency Drive (supply and return)
 - iii. Return fan section or stand alone return fan. In either configuration the return fan will have dedicated wiring with HOA switch for function in Smoke Purge Mode.
 - iv. Filter bank/mixing section.
 - v. Final filter section where noted.
 - vi. 100% Economizer Section.
 - vii. Steam or hot water pre-heating coil with control valve.
 - viii. Chilled water cooling coil with two-way valve.
 - ix. Stainless steel drain pans and coil supports.
 - x. Reheat coil, where appropriate, with two-way control valve.
 - xi. Appropriate access sections.
 - xii. Return air and low leakage outdoor air dampers.
 - xiii. Double-wall construction.
 - xiv. Internal spring isolation.
 - xv. Modulating control valves on hot water coils
 - c. Refer to schedules for more information and additional air handlers.
 - d. Beer/Food Hall - Provide 9,000 CFM VAV chilled water/hot water heat air handing unit hung in the ceiling above. Extend outside air and relief to louvers at the perimeter of the building.

- e. Trumbull Main Entry - Provide 5,000 CFM constant volume chilled water/hot water heat air handing unit hung in the ceiling above.
 - f. Kitchen Make-up Unit – Provide a 10,000 CFM constant volume steam heating only air handing unit in level 48 east mechanical room.
4. Two Loge Clubs – Level 61
- a. Provide 500 CFM transfer fan in each of the Loge Clubs.
 - b. Relocate the two existing bowl return risers located in the bowl side of the future loge clubs to a location under the stair with new louvers facing the concourse.
5. Six Suites – Level 61
- a. Provide 500 CFM transfer fan in each of the Suites.
 - b. Relocate existing concourse supply and return risers in the future suite as required to accommodate the architectural layout.
6. Miscellaneous Cooling Units
- a. Electrical Rooms – Provide a 2-ton dedicated air cooled DX split system.
7. Exhaust systems
- a. Exhaust toilet groups at a rated of 2.0 CFM/SF or as shown where systems are indicated.
 - b. Provide exhaust for miscellaneous areas such janitor storage and other areas which need air movement (but not necessarily heating), at a rate of 2.0 CFM/SF.
 - c. Storage areas will be ventilated at 0.2 CFM/SF.
8. Infrastructure work
- a. Refurbish the following mechanical equipment with new mechanical components as noted on schedules.
 - i. Concourse Air Handing Units: S-9 through S-12
 - ii. Trumbull Atrium Rooftop Air Handing Units: AHU-5 & AHU-6
 - iii. South Locker Room Air Handing Units: S-13
 - iv. Concourse Return Fans: R-9 through R-12
 - v. Trumbull Atrium Return Fans: RF-5 & RF-6
 - vi. South Locker Room Return Fan: R-13
9. Emergency Generator
- a. A generator supplied by Division 16 will be an exterior generator unit with under-slung fuel tanks.

- b. Fuel will be pumped from a tank system located on the first floor up to generators on the roof. Provide automatic controls for transfer system. All piping shall be double wall with masonry chases and concrete encasement where required. Provide drain to visible location at the bottom of all shafts and at all horizontal offsets.

10. Kitchen Grease Exhaust Systems

- a. Kitchen hood exhaust systems will be provided for connection to cooking hoods. Grease ductwork shall be provided to serve all hoods and shall be constructed in accordance with the requirements of the IBC. Provide dedicated kitchen exhaust systems for all areas indicated to be a kitchen or cooking concession.
- b. Fans will be inline, up-blast or utility sets based on locations of the units. Fans shall be UL listed for kitchen exhaust application.
- c. Exhaust system ductwork shall be welded black iron in gauges as specified by the IBC. Ductwork shall be wrapped with zero-clearance, 2-hour, UL rated, duct wrap. Provide a minimum of two layers for zero clearance and a vertical chase to maintain the "separate chase".
- d. See drawings and schedules for exhaust fans.

11. Atrium Smoke Exhaust System

- a. Provide two 45,000 CFM rooftop smoke exhaust fans, one at each atrium.
- b. Provide a complete smoke management system for the Trumbull Atrium space as required by the Hartford modified IBC including, but not limited to, exhaust fans , exterior door openers, and all associated interlocks to the fire alarm system and Fire Command Center.
- c. In general, the Smoke Management system may be subject to modification as the overall building Code interpretations are verified throughout the project.
- d. All Smoke Management Systems will be controlled by the Listed Fire Alarm System.
- e. All Smoke Control System devices have override control at the Fire Command Station.

12. All HVAC controls shall be by a networked and internet accessible BMS system. All controls shall be Automated Logic.

- a. Equipment being controlled and monitored shall include (at a minimum):
 - i. Air Handling Units
 - ii. Fan Coil Units
 - iii. Fan
 - iv. VFD's
- b. The system shall consist of programmable control modules at the equipment and building control modules as needed.

- c. All control valves, damper operators, and damper actuators shall be Belimo electronic operated with DDC control interface.
- d. The building automation will be provided under Division 23. All hardware and software use shall be BacNet compatible with a web based front end.
- e. The building management system shall be easily programmable to provide flexibility for intermittent use of the facility. Programing will be incorporated to maximize energy efficiency with the facility.
- f. Provide "Gateways" to communicate with the fire alarm system.
- g. BMS should contain the ability to email/call an engineer on duty when there are certain alarm troubles.

13. Ductwork:

- a. Sizes shown on the drawings are inside duct dimensions. All ductwork shall be constructed of sheet-metal, furnished and installed in accordance with SMACNA.
- b. Low Velocity Flexible Ducts Acoustically insulated flexible duct, consisting of inner core of perforated one-ply corrugated duct, one inch thick insulation and vapor barrier cover. Three foot maximum length.
- c. Round duct connectors to be factory fabricated galvanized for insulated ducts, steel adapter plate on glass fiber ducts. Butterfly damper and locking quadrant operator on all applications except variable air volume systems upstream of variable air volume box.
- d. Flexible connections to be 24 oz. per yard, UL approved material.
- e. Provide turning vanes on all rectangular elbows.
- f. Opposed blade dampers for duct splits and where shown to be steel or aluminum construction with worm drive operator. Screwdriver slotted shaft, factory assembled.
- g. Provide fire/smoke dampers with UL Label, minimum 1½ hour fire rating and sleeve wherever ductwork or louvers penetrate fire rated construction shown on architectural plans. Dampers shall be of the shutter, curtain type with replaceable fusible links. Use Type "B" dampers at all locations where space permits. Use "C" dampers for round and oval ducts. Use Type "A" dampers only where space will not allow the use of Type "B".
- h. Smoke dampers, and damper operators UL label UL555S and meet pressure requirements for the smoke exhaust systems.

14. Piping:

- a. Refer to Piping Materials schedule below for additional information.
- b. Grade and valve all heating water piping with 3/4 inch hose end valves to permit complete drainage of the system. Vent all high points and equipment rooms as necessary with automatic air vents piped to convenient drain. All high points in system outside of equipment rooms with combination automatic/manual air vents as required to relieve air from the system.

Piping Systems					
System	Pipe Size	Pipe Material & Weight	Joint Type	Fitting Material	Insulation Material
Low Pressure Steam (15 psig or less)	2" or smaller	Steel, Schedule 40, ASTM A53, Type S, Grade B (Schedule 80 within 20' of PRV station)	Threaded or Welded	Cast Iron or Steel	Fiberglass

	2-1/2" or larger	Steel, Schedule 40, ASTM A53, Type S, Grade B (Schedule 80 within 20' of PRV station)	Welded	Steel	Fiberglass
Low Pressure Steam Condensate (15 psig or less)	2" or smaller	Steel, Schedule 80, ASTM A53, Type S, Grade B	Threaded or Welded	Cast Iron or Steel	Fiberglass
	2-1/2" or larger	Steel, Schedule 80, ASTM A53, Type S, Grade B	Welded	Steel	Fiberglass
Hot Water (<250 degF)	3" or smaller	Copper, Type L, ASTM B88	Soldered below 175 PSI, Brazed above 175 PSI	Wrought Copper	Fiberglass
	4" or larger	Steel, Schedule 40, ASTM A53, Type S, Grade B	Welded	Steel	Fiberglass
Chilled Water (<250 degF)	3" or smaller	Copper, Type L, ASTM B88	Soldered below 175 PSI, Brazed above 175 PSI	Copper	Fiberglass
	4" or larger	Steel, Schedule 40, Type S, Grade B	Welded	Steel	Fiberglass
Refrigerant	All sizes	Copper Tube, Type ACR, ASTM B280	Brazed	Wrought Copper 300#	Fiberglass

15. Insulation

- a. Piping and ductwork insulation, materials, and thickness will comply with the requirements of ASHRAE 90.1 and the 2015 International energy conservation code.
- b. Insulation will be finished with PVC jacketing where it is within mechanical rooms. Provide pre-molded PVC covers over fittings.
- c. Provide aluminum jackets on all exterior insulated piping.
- d. All ductwork shall be internally lined for the first fifteen from fans, AHU's, VAV, CAV, etc. Remainder of duct run will be externally insulated, unless otherwise noted on plans.
- e. All exposed ductwork shall be double walled with an interstitial space packed with mineral wool insulation. Insulate all plenums for linear slot supply diffusers.
- f. All concealed ductwork shall be externally insulated.
- g. Refer to Piping Materials schedule above for additional information.

16. Grilles, Registers, and Diffusers

- a. Most ceiling and wall mounted supply diffusers shall be louver face. Provide at least one supply device in each space, maximum of 250 square feet per diffuser. The entry and other public areas may use linear or slot diffusers.
- b. All return air grilles shall be perforated face. All exhaust registers shall be perforated face with opposed blade dampers.
- c. All standard air devices shall be white painted steel.
- d. All exterior louvers shall be provided under this division and shall be galvanized steel with primer coat.
- e. Paint color shall be selected by Architect.
- f. Replace all existing diffusers and grilles with the following renovated areas.
 - i. Level 31 dressing rooms (Room 1154 & 1462)

- ii. Level 48 vestibule and Lobby (Room 2300)
- iii. Level 61 concessions are getting a facelift (north and south)

17. Test and Balance

- a. At a minimum test 10% of all installed ductwork for duct leakage within the acceptable limits.
- b. Test all water piping to 1 ½ times working pressure or 150 psig, whichever is greater, before connecting to equipment.
- c. Test all drain and waste lines with standing water test of twelve feet of head, held long enough to inspect each joint.
- d. All tests required by code must be done before covering to the satisfaction of the local authorities having jurisdiction.
- e. At the completion of the installation, the mechanical systems shall be adjusted and balanced by an independent balancing firm specializing in this work, with a Registered Professional Engineer in charge of the work prior to commissioning.
- f. Furnish and install such items as thermometer wells, pressure test clocks, access doors, etc., as required to allow tests and adjustments to be made.
- g. Adjust and balance all air and water systems. Check, adjust, and balance all systems to meet the design conditions, and tabulate all information on acceptable forms. All systems shall be checked for proper performance during design conditions, both heating and cooling prior to commissioning.

18. Shop Drawing Requirements

- a. The trade contractors will be responsible for developing their own 3D coordinated model to be used in the creation of coordination drawings and shop drawings. The model created by the design team may be provided for reference, but shall not be utilized in the shop drawing and coordination purpose.
- b. Contract Documents:
 - i. General: The Contract Documents will be diagrammatic showing certain physical relationships, which must be established within the Division's work and its interface with other work. Such establishment is the exclusive responsibility of the Contractor. Drawings shall not be scaled for the purpose of establishing material quantities.
 - ii. Supplemental Instructions: The exact location for some items in the specifications may not be shown on the Drawings. The location of such items may be established by the Architect/Engineer during the progress of the work. Make reasonable modifications in the layout as needed to prevent conflict with work of other trades.
- c. The contractor will be responsible for providing proper documentation of equipment product data and shop drawings to all entities providing service.
- d. Coordination Drawings:
 - iii. Submit coordination drawings for all HVAC, Plumbing, Fire Protection and Electrical work. The drawings shall be fully coordinated and signed off by all affected trades prior to submission. The coordination drawings shall include the following at a minimum:
 - 1. All major ductwork, piping, conduit and equipment.
 - 2. Reflected ceiling plans with light fixtures.
 - 3. Current architectural floor plans.
 - 4. Major structural elements.

- 5. Elevations of piping ductwork or equipment.
- 6. Sections through critical spaces.
- iv. The drawings shall be at a suitable scale (3/8"=1'-0" minimum) to clearly show information.
- e. Any work installed without approved coordination drawings is done at the Contractor's risk.

19. Miscellaneous Requirements

- a. Provide Vibration Isolators on all reciprocating or rotating equipment. Packaged fans, which are internally isolated with springs, do not require additional isolation. Provide spring and rubber-in –shear vibration isolation hangers for all suspended equipment of ½ HP or greater.
- b. Provide identification of all equipment, control cabinets, ductwork, etc.

20. Start-up

- a. Division 15 shall include services of factory-trained representatives for a period of at least five (5) working days to supervise initial start-up and assist in necessary adjustments to place the equipment in operation.
- b. In addition to start-up time, include additional five (5) days to train designated operation personnel to safely and properly operate and maintain the equipment.

END OF HVAC BASIS OF DESIGN

Plumbing

BUILDING PLUMBING SYSTEMS

1. Plumbing systems will be developed in response to the space program.
2. Domestic cold and hot water piping will be run to serve all equipment and fixtures as required including toilet room fixtures, janitor closets, pantry fixtures, hose bibs, etc. Interior cold water hose bibs with backflow preventers will be provided for mechanical rooms and maintenance areas.
3. Provide domestic hot water recirculation connection to fixtures located further than 20’ from a recirculated hot water main. Hot water recirculation to all lavatories shall be connected within 24” of the valve stops.
4. Provide isolation valves at all branches serving bathroom groups. All isolation valves shall be accessible through respective ceilings.
5. All water piping, subject to heat loss or sweating shall be provided with insulation and a fire retardant jacket, and as required by ASHRAE 90.1-2013.
6. Where piping penetrates fire separations, an approved fire stopping installation shall be provided.

Plumbing Systems Material Specification					
System	Size	Pipe Material	Joint Type	Joint Material	Insulation
Domestic Cold Water	3” or smaller	Copper, Type L	Solder	Copper	Fiberglass w/ vapor barrier.
	4” or larger	Schedule 40 Stainless	Grooved		
Domestic Hot Water, HWC	3” or smaller	Copper, Type L	Solder	Copper	Fiberglass.
	4” or larger	Schedule 40 Stainless	Grooved		
Sanitary, Storm, Waste & Vent	All sizes	Cast Iron, Service Weight	No-hub w/heavy duty SS clamp	Cast Iron	Fiberglass on horizontal storm piping.
Below Slab Sanitary	All sizes	Cast Iron, Service Weight	Bell & Spigot	Cast Iron	None

7. No plumbing piping shall be installed above or in any electrical rooms, vaults or electrical spaces. Provide a sub-roof or drip pan channel system to protect the electrical equipment where this cannot be avoided.
8. Provide adequate clearance for piping and equipment in all areas.

9. Domestic water system will be designed to prevent water hammer conditions by providing shock arrestors for quick closing valves.

10. Natural Gas

- a. Extend existing natural gas piping as necessary to accommodate the new cooking load. Existing piping serving areas not affected by the renovation shall remain in places unless otherwise noted.
- b. Above ground piping shall be Schedule 40 Black steel pipe with 150 pound malleable screwed fittings. Provide welded fittings on concealed pipe, piping 4" and larger and for all piping in return air plenums.
- c. Any required pressure regulating valves (PRVs) shall be vented to the outdoors as required by local code. Vents from PRVs shall be increased one pipe size for each 50 feet of run. Vent limiting devices on PRVs shall not be allowed in indoor locations.

11. Fixtures and Equipment:

- a. Refer to architectural drawings and specifications for proposed fixtures and equipment requiring plumbing connections.
- b. Secure fixtures to walls and floors or countertops in accordance with Manufacturer's rough-in requirements and form a rigid installation.
- c. All pipe, at the fixtures, which may be exposed to view shall be brass chrome finish, finished with chrome escutcheons where they project from walls and floors.
- d. Stop valves shall be furnished and installed at all fixtures, for all equipment, and at rough-in locations.
- e. Vacuum breakers shall be provided at all outlets with hose connections.
- f. Floor drains will be provided in mechanical rooms, maintenance areas and storage rooms. All floor drains and floor sinks shall have deep seal traps and trap primers with connection to domestic CW system.
- g. Fixtures will be provided with chromium plated brass trim and individual stop valves.
- h. Water closets will be bowl and flush valve fixtures.
- i. Provide automatic flush valves on toilets and urinals
- j. Provide a floor drain in each bathroom and mechanical room. Provide trap primers at all public bathrooms and mechanical room floor drains.
- k. Provide stainless steel kitchen and bar sinks in the Suites.
- l. Appropriate "Barrier Free" fixtures will be provided in accordance with ADA requirements.

12. Concession Services

- a. The following utility services should be planned for concession stands.
 - i. Refer to the Food Service plans and narrative for specific requirements at each concession.
 - ii. Assume a 4" sanitary sewer service at each concession.

- iii. Assume a local, on-floor grease trap will be located within each stand, at the 3-compartment sink.
 - iv. Each concession shall be provided with a 1-1/2" cold water service and a 1-1/4" hot water service from the central system.
 - v. Provide services for a 500 MBH gas load at each cooking concession.
 - vi. Heat trace any piping installed on the exterior wall in a chase outside of the insulation barrier and any piping installed in an intake shaft.
- b. The following utility services should be planned for Kitchen areas.
- i. Refer to the Food Service plans and narrative for specific requirements.
 - ii. Assume a 4" sanitary service to each Kitchen.
 - iii. Grease waste shall route through a central grease interceptor located in the floor of the Kitchen served. All fixtures and floor drains receiving grease shall route through this.
 - iv. Provide a 2" CW and 2" HW from the central domestic system.
 - v. Provide services for 2000 MBH load at each Kitchen.
 - vi. Heat Trace any piping installed on an exterior wall in a chase outside of the insulation barrier and any piping installed in an intake shaft.

13. Start-up Services

- a. Division 15 shall include services of factory-trained representatives for a period of at least five (10) working days to supervise initial start-up and assist in necessary adjustments to place the equipment in operation.
- b. In addition to start-up time, include additional two (2) days to train operation designated personnel to safely and properly operate and maintain the equipment.

END OF PLUMBING BASIS OF DESIGN

Fire Protection

BUILDING FIRE PROTECTION SYSTEMS

1. The building will be fully sprinklered.
2. The Fire Protection systems will be designed to conform, at a minimum, to the following codes and standards in addition to those referenced above:

National Fire Protection Association (NFPA) Standard 13 as modified by local requirements
 The National Electrical Manufacturers Association (NEMA).
 American Society for Testing Materials (ASTM).
 American National Standards Institutes (ANSI).
 American Water Works Association (AWWA).
 Underwriters Laboratories (UL).

3. The building’s Sprinkler system design assumption is based on NFPA 13 for ordinary hazard occupancy for all MEP equipment rooms and kitchens.
4. All materials shall be listed by Underwriters Laboratories, Inc. and Factory Mutual and approved for fire protection system use.
5. The system will be comprised of automatic wet sprinklers with associated valves, alarms, switches, drains, etc.
6. The building sprinkler systems will be hydraulically calculated to meet the coverage classifications.
7. Flow and tamper switches shall be connected to the base building fire alarm system by the fire alarm contractor. All valves controlling water into the fire alarm system will be electrically supervised with tamper switches.
8. Dry sprinkler heads shall be provided for all areas subject to freezing.
9. Replace all existing sprinkler concealer caps following renovated areas.
 - a. Level 31 dressing rooms (Room 1154 & 1462)
 - b. Level 61 concessions are getting a facelift
10. It is the intent that the Contractor will provide complete hydraulically designed wet sprinkler systems for the areas indicated in these Specifications and shown on the Contract Drawings. This Contractor shall submit signed and sealed shop drawings and hydraulic calculations that will be used for filing with the local Authorities.

Piping System Material				
System	Size Range	Piping	Joint Type	Joint Material
Wet Fire Protection	All Sizes	Steel, Schedule 40, Type S	Threaded or Groove Joint	Cast Steel or Ductile Iron
Fire Service	All sizes	Cement Lined Ductile Iron	Bell and Spigot	Ductile Iron

END OF FIRE PROTECTION BASIS OF DESIGN

Electrical

BUILDING ELECTRICAL SYSTEMS

The purpose of this document is to describe and define the design criteria and assumptions for the proposed construction of Phase 2 Infrastructure Upgrades to the XL Center.

Work Included

1. The electrical work shall comply with architectural, structural and mechanical requirements and all documents referred to therein.
2. The work will be installed in compliance with all local, state and national codes as appropriate for work in the city of Hartford, Connecticut.
3. Materials, equipment, and installation will be to above codes, and generally accepted good practice.

System Scope

The following list of systems and components are included within this narrative:

- Utility Service Transformer Upgrade
- Emergency Power System
- Mechanical Equipment & Connections
- Replace Feeders and add show power
- Branch Power Receptacles & Connections
- Lighting & Lighting Control
- Fire Alarm System
- Communications
- Security

Utility Service

1. The utility service is original and consists of (3) 1000 kva transformers. Originally the system was intended to be N+1 but loads have grown and exceeded two transformers. Eversource is engineering new larger transformers for the building to be placed in the same room as the existing transformers.
2. New ventilation will need to be added from that room routed underground up to the sidewalk to the exterior possibly with a Kiosk.
3. Provide all labor to change out old transformers and install new transformers.

Emergency Power System

1. Emergency power for the XL Center is served by an undersized generator that has reached the end of useful life. Replace existing generator with new and locate in new generator room on level 48 NW corner. Reconnect power and control to existing and new ATS switches.
2. Provide a new 1200kw Generator with indoor enclosure. Provide a new 2000 amp DP-Gen Panel with overcurrent devices to re-feed the ATS. Refer to One Line /Riser Diagrams for additional information.

Mechanical & Equipment Connections

1. Mechanical:
 - a. Power wiring shall be provided for all Division 23 equipment, including all starters, local disconnect switches and thermal overload switches.
 - b. Provide power and control wiring for mech room lighting. Provide power for mech room receptacles.
 - c. Starters for all packaged and non-packaged equipment shall be provided by the mechanical contractor (MC).
 - d. Outlets will be provided for controls in each mechanical room.
 - e. The Control system shall be provided by Division 23. Conduit & wiring by the Division 23
4. Division 23 equipment is as follows below. Refer to mech narrative for additional information.
5. Air handling Systems
 - a. Beer/Food Hall
 - b. Trumbull Main Entry
 - c. Kitchen Make-up UnitTwo Loge Clubs – Level 61
Six Suites – Level 61
Miscellaneous Cooling Units
Exhaust systems
Infrastructure work
Refurbish the following mechanical equipment with new mechanical components as noted on schedules.
 - i. Concourse Air Handling Units: S-9 through S-12
 - ii. Trumbull Atrium Rooftop Air Handling Units: AHU-5 & AHU-6
 - iii. South Locker Room Air Handling Units: S-13
 - iv. Concourse Return Fans: R-9 through R-12
 - v. Trumbull Atrium Return Fans: RF-5 & RF-6
 - vi. South Locker Room Return Fan: R-13Kitchen Grease Exhaust Systems
Kitchen hood exhaust systems
Fans will be inline, up-blast or utility
6. Atrium Smoke Exhaust System
 - a. Provide two rooftop smoke exhaust fans, one at each atrium.
 - b. All Smoke Control System devices have override control at the Fire Command Station.

Replace Feeders & Add Show Power

1. Replace all feeders from main switchboards to distribution panels, power panels, lighting and appliance panels. Replace all distribution panels, power panels, lighting and appliance panels. Add TV Truck power (2) 400 amp switches with Cam-Loc's, and add Show Power (4) 400 amp switches with Cam-Loc's. Refer to drawings for additional information.

Branch Power Receptacles & Connections

1. Receptacles: In general receptacles shall be provided where needed, including the following:

- a. The mechanical, electrical, and storage area receptacles to be 18" AFF, rated 20 Amps with stainless cover plates, generally one on each wall.
- b. Provide receptacles within 25 feet of mechanical equipment.
- c. Provide dedicated 120 Volt, 20 Amp, double duplex receptacles (48" on center) in telephone room. Comm Room shall have a dedicated 24 pole 100 Amp panelboard and dedicated 120 Volt, 20 Amp, double duplex receptacle (48" on center) throughout the room and circuits for each rack.

Lighting & Lighting Controls

1. Lighting:
 - a. Lighting design shall meet 2015 International Energy Conservation Code with CT State Supplements.
 - b. All light fixtures utilized will be commercial quality grade fixtures.
 - c. Lighting systems will be provided with panelboards, feeders, branch circuits, and controls. Circuiting will generally be 277 volts for LED lighting.
 - d. One third of all fixtures shall be provided with connection to emergency generator power system and with test switch and pilot light.
 - e. Replace all interior lighting for all concessions, office, and suite/club renovations.
 - f. Replace / supplement exterior lighting fixtures.
 - g. Expand existing lighting control system and add control from existing lighting control system to control new interior and exterior lighting.

Fire Alarm System

1. Provide an ATS switch and connection to the new emergency generator.

Communication Systems

Provide Tel/Data empty conduit and outlet boxes in all office areas. Provide vertical conduit to reach the horizontal pathways.

Security Systems

Provide extension of XL Center security system.

Provide new proximity readers and cards, and camera Access Control Security for all new renovated areas including offices and money room.

END OF ELECTRICAL NARRATIVE

Appendix A – MEP Plans