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Space B-14  
Pineville, NC 28134

# MEP Specifications

**ISSUED:** 09/26/2014

### REVISIONS:

**Required By:**

**Date**



Limitedbrands

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## DIVISION 21: FIRE PROTECTION

### SECTION 210000: FIRE PROTECTION

#### A. Scope of work

1. Provide a complete and operable fire protection system as it applies to the demised premise.
2. Where applicable, the contractor shall contract this work with a landlord approved fire protection contractor, all materials and equipment under this section shall be new and listed by Underwriters Laboratories, Inc. For fire protection system installation.
3. The fire protection system shall be as follows:
  - a. New wet sprinkler fire protection system for all areas of the retail space, portions that are unheated or exposed to freezing temperatures shall be provided with an automatic dry pipe system complying with NFPA/NFPAC 13.
  - b. Coverage shall be in accordance with existing conditions, NFPA/NFPAC 13, local codes, landlord's criteria, mall insurance and LSD&C's standards and shall include:
    - (1) All pipe taps, risers, laterals, branches, valves, hangers, alarms, sprinkler heads and all components required.
    - (2) Provide professionally designed and sealed drawings, hydraulic calculations, submittals and approvals as needed including any seals, permits, fees, and charges.
  - c. Fire extinguishers shall be provided. Refer to installation section of this specification.
4. Examine architectural, structural, mechanical and electrical documents to properly sequence, coordinate, and integrate the various elements of the fire protection system with other contractors to avoid interferences and confrontations.
5. Contractor shall use approved industry fire sprinkler standards for reusing existing fire sprinkler branches and submit calculations to the LSD&C's project manager upon request or rework system to the LSD&C project manager's satisfaction.
6. Relocation of existing mains, laterals, branches and risers to facilitate store design criteria shall be included as part of this work.

#### B. Shop drawings and design

1. In accordance with the prevailing standards, but no less than that required by NFPA/NFPAC 13, this fire protection contractor shall prepare complete calculations and shop drawings. Six (6) copies shall be submitted to the general contractor and additional sets as required to the proper

code authorities for approval (no work shall begin until all approvals have been received).

2. Copy of the letter of approval from the landlord's insurance rating bureau shall be forwarded to the landlord's agent and to the LSD&C project manager.
3. Listed below are minimum requirements for sprinkler system design and installation. System shall be hydraulically designed:
  - a. Ordinary hazard, group 2: provide a 0.20 gpm/sf per 1,500 square feet density with 165°F rated 1/2" orifice sprinkler heads or follow NFPA/NFPAC density/area curve for density coverage. Provide a maximum coverage of 130 square feet per head.
  - b. Maximum head spacing: 15 ft.
  - c. Sprinklers shall be tested for a minimum of 2 hours at 200 psi.
  - d. Design calculations of inside pipe shall use c=100 for dry and c=10 for wet systems.

#### C. Sprinkler heads

1. All sprinkler heads shall be new (existing heads in existing LSD&C stores are not to be replaced unless noted otherwise), U.L. and F.M. listed and approved automatic spray type as manufactured by automatic sprinkler, Grinnell, reliable, or Viking.
2. All sprinkler heads shall be rated as follows or as required by local codes:
  - a. Storage areas or mezzanines: 200°F-225°F.
  - b. Sales area: 150°F-170°F or 200°F-225°F as noted on plans.
3. All sprinkler heads shall be as follows:
  - a. Manufacturer
    - (1) Sales area: base bid shall include heads manufactured by reliable with alternate bids based on Viking Micromatic model M or Grinnell model F972 and shall be approved by the LSD&C project manager prior to ordering and installation.
    - (2) Non-sales area: rough brass finish as manufactured by Automatic Sprinkler, Star, Reliable, Grinnell or Viking Sprinkler Company only.
  - b. Head type
    - (1) Sales area: gypsum board=concealed; lay-in ceiling=recessed
    - (2) Non-sales area: gypsum board or lay-in ceiling=recessed; open to structure=upright; heads mounted under 8 feet above finished floor shall be concealed or be provided with wire guards.
4. All sales area sprinkler heads including trim and cover shall have factory applied finish.

- Refer to fire sprinkler head plan for finish requirements.
5. All sprinkler heads on the mall side of tenant's storefront enclosure, if any, shall match landlord's type.
- D. Piping, fittings, & valves
1. Schedule 40 black steel: ASTM a-53 welded and seamless, ANSI b-36-10-70 for wrought steel pipe.
  2. Cast iron or malleable iron screwed fittings for pipes 2 Inches and smaller, screwed or cast iron flanged joints for pipes larger than 2 Inches. Fitting shall be approved for 175 psi working pressure.
  3. Galvanized or black malleable iron with brass seat screwed unions for pipes 2 Inches and smaller.
  4. Victaulic type couplings are acceptable where approved by local code and the landlord.
- E. Installation
1. A fire protection system tap is normally furnished by the landlord, verify in field prior to bid.
    - a. Whenever an existing sprinkler system is being renovated, the integrity and reliability of the existing system shall be maintained.
    - b. Original sprinkler shop drawings shall be acquired through the mall manager/project manager; however, the sprinkler contractor shall verify the existing sprinkler system in the field and shall coordinate with and show discrepancies between the original shop drawings and field conditions in the renovated shop drawings.
  2. Installation shall include testing the building system prior to connecting to mall sprinkler system. Testing shall be approved by the fire department and landlord representatives. Final connection to landlord's sprinkler main will not be made until the entire system within the demise premises is tested and ready for service.
  3. Sprinkler head spacing shall comply with ordinary hazard, group 2.
  4. System shall comply with the most stringent of these specifications, the landlord's design criteria or local codes with pipe sizing being based on NFPA/NFPAC ordinary hazard, group 2 and comply with NFPA/NFPAC 13 latest edition.
  5. All sprinkler lines shall be concealed and mounted as high as is practical, avoiding interference with lights, ducts, pipes, storage deck, etc.
  6. Fire protection contractor shall prepare coordinated shop drawings indicating the locations of all sprinkler heads, sprinkler lines, lights, diffusers, grilles and registers prior to installation.
7. Relocate all mains and branches interfering with ceiling heights, equipment and major components, Inclusive of adjacent tenants and mall common areas, remove all unused piping.
  8. Fastening and/or suspension devices must be attached to the building structure only. Support shall be from the top of any bar joist or as directed by the landlord or the building structural engineer.
  9. Furnish and install a valved test connection in an accessible location for the sprinkler system as required or requested by the mall, local inspector, or insurance carrier - coordinate location with the LSD&C project manager and local fire protection official to rough-in.
  10. When completed, the entire fire protection piping system shall be hydrostatically tested as required by the rules and regulations of the authorities having jurisdiction. System shall show no signs of leakage or other defects. This contractor shall be responsible for damage to the work of the other contractors or to the building, or to its contents, people, etc., expense. Completely flush the system until discharge shows no discoloration.
  11. Properly completed and signed "sprinkler contractor's material and test certificates shall be furnished to the landlord, authorities having jurisdiction, tenant's architect, insurance representative, project office and the LSD&C project manager.
  12. Provide valved drain with hose thread at all low points or traps in sprinkler piping. Identify drain valves if above hard ceilings with a suitable ceiling marker and provide architect approved method for access as required.
  13. Coordinate sprinkler work with fire/alarm contractor where there are flow and tamper switches and alarm requirements.
  14. Sprinkler system shall be interfaced with building fire/life safety and smoke exhaust system if required. Refer to landlord tenant criteria and requirements.
  15. Furnish and install 10lb. Type "ABC" fire extinguishers with cabinets if required, and at least a "4A-80B:C" rated extinguisher. Locations are to be established in the field by the LSD&C project manager and the local fire protection official maximum travel distance between extinguishers shall be 75 feet or less as required by local codes.

## DIVISION 22: PLUMBING

### SECTION 220000: PLUMBING

#### A. Scope of work

1. This contractor shall furnish all labor, materials, equipment, services, tools, transportation and facilities necessary for, reasonably implied and incidental to, the furnishing, installation, completion and testing of all work for the plumbing systems as shown on the drawings, called for in the specifications, and as required by job conditions, to include, but not be limited to the following:
  - a. Complete sanitary piping systems of waste, drains, and vents.
  - b. Complete cold and hot water piping systems, appurtenances and insulation.
  - c. Fixtures and equipment as scheduled.
  - d. Complete natural gas or propane piping systems (as applicable, refer to plans).
  - e. Condensate piping systems (as applicable, refer to plans).
  - f. Tests and adjustments.
  - g. Submit a complete set of reproducible as-builts.
2. Before starting work, this contractor shall examine the architectural, structural, mechanical and electrical plans and specifications to sequence, coordinate, and integrate the various elements of the plumbing system, materials, and equipment with other contractors to avoid interferences and confrontations.
3. GC to provide written report to LSD&C pm on condition of existing sewer tie-in regarding slope and flow.
  - a. Scope with camera prior to connection.
  - b. Do not connect without LSD&C pm authorization if specs not met.
4. Relocation of existing water, gas, waste, vent, or drainage lines to facilitate store design criteria must be included in bid proposal.

#### B. Equipment and installation

1. Refer to plans for schedules of equipment and fixtures. American standard and crane may be considered with approval from LSD&C project manager.
2. Sanitary piping
  - a. Provide all sanitary waste, sewers, and vents within the project space with connection to the existing drainage systems on-site. Sanitary waste and vent piping above floor shall be hubless cast-iron pipe, fittings and connections. Sanitary waste and vent piping below grade shall be schedule 40 PVC plastic pipe with solvent weld fittings, or service-weight cast-iron with neoprene gasket joint system. No PVC plastic

- piping allowed within ceiling voids used for non-ducted return air plenum or in walls, except in Canada where XFR-PVC may be used if permitted by the authority having jurisdiction. All drainage piping shall be uniformly pitched, 1/4" per foot for pipe sizes 3" and smaller, 1/8" per foot for pipe sizes 4" and larger, unless otherwise required by existing conditions, or indicated on the drawings.
- b. Insulate all horizontal runs of piping located in ceiling spaces, when applicable. Insulation to be as specified for water piping.
  - c. Condensate piping shall be type 'L' drawn copper tube with 95-5 tin-antimony soldered joints and wrought copper fittings with dielectric separation between dissimilar metals.
3. Potable water piping shall be as follows:
  - a. Below grade: type 'K', annealed type tempered copper tube for pipe sizes 2 inches and smaller, braze all joints.
  - b. All other: type 'L' drawn copper tube with wrought copper fittings and 95-5 tin-antimony solder.
4. Piping of dissimilar metals must be dielectrically separated.
5. Generally, sanitary and potable water taps will be provided by the landlord. Field verify exact connection points prior to submitting bid. Notify the LSD&C project manager, if conditions are not as shown on the plans or as stated in the specifications. Contractor must verify the operability of entire system prior to tie-in as follows:
  - a. Scope sanitary to lease line, snake as required and report any blockages.
  - b. Test water pressure to insure minimum psi matches most demanded by equipment supplied.
6. Insulate all hot water, cold water and condensate piping with 1" thick (k=0.23 @ 75°F) pipe insulation with an all service jacket to meet local codes and UL/ULC flame spread and smoke developed ratings.
7. Insulate the trap, sanitary and supply pipes under lavatory with 1/2" Armstrong "Armaflex" piping insulation or Truebro model 102w "Handi Lav guard" insulation kit.
8. Install all necessary pipe hangers, saddles, and carriers to properly support all piping and fixtures. Hangers shall suit type of piping provided and be spaced at a maximum span of 5 feet. Provide sway and seismic bracing where required by codes.
9. Sterilize water system in accordance with local codes.
10. Cleanouts and floor drains shall be installed per local codes. Wall covers are to be stainless steel and floor covers are to be brass, unless otherwise specified. Provide

- floor covers with inset area for carpeted locations. All cleanout locations shall be approved by the LSD&C project manager.
11. Escutcheons shall be chrome plated, size as required, and placed at all pipe penetrations at walls, floors and ceilings in finished areas.
  12. Leakage tests shall be per local codes minimum as follows:
    - a. Test water piping at 100 psig for six hours.
    - b. Test drain, waste, vent piping by a 10' water column for two hours.
  13. Flashing shall be sealed watertight and performed in accordance to the landlord's criteria. Use a landlord approved roofing contractor, where applicable.
  14. Provide water meter and remote reader per landlord's criteria or local utilities requirements, if applicable. Refer to plans to determine if water meter is required.

**DIVISION 23: MECHANICAL****SECTION 230000: BASIC MECHANICAL REQUIREMENTS****A. Note**

1. The abbreviation LSD&C wherever it appears in these mechanical drawings and/or specifications shall refer to "Limited Store Design and Construction". Any reference to tenant's project manager or furnished by any of the above refers to LSD&C.
2. Drawings and general provisions of contract, including general and supplementary conditions and all other specification sections, apply to this and the other sections of Division 15.
3. The contractor for this division of work is required to read the specifications and review drawings for all divisions of work and is responsible for the coordination of this work and the work of his subcontractors with all divisions of work. It is this contractor's responsibility to provide his subcontractors with a complete set of bid documents.
4. This contractor is responsible for scheduling the completion and inspection of this work to comply with the LSD&C schedule and the project completion date.
5. This contractor shall visit the site prior to submittal of bid to determine conditions affecting the work. Any items which are not covered in the bid documents or any proposed substitutions shall be listed separately and qualified in the contractors bid. Submittal of bid shall serve as evidence of knowledge of existing conditions and any modifications which are required to meet the intent of the drawings and specifications. Failure to visit the site does not relieve the contractor of responsibility in performance of his work.
6. Refer to responsibility schedule on sheet M04.01 of this set for information in regard to responsibility of work or items which may affect the bid.

**B. General requirements**

1. This contractor shall provide all labor, materials, equipment, services, tools, transportation, Incidentals and details necessary to provide a complete mechanical system as shown on the drawings, called for in the specifications, and as required by job conditions. All work not specifically noted as being by the landlord or LSD&C shall be provided by this contractor. Closely coordinate the entire installation with the landlord and the LSD&C project manager, as required.

2. The drawings and specifications are intended to supplement each other and any material or labor called for in one shall be furnished and installed even though not specifically mentioned in both. Any material or labor which is neither shown on the drawings nor called for in the specifications, but which is obviously necessary to complete the work, and which is usually included in work of similar character, shall be furnished and installed as part of contract.
3. Where the drawings or specifications call for items which exceed codes or the landlord's tenant criteria, the contractor is responsible for furnishing and installing the system with the more stringent requirements as designed and described on these drawings, unless specifically noted otherwise.
4. All work in this section shall be installed so as to be readily accessible for operating, servicing, maintaining, and repairing. This contractor is responsible for providing sufficient service access to all equipment.
5. All work shall be performed in a neat professional manner using good construction practices.
6. Unless specifically noted otherwise, materials, products, and equipment, including all components thereof, shall be new, Underwriter's Laboratories/Underwriter's Laboratories of Canada listed and labeled and sized in conformity with requirements of state/province and local codes, whichever is more stringent.
7. This contractor shall do all cutting, chasing and channeling required for any work under this division. Cutting shall have prior approval by LSD&C project manager and the landlord. All patching shall be by G.C. and shall match the surrounding surfaces.
8. The mechanical contractor shall make all final mechanical connections as required for a complete and operating system.
  - a. The mechanical contractor shall notify the general contractor to contact LSD&C's designated company (EMS) for start-up. (Refer to sheet M01.01).

**C. Codes**

1. All work shall conform to the landlords' criteria, the state's/province's, county's, city's and local codes and ordinances, safety and health codes, NFPA/NFPAC codes, energy codes and all other applicable codes and requirements. This contractor shall inquire into and comply with all applicable codes, ordinances, and regulations. This contractor shall include any changes required by codes in the bid and if these changes are not included in the bid, they must be qualified as a separate line item in the bid. After contract is awarded, change orders for increased

- costs due to code issues will not be accepted by LSD&C.
- D. Licenses, permits, inspections & fees
1. This contractor shall obtain and pay for all licenses, permits, inspections, and fees required or related to his work.
  2. Furnish to the LSD&C's project manager all certificates of inspection and final inspection approval at completion of project.
- E. Trade names, manufacturers and shop drawings
1. Where trade names and manufacturers are used on the drawings or in the specifications, the exact equipment shall be used as a minimum for the base bid. Manufacturers considered as an equal or better in all aspects to that specified will be subject to approval in writing by LSD&C's project manager through shop drawing submittal process for acceptance prior to installation. The use of any unauthorized equipment shall be replaced at the contractor's expense.
  2. General contractor shall submit only substitution requests to LSD&C project manager for approval. Submissions shall be made early enough in project to allow four (4) working days for LSD&C project manager's review without causing delays or conflicts to the job's progress. Submittals shall bear the stamp and/or the signature of the general contractor and the subcontractor showing that he has reviewed and confirmed that the submittals are in conformance with the contract drawings and specifications or indicate where exceptions have been taken.
- F. Guarantee
1. This contractor shall guarantee all materials and work provided under his contract and shall make good, repair or replace at his own expense, any defective work, material, or equipment which may be discovered within a period of 12 months from the date of acceptance (in writing) of the installation by LSD&C's project manager. Extended warranties are as specified with individual equipment.
  2. The equipment manufacturer shall guarantee and provide a 12 month guarantee to LSD&C from the date of acceptance. This contractor shall warranty the installation of this equipment and will be responsible for any damage and/or malfunction caused by the installation. This contractor shall not bear additional warranties beyond a complete working system.
- G. Record drawings
1. This contractor shall maintain one set of drawings on the job site updated weekly to record all deviations from contract drawings, such as:
    - a. Location of concealed piping valves and ducts.
- b. Revisions, addendum, and change orders.
  - c. Significant deviations made necessary by field conditions, approved equipment substitutions, and contractor's coordination with other trades.
2. At completion of the project and before final approval, this contractor shall make any final corrections to drawings and certify the accuracy of each print by signature thereon. Failure to keep these records will allow LSD&C to direct the general contractor to provide these records at his expense prior to final payment.
- H. Discrepancies in documents
1. Drawings (plans, specifications, and details) are diagrammatic and indicate the general location and intent of the mechanical systems. Where drawings, existing site conditions, specifications or other trades conflict or are unclear, advise the general contractor in writing, prior to submittal of bid. The general contractor is responsible to advise LSD&C's project manager, in writing, of variations to contract documents prior to submission of bid. Otherwise, LSD&C project manager's interpretation of contract documents or conditions shall be final with no additional compensation permitted.
- I. Phasing requirements
1. This contractor is to include in his bid all necessary service required to keep the operating phase of the store's HVAC, plumbing and sprinkler service in operation. Contractor must schedule in writing with LSD&C's project manager and the landlord one week prior to any shut down of the HVAC, plumbing or fire protection systems.
- J. Demolition
1. This contractor shall be responsible for the coordination of the demolition of existing work and the demolition provided by the general contractor. Coordinate with the general contractor any existing equipment required to be left intact.
  2. This contractor shall include, and will be held responsible for, the removal of all existing HVAC units, hydronic piping, refrigerant recapture, exhaust fans, etc. And associated roof curbs not to be reused on this project, unless specifically noted otherwise. Contractor must verify with the landlord all presumed abandoned equipment, pipes, and ductwork prior to removal. Roof curbs shall be removed and the roof patched. All extraneous items in the space or on the roof not applicable to the new work must be removed and roof/wall/floor patched/repaired to match existing structure. Existing abandoned pipes, ducts, or equipment in the floor, embedded in concrete or otherwise inaccessible are to be cut off and sealed



- below or within floor or wall level when they are not to be reused in this project. If required by landlord or codes, abandoned piping and/or ductwork must be removed to point of origin. Confirm the extent of demolition prior to bid and include in bid proposal.
- K. Sleeves
1. This contractor shall provide sleeves to protect equipment or facilities in the installation. Each sleeve shall extend through its respective floor, wall or partition and shall be cut flush with each surface except sleeves that penetrate the floor, which shall extend 2" above the floor. Contractor must coordinate through the landlord any core drilling or cutting of openings in masonry floors or walls.
  2. All sleeves and openings through fire rated walls and/or floors shall be fire sealed with calcium silicate, silicone "RTV" foam, "3M" fire rated sealants or equal, so as to retain their fire rating.
  3. Sleeves in bearing and masonry walls, floors, and partitions shall be standard weight steel pipe finished with smooth edges. For other than masonry partitions, through suspended ceilings, or for concealed vertical piping, sleeves shall be no. 22 U.S.G. galvanized steel minimum.
- L. Scope of work
1. This contractor shall furnish all labor, materials, equipment, services, tools, transportation and facilities necessary for, reasonably implied and incidental to, the furnishing, installation, completion and testing of all the work for the HVAC systems as shown on the drawings, called for in the specifications, and as required by job conditions, to include, but not be limited to the following:
    - a. HVAC units, all related equipment and accessories (unless noted otherwise).
    - b. Ductwork, fittings, dampers, and insulation.
    - c. Hydronic piping. (as applicable, refer to plans).
    - d. Refrigerant piping (as applicable, refer to plans).
    - e. Curbs, roofing, and steel framing for support (as applicable, refer to plans).
    - f. Testing, adjusting, and balancing.
    - g. Keeping a record set and prepare as-built drawings.
  2. Before starting work, this contractor shall visit the job site and examine the architectural, structural, mechanical and electrical plans and specifications to sequence, coordinate, and integrate the various elements of the HVAC system, materials, and equipment with other contractors to avoid interferences and confrontations.
3. Relocation of existing duct mains or branches to meet store design criteria must be included in bid proposal.
- M. HVAC equipment
1. Primary heating and air conditioning units are to be furnished by LSD&C as scheduled unless noted otherwise. Refer to plans for requirements. All equipment shall include a five (5) year compressor and ten (10) year heat exchanger warranty.
  2. All equipment shall be complete in every respect with all devices and accessories provided to meet the design intent and operation of the systems shown on the drawings and specified herein.
  3. Equipment shall be installed in strict accordance with the manufacturer's instructions.
- N. Equipment furnished by limited store design and construction
1. The following equipment is furnished by LSD&C and installed by this contractor unless specifically noted otherwise. Refer to responsibility schedule and plans for applicability.
    - a. HVAC units.
    - b. Toilet exhaust fans.
    - c. Diffusers, grilles and registers.
    - d. Temperature controls.
  2. All ductwork, roof openings and caps necessary to provide a complete toilet exhaust system shall be furnished and installed by this contractor.
- O. Curbs for support
1. This contractor shall furnish and install curb adaptors on existing curbs where allowed by landlord. Curb adaptors must be manufactured by Thybar, Micrometl, or LSD&C approved equal.
  2. Where existing curbs are not available or where curb adaptors are not allowed this contractor shall furnish and install all necessary curbs required to install all HVAC equipment as described on the drawings. Curbs shall be a minimum of 14" high (see M04.01 "local area requirements" item # 5), of the same manufacturer of the equipment unless noted otherwise.
  3. All curbs and curb adaptors shall be installed such that top of curbs are level. All penetrations of existing structure shall be done in accordance with the landlord's guidelines at this contractor's expense. This contractor shall receive LSD&C project manager's written approval before any work takes place. This contractor is also responsible for all seismic, hurricane or other securing devices required by local or other codes.
- P. Labels/pipe markers

1. Furnish and install pipe identification markers on all pipes installed under this contract. Markers shall be a minimum of 1-1/2" x 8" and identified in accordance with the background and letter colors issued by the American National Standards Institute (ANSI).
  2. Piping shall be identified as follows: chilled water return, chilled water supply, condensate, hot water return, hot water supply, condenser water return, condenser water supply, refrigerant liquid, refrigerant suction, and directional arrows. All identifications must be visible at equipment.
- Q. Final HVAC inspections
1. Aside from normal interim inspections of work in place, LSD&C shall have an independent HVAC contractor inspect the finished HVAC installation upon completion for compliance with the plans, specifications and codes. The installing contractor will be responsible to bring all items reported by the independent HVAC contractor up to plans and specification requirements.

## SECTION 230500: COMMON WORK RESULTS FOR HVAC

- A. Hangers
1. Hangers shall include all miscellaneous steel such as angle iron, bands, c-clamps with retaining clips, channels, hanger rods, etc., necessary for the installation of work.
  2. Hangers shall be fastened to building steel, concrete, or masonry, but not to piping. Hanging from metal deck is not permitted. Hangers must be attached to upper chord of bar joist. Where interferences occur, and in order to support ductwork or piping, the contractor must install trapeze type hangers or supports which shall be located where they do not interfere with access to fire dampers, valves, and other equipment. Hanger types and installation methods are also subject to landlord criteria.
  3. Hangers for all insulated piping shall be sized and installed for the outer diameter of insulation. Install 6" long split circle galvanized saddle between the hanger and the pipe insulation.
  4. Hangers and piping of dissimilar metals shall be di-electrically separated.
- B. Vibration isolation devices
1. Spring vibration isolation devices shall be furnished and installed in all supports between vibrating equipment (fans, air handlers, etc.) And structure. Isolators to be sized according to load with a min. 1" deflection. Vibrating equipment hung from structure shall be isolated with rubber and spring devices. Vibrating equipment

- supported from floor or deck shall be isolated with housed spring mount devices.
2. Examine dead load and operating load conditions when selecting devices. Adjust for proper alignment and loading. Avoid "grounding" the isolator.
  3. Check hanger rod size for allowable loads at the isolating device and at the upper and lower attachments to structures, ducts, equipment, etc.
  4. Consult manufacturer for application data.
- C. Testing, adjusting, and balancing
1. Testing, adjusting and balancing of all work shall be made by an independent contractor who is a currently licensed Associated Air Balancing Council (AABC) or National Environmental Balancing Bureau (NEBB) balancing contractor. No other balance reports will be accepted. All balancing work must be complete and done in accordance with the most recent standards of their society and as a minimum shall include the information as shown in the air balance review checklist in the GC project manual. Payment of all costs for testing and balancing shall be included in the bid. However, it will be the G.C. that will contract directly with the air balancing company.
  2. Final testing, adjusting and balancing report must be complete and submitted with final close-out documents to LSD&C 1 week prior to merchandising date.
  3. The HVAC contractor shall be present for air balance to verify accessibility to all devices, verify all operating sequences and install new filters in all units just prior to the air balance. The complete air balance shall take place with outside air dampers in minimum position, except as noted otherwise. HVAC contractor shall also install a new set of filters one day prior to merchandising.
  4. Balance landlord media quantities to within 5% of that indicated on the drawings. Any required changes in sheaves, belts or pulleys needed to achieve specified flow rates shall be performed by the HVAC contractor with no additional cost to LSD&C.
  5. All control sequences shall be tested (interlocked equipment, smoke detectors, smoke evacuation, economizer, etc.) And operating status recorded in the balance report.
  6. Air balancing contractor is to confirm override of minimum outside air intake upon CO2 monitoring confirmation. For CO2 monitoring contact, see contact information on sheet M01.02.
  7. Three copies of the balance report shall be submitted through the general contractor to LSD&C for approval. The general contractor shall verify the completeness of the reports prior to submitting to LSD&C. Submit one

copy of final approved air balance report to mall general manager.

8. The balancing contractor shall perform all applicable testing and balancing functions required for the system designed on these drawings. All systems unable to be completely balanced at the time of original balance must be balanced in future at no additional expense to LSD&C the balancing contractor shall recheck any items that LSD&C deems necessary at no additional cost to LSD&C.

#### D. Valves

1. Gate valves, 2-inch and smaller: class 150, body and union bonnet of ASTM B 62 cast bronze with threaded or solder ends, integral seat, renewable solid bronze wedge disc, rising stem, screwed bonnet and re-packable under pressure. Ball valves are accepted as an equal substitution.
2. Gate valves, 2-1/2 inch and larger: class 125 cast iron body, renewable bronze seats and solid wedge disc, rising stem, flanged ends, and re-packable under pressure.
3. Swing check valves, 2-inch and smaller: class 150, cast bronze body and cap conforming to ASTM B 62 with horizontal swing, Y-pattern, renewable bronze disc, and having threaded or soldered ends.
4. Swing check valve, 2-1/2 inch and larger: class 125 cast iron body and bolted cap, horizontal swing, renewable bronze disc, flanged ends and capable of being refitted while the valve remains in the line.
5. Combination balancing and shutoff valves: Bell & Gossett circuit setter with locking set point. A circuit setter balance wheel must be included with O & M manual. Taco or Griswold are considered as equal.

### SECTION 230700: HVAC INSULATION

#### A. Ductwork insulation

1. Furnish and install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices. Insulation must comply with NFPA/NFPAC 90A.
2. All insulation shall have a flame spread rating of not more than 25 and a smoke developed rating of no higher than 50 when tested in accordance with ASTM E 84-05, or as required by local codes.
3. Ductwork shall be insulated according to the energy code adopted by local AHJ. It is the contractor's responsibility to confirm code and provide adequate insulation as indicated below (within assumed parameters). This spec does not include requirements for ductwork located within a ventilated attic or outside. In such instances, refer directly to code adopted by local AHJ.

- a. Rectangular Supply and Return air Ducts - Plenum Return air System: Duct sizes shown on drawings are inside clear dimensions. All rectangular ductwork (supply and return) shall be internally insulated to thickness listed below. Liner is to have a coated surface exposed to airstream to prevent erosion. Apply adhesives and mechanical fasteners as recommended by SMACNA and the manufacturer to prevent liner separation from the duct. All adhesives shall be low VOC type. All transverse edges to be coated with adhesive. Lined ductwork does not need to be wrapped unless required by Mall.

- (1) 2007 & 2010 ASHRAE 90.1, 2009 IECC, 2012 IECC, 2009, 2010 Oregon Energy Code, and 2012 Washington State Energy Code: Provide 1" thick, 1.5 lb/ft<sup>3</sup>, minimum internal liner (conductivity  $\leq 0.26$  @ 75°F; R-4.0)

- b. Rectangular Supply and Return air Ducts - Ducted Return air System: Duct sizes shown on drawings are inside clear dimensions. All rectangular ductwork (supply and return) shall be internally insulated to thickness listed below. Liner is to have a coated surface exposed to airstream to prevent erosion. Apply adhesives and mechanical fasteners as recommended by SMACNA and the manufacturer to prevent liner separation from the duct. All transverse edges to be coated with adhesive. Lined ductwork does not need to be wrapped unless required by Mall.

- (1) 2007 & 2010 ASHRAE 90.1, Provide 1" thick, 1.5 lb/ft<sup>3</sup>, minimum internal liner (conductivity  $\leq 0.26$  @ 75°F; R-4.0 min.) for all supply air ductwork and first 15'-0" of the return air ductwork.

- (2) 2009 IECC, 2012 IECC, 2012 Washington State Energy Code and 2010 Oregon Energy Code, Provide 1.5" thick (2" also acceptable), 1.5 lb/ft<sup>3</sup>, minimum internal liner (conductivity  $\leq 0.17$  @ 75°F; R-6.0 min.)

4. All outdoor air (round, oval, and rectangular) and round/oval supply air ductwork shall be externally insulated as indicated:

- a. Plenum and Ducted Return air Systems: All outdoor air (round, oval, and rectangular) and round/oval supply air ductwork shall be externally insulated with a duct wrap with vapor barrier. Refer to thickness below. Vapor barrier

is to be maintained throughout duct system. All joints must be overlapped and tucked so that no insulation fiber is visible. Extend ductwork insulation without interruption through walls, floors and other penetrations.

- (1) 2007 and 2010 ASHRAE 90.1, 2009 and 2012 International Energy Code, 2010 Oregon Energy Code: Provide a minimum of 2" thick, 1.0 lb/ft<sup>3</sup> (R=7.6, R=6.1 installed) duct wrap with vapor barrier.
- (2) 2012 Washington State Energy Code:
  - (a) Supply and return air round and oval ductwork insulation: Round/oval supply and return air ductwork shall be externally insulated with a minimum of 2" thick duct wrap, 1.0 lb/ft<sup>3</sup> (Installed R-6.1).
  - (b) Outside air ductwork insulation for units supplying less than 2800 CFM: all outdoor air (round, oval, and rectangular) ductwork shall be externally insulated with a minimum of 2-1/2" thick duct wrap, 0.75 lb/ft<sup>3</sup> (installed R-7.1).
  - (c) Outside air ductwork insulation for units supplying more than 2800 CFM: Provide two layers of 2.5" thick, 2.25 lb/ft<sup>3</sup>, external board insulation (conductivity 0.24 @ 75°F; R-20.8).

B. Hydronic piping insulation

1. All hydronic piping for chilled water and/or hot water (not including condenser water unless specifically noted otherwise), valves, fittings, and accessories shall be insulated according to the energy code adopted by local AHJ. It is the contractor's responsibility to confirm code and provide adequate insulation as indicated below (within assumed parameters). Chilled water temperature is assumed to be no less than 40°F and hot water temperature no greater than 200°F. In the case that actual project conditions exceed these values, refer directly to the code adopted by local AHJ for requirements.
  - a. Per ASHRAE 90.1-2007:
    - (1) When all pipe sizes are less than 8 inches: Insulate with 1 inch thick fiberglass insulation with all service jacket and vapor barrier. Insulation shall have a conductivity not to exceed 0.28 btu•in/h•ft<sup>2</sup>•°F @75°F when tested in accordance with ASTM C 547.

- (2) When pipe sizes exceed 8 inches: Insulate with fiberglass insulation with all service jacket and vapor barrier. Insulation shall have a conductivity not to exceed 0.28 btu•in/h•ft<sup>2</sup>•°F at 75°F when tested in accordance with ASTM C547. Insulate pipes sized less than 8 inches with 1 inch thick insulation. Insulate pipes sized 8 inches and larger with 1-1/2" thick insulation.
- b. Per ASHRAE 90.1-2010:
  - (1) When all pipe sizes are less than 1-1/2 inches: insulate with 1-1/2" inch thick fiberglass insulation with all service jacket and vapor barrier. Insulation shall have a conductivity not to exceed 0.26 btu•in/h•ft<sup>2</sup>•°F @75°F when tested in accordance with ASTM C547.
  - (2) When pipe sizes equal or exceed 1-1/2 inches: insulate with fiberglass insulation with all service jacket and vapor barrier. Insulate pipes sized less than 1-1/2 inches with 1-1/2 inch thick insulation. Insulate pipes sized 1-1/2 inches and larger with 2" thick insulation. Insulation shall have a conductivity not to exceed 0.26 btu•in/h•ft<sup>2</sup>•°F @75°F when tested in accordance with ASTM C547.
- c. 2009 International Energy Conservation Code:
  - (1) Insulate with fiberglass insulation with all service jacket and vapor barrier. Insulation shall have a conductivity not to exceed 0.27 btu•in/h•ft<sup>2</sup>•°F @ 75°F when tested in accordance with ASTM C547. Insulate pipes sized 1-1/2 inches and smaller with 1 inch thick insulation. Insulate pipes sized larger than 1-1/2 inches with 1-1/2 inch thick insulation.
- d. 2012 International Energy Conservation Code:
  - (1) Insulate with fiberglass insulation with all service jacket and vapor barrier. Insulate chilled water pipes with 1 inch thick insulation having a conductivity not to exceed 0.28 btu•in/h•ft<sup>2</sup>•°F @ 75°F when tested in accordance with ASTM C547. Insulate hot water pipes with 2 inch thick insulation having a conductivity not to exceed 0.28 btu•in/h•ft<sup>2</sup>•°F @ 125°F when tested in accordance with ASTM C547.
- e. 2008/2010 California Energy Code:

- (1) Insulate with fiberglass insulation with all service jacket and vapor barrier. Insulate chilled water pipes with 1 inch thick insulation with a conductivity not to exceed 0.27  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  at 75°F when tested in accordance with ASTM C335. Insulate hot water pipes with 1-1/2" thick insulation with a conductivity not to exceed 0.29  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  at 125°F when tested in accordance with ASTM C335.
- f. 2012 Washington State Energy Code:
  - (1) Insulate with fiberglass insulation with all service jacket and vapor barrier. Insulate chilled water pipes with 1-1/2 inch thick insulation with a conductivity not to exceed 0.26  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  at 75°F when tested in accordance with ASTM C335. Insulate hot water pipes (up to 200°F) sized less than 1.5 inches with 1-1/2" thick insulation with a conductivity not to exceed 0.29  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  at 125°F when tested in accordance with ASTM C335. Insulate hot water pipes sized 1.5 inches or larger with 2" thick insulation with a conductivity not to exceed 0.29  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  at 125°F when tested in accordance with ASTM C335.
- g. 2010 Oregon Energy Efficiency Specialty Code:
  - (1) Insulate with fiberglass insulation with all service jacket and vapor barrier. Insulation shall have a conductivity not to exceed 0.27  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  @ 75°F when tested in accordance with ASTM C547. Insulate pipes sized 1-1/2 inches and smaller with 1 inch thick insulation. Insulate pipes sized larger than 1-1/2 inches with 1-1/2 inch thick insulation.
- 2. Insulation at all hangers for piping 2-1/2 Inches and larger shall be hard and non-compressible.
- 3. All insulation shall have a flame spread rating of not more than 25 and a smoke developed rating of no higher than 50 to conform with the requirements of the NFPA/NFPAC.
- 4. Provide Zeston or equal insulation fittings for all tees, ells or specialty fittings.
- C. Refrigerant piping insulation
  - 1. Insulate the refrigerant suction lines and condensate lines with 1 1/2" pipe insulation similar to Flextherm seam-seal or Insul-lock. Insulation shall be a closed cell fiber free elastomeric foam in accordance with ASTM C 534, type I - tubular, grade 1; shall have a

conductivity not to exceed 0.26  $\text{btu}\cdot\text{in}/\text{h}\cdot\text{ft}^2\cdot^\circ\text{F}$  at 75°F when tested in accordance with ASTM C 177 or C 518; shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E 84; and shall have a maximum water absorption % of 0.2 by volume when tested in accordance with ASTM C 209. Do not insulate the hot gas (liquid) lines or any hot gas bypass.

## SECTION 230900: INSTRUMENTATION AND CONTROL FOR HVAC

- A. Work responsibility
  - 1. LSD&C HVAC supplier will furnish necessary control devices to the field. For all devices not factory installed, it will be the mechanical contractor's responsibility to install.

## SECTION 232100: HYDRONIC PIPING AND PUMPS

- A. Hydronic piping
  - 1. Furnish and install a complete hydronic piping system if applicable. Refer to plans to determine if a hydronic system is required. Unless otherwise noted the working pressure for system piping and components shall be at minimum 150 psig.
  - 2. Piping
    - a. Hydronic piping for chilled water, condenser water and/or heating water shall be ASTM A 53, schedule 40, ERW, black steel pipe with plain ends. Install steel pipe with welded joints where pipe is 2-1/2 inch and larger. Install steel pipe with threaded joints and fittings. Install type "K" copper pipe for 2 inch and smaller pipe. Provide dielectric unions between dissimilar metals. All piping shall be in strict conformance with ASTM, ASA, and landlord's requirements; whichever is most stringent. Unions or flanges must be used at equipment connections where service or removal may be required.
    - b. All piping and equipment shall be pressure tested without leakage at a minimum pressure of 125 psi.
    - c. All hydronic piping and equipment connected to the HVAC piping system shall be cleaned and flushed. Remove, clean, and replace strainer screens. Fill tenant's system with domestic water and vent all piping and equipment prior to connection to the landlord's system. Contractor shall not fill tenant's system with water from the landlord's system

- unless specifically instructed to do so from the landlord's field representative. Any runs thru a chase or shaft will be done with fewest joints possible using the longest length of hard copper pipe available. Should a joint be required, contractor shall make all efforts to keep the joints in accessible areas.
- d. Prior to connection to the landlord's system, contractor shall obtain written confirmation from the landlord's field representative, that all testing, flushing, and proper filling of the tenant's system has been completed in accordance to the landlord's requirements and that the tenant's system is ready to be connected to the landlord's system.
3. Piping specialties
- a. Pressure/temperature test plugs (Pete's plug) - 1/4 inch NPT fittings to receive either a temperature or pressure probe, 1/8 inch O.D. fitting and caps shall be brass with valve core of Nordel, rated at 400 psig, 0 to 200 degrees F.
- b. Strainers - "Y" pattern strainers, 125 psig, cast iron body with perforated stainless steel screen, threaded for 2 inches and smaller, flanged for 2-1/2 inches and larger. Screen opening size at 0.033 inch for heating and 1/8 inch for chilled or condenser water. Provide with blowdown valve with hose end fitting.
- c. Flexible hose: pipe size 1/2 inch to 1-1/4 inch - provide plenum rated stainless steel braided hose with EPDM core. End connections shall be compatible with pipes to be joined. Provide dielectric unions between dissimilar metals. Pipe size 1-1/2 inch and larger - provide stainless steel braided hose over a corrugated stainless steel tube with carbon steel end fittings. End fittings shall be compatible with pipes to be joined. Provide dielectric unions between dissimilar metals.
- d. Dielectric unions: where joining two separate metals provide a connector assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
4. General installation
- a. Install water mains without pitch. Use eccentric reducing couplings at changes in size with the top of pipes at same elevation.
- b. Branches to units below mains to be taken from bottom of mains at a 45 degree angle, pitch downward toward units. Branches to units above mains to be taken from top of mains at a 45

- degree angle pitched upward towards units. Pitch not less than 1" to 10 feet.
- c. See mechanical detail drawings for applicable details.
- d. Provide UL/ULC listed fire stopping system around all piping penetrations through rated walls. Penetrations shall meet the requirements of UL/ULC details WL1001 (uninsulated wall) and WL5039 (insulated wall).

## SECTION 232300: REFRIGERANT PIPING

- A. Refrigerant piping:
1. This contractor shall furnish and install a complete refrigerant piping system between the indoor fan units and outdoor condensing units. Refer to plans to determine if a refrigerant system is required. New piping is required. Reuse of existing piping is not allowed.
2. Piping
- a. Refrigerant piping shall be type ACR copper tubing. Tubing shall be clean and clear of debris, and evacuated with a deep vacuum prior to refrigerant charge. The contractor shall confirm the diameter of the refrigerant piping runs in excess of 50 equivalent feet with the architect, engineer, and manufacturer for all split systems. No refrigerant piping runs exceeding 100 equivalent feet are to be installed without LSD&C PM's permission. The manufacturer shall provide all final pipe sizing and coil selections for all refrigerant piping systems.
- b. All fittings and joints shall be wrought copper or cast bronze (ANSI B 16.22). All copper to copper joints shall be brazed with a copper-phosphorus alloy and all other joints shall be brazed with Silfos-5 alloy.
- c. All elbows are to be long radius type.
3. Installation
- a. Refrigerant pipe sizing shall be the responsibility of the HVAC supplier. Contractor will provide a schematic proposed layout of the system including all elbows, rises, runs, etc., with dimensions. The HVAC supplier will then provide written documentation of pipe sizes and additional required system components to the field.
- b. Suction lines shall have adequate lift traps and/or double suction risers to meet the requirements of field conditions and equipment manufacturer's recommendations.
- c. Braze all joints with Silfos-5 starting at the indoor unit and working toward the outdoor unit. The seals on the outdoor

- unit shall be broken last. A nitrogen bleed shall be used during all brazing and any time the system is open. All open lines shall be capped and sealed before leaving the site during construction. Pressure test for leaks with an inert gas up to 245 psig. Redo leaking joints and retest until system is tight. Evacuate entire system to 200 microns of mercury. Charge system with 5 psi of R-410a and an inert gas to 245 psi and retest system. Energize crank case heaters 24 hours prior to starting compressor to ensure that all refrigerant liquid is out of the compressor.
- d. Upon completion of testing, but before the refrigerant piping insulation is applied, the piping must be inspected by a representative of the local governing authority as necessary.
  - e. Insulate the refrigerant suction lines and condensate lines as specified herein.
  - f. Provide UL/ULC listed fire stopping system around all piping penetrations through rated walls. Penetrations shall meet the requirements of UL/ULC details WL1001 (uninsulated wall) and WL5039 (insulated wall).
4. Inspection
- a. Contractor must prepare and submit a complete piping schematic to the local manufacturer representative for approval prior to beginning installation. Upon completion of piping, this contractor must call the local representative for field inspection of work performed. All items found to be inadequate for proper performance by manufacturer representative must be corrected. This inspection is performed at LSD&C expense.

## SECTION 233100: HVAC DUCTS AND CASINGS

- A. Metal ductwork - no fiberglass duct allowed
1. No ductwork shall be fabricated prior to job site visit and approval by the general contractor. A sketch must be submitted indicating deviations from design and must be approved by LSD&C's project manager prior to fabrication or installation.
  2. Except as otherwise indicated, fabricate and install rectangular and round ductwork with galvanized steel, in accordance with SMACNA "HVAC Duct Construction Standards" of the latest edition. Where other codes are enforced, (1E. UMC, BOCA, etc.) Use the most stringent code for duct construction standards.

3. Except where otherwise indicated, construct duct systems to the following pressure classifications:
  - a. Supply ducts: 2" w.g., positive
  - b. Return and exhaust ducts: 2" w.g., negativeExcept where otherwise indicated, use duct sealants of the following pressure classifications:
  - c. Supply ducts: class B - 3" w.g.
  - d. Return and exhaust ducts: class C - 2" w.g.In accordance with these construction and sealant pressure classifications, maximum duct air leakage will not exceed 5% as required for final air balance approval.
4. Round ductwork shall be galvanized steel with spiral lockseam construction for all sizes 14" diameter and larger. Round ductwork sizes 13" diameter and smaller may be snap-lock construction. All snap-lock seams shall be sealed as described in these specifications. Round fittings shall be galvanized steel with spot welded and bonded construction.
5. Round spiral galvanized steel ductwork may be used in place of rectangular ductwork in horizontal application when above ceiling clearances permits and equivalent free area is maintained, with the following exception; all supply and return ductwork within 15 feet of the air handler must be rectangular and internally lined. Once a transition in the direction of the airflow to spiral has been done, duct will not be allowed to revert to rectangular. Where round duct substitution will take place, submit a sketch and chart showing equivalent round conversions of rectangular ductwork to LSD&C project manager's for approval prior to fabrication or installation.
6. Install factory manufactured double thickness turning vanes in right angle elbows in main duct per latest edition of SMACNA.
7. Install rigid round and rectangular metal duct with support systems indicated in SMACNA standards. Support horizontal ducts within 2 feet of each elbow and within 4 feet of each branch intersection using double strap hangers on each side of fitting. Support vertical ducts at a maximum interval of 16 feet and at each floor. No wood shall be used to support or brace ducts. Provide sway and seismic bracing as required by state/province and local codes or by landlord.
8. Where ducts pass through roofs and floors, provide as minimum 1-1/2"x1-1/2"x1/8" steel angle frames at each side of opening. The annular space between duct and angle frames shall be caulked with silicone sealant

- or fireproofed as required by assembly fire rating.
9. All joints and seams shall be sealed with 2" wide, glass-fiber-fabric reinforced tape. Joints also shall be riveted or connected with sheet metal screws. Liquid sealants by United McGill Corp., Dow Corning, Miracle Adhesives and Surebond Inc. will be accepted in lieu of tape.
  10. Soft elastomer butyl gasket with adhesive backing shall be used to seal flanged joints.
  11. Duct transitions shall not exceed 30 degrees slope except as specifically noted otherwise.
  12. Provide access to all motorized dampers, fire dampers, controls, and other items in ductwork that require service or inspection. If the access panel location is exposed to the sales area, it must be approved by LSD&C's project manager prior to installation. In hard ceilings, lay-in supply and return air diffusers, grilles and registers with plaster frames may be used as access locations when within 3'-0" of device.
  13. All ductwork shall be installed with inside clear dimensions as noted on drawings. Where ductwork size is larger than connected device (ie. VAV box, diffuser, register) smooth duct transitions are to take place just prior to device connection. See mechanical drawings for detail.

## SECTION 233300: AIR DUCT ACCESSORIES

### A. Flexible connections

1. Flexible collars shall be furnished and installed in all connections between vibrating equipment (fans, air handlers, etc.) And ducts or casings. Also, furnish and install flexible connections where ducts cross building expansion joints.
2. Flexible connections shall be constructed of neoprene-coated flameproof fabric. Provide adequate joint flexibility to allow for movement and prevent the transmission of vibration.

### B. Flexible air duct

1. Flexible air duct shall be 1" insulated class 1, UL/ULC listed and rated for the operating pressure of the system. Duct construction material (plastic, cloth, aluminum) must adhere to local codes and landlord's requirements and be Included as such in the bid.
2. Flexible air duct shall be attached per details on the drawings. Flexible air duct may only be used in vertical applications.
3. Flexible duct shall not extend over 4'-0" in length at any one location.

### C. Supply air take-off fittings

1. Furnish and install conical, tapered or 45 degree saddle takeoffs from main ductwork

to round branches. Installation shall be per SMACNA latest edition.

### D. Dampers

1. Where designated, furnish and install round balancing dampers. Provide minimum 20 gauge galvanized steel frame and blades with minimum 3/8" square steel axle, and molded synthetic bearings (equivalent to Ruskin model MDRS25) with manual locking position regulator with standoff (equivalent to Duro Dyne model KR).
2. Where designated, furnish and install rectangular volume dampers. Provide minimum 16 gauge galvanized steel channel frame, 16 gauge galvanized steel blades, minimum 1/2" hexagonal axle, molded synthetic bearings, with 3/8" square plated steel control shaft (equivalent to Ruskin Model CD35). Maximum blade width shall not exceed 6". Linkages shall be concealed in the frame. Control shaft shall extend beyond frame and duct covering to a locking quadrant with adjustable lever (equivalent to Duro Dyne model K-4) with standoff.
3. Operating handles on all dampers shall be tagged with a minimum 18" long orange marker tape and shall be installed far enough away from duct to ensure it fully and comfortably clears the insulation when turned.
4. Where access to balancing damper is restricted, a remote device, manually operated shall be used. Units shall be ordered three weeks before installation to allow for delivery lead time.

### E. Fire/smoke dampers

1. Furnish and install primary fire dampers where indicated or required by codes. Dampers shall be designed for horizontal or vertical flow of air as required. Fire dampers shall be UL/ULC labeled and meet all code requirements.
2. Fire dampers shall have the blades out of the airstream and a 165 degree F fusible link, type B, as minimum. Furnish and install access doors as necessary.
3. Furnish and install all necessary framing and sleeves for damper mounting per UL/ULC and code requirements.
4. Fire/smoke dampers shall be furnished and installed with electric powered mechanism. Coordinate with electrical contractor for power requirements



## **DIVISION 26: ELECTRICAL**

### **SECTION 260000 – BASIC ELECTRICAL REQUIREMENTS**

#### **A. Note**

1. The abbreviation LSD&C wherever it appears in these electrical drawings and/or specifications shall refer to "limited store design and construction". Any reference to tenant's project manager or furnished by any of the above refers to LSD&C.
2. Drawings and general provisions of contract, including general and supplementary conditions and all other specification sections, apply to this and the other sections of division 26.
3. The contractor for this division of work is required to read the specifications and review drawings for all divisions of work and is responsible for the coordination of this work and the work of his or her subcontractors with all divisions of work. It is this contractor's responsibility to provide his or her subcontractors with a complete set of bid documents.
4. This electrical contractor is responsible for scheduling the completion and inspection of this work to comply with the LSD&C schedule and the project completion date.
5. This contractor shall visit the site prior to submittal of bid to determine conditions affecting the work. Any items which are not covered in the bid documents or any proposed substitutions shall be listed separately and qualified in the contractors bid. Submittal of bid shall serve as evidence of knowledge of existing conditions and any modifications which are required to meet the intent of the drawings and specifications. Failure to visit the site does not relieve the contractor of responsibility in performance of his or her work.
6. Refer to responsibility schedule on sheet E01.01 of this set for information in regard to responsibility of work or items which may affect bid.

#### **B. General Requirements**

1. This contractor shall provide all labor, materials, equipment, services, tools, transportation, Incidentals and details necessary to provide a complete electrical system as shown on the drawings, called for in the specifications, and as required by job conditions. All work not specifically noted as being by the landlord or LSD&C shall be provided by this contractor. Closely coordinate the entire installation with the landlord and the LSD&C project manager, as required.

2. The drawings and specifications are intended to supplement each other and any material or labor called for in one shall be furnished and installed even though not specifically mentioned in both. Any material or labor which is neither shown on the drawings nor called for in the specifications, but which is obviously necessary to complete the work, and which is usually Included in work of similar character, shall be furnished and installed as part of contract.
  3. Where the drawings or specifications call for items which exceed codes or the landlord's tenant criteria, the contractor is responsible for furnishing and installing the system with the more stringent requirements as designed and described on these drawings, unless specifically noted otherwise.
  4. All work in this section shall be installed so as to be readily accessible for operating, servicing, maintaining, and repairing. This contractor is responsible for providing sufficient service access to all equipment.
  5. All work shall be performed in a neat professional manner using good construction practices.
  6. Unless specifically noted otherwise, materials, products, and equipment, including all components thereof, shall be new, Underwriters Laboratories listed and labeled and sized in conformity with requirements of state and local codes, whichever is more stringent.
  7. This contractor shall do all cutting, chasing and channeling required for any work under this division. Cutting shall have prior approval by LSD&C project manager and the landlord. All patching shall be by G.C. and shall match the surrounding surfaces.
  8. The electrical contractor shall make all final electrical connections as required for a complete and operating system.
- #### **C. Temporary Light And Power**
1. This contractor shall furnish and install all temporary wiring and related ground fault interruption protection for light and power for all contractors and is responsible for its removal
  2. All temporary lighting will conform with OSHA standards.
  3. The general contractor sets up all electrical utilities in the name of limited brands. Limited Brands pays for all utilities throughout construction.
- #### **D. Codes**
1. All work shall conform to the landlords' criteria, the state's, county's, city's, province and local codes and ordinances, safety and health codes, NFPA/NFPAC codes, energy codes and all other applicable codes and requirements. This contractor shall inquire into and comply with all applicable codes,

- ordinances, and regulations. This contractor shall include any changes required by codes in the bid and if these hangers are not included in the bid, they shall be qualified as a separate line item in the bid. After contract is awarded, change orders for increased costs due to code issues will not be accepted by LSD&C, unless allowances have previously been agreed upon.
- E. Licenses, permits, inspections & fees
1. This contractor shall obtain and pay for all licenses, permits, inspections, and fees required or related to his or her work.
  2. Furnish to the LSD&C's project manager all certificates of inspection and final inspection approval at completion of project.
- F. Trade names, manufacturers and shop drawings
1. Where trade names and manufacturers are used on the drawings or in the specifications, the exact equipment shall be used as a minimum for the base bid. Manufacturers considered as an equal or better in all aspects to that specified will be subject to approval in writing by LSD&C's project manager through shop drawing submittal process for acceptance prior to installations. The use of any unauthorized equipment shall be replaced at the contractor's expense.
  2. General contractor shall submit only substitution requests to LSD&C project manager for approval. Submissions shall be made early enough in project to allow four (4) working days for LSD&C project manager's review without causing delays or conflicts to the job's progress. Submittals shall bear the stamp of the general contractor and the subcontractor showing that he has reviewed and confirmed that the submittals are in conformance with the contract drawings and specifications or indicate where exceptions have been taken.
- G. Guarantee
1. This contractor shall guarantee all materials and work provided under his or her contract and shall make good, repair or replace at his or her own expense, any defective work, material, or equipment which may be discovered within a period of 12 months from the date of acceptance of the installation by LSD&C's project manager (in writing). Extended warranties are as specified with individual equipment.
  2. The equipment manufacturer shall guarantee and provide a 12 month guarantee to LSD&C from the date of acceptance. The contractor shall warrant the installation of this equipment and will be responsible for any damage and/or malfunction caused by the installation. This contractor shall not bear additional warranties beyond a complete working system.
- H. Record drawings
1. This contractor shall maintain one set of drawings on the job site updated weekly to record all deviations from contract drawings, such as:
    - a. Location of concealed pullboxes.
    - b. Revisions, addendums, and change orders.
    - c. Significant deviations made necessary by field conditions, approved equipment substitutions, and contractor's coordination with other trades.
  2. At completion of the project and before final approval, this contractor shall make any final corrections to drawings and certify the accuracy of each print by signature thereon. Failure to keep these records will allow LSD&C to direct the general contractor to provide these records at his or her expense prior to final payment.
- I. Discrepancies in documents
1. Drawings (plans, specifications, and details) are diagrammatic and indicate the general location and intent of the mechanical systems. Where drawings, existing site conditions, specifications or other trades conflict or are unclear, advises the general contractor in writing, prior to submittal of bid. The general contractor is responsible to advise LSD&C's project manager, in writing, of variations to contract documents prior to submission of bid. Otherwise, LSD&C project manager's interpretation of contract documents or conditions shall be final with no additional compensation permitted.
- J. Phasing requirements
1. This contractor is to include in his or her bid all necessary service required to keep the operating phase of the store's HVAC, electrical, plumbing and sprinkler service in operation. Contractor shall schedule in writing with LSD&C's project manager and the landlord one week prior to any shut down of the HVAC, plumbing or fire protection systems.
- K. Demolition
1. This contractor shall be responsible for the coordination of the demolition of existing work and the demolition provided by the general contractor. Coordinate with the general contractor any existing equipment required to be left intact.
  2. This contractor shall include, and will be held responsible for, the removal of all existing conduit, fire alarm system, switch gear, pitch pockets and equipment etc.. Unless specifically noted otherwise. Contractor shall verify with the landlord all presumed abandoned equipment, conduit and switch gear prior to removal. Pitch pockets shall be removed and the roof patched, as required by the landlord. All extraneous items in the space or on the roof not applicable to the

- new work shall be removed and roof/wall/floor patched/repared to like new condition. Existing abandoned conduit or equipment in the floor, embedded in concrete, or otherwise inaccessible, are to be cut off and sealed below or within floor or wall level when they are not to be reused in this project. If required by landlord or codes, abandoned conduit shall be removed to point of origination. Confirm extent of demolition prior to bid and Include in proposal.
3. All unused communication, data, and low voltage cabling is to be removed in accordance with N.E.C. 725.(3)b and 760.3(a).
- L. Sleeves
1. This contractor shall provide sleeves to protect equipment or facilities in the installation. Each sleeve shall extend through its respective floor, wall or partition and shall be cut flush with each surface except sleeves that penetrate the floor, which shall extend 2" above the floor. Contractor shall coordinate through the landlord any core drilling or cutting of openings in masonry floors or walls.
  2. All sleeves and openings through fire rated walls and/or floors shall be fire sealed with calcium silicate, silicone "RTV" foam, "3m" fire rated sealants or equal, so as to retain their fire rating.
  3. Sleeves in bearing and masonry walls, floors, and partitions shall be standard weight steel pipe finished with smooth edges. For other than masonry partitions, through suspended ceilings, or for concealed vertical piping, sleeves shall be no. 22 U.S.G. galvanized steel minimum.
- M. Hangers
1. Hangers shall include all miscellaneous steel such as angle iron, bands, c-clamps with retaining clips, channels, hanger rods, etc., necessary for the installation of work.
  2. Hangers shall be fastened to building steel, concrete, or masonry, but not to piping. Hanging from metal deck is not permitted. Hangers shall be attached to upper chord of bar joist. Where interferences occur, and in order to support ductwork or piping, the contractor shall install trapeze type hangers or supports which shall be located where they do not interfere with access to fire dampers, valves, and other equipment. Hanger types and installation methods are also subject to landlord criteria.
  3. Hangers for all insulated piping shall be sized and installed for the outer diameter of insulation. Install 6" long split circle galvanized saddle between the hanger and the pipe insulation.
  4. Hangers and piping of dissimilar metals shall be di-electrically separated.
- N. Final electrical inspection
1. Aside from normal interim inspections of work in place, LSD&C may have an independent electrical contractor inspect the finished electrical installation upon completion for compliance with the plans, specifications and codes. The installing contractor will be responsible to bring all items reported by the independent electrical contractor up to plans and specification requirements.
- O. Scope of work
1. This contractor shall furnish all labor, materials, equipment, services, tools, transportation, and facilities necessary for, reasonably implied and incidental to, the furnishing, installation, completion and testing of all the work for the electrical systems as shown on the drawings, called for in the specifications, and as required by job conditions, to Include, but not be limited to the following:
    - a. A complete electrical distribution system Including the installation of LSD&C furnished power distribution system unit, safety switches, disconnect switches and motor starters (sometimes furnished and installed by contractor), and lighting. It is the electrical contractor's responsibility to include in his or her bid for providing service equipment necessary for tie-in to landlord's distribution equipment or to obtain service from local utility company. Refer to electrical responsibility schedule and electrical power riser diagram for additional information.
    - b. Contractor shall Include in bid all necessary materials required to complete the system Including, but not limited to, feeders, branch circuits, junction boxes, outlet boxes, wiring devices, coverplates, conduits, motor starters, disconnects, etc.
    - c. Metering and current transformers as required by drawings, LSD&C, utility company, and/or landlord.
    - d. The wiring of mechanical equipment as outlined on the bid set drawings and in the specifications. Work shall include wiring of all starters, disconnects, and power wiring of mechanical equipment except as specifically noted otherwise. All low voltage (24 volt) ems temperature control wiring shall be the responsibility of the electrical contractor unless noted specifically on drawing.
    - e. Installation of light fixtures and lamps as shown on the drawings Including all devices, equipment, etc. Required for mounting.

- f. A complete conduit system for telephone/data and traffic counter including branch conduits, outlet boxes, pull wires, ground conductors, cover plates, etc. Or as specifically noted otherwise on the drawings.
- g. A complete emergency and exit lighting system as shown on the drawings.
- h. Temporary service as indicated in the specifications, including its removal.
- i. Final connections to all signs, cornice lighting, case lighting, etc. As shown on drawings.
- j. Installation and wiring of speakers, amplifiers, conduit and final connections for sound system as shown.
- k. Smoke/fire alarm wiring, devices and conduit, as shown or described on drawings or as necessary to meet landlord, state, local, insurance and fire department requirements.
- l. Installation of conduits stubbed to above ceiling for HVAC. Also, any additional conduit for HVAC control equipment where plenum rated cables are not permitted.
- m. Balancing loads.
- n. As-built, panel description and circuit breaker specific labeling.
- 2. Work not Included: the following items of electrical construction are not Included in this contract:
  - a. Telephone instruments and wiring unless noted otherwise.
  - b. Data cable wiring unless noted otherwise.
- 3. Before starting work, this contractor shall examine the architectural, structural, fire protection, mechanical and plumbing plans, shop drawings and specifications to sequence, coordinate, and integrate the various elements of the electrical system, materials and equipment with other contractors to avoid interferences and confrontations.
- P. Cleaning
  - 1. At the end of the project, this contractor shall clean all equipment, Including light fixtures, to the satisfaction of LSD&C. All dust, dirt, debris, and foreign matter shall be removed from all equipment.

## SECTION 260126 – MAINTENANCE TESTING OF ELECTRICAL SYSTEMS

- A. All connections at panels, lighting contactors and switches are to be made, all splices complete, all fuses in place, and all circuits continuous from point of service connection to its final destination, and all covers and plates installed prior to the

- time of final inspection by LSD&C's project manager.
- B. Upon completion of the work, all parts of the electrical installation shall be tested and proved free of unwanted grounds and other defects.
- C. All overload devices, including equipment furnished under other contracts, shall be set and adjusted to suit the load conditions.
- D. Test and make corrections/adjustments for phase balancing.
- E. This contractor is to balance the voltage leaving the step-down transformer to provide a secondary voltage of 120 minimum to 125 volts maximum by adjusting the transformer taps once all the final connections have been made to the low voltage panelboard. Include final balance report with as-built drawings.

## SECTION 260519 – ELECTRICAL POWER CONDUCTORS AND CABLES

- A. Conductors for feeders and branch circuits shall be copper and the AWG size and type as shown on drawings. Minimum wire size shall be #12 and the conductors shall be 600 volt insulation type THW, THWN or THHN.
- B. Minimum wire size - 20 amp branch circuit shall be AWG listed size per distance shown below. Distance shall be measured from the panelboard circuit breaker to the farthest outlet.
  - 1. #12 less than 100 feet
  - 2. #10 between 100 - 150 feet
  - 3. #8 between 150 - 250 feet
  - 4. #6 over 250 feet
- C. On all 20 amp branch circuits, conductors larger than #10 AWG shall be reduced to #10 AWG within 10 feet of panelboard and device in junction boxes on rated terminal strips.
- D. Conductors may be stranded for sizes #10 AWG and larger. Conductors' size #12 shall be solid.
- E. Aluminum conductors are not permitted, except at service entrance, where required by landlord. Conductor connection shall be per manufacturer's requirements. Contractor shall obtain written permission from general contractor and LSD&C's project manager when used.
- F. All wiring shall be in conduit, unless specifically noted otherwise (i.e. Low voltage plenum rated wire).
- G. The use of Romex or BX cable is not permitted. The use of mc cable is not permitted in Canada.
- H. Wire connectors shall be equal to "scotch lock" for #8 AWG wire and smaller and equal to T & B "Locktight" for #6 AWG and larger.
- I. No other circuits are to be run in same conduit feeding isolated ground receptacles.

## **SECTION 260523 – CONTROL VOLTAGE ELECTRICAL POWER CABLES**

- A. United States
  - 1. Furnish and install a system of conduit raceways, outlet boxes and pull wires as shown on the drawings unless otherwise noted on plans. Telephone switching apparatus, conductors, instruments, miscellaneous equipment and appurtenances are not part of this contract and will be provided and installed by LSD&C.
  - 2. Outlet boxes to be 4" square minimum with single device cover and telephone plate.
  - 3. Conduit runs from if enclosure or manager's office for telephone and data lines to cashwraps are to be continuous with no junction boxes except as noted otherwise on drawings.
  - 4. All pull wires are to be labeled for purpose designated.
  - 5. No other circuits are to be run in same conduit feeding isolated ground receptacles.
  - 6. Electrical contractor shall refer to mechanical drawings for additional electrical work to be Included in his or her bid.
  - 7. Electrical contractor shall do all power wirings, line voltage wirings, and line voltage control wiring indicated under the heating, ventilation and air conditioning, plumbing and fire protection specifications and drawings. This contractor shall also do all interconnecting line voltage wirings between relays and switches as required.
  - 8. Electrical contractor is responsible for furnishing and installing conduit for HVAC control wiring where required by code or shown on prints to be in conduit. Refer to plans for requirements and size.
  - 9. Fire and/or smoke dampers shall be wired by electrical contractor. Coordinate with HVAC contractor for power requirements.
  - 10. Refer to mechanical drawings for available schematic wiring diagrams of equipment.

## **SECTION 260526-GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

- A. Furnish and install complete wired grounding conductor system, #12 AWG minimum, sized and installed in accordance with the latest adopted edition of the national electrical code, state and local codes, the landlord's tenant criteria, as noted in the specifications, and as indicated on the drawings.
- B. All conduits, including flexible metal conduit, shall be grounded with a green grounding conductor.
- C. Grounding connections made to the water piping system shall be coordinated with the plumbing contractor and a bonding jumper installed around

water meter per codes and as indicated on drawings.

- D. All devices shall be bonded to the conduit system. Use a bonding jumper between the outlet box and the device grounding terminal. Metal-to-metal contact between the device yoke and the outlet box is not acceptable as a bond for either surface mounted boxes or flush type boxes. All junction boxes, outlet boxes, and pull boxes shall be bonded to the conduit system.
- E. Run a separate isolated grounding conductor, #12 AWG minimum, in each conduit feeding the cashwrap, the Sensormatic and other computerized equipment as shown on drawings.
- F. All enclosures and non-current carrying metal parts are to be grounded. Conduit system is to be electrically continuous. All locknuts shall cut through enameled or painted surfaces on enclosures. Where enclosures and non-current carrying metal parts are isolated from the conduit system, use bonding jumpers with approved clamps. All ground clamps shall be "Penn-union" or equal, similar to "GPL" type.

## **SECTION 260533-RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

- A. This contractor shall furnish and install all conduits serving all equipment, Including but not limited to, lighting, receptacles, heating, air conditioning, plumbing equipment, telephone, data, speakers, security, pager, traffic counting system and electrical equipment.
- B. All conduits shall be galvanized IMC or EMT unless otherwise specified in specifications or on drawings. All conduit is to be UL/ULC labeled. EMT connectors shall be steel compression or set screw type. Conduit under slab on grade shall be rigid steel, or schedule 40 PVC with rigid steel ells where permitted by landlord or code.
- C. Minimum size of conduit shall be:
  - 1. Main feeder conduit to 2" or larger for all applications.
  - 2. 1/2" minimum for all locations (if acceptable by the landlord and local code officials), unless noted otherwise in plans, specifications, or drawings.
  - 3. If HVAC control wiring is required to be run in conduit, it shall be a minimum of 3/4", unless noted otherwise on drawings.
  - 4. All in/under floor conduit shall be of minimum 3/4" size.
  - 5. All fire alarm conduit shall be of minimum 3/4" size.
- D. Support all conduit, Including seismic and sway bracing, in accordance with the locally adapted codes.
- E. Generally, all conduit shall be concealed except for unfinished areas, such as equipment rooms. Exposed conduit shall be allowed only as noted on plan and as approved by LSD&C's project

manager. Painting of conduits, noted on drawings or specifications will be by general contractor.

- F. Flexible metal conduit, MC type cable or AC90(Canada)
  - 1. Flexible metal conduit, MC type cable or AC90(Canada) shall be used for the following applications only:
    - a. Final connections to motors.
    - b. Final connections into and out of the transformer.
    - c. Final connections to vibrating equipment.
    - d. Inter-connections between all recessed light fixtures and junction boxes.
    - e. Final connections where rigid conduit is not practical.
    - f. In walls (for light switches and 120 volt power receptacles and HVAC control equipment).
  - 2. Flexible metal conduit or AC90 (Canada) shall be the same size as the IMC or EMT conduit to which it is connected. Both the flexible metal conduit, or AC90 (Canada) and its fittings are to be listed for grounding. A green grounding conductor shall be installed. All connectors are to be of a NEMA approved type.
  - 3. Length of flexible metal conduit, MC type cable, or AC90 (Canada) is not to exceed 6'-0".
  - 4. The use of Romex or BX cable is not permitted.
  - 5. E. Connection to any outdoor equipment shall be made with Liquidtight flexible metal conduit or AC90 (Canada).
- G. Provide pull-wire in all empty conduits except as noted otherwise on drawings.
- H. Home runs and main conduit runs are to be held tight to structure above or as required to allow proper service access and other trades work. Conduit shall be trapezed to allow 3 feet minimum clearance above ceiling.
- I. All conduits shall be sized per locally adopted codes.
- J. All Sensormatic wiring shall be placed in EMT, IMC, or RMC conduit. PVC is not allowed.
- K. All outlet boxes shall be galvanized pressed steel of the standard knockout type. No round outlet boxes shall be permitted unless indicated and for lighting that require such configuration. Concealed boxes shall not be less than single gang and 1-1/2" deep, with plaster rings.
- L. All knockout boxes, upon which lighting fixtures are to be installed, shall be equipped with 3/8" fixture studs.
- M. Exterior boxes shall be cast rust-resisting metal with gasketed covers.
- N. Install boxes rigidly from building structure and support independently of the conduit system. Also provide suitable box extensions to extend boxes to finished faces of floors, ceilings, walls

etc. All outlet boxes to be provided with caddy "quick-mount box support" to minimize the deflection that occurs when plugging/unplugging into these devices.

- O. Unless otherwise noted on drawings or otherwise required by the national electrical code, accessibility codes or local codes, outlet heights shall be as follows:
  - 1. Switch height 42" from finished floor to centerline of outlet.
  - 2. Convenience outlets:
    - a. Sales areas: mounted on the wall 15" AFF unless indicated or horizontally mounted in baseboard beneath cabinets, as shown on drawings, or as required by local codes. See drawings.
    - b. Non-sales area: 15" from finished floor to centerline of outlet.
  - 3. Telephone outlets shall be located as noted on drawings.
- P. The plans indicate only schematic routings for conduit runs. This contractor shall furnish and install additional boxes where required by field conditions or by code.
- Q. Boxes and covers shall be galvanized steel of code gauge size
- R. Arrange circuits to avoid the use of junction boxes in inaccessible locations. The use of junction boxes above drywall ceilings should be limited to locations near access frames used for diffusers and return air grilles or access panels as located on plans.

## SECTION 260553-IDENTIFICATION FOR ELECTRICAL SYSTEMS

- A. For all U.S projects all wiring shall be color-coded as follows:
  - 1. 120/208 Volt System
    - a. neutral – white
    - b. phase A or L1 - black
    - c. phase B or L2 – red
    - d. phase C or L3 - blue
    - e. ground – green
    - f. isolated ground - green with yellow tracer
  - 2. 277/480 Volt System
    - a. neutral - gray
    - b. phase A or L1 - brown
    - c. phase B or L2 - orange
    - d. phase C or L3 - yellow
    - e. ground – green
- B. For Canadian project all wiring shall be color-coded as follows:
  - 1. 120/208 Volt System
    - a. neutral – white
    - b. phase A or L1 - red
    - c. phase B or L2 – black
    - d. phase C or L3 - blue
    - e. ground – green

- f. isolated ground - green with yellow tracer
- 2. 347/600 Volt System
  - a. neutral - gray
  - b. phase A or L1 - red
  - c. phase B or L2 - black
  - d. phase C or L3 - blue
  - e. ground - green
- C. Junction and pull boxes shall be labeled with circuit number identification and system type on cover.

## SECTION 260923-LIGHTING CONTROL EQUIPMENT

- A. Lighting control panel will be provided by LSD&C through control manufacturer, mounted in its panel with conduit, installed by the electrical contractor. The control panel shall be programmed and complete when shipped to the job site. The electrical contractor will be responsible to pull all wires as detailed on these drawings and circuited exactly as diagrammed on the electrical plan drawings. No variations to the circuiting are allowed without prior written approval by LSD&C's project manager.
- B. Dimming system will be provided by LSD&C through lighting supplier, installed by the electrical contractor. The electrical contractor will be responsible to pull all wires as detailed on these drawings and circuit exactly as diagrammed on the electrical plan drawings. No variations to the circuiting are allowed without prior written approval by LSD&C's project manager.

## SECTION 262213-DRY TYPE TRANSFORMERS

- A. Transformers are generally included in the IFS switchgear. If not, transformer shall be pad mounted or shall be securely mounted from the building structure, reinforced walls or as noted on drawings. Use additional vibration isolators at points of mounting to cut vibration noises. Use flexible metallic conduit with grounding bushing for primary and secondary connections to transformer. Transformers shall be located, set, mounted and connected in such a manner as to keep noise levels within the surrounding ambient noise levels and maintain all code required clearances.
- B. Transformer shall be quiet type construction and have six (6) 2-1/2% taps, two (2) taps above and four (4) taps below normal primary rating.
- C. Transformer to be class 1 efficiency level for distribution transformers as specified in table 4-2 of the "guide for distribution transformers" as

published by national electrical manufacturer assoc. (NEMA tp-1 2000).

## SECTION 262416-PANELBOARDS

- A. All panelboards shall be factory assembled of the bolted circuit breaker type with solid copper bussing, full sized copper neutral, 100% ground bushing, and overall hinged/lockable door. All circuit breakers shall be of the quick-make and quick-break design, thermal-magnetic type, trip free and trip-indicating. All panels shall be dead front and flush or surface mounted as shown.
- B. Contractor shall furnish and install a typewritten directory card of the circuits and place in panel door. The directory shall identify the specific room location for each circuit.
- C. All panelboards phase amperage shall be balanced to within 7 percent max. to min. Rearrange non-lighting branch circuits as required and note changes on record drawings. Lighting panel circuit breakers shall be installed and wired exactly as shown on drawings.
- D. If loose panelboards are used, panelboards shall be mounted on minimum 3/4" A/D plywood and painted in a color to match the surrounding walls or a color as required by local code. Plywood shall extend 1 foot minimum beyond edge of equipment.
- E. Panelboards shall have a minimum short circuit current rating and lug connections as follows:
  - 1. 120/208 volt panelboards: 10,000 A.I.C.
  - 2. 277/480 volt panelboards: 14,000 A.I.C.
  - 3. 347/600 volt panelboards: 14,000 A.I.C.
  - 4. Verify actual A.I.C. short circuit current requirements with the landlord or utility company and verify switchgear compliance prior to installing equipment. All lug connections to be 75°C rated.
- F. IFS enclosure furnished by LSD&C and installed by electrical contractor is herein described:
  - 1. Unit will be shipped to the project in multiple sections and the electrical contractor will be responsible for off-loading of equipment, inspection of equipment for damages, verification of equipment received, ensuring that the equipment received is complete and meets the scheduled panels for the project, moving and mounting of sections as well as reassembling of same into one complete unit per manufacturer's requirements.
  - 2. Electrical contractor is to connect all provided interconnecting cables between sections and torque connections per manufacturer's requirements. Contractor is to anchor panel system in accordance with manufacturer's specifications and local codes in seismic zones.
  - 3. Electrical contractor is to connect lighting branch circuits to appropriate load terminals or PRC limiter panel provided within ifs

enclosure per lighting zones indicated in the panel schedule (i.e.: zone a, b, c, or d) and current limiting breaker schedule. Line side wiring and lighting control wiring will be prewired by manufacturer at factory. Coordinate exact terminal number for each circuit connection with manufacturer's drawings.

4. All lighting, receptacle and miscellaneous branch circuits not specified as being controlled, are to be wired directly to the corresponding branch breaker in the designated panel.
5. All connections within the telephone/data section and HVAC control section of the IFS enclosure are to be performed by others.
6. Electrical contractor will only be responsible for installation of the conduit system into the low voltage section of the IFS panel.
7. PRC limiter panel is compliant with California title 24, sect. 130 c(3) and ASHRAE.

## SECTION 262726-WIRING DEVICES

- A. This contractor shall furnish and install switches and receptacles, unless noted otherwise, as necessary for a complete installation. Color of devices and plates shall be selected by LSD&C. The devices shall be of the types and ratings listed, or equals by arrow-hart, Hubbell or pass & Seymour. Weatherproof GFI receptacles shall be installed where shown on drawings or as required by code.
  1. Single pole toggle switches: 20 amp, 120-277v: pass & Seymour "PS20AC1-W"
  2. Three way switches: 20 amp, 120-277v: pass & Seymour "PS20AC3-W"
  3. Duplex receptacles: 20 amp, 125v: pass & Seymour "BR20W"
  4. Isolated ground receptacles: 20 amp, 125v: pass & Seymour "IG6300W"
  5. Ground fault circuit interrupting receptacles: 20 amp, 125v: pass & Seymour "2094-W"
- B. All device coverplates shall be pass and Seymour series "TP" or equal.

## SECTION 262816-ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- A. Safety and disconnect switches shall be heavy duty type, quick-make, quick-break fused or non-fusible with ratings and sizes as noted on plans and required by codes.
- B. Switches shall be weatherproof in outdoor locations or as required by local codes.
- C. At service entrance, disconnect shall bear the manufacturer's label indicating the equipment is UL/ULC rated for application in accordance with all codes.

- D. Cutler hammer or equal manual motor starters, less overload protection heaters, are to be used as a disconnecting means only where indicated on drawings for motors above 1 1/2 HP at 120 volts and 2 HP at 240 volts that do not require auxiliary control. Motors that are below the 1 1/2 HP at 120 volts, 2 HP at 240 volts, water heater and rolling grille are to be provided with Hubbell "HBL-1221, or 1222" AC switch.
- E. Magnetic motor starters shall be provided with reset type overloads that closely match motor nameplate rating and shall be electrically held (minimum size #1 in a NEMA 1 enclosure) and be used for all single phase and three phase motors rated above 1/2 HP that require auxiliary control. Provide control devices (auxiliary contacts, transformers, h-o-a, etc.) In starters as required for interlocks. Coordinate all control devices with mechanical contractor. Combination starter/disconnect switches shall contain fusible switches and only used where indicated on drawings.

## SECTION 265100-INTERIOR LIGHTING

- A. This contractor shall install all lighting fixtures and lamps as shown on the fixture schedule. Lighting fixtures and lamps are supplied by LSD&C, unless noted otherwise. Contractor is to replace all non-working lamps prior to merchandise date and is to include cost in bid.
- B. All recessed Incandescent fixtures shall be provided with applicable thermal protection.
- C. Where fluorescent fixtures are specified, they shall be provided with high power factor rapid start ballasts, U.L./U.L.C listed, C.B.M. certified, and E.T.L. approved with efficiency factors in accordance with "the energy policy act of 1992" and its amendments as a minimum.
- D. This contractor shall furnish additional auxiliary support steel hanger wires adequately sized to support the weight of the fixture fastened to the building structure (minimum two per fixture) for all fixtures in lay-in ceilings and other fixtures as required by the landlord and local code officials.
- E. Furnish and install applicable fire rated drywall boxes over recessed fixtures in fire rated ceilings as required by codes. Field coordinate as required to avoid conflicts.