



[REDACTED]

MULTIFAMILY ELECTRICAL KICKSTART PACKAGE

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[REDACTED] **2025**

Project Description

This project consists of the addition of 59 condo units into the existing building. The project will fit out existing shell space, converting from an old mill to new apartment complexes or apartment units plus commodity spaces, including:

- A gym
- A kitchenette
- Community space
- An open seating space
- A restroom

The project is split between two areas of the building: Wing A and Wing D/E. There will be two new electrical rooms, one serving each wing. Meter stacks, disconnects, and electrical distribution will be located remotely in those electrical rooms from the service entrance of the building, which is existing. Each wing will be 3 stories tall. Wing D/E has 15 units, Wing A has 44 units, totaling 59. The project is all electric with heat pumps on the roof, electric water heating, and electric cooking. All gas will be abandoned.

Key Stakeholders

- [REDACTED] Electric Utility
- [REDACTED] Architects
- [REDACTED] Development
- City of [REDACTED]
- [REDACTED]

Executive Summary

1. Code Compliance
 - a. Alteration level drives scope: Confirm Level 2 vs. Level 3 with the AHJ now [REDACTED]
[REDACTED]
[REDACTED]
 - b. Life-safety is minimal: No generator, standpipes, fire pump, smoke control, or BDA (BDA only if the final radio test fails). Egress lighting via 90-minute unit batteries. Electrical rooms must have out-swing doors with panic hardware and be rated 90-minute (sprinklered) or 2-hour (unsprinklered) per [REDACTED]
 - c. Energy and loads plan: Work areas follow IECC 2021 with Massachusetts amendments; Stretch/Specialized code is not triggered. Provide EV-ready infrastructure per C405.13 and proceed with an all-electric strategy (ASHPs plus electric appliances) for service and load sizing.
2. Risk & Mitigations

- a. Construction schedule/cost risk. Electrical service entrance panel is damaged beyond repair, and shall be replaced. Early design engagement recommended as mitigation.
 - b. Construction schedule/cost risk. Existing electrical gear (meter stacks) to be reviewed by utility early for approval. Recommend including replacements in early project planning.
 - c. Infrastructure/Asset risk. Repair water intrusion issues into main electrical room to avoid continued damage to the building & electrical infrastructure.
3. Design & Procurement
- a. Electrical engineering fees: ■■■■ fixed lump sum (new electric service, 60 units design and construction administration). Refer to detailed proposal.
 - b. Procurement (early release gear package): new electric service switchboard: 34 weeks from approved submittal. Approval submittal from design team: 4 weeks. 38-40 total weeks new switchboard delivered on site.
 - c. Full electrical design (site and building stamped drawings): 8 weeks
4. Next Steps
- a. City & electric utility coordination to verify code compliance path.
 - b. Service entrance evaluation by certified testing company for replacement scope (could possibly save some sections).
 - c. Coordination with ■■■■ utility and City of ■■■■ for requirements in replacement service entrance scope and local requirements.
 - d. For new electrical rooms, verify fire-rated construction required by the City of ■■■■

How To Use This Report

This report is a decision tool. It outlines your engineering scope and fee, schedule, code strategy, AHJ path, state code compliance route, preliminary electrical system requirements, and the key risks with mitigations. Use it to align timelines, validate budgets and loans, surface critical decisions early, and de-risk execution.

What you get

- **Scope & Fee (Fixed):** Cost certainty for electrical engineering.
- **Schedule (Design & Permit):** Dates for deliverables and permit submissions.
- **Code Path (Major Options):** Compliance routes and directional decision-making.
- **State Building Code Compliance:** The selected chapter/section pathways that govern the project. Reference during design coordination and permit prep.

- **Preliminary Electrical Requirements:** Service/metering, utility transformers, and distribution expectations with enough information to coordinate with the utility, size electrical rooms, and inform early pricing.
- **Risk Focus & Mitigations:** The few items most likely to impact cost, schedule, or approvals and concrete steps to reduce exposure.

How to put it to work

1. Lock scope/fee and schedule to remove consultant cost and document timing uncertainty.
2. Review the report with the Architect, AHJ, and project team to capture rulings/interpretations early.
3. Kick off utility coordination using the preliminary electrical requirements (service size, metering, OH/UG).
4. Address critical path items immediately (listed in the Risk section) so they don't stall permit or financing.
5. Use the exhibits; drawings, one-lines, narratives as preliminary submittals to secure AHJ guidance and GC pricing.

Who should use this report

Developers, architects, AHJs, and contractors can rely on the contained drawings, diagrams, assessments, and recommendations to supplement preliminary decisions, budgetary pricing, and engineering costs.

Important notes

- **Preliminary, advisory:** Conclusions are based on limited information obtained from kickoff/design meetings and are intended to guide planning and de-risking discussions.
- **Not a permit set:** Final designs and stamps will reflect confirmed program, utility input, and AHJ decisions.
- **Next deliverables:** Electrical design development level drawings and specifications.

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Basis of Design

I. PROJECT DESCRIPTION

- A. This project consists of the addition of 59 condo units into an existing building. The project will fit out existing shell space, converting from an old mill to new condominiums plus commodity spaces, including:
 - 1. A gym
 - 2. A kitchenette
 - 3. Community space
 - 4. An open seating space
 - 5. Restrooms
- B. The project is split between two areas of the building: Wing A and Wing D/E.
- C. There will be two new electrical rooms, one serving each wing. Meter stacks, disconnects, and electrical distribution will be located remotely in those electrical rooms from the existing service entrance of the building.
- D. Each wing will be 3 stories tall. Wing D/E has 15 units, Wing A has 44 units, totaling 59.
- E. The project is all electric with cold weather heat pumps on the roof, electric water heating, and electric cooking. All gas will be abandoned.

II. EXISTING CONDITIONS

- A. Power
 - 1. Utility Feed:
 - a. The main electrical service is fed from a street-side three-phase riser from the utility with a primary connection underground to a pad-mounted transformer on site. The secondary is fed underground, below grade, to the second floor which is sub-grade in the building.
 - 2. Main Electric Service Entrance Switchboard:
 - a. The main electric service entrance switchboard is 208/120V, 3-phase, 4-wire, and has 4 sections:
 - i. Section 1: Incoming supply (4000A).
 - ii. Section 2: Tenant distribution section (5 breakers present).
 - iii. Section 3: Main house breaker and utility metering.

- iv. Section 4: House distribution section (4 breakers present).
 - b. The existing service entrance is in poor condition. It has extensive water damage in Sections 1 and 2. At a minimum, Sections 1 and 2 shall be replaced as part of this project. A third-party assessment is strongly recommended, along with coordination and review by the Authority Having Jurisdiction (including the City of ██████████) before determining whether any portion of the service entrance is suitable for reuse.
3. Power Distribution:
- a. There are PVC conduit pathways from the existing service entrance to a remote meter stack (not used) in Wing A, and from the existing service entrance to the shell space in Wing D/E.
 - b. Existing meter stacks B, C, and C1. These meter stacks are located in the main electrical room with the service entrance. They are in good condition and can remain. It is noted that the meters are “ringed” type, which is no longer the serving utility’s standard. It is assumed these can remain as is. The meter centers are not being modified, but it is recommended that ██████████ be engaged and confirm these meters can remain ringed type if the project is not modifying the equipment nor electrical feed.
 - c. Existing meter stack (unused, no meters installed) in basement of Wing A. This meter socket equipment is of the same vintage as the existing, but has been stored unused for many years and is not properly installed (for permanent use). These are “ringed” type meter sockets. It is assumed that since commissioning of this gear by ██████████ is required for the reuse of this equipment, the ringed type meter sockets will be flagged for replacement by the utility. Assume that this equipment cannot be reused for this project, and that new meter center will be required. Do not rely on reuse of this gear.
4. Electrical Rooms:
- a. Main electrical room is appropriately sized for all existing equipment, but the entry/exit is not to code. The door swings inward against the path of egress and has no panic hardware.
 - i. The supporting structure for the main switchboard is failing, and is undersized. The electrical equipment is sinking into the floor slowly over time. This must be addressed temporarily in construction, with permanent solution in place prior to project completion (if any of the gear is reused – which we do not recommend).
 - b. The basement A electrical room is sized appropriately for all electrical gear, but is not finished/constructed per City of ██████████ or the International Building Code requirements. Fire-rated construction, humidity control, lighting,

entry/exit door, and fire sprinklers are all deficient or otherwise need to be modified.

B. Lighting & Controls

1. Nothing to report that is applicable to the project area.

C. Low-voltage Systems

1. Data/Internet/TV

- a. Existing connections are located in central closets on each floor. It is recommended that the data utility be engaged early and verify 59 additional units can be accommodated with existing infrastructure.
- b. Access control present at the front entry to the building is present with call functionality to each existing apartment.

D. Fire Alarm System

1. Existing fire alarm control panel is a fully addressable unit providing fire alarm notification and initiation devices throughout.
2. The basement A electrical room has no notification or initiation device coverage.
3. The fire alarm panel appears to be capable of serving the new construction. It is recommended to verify this at early design stage with the Owner's designer and/or service vendor.

III. SUMMARY OF MAJOR DEFICIENCIES

- A. Service entrance switchboard is in poor condition and is failing (extensive water damage and corrosion). The supporting structure for the gear is also failing.
- B. Both existing electrical rooms need doors replaced with suitable panic hardware and signage added.
- C. Basement A electrical room needs to be reconstructed into a 90-minute fire-rated room with appropriate lighting and fire alarm coverage.

IV. PROPOSED CONDITIONS

A. Power

1. New Wings A and D/E served by new meter centers, feeders, and branch circuits. Refer to the one-line diagram and typical unit panel schedule.

2. Existing main service entrance to be completely replaced
3. The architect and developer have elected to handle power distribution design within the apartment units themselves, submitting all necessary documentation to the AHJ as part of their separate design build services.

B. Lighting & Controls

1. Common area lighting power densities, controls, and emergency egress and exit signs. Fixtures shall be LED. Controls shall meet International Energy Conservation Code (IECC) requirements for new construction, and include occupancy sensors in common areas, corridors, and storage spaces.
2. Condominium lighting controls shall be wall switch with continuous dimming meeting IECC code requirements.

C. Low-voltage Systems

1. The architect and developer have elected to self-perform the low voltage system design.

D. Fire Alarm System

1. The fire alarm system design will be performed by a separate firm selected prior to NLS involvement. NLS will coordinate requirements and provide power, grounding, and raceway systems where required.

E. Critical Path Items

1. Engage the utility early, open a work order, submit required project documentation to start utility design and procure equipment.
2. Create early release package for new service entrance switchboard.
3. Engage AHJ (City of ██████████) to resolve any outstanding coordination to advise the engineering design package before the first review cycle.

Code Review

Code Review

This code review is a strategic, non-exhaustive overview focused on the major code-path determinations that shape the project; layout, program, cost, schedule, energy compliance, and reporting. It is not a catalog of every detailed requirement. It is intended as a common reference for the stakeholder team (owner, developer, architect, and the AHJ at city and state levels) to align early on baseline-versus-beyond-code objectives, identify high-impact compliance drivers, and make informed decisions before design hardens. Use this as a forum piece to surface choices (and their implications) so the project isn't surprised midstream by hidden requirements. The detailed, discipline-specific compliance checks will follow in subsequent design phases.

Topic	Decision/Assumption	Impact (Why It Matters)	Code Citation	Owner/AHJ Coordination
Occupancy Classification	R-2 only; no mixed-use, no garage.	Downstream code requirements dependency.	780 CMR 302.1; 310 (Group R-2).	Confirm.
Construction Type	Type IIIA/VA wood framing within existing masonry; no podium.	Plan for penetrations through rated assemblies; firestop coordination, coordinate shaft/risers early for electrical feeders.	780 CMR Ch. 6; Tables 601 & 602	Confirm.
Fire & Smoke Protection Features	Electrical rooms are fire-rated construction. 90-minute with fire sprinklers installed, 120-minute without fire sprinklers installed.	Planning shaft/risers/penetrations. Fire-rated construction costs. Early detailing saves rework and keeps construction costs for these rooms certain.	N/A	City of [REDACTED] requires rated electrical rooms.
Fire Protection Systems - General	No standpipes, no fire pump, no smoke control; no generator. ERRC/BDA only if acceptance test fails. Fire alarm design by others for this project, no analysis here.	Limits big standby loads (pump, smoke control). Avoids rated pump/generator rooms and long-lead gear.	780 CMR Chapter 9	Document radio coverage test at CO.

Topic	Decision/Assumption	Impact (Why It Matters)	Code Citation	Owner/AHJ Coordination
Emergency Egress (Lighting & Signs)	Use distributed battery unit equipment for egress illumination and exit signs (≥ 90 min).	No generator/inverter; branch-circuit layout for unit packs. Low cost, simple maintenance. Layout: Coverage for stairs, corridors, exits, and exit discharge.	780 CMR 1008 (illumination; 1008.3 emergency power, 90 min), 1013 (exit signs, power/illumination).	N/A
Electrical Rooms: Doors/Egress	Apply NEC 110.26(C)(2) & (C)(3): two entrances/exits for large gear; doors within 25 ft of working space to open out with panic hardware.	Safer egress clearances around service/large gear. Cost/Schedule: May add new door or hardware.	NEC 110.26(C)(3) (direction of door swing & panic hardware for equipment ≥ 1200 A and >6 ft wide, or service equipment), NEC 110.26(C)(2) (two exits where required). One door where double working space achieved.	Confirm ampacity/width and whether space contains service disconnects; [REDACTED] to verify any local enhancements.
Apartment Main Entry (MA Amendment)	Self-closing, auto-locking main entry with intercom/door release to each dwelling; resident visual verification (CCTV, TV integration, or equivalent).	Low-voltage intercom/strike power and cabling. Cost/Schedule: Minor hardware/AV scope; no FA tie-in. Layout: Provide device locations and back boxes at reception/units.	M.G.L. c.143 §3R and 780 CMR (MA amendments) for apartment entry security.	If building is 24/7 monitored by trained staff, confirm AHJ allows omission of in-unit A/V (if desired); coordinate exact technology (hardwired vs app).
Elevators & AMOE	No new elevators; no designated Accessible Means of Egress (AMOE) elevators.	No standby/EM power additions for elevators. Cost/Schedule: Avoids generator/ATS/shaft upgrades. Layout: Existing elevator(s) remain as is.	780 CMR 1009 (AMOE), 2702 (standby power), Ch. 30 (elevators, ASME A17.1).	Confirm story count/accessible route so AMOE not triggered; verify no modernization scope that would invoke standby power requirements.

Topic	Decision/Assumption	Impact (Why It Matters)	Code Citation	Owner/AHJ Coordination
Elevators & Conveying (existing)	Level 2/3 alteration; no new elevators or AMOE elevators planned.	No new standby power. Cost/Schedule: No generator/ATS; only maintenance/limited modernization.	780 CMR Ch. 30 (ASME A17.1)	Confirm with AHJ: no AMOE required for this scope.
Existing Buildings - General	Use IEBC work-area method; project is a Level 2/3 alteration.	Triggers limited to work areas; building-wide upgrades generally not required. Cost/Schedule: Limits scope creep; targeted compliance. Layout: Define work-area boundaries early.	IEBC Ch. 4–7 (methods), Level 2/3 provisions; IEBC 302–305 (scoping for alterations).	Confirm method of compliance with AHJ (work-area vs prescriptive/performance) and document work-area limits on plans.
Existing Buildings - Energy	Apply IECC 2021 (MA amendments) to altered systems only; no whole-building upgrade.	Replace-in-kind must meet new-equipment efficiencies. Cost/Schedule: Envelope/lighting/HVAC upgrades only where touched. Layout: Controls and lighting power density may change in work areas.	IECC C501 (scope), C503 (alterations) with MA amendments.	N/A
Stretch/Specialized Code - Existing	Specialized/Stretch primarily targets new construction of additional building envelope; alterations follow IECC with MA amendments.	Avoids unnecessary specialized measures in interiors. Cost/Schedule: Keeps compliance to IECC-alterations.	225 CMR 22/23 & Appendix CC (municipal adoption); IECC C503.	Verify with energy official: Does local Specialized apply to this alteration? Document municipal adoption date and any local by-law overlays.

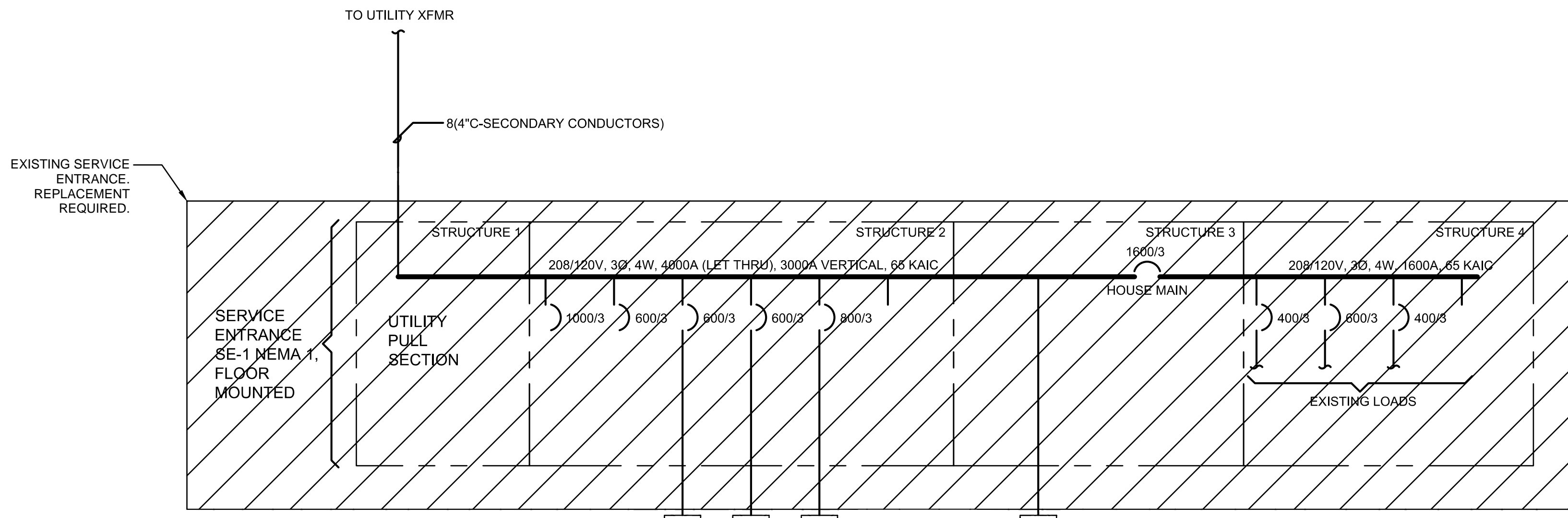
Topic	Decision/Assumption	Impact (Why It Matters)	Code Citation	Owner/AHJ Coordination
EV Charging Infrastructure (site work)	Provide EV-ready/EVSE per site package; include in service sizing.	Reserve capacity, spaces, and raceways per adoption. Cost/Schedule: Coordinate trenching and gear lead times. Layout: Stalls, panels, and raceway paths set by site plan.	IECC/MA amendments or 225 CMR 23 + Appendix CC (EV) as adopted; local zoning may add counts.	Confirm EV stall counts and EV-ready vs EVSE with site civil and AHJ.
Dwelling-Unit Lighting (R-2 within commercial scope)	All dwelling-unit luminaires high-efficacy LED; provide continuous dimming on all unit circuits.	Simpler compliance; fewer fixture types. Cost/Schedule: Commodity LED, no controls commissioning in units. Layout: Standard switch legs; coordinate dimmer types with fixtures.	IECC C405.1.1 (lighting for dwelling units); C405.2.3.1 (light-reduction/continuous dimming option).	Confirm AHJ treats dwelling-unit lighting under C405.1.1; document fixture efficacy on schedules.
Additional Efficiency Package (C406)	Not required - alteration project; no elective C406 package selected.	Avoids extra measures (DOAS, higher HVAC efficiency, etc.). Cost/Schedule: Reduces design/commissioning burden.	IECC C503 (alterations), C406 (applies to new buildings/additions).	Confirm with energy official that C406 not enforced for this permit/scope.
Energy Credits / Electrification (Owner Choice)	Provide renewable space heating via cold-climate air-source heat pumps; all-electric appliances in units.	Right-size electrical service; provide heat-pump branch circuits & condensate routing. Cost/Schedule: Adds outdoor units/linesets; eliminates gas scope.	IECC C503 (system alterations must meet current efficiencies); AHJ/local policy if incentives or electrification overlay exist.	Confirm service sizing & demand factors; verify defrost/backup heat strategy and noise limits; check local incentives/Stretch-Specialized expectations.

CODES AND STANDARDS BASIS (MASSACHUSETTS)

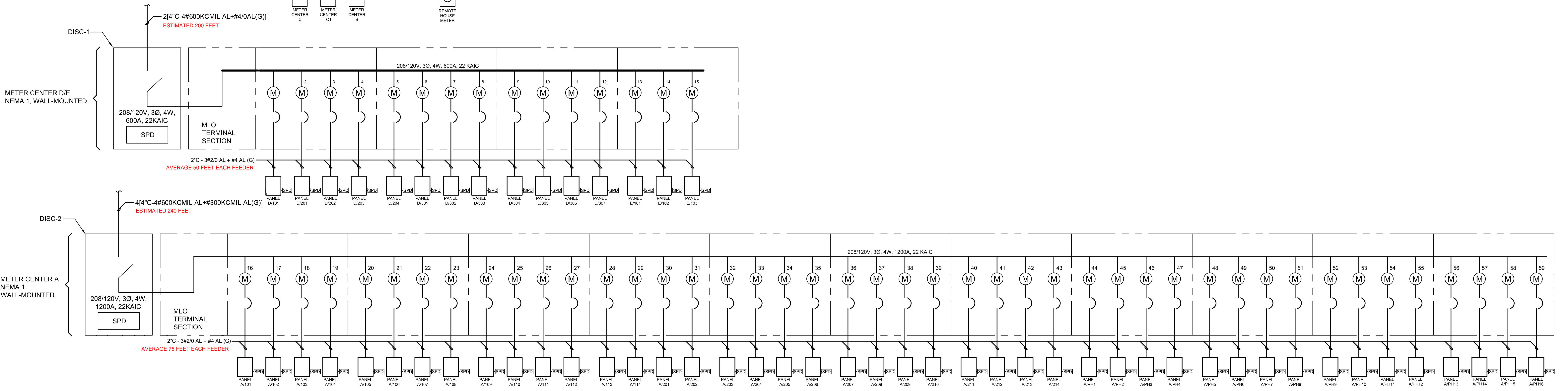
- 780 CMR, 10th Edition (Massachusetts State Building Code - Commercial), based on 2021 IBC/IEBC/IMC/IECC with Massachusetts amendments.
- 527 CMR 12.00 (Massachusetts Electrical Code), adopting NFPA 70 (NEC) 2023 with Massachusetts amendments.
- Energy Code: IECC 2021 with Massachusetts amendments.
- Accessibility: 521 CMR (Massachusetts Architectural Access Board) replaces IBC Chapter 11 in Massachusetts (see 780 CMR 1101.1).
- Referenced standards: NFPA 13, NFPA 13R, NFPA 20, NFPA 72, NFPA 110, ASME A17.1, and other references as adopted by 780 CMR Chapter 35 and 527 CMR. Editions are those adopted by the governing code.

Notes: Fire alarm design by others. Where referenced, scope aligns with 780 CMR Chapter 9 and NFPA 72. This review focuses on building, electrical, and energy codes only.

Electrical One-Line Diagram & Equipment List



ELECTRICAL EQUIPMENT LIST - MAJOR DISTRIBUTION EQUIPMENT				
LABEL	MAKE	MODEL	QTY	NOTES
SERVICE ENTRANCE SE-1	SCHNEIDER ELECTRIC (SQUARE D)	QED-2	1	SQUARE D CUSTOM SWBD-QED-2 SWITCHBOARD
METER STACK A - TERMINAL BOX	SCHNEIDER ELECTRIC (SQUARE D)	EZM31600TB	1	EQUIPMENT UPSIZED TO LAND ADDITIONAL FEEDER DUE TO VOLTAGE DROP (IECC 2021)
METER STACK A - METER SOCKETS/BUS	SCHNEIDER ELECTRIC (SQUARE D)	EZMR316125X	6	6 SOCKETS EACH. 8 TOTAL SECTIONS
METER STACK D/E - TERMINAL BOX	SCHNEIDER ELECTRIC (SQUARE D)	EZM3600TB	1	
METER STACK D/E - METER SOCKETS/BUS	SCHNEIDER ELECTRIC (SQUARE D)	EZMR314125	4	4 SOCKETS EACH. 4 TOTAL SECTIONS
DISC-1	EATON	DH-3-2-6-N-D-K-W-CVXC	1	INTEGRAL SURGE PROTECTION MEETS NEC EXCEPTION PER 230.67
DISC-2	EATON	DH-3-2-8-N-D-K-W-SP1B	1	INTEGRAL SURGE PROTECTION MEETS NEC EXCEPTION PER 230.67
UNIT PANELBOARD	SIEMENS	PN3048L1125C	59	PLUG-ON NEUTRALS, 125A
UNIT PANELBOARD SURGE PROTECTION	SIEMENS	BOLTSHIELD QSPD	59	MOUNTED INTEGRAL TO PANEL. MEETS INTENT OF NEC 215.18



1 ONE-LINE DIAGRAM & EQUIPMENT LIST

Unit

Panelboards

PROJECT: ██████████	SYSTEM: 208/120V, 1P	PANEL ID: TYPICAL UNIT PANEL
ENGINEER: JAKE MAXEY	MAIN: MAIN LUG ONLY 125A	MOUNTING: FLUSH
DATE: ██████████	FAULT: 10k AIC	LOCATION: SINGLE & DOUBLE BEDROOM UNITS

TYPE 2 SURGE PROTECTION DEVICE (NOTE 2)

ODD CIRCUITS						EVEN CIRCUITS					
NOTES	CKT	DESCRIPTION	AFCI/GFCI	BRK	POLES	POLES	BRK	AFCI/GFCI	DESCRIPTION	CKT	NOTES
-	1	HEAT PUMP	-	20	2P	1P	20	GF	RECEPTACLE - BATH	2	5,6
-	3	HEAT PUMP	-	-	-	1P	20	AF	RECEPTACLE - LIVING	4	-
-	5	ELECTRIC WATER HEATER	-	40	2P	1P	20	AF	RECEPTACLE - BED	6	-
-	7	ELECTRIC WATER HEATER	-	-	-	1P	20	AF/GF	KITCHEN (SMALL APP)	8	-
-	9	ELECTRIC RANGE/OVEN	GF	50	2P	1P	20	AF/GF	KITCHEN (SMALL APP)	10	-
-	11	ELECTRIC RANGE/OVEN	-	-	-	1P	20	AF	RECEPTACLE - NOT KITCHEN	12	-
-	13	DISHWASHER	AF/GF	20	1P	1P	15	AF	SWITCHED RECEPTACLE	14	-
-	15	GARBAGE DISPOSAL	AF/GF	20	1P	1P	15	AF	LIGHTING	16	-
4	17	REFRIGERATOR	AF/GF	20	1P	1P	20	AF/GF	LAUNDRY (WASHER)	18	-
-	19	MICROWARE	AF/GF	20	1P	2P	30	GF	ELECTRIC DRYER	20	-
5	21	RECEPTACLE (OUTDOOR)	GF	20	1P	-	-	-	ELECTRIC DRYER	22	-
-	23	SPACE	-	-	-	1P	15	AF	BATHROOM FAN	24	6
-	25	SPACE	-	-	-	-	-	-	SPACE	26	-
-	27	SPACE	-	-	-	-	-	-	SPACE	28	-
-	29	SPACE	-	-	-	-	-	-	SPACE	30	-

NOTES:

- PANELBOARD BASIS OF DESIGN: SIEMENS PN3048L1125C.
- SURGE PROTECTION DEVICE SHALL BE INTEGRAL TO THE PANEL. BASIS OF DESIGN: SIEMENS BOLTSHIELD QSPD.
- INSTALL PANELS FLUSH IN NON-FIRE RATED WALLS LOCATED WITHIN THE UNITS LOCATIONS NOT SUBJECT TO STORAGE (ENTRY, HALL). MINIMUM 36" CLEARANCE FROM PANEL DOOR FACE.
- SOME JURISDICTIONS PROVIDE EXCEPTION FOR GFCI PROTECTION OF REFRIGERATORS DUE TO NUISANCE TRIPPING. CHECK WITH YOUR LOCAL AHJ.
- TYPICALLY "BEST COST" TO PROJECT IS GFCI RECEPTACLE IN BATH AND OUTDOOR (IN LIEU OF GF BREAKER).
- BATHROOM CIRCUITING OPTION: IN ACCORDANCE WITH NEC 210.11(C)(3), BATHROOM RECEPTACLES SHALL BE SERVED BY A DEDICATED 20A BRANCH CIRCUIT. THIS CIRCUIT MAY SERVE ONLY RECEPTACLES, OR MAY ALSO SERVE LIGHTING AND FAN IN A SINGLE BATHROOM PROVIDED THE ENTIRE CIRCUIT IS GFCI PROTECTED. PANEL SCHEDULE SHOWS SEPARATE CIRCUITS AS PREFERRED; CONTRACTOR/OWNER MAY ELECT TO COMBINE FOR COST EFFICIENCY.

Electrical Calculations

Electrical Calculations

Voltage Drop

Voltage Drop Summary Table

Segment Source	Segment Destination	% VD	Pass IECC & NEC
Service Entrance SE-1	Wing A Heat Pump (Farthest Load)	4.92%	PASS
Service Entrance SE-1	Wing D/E Heat Pump (Farthest Load)	4.31%	PASS

This summary table represents the estimated voltage drop based on the calculated demand loads for each segment of the power distribution system from the customer's service entrance to the worst case farthest load for the building. The "segment destination" represents the longest combined conductor run to the farthest end load, which is required to be an aggregate 5% voltage drop or less.

Electrical Calculations

Voltage Drop - Continued

Electrical System Voltage Drop Analysis - Segment Analyzer							
Segment Source	Segment Destination	Length (ft) One-Way	Conductor (AWG/KCMIL)	Material	Sets (N Parallels)	Conduit Material	% VD Segment (Note 2)
SE-1	Meter Stack A	240	600	AL	4	Steel	2.21%
Meter Stack A	Farthest Unit Panel	250	2/0	AL	1	Steel	1.79%
SE-1	Meter Stack D/E	200	600	AL	2	Steel	1.87%
Meter Stack D/E	Farthest Unit Panel	180	2/0	AL	1	Steel	1.51%
Farthest "A" Unit Panel	Heat Pump (Roof)	50	10	AL	1	N/A	0.92%
Farthest "D/E" Unit Panel	Heat Pump (Roof)	50	10	AL	1	N/A	0.92%

NOTES:

1. 3-Phase & 1-Phase feeder calculations assume full design/demand current balanced on the phases. 1-phase (L-N) unbalanced return considers "Ieff" of design/demand current. Total voltage drop includes combination of 3-phase and 1-phase contributions.
2. NEC recommends 3% or less voltage drop for feeder segments and 3% or less voltage drop for branch circuit segments.
3. IECC requires 5% whole system voltage drop from the combination of the feeder and branch circuit segments to the farthest electrical device.
4. This project meets both the recommended and required voltage drop requirements of the NEC and IECC.
5. An allowance for branch circuits within the units themselves is allotted for voltage drop purposes. Refer to voltage drop table for the Unit circuits.
6. Impedance from manufacturer data or NEC Ch.9, Table 9 (adjusted for conductor material and raceway).

Electrical Calculations

Fault Current Analysis

Electrical System Available Fault Current Analysis - MVA Calculated Fault @ Equipment				
Equipment	Calculated MVA Value At Point In Distribution System	Calculated AIC Value At Point In Distribution System (Amps)	Equipment AIC Rating Per Design	Notes
SE-1	14.91	41,396	65,000	Existing Gear Rating
Meter Stack A	6.63	18,402	22,000	New Meter Stack Rating
Meter Stack D/E	5.33	14,788	22,000	New Meter Stack Rating
Closest "A" Unit Panel	2.98	8,267	10,000	All Panels Assumed 10kAIC Rated
Closest "D/E" Unit Panel	2.68	7,449	10,000	All Panels Assumed 10kAIC Rated

Electrical Calculations

Fault Current Analysis

Electrical System Available Fault Current Analysis - Equipment & Feeder MVA Equivalents						
Equipment/Feeder	Voltage	kVA	Length (ft)	Phase Conductor	Effective Z	Equivalent MVA Value of Equipment/Feeder
Utility Transformer	208 L-L	1000	-	-	0.057	17.5
SE-1 Feeder	208 L-L	-	60	Refer to Voltage Drop Table	0.00725	99.5
Meter Stack A Feeder	208 L-L	-	250		0.0145	11.9
Meter Stack D/E Feeder	208 L-L	-	180		0.029	8.3
Closest "A" Unit Panel Feeder	208 L-L	-	50		0.16	5.4
Closest "D/E" Unit Panel Feeder	208 L-L	-	50		0.16	5.4

GENERAL NOTES:

- Calculations follow the MVA method for estimating bolted 3-phase symmetrical fault currents at the equipment level throughout the power distribution system (with equivalent assumptions for single phase).
- Actual available calculated fault current data will be requested from the utility at the time of design. Once provided, design ratings can be verified (The expectation is that the ratings presented here are the maximum required).

Electrical Calculations - Load Summaries

Existing Service SE-1 Load Analysis									
Description	Volts	Amps	Phase	VA	Quantity	Totals	Unit	NEC	
Unit Loads									
Existing Units	-	-	-	31000	55	1705000	VA	220.82(B)(1)-(3), 220.82(C)	
New Units	-	-	-	30620	59	1806580	VA		
Subtotal Unit Loads						3511580	VA		
Number of Units						114	# of Units		
Demand Factor						23%	%	220.84(B)	
Total Unit Demand Load						807663	VA		
Total Unit Demand Amps						2244	A (208V, 3Φ)		
Existing Structure 2 Vertical Bus Size						3000	A (208V, 3Φ)		
Existing House Loads									
Existing Demand Load						144000	VA		
Demand						125%	%	220.87(2)	
Subtotal Existing Demand						180000	VA		
New House Loads									
Electric Vehicle Charging Stations	208	24	1	4992	17	84864	VA		
Common Area Power/Lighting	-	-	-	5000	1	5000	VA		
Parking Lot Lighting	208	10	1	2080	1	2080	VA		
Subtotal New House Loads						91944	VA		
Total Net House Demand Load						271944	VA		
Total Net House Load Demand Amps						755	A (208V, 3Φ)		
Existing House Structure 3 & 4 Vertical Bus Size						1600	A (208V, 3Φ)		
Total SE-1 Demand Load						1079607	VA	220.84(A)	
Total SE-1 Demand Amps						2999	A (208V, 3Φ)		
Total SE-1 Feeder Amps						3360	A (208V, 3Φ)		
Existing SE-1 Bus Size (Through Bus)						4000	A (208V, 3Φ)		

Electrical Calculations - Load Summaries

Multifamily Dwelling - Feeder Or Service Load Calculations - NEC 220.84 Optional Load Strategy								
Wing D/E Meter Stack Feeder Calc								
Description	Volts	Amps	Phase	VA	Quantity	Totals	Unit	NEC
Unit Loads								
Single Bedroom	-	-	-	28496	11	313456	VA	
Two Bedroom	-	-	-	30620	4	122480	VA	
Subtotal Unit Loads						435936	VA	
Number of Units						15	# of Units	
Demand Factor						40%	%	220.84(B)
Total Units Demand Load						174374	VA	
Total Wing D/E Meter Stack Demand Load						174374	VA	220.84(A)
Total Wing D/E Meter Stack Demand Amps						484	A (208V, 3Φ)	
Chosen Meter Stack Bus Size						600	A (208V, 3Φ)	

Multifamily Dwelling - Feeder Or Service Load Calculations - NEC 220.84 Optional Load Strategy								
Wing A Meter Stack Feeder Calc								
Description	Volts	Amps	Phase	VA	Quantity	Totals	Unit	NEC
Unit Loads								
Single Bedroom	-	-	-	28196	34	958664	VA	
Two Bedroom	-	-	-	30320	10	303200	VA	
Subtotal Unit Loads						1261864	VA	
Number of Units						44	# of Units	
Demand Factor						27%	%	220.84(B)
Total Units Demand Load						340703	VA	
Total Wing A Meter Stack Feeder Load						340703	VA	220.84(A)
Total Wing A Meter Stack Feeder Amps						946	A (208V, 3Φ)	
Existing Meter Stack Bus Size						1600	A (208V, 3Φ)	

Electrical Calculations - Load Summaries

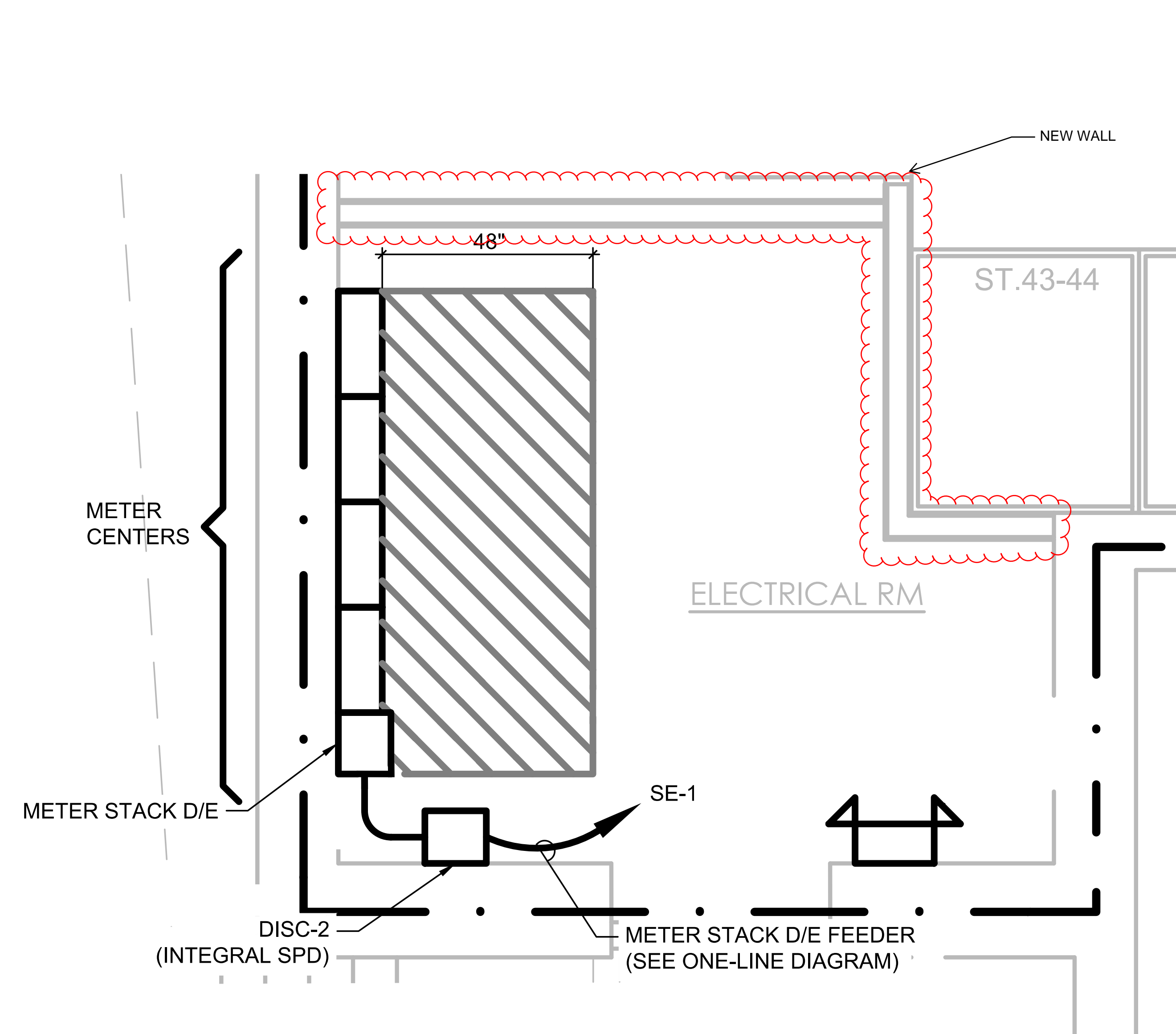
Multifamily Dwelling - Single Apartment Unit Load Calculations - NEC 220.82 Optional Load Strategy								
Single Bedroom Unit								
Description	Volts	Amps	Phase	VA	QTY	Totals	Unit	NEC
General Loads								
Power/Lighting	-	-	-	3	900	2700 VA		220.82(B)(1)
2 Small-Appliance Branch Ckts	120	12.5	1	1500	2	3000 VA		
Water Heater (Electric)	208	21	1	4368	1	4368 VA		220.82(B)(3)(d)
Dishwasher	120	7	1	840	1	840 VA		220.82(B)(3)(a)
Microwave	120	8	1	960	1	960 VA		220.82(B)(3)(a)
Range/Oven (Electric)	208	38.5	1	8008	1	8008 VA		220.82(B)(3)(b)
Dryer (Electric)	208	24.5	1	5096	1	5096 VA		220.82(B)(3)(c)
				Subtotal General Loads		24972 VA		
				First 10,000VA @ 100%		10000 VA		
				Remainder @ 40%		5989 VA		
				Total General Demand Load		15989 VA		220.82(B)
HVAC Loads (Largest Heating or Cooling)								
Outdoor Heat Pump Condenser	208	15.5	1	3224	1	3224 VA		220.82(C)
				Total HVAC Loads		3224 VA		
				Unit Total Demand Load		19213 VA		
				Unit Total demand Amps		92 A (208V, 1Φ)		
				Chosen Unit Panel Bus Size		125 A (208V, 1Φ)		

Electrical Calculations - Load Summaries

Multifamily Dwelling - Single Apartment Unit Load Calculations - NEC 220.82 Optional Load Strategy									
Two Bedroom Unit									
Description	Volts	Amps	Phase	VA	Quantity	Totals	Unit	NEC	
General Loads									
Power/Lighting	-	-	-	3	1400	4200	VA	220.82(B)(1)	
2 Small-Appliance Branch Ckts	120	12.5	1	1500	2	3000	VA		
Water Heater (Electric)	208	21	1	4368	1	4368	VA	220.82(B)(3)(d)	
Dishwasher	120	7	1	840	1	840	VA	220.82(B)(3)(a)	
Microwave	120	8	1	960	1	960	VA	220.82(B)(3)(a)	
Range/Oven (Electric)	208	38.5	1	8008	1	8008	VA	220.82(B)(3)(b)	
Dryer (Electric)	208	24.5	1	5096	1	5096	VA	220.82(B)(3)(c)	
Subtotal General Loads						26472	VA		
First 10,000VA @ 100%						10000	VA		
Remainder @ 40%						6589	VA		
Total General Demand Load						16589	VA	220.82(B)	
HVAC Loads (Largest Heating or Cooling)									
Outdoor Heat Pump Condenser	208	18.5	1	3848	1	3848	VA	220.82(C)	
Total HVAC Loads						3848	VA		
Unit Total Demand Load						20437	VA		
Unit Total demand Amps						98	A (208V, 1Φ)		
Chosen Unit Panel Bus Size						125	A (208V, 1Φ)		

Electrical Space Planning

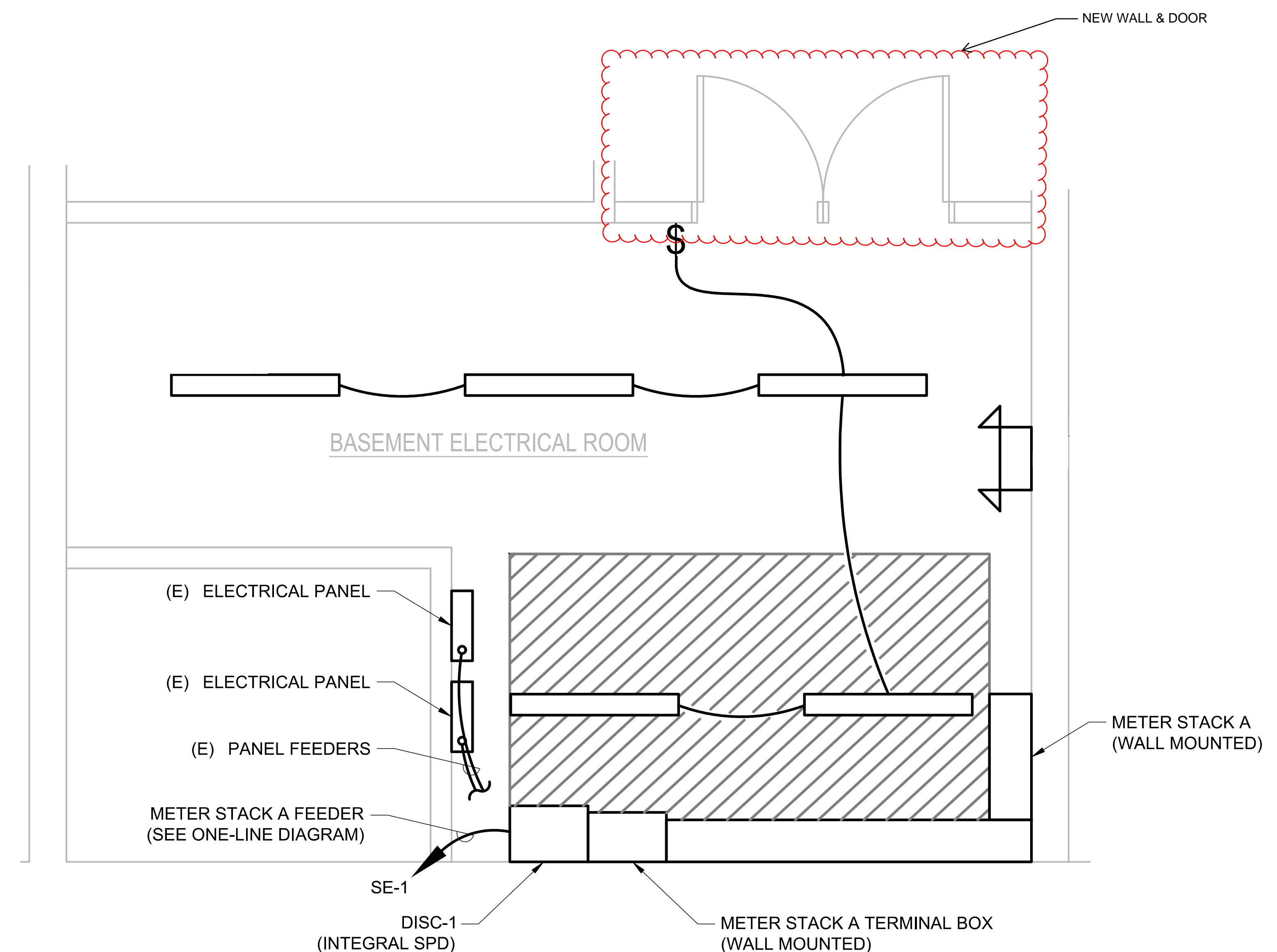
ELECTRICAL ROOM LAYOUTS



1 2ND FLOOR ELECTRICAL ROOM - APPROX 150 SQUARE FEET

NOTES:

1. ELECTRICAL ROOM TO BE FINISHED WITH FIRE-RATED CONSTRUCTION AND PROVIDED WITH NEW DOOR. REFER TO CODE REVIEW.
2. NEW LIGHTING, SWITCHING, EMERGENCY EGRESS, REQUIRED. REFER TO BASIS OF DESIGN.
3. ALL ELECTRICAL GEAR SHOWN IS NEW.



2 BASEMENT ELECTRICAL ROOM - APPROX 300 SQUARE FEET

NOTES:

1. ELECTRICAL ROOM TO BE FINISHED WITH FIRE-RATED CONSTRUCTION. REFER TO CODE REVIEW.
2. NEW WALL AND DOOR COULD BE PLACED DIFFERENTLY TO MINIMIZE THE SIZE OF THE NEW ELECTRICAL ROOM AND THEREFORE LOWER COST. DISCUSS WITH ARCHITECT, AHJ (WHO REQUIRES THE NEW DOOR), AND ENGINEER.
3. EXISTING ELECTRICAL PANELS TO BE REMOVED AND REINSTALLED.
4. (E) REPRESENTS EXISTING GEAR TO BE REINSTALLED. ALL OTHER GEAR SHOWN IS NEW.
5. NEW LIGHTING, SWITCHING, EMERGENCY EGRESS, REQUIRED. REFER TO BASIS OF DESIGN.

Electrical Engineering Proposal

Client Contact

██████████

Client Name

████████████████████

NLS Project Number

25017.001

████████████████████

Wing A, D, E Units – Electrical Engineering
NLS Engineering Proposal

Revision History			
Rev.	Description of Change	Date	Rev. By
■	████████████████████	██████████	Jake Maxey

Submitted To:

[Redacted]
[Redacted]
[Redacted]

Address: [Redacted]

[Redacted]

Phone: [Redacted]

E-Mail: [Redacted]

Submitted By:

Jake Maxey, PE
Principal Engineer
NLS Engineering Consultancy LLC

Address: 8 Burnside St
Plymouth, MA 02360

Phone: 508.591.0980

E-Mail: Jmaxey@NLS-engineering.com

Proposal for Engineering Services

Section 1 Project Description

[Redacted] is leading the design and construction of the [Redacted] expansion/renovation, a 59-unit residential fit out of Wings A, D, and E of the existing complex at [Redacted]. The project includes the renovation and fit-out of spaces within a historic mill building originally constructed in the [Redacted] as the [Redacted].

The development will provide a mix of single-bedroom and two-bedroom condominium units across multiple floors. [Redacted]

[Redacted] this scope of work will cover any electrical feeds and power distribution equipment required to service the meters for the new units, including design of required electrical rooms. Design of new common areas is also included.

NLS Engineering has been engaged to provide electrical engineering services in support of this effort, including utility coordination, building department coordination, preparation of electrical construction drawings and specifications, and construction administration as required for final occupancy. Our scope covers all required power distribution and lighting design for the project, with fire alarm system design provided by a separate firm (out of NLS scope).

Key scope drivers include the project schedule and overall project costs, which will guide design decisions, coordination efforts, and prioritization of work. The project team is committed to a coordinated, buildable, and cost-conscious design process that anticipates field realities and maximizes construction efficiency, while respecting the building's historic fabric.

Design associated with the existing elevator is out of scope and is assumed to be code compliant as-is. See 6. *Clarifications and Assumptions*.

Key Project Insights

- **Project Type:** Multi-family residential fit out (59 condos) + community room, exercise room, and kitchen.
- **Project Size:** Wing A (about 30,000 SF), Wings D and E (about 20,000 SF).
- **Scope Drivers:**
 - Project schedule and construction phasing to minimize disruption to existing residents.
 - Construction cost control.
 - Coordination with existing building systems.
 - Separate fire alarm design by dedicated FA consultant.
- **Location:** [REDACTED]
- **Schedule Constraints:**
 - Maintain occupancy in unaffected wings during construction.
 - Owner-driven milestone dates for occupancy and funding.
- **Owner Priorities:**
 - Minimize disruption to current residents and staff.
 - Meet budget constraints without sacrificing safety or compliance.
 - Limit construction rework.
 - Minimized design schedule [REDACTED]
- **Design/Project Risks:**
 - Tying into and extending existing electrical systems.
 - Limited shutdown windows for electrical tie-ins.
 - [REDACTED]
- **Construction Phasing:**
 - No special phasing at this time.
- **Key Stakeholders & Entities:**
 - Architect: [REDACTED]
 - Electrical Engineer: NLS Engineering.
 - Fire Alarm Engineer: [REDACTED]
 - Local AHJ: [REDACTED]

Section 2 Engineering Services

NLS Project Execution Standards

At NLS, we never lose sight of our operating principles.

- **Responsiveness** – Responses to emails or voicemails are provided within 24 hours.
- **Critical Items** – Issues requiring urgent attention will not sit more than 48 hours without progress or communication on status.
- **Field Reports** – Delivered within 24 hours of the site visit.
- **Meetings** – Attending project design meetings is included in the base scope. Every meeting will have a clear agenda and purpose that drives the project forward.
- **Submittal & RFI Turnaround** – Initial review and coordination within 3 business days, with standard turnaround time for complete review in 5 business days unless otherwise agreed.
- **Coordination** – We coordinate proactively with other design disciplines and stakeholders to resolve conflicts early and minimize changes during construction.
- **Additional Services** – Any need for additional services will be communicated immediately. These are not typically required but will always be identified and discussed as soon as they arise.

Each phase below includes NLS Engineering's approach, design goals, deliverables, and coordination structure.

2.1 95% & 100% Construction Documents

Goals

- Finalize design for permit and construction.
- Ensure constructability and code compliance of all drawings and specifications.
- Support final coordination and QA/QC reviews across disciplines.

Approach

- Finalize drawings, equipment schedules, risers, and installation details.
- Prepare technical specifications to align with final design.
- Distribute a 90% progress set for final coordination and QA/QC.
- Conduct a review session with the project team.
- Submit 100% sealed documents for permitting and bidding.

Deliverables

- Virtual project meetings as required during CD phases to manage coordination, feedback, and QA/QC (in person as needed and optionally aligned with milestone reviews).
- 90% Progress Electrical Drawings for team coordination.
- Final 100% Sealed Electrical Drawings for permit and bid.
- Electrical technical specifications.
- Compliance documentation (where applicable).

Meetings

- Virtual meetings as needed; in person as needed for alignment and kickoff reviews.
- On site review with National Grid engineer.
- Owner review sessions as required.
- Meetings with the project stakeholders as requested by the Client to ensure project success.

2.5 Construction Administration

Goals

- Support the construction team in executing the design accurately and efficiently.
- Respond to field conditions and submittals in a timely and informed manner.
- Maintain quality assurance and compliance through site interaction and documentation.

Approach

- Review and respond to RFIs promptly.
- Evaluate required electrical submittals and shop drawings for conformance with design intent.
- Conduct site visits to observe installation, confirm compliance, and identify field issues early.
- Submit detailed field reports with observations, discussions, and tracked action items.
- Maintain ongoing communication with the contractor, owner, and architect throughout construction.
- Prepare and distribute field reports and meeting notes after each interaction.

Deliverables

- Responses to RFIs.
- Submittal and shop drawing reviews.
- Site visit field reports.
- Meeting notes.

Meetings

- Virtual construction meetings as required for coordination and updates throughout the construction phase (in person meetings aligned with field visits as needed).

2.6 Project Closeout

Goals

- Ensure the project is turned over with complete documentation and resolved issues.
- Confirm that the electrical systems are tested, reviewed, and accepted as required.
- Support the owner's transition into operation of the completed systems.

Approach

- Review contractors submitted record drawings, equipment cut sheets, O&M manuals, and warranties.
- Verify results from electrical system testing and inspection reports.

- Provide review comments and request corrections or supplements if necessary.
- Participate in the final project review and assist in resolving any open issues.

Deliverables

- Reviewed and commented contractor record drawings.
- Reviewed O&M manuals and warranty documentation.
- Reviewed NFPA testing and inspection reports.
- Final closeout punch list support and documentation.

Meetings

- Final closeout meeting as needed with owner and contractor team.

3. Schedule of Deliverables

3.1 Preface

The following schedule outlines preliminary estimated durations for major project milestones. These durations will be reviewed and finalized once the project begins, allowing the project team to weigh in based on actual conditions.

Once schedules are agreed upon, extensions/variations are not typically required unless there are changes to scope, insufficient information flow, or unintended stoppages. In such cases, NLS will promptly notify the architect and project team that we may be approaching the need for a revised schedule and work together to agree upon appropriate action.

3.2 Estimated Milestone Durations

Milestone	Estimated Duration (weeks) From Start or Approval
90% Construction Documents	4
100% Construction Documents	2
Permitting & Bidding	N/A
Construction Administration	TBD
Project Closeout	2

3.3 Electrical Drawings

- **E-1 Series Power Plan(s)** – Floor plans showing service location, feeder/branch routing, receptacles, dedicated outlets, and major equipment connections (the potential new electrical room included); include load designations and circuit numbers where needed. Typical unit arrangements will be represented as able.
- **E-2 Series Lighting Plan(s)** – Fixture locations, controls requirements, exit signs, and emergency egress fixtures in accordance with energy code. Include COMcheck reports for lighting power density and control compliance. We will not provide typical general area or unit lighting fixture schedules unless specifically directed to; these fixtures are assumed already on order and do not require specification.
- **E-3 Series Panel Schedules** – Schedules for all new/modified panels with panel name, voltage, phase, main size, circuit numbers, load descriptions, and connected/estimated demand loads. Typical panel arrangements will be represented as able.
- **E-4 One-Line Diagram** – Service through distribution (main disconnect, metering, feeders, panels, major equipment); show conductor/conduit sizes, OCPD ratings, and grounding/bonding method.
- **E-5 Partial Site Plan – Electrical** – Utility point of connection, route to building, service equipment location, exterior equipment. This is to satisfy utility work order and design requirements.
- **E-6 Roof Power Plan** – Locate/identify all rooftop HVAC equipment (condensers/RTUs/ERVs, etc.) and show power connections/disconnects, including code-required service receptacles within 25 ft per NEC 210.63.

3.4 Electrical Specifications

- Division 26 as required to meet requirements of the proposed design and construction and provide minimal submittal material for proper execution of the project.

Switchboard Replacement Quote

Prepared By:

[Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted]

Proposal Name: Switchboard Replacement - NLS Engineering - Jake Maxey

Quote Name: NLS Gear Replacement

[Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted]

Conditions of Sale

This Quotation is subject to Coordinated Project Terms. See <https://www.se.com/us/en/download/document/0100PL0043/>

Quoted price in currencies other than U.S. Dollars is per the annual Schneider Electric exchange guidance. Quote is valid for 30 days. Quoted lead times are approximate and subject to change.

Schneider Electric reserves the right to amend, withdraw or otherwise alter this submission without penalty or charge as a result of any event beyond its control arising from or due to the current Covid-19 epidemic or events subsequent to this epidemic / pandemic including changes in laws, regulations, by laws or direction from a competent authority.

Pricing

Total DISTRIBUTOR NET PRICE US Dollars	\$ 110,000.00
-----------------------------------------------	----------------------



Seq #	Qty	Product Description
1	1	<p>Designation : Product Details : 1 - Square D Custom Swbd-QED-2 Switchboard</p> <p>-----</p> <p>Square D Custom Swbd Designed and Tested in accordance with: UL 891/NATIONAL ELECTRIC CODE/NEMA PB-2 System Voltage - 208Y/120V 3Ph 4W 60Hz Source Description - Main is Remote System Ampacity - 4000A Bussing - Aluminum Plated w/Tin and Copper Plated w/Silver Neutral Bus - 100% Max Available Fault Current (RMS) - 100kA Enclosure - Type 1 Accessibility: Front Only Exterior Paint Color - ANSI 49 Ground Lug provided for each device SIS Control Wire Aluminum Ground Bus Special: (1) Per Lineup - <1.6kA std UCT - TAG # TR-157140-1 Special: (1) Per Lineup - <1.6kA Custom UCT work - TAG # TR-157140-2</p> <p>Dimensions</p> <p>-----</p> <p>2 - 42" Wide Section(s) 2 - 36" Wide Section(s) 4 - 48" Deep Enclosure(s) Dimensions: 156.00" W X 48" Max D X 91.5" H Approximate Weight: 4663.00 lbs / 2115.14 kgs</p> <p>Incoming Requirements</p> <p>-----</p> <p>UL Dead Front Entry Point: Left of Lineup, Through the Bottom Connection Type: Cable in Bussed Auxiliary</p> <p>SubMains</p> <p>-----</p> <p>SubMains Associated to Remote Main:</p> <p>1 - 1600AT 208V 80% Rated 100 kA 3 Pole UL, Fixed Mounted Basic Electronic Trip Circuit Breaker: Type RJ SubMain 1</p> <p>Feeders</p> <p>-----</p> <p>Devices Associated to SubMain 1:</p> <p>2 - 400AS/400AT 208V 80% Rated 125 kA 3 Pole UL, Group Mounted Electronic Trip Circuit Breaker: Type LL Standard Trip Unit, Long Time, Instantaneous 1 - 600AS/600AT 208V 80% Rated 125 kA 3 Pole UL, Group Mounted Electronic Trip Circuit Breaker: Type LL Standard Trip Unit, Long Time, Instantaneous</p> <p>Devices Associated with Remote Main:</p>

2 - 600AS/600AT 208V 80% Rated 125 kA 3 Pole
UL, Group Mounted Electronic Trip
Circuit Breaker: Type LL
Standard Trip Unit, Long Time,
Instantaneous

1 - 800AS/800AT 208V 80% Rated 100 kA 3 Pole
UL, Group Mounted Electronic Trip
Circuit Breaker: Type PJ
Standard Trip Unit, Long Time,
Instantaneous

1 - 1000AS/1000AT 208V 80% Rated 100 kA 3
Pole UL, Group Mounted Electronic Trip
Circuit Breaker: Type PJ
Standard Trip Unit, Long Time,
Instantaneous

1 - 400AS/400AT 208V 80% Rated 125 kA 3 Pole
UL, Group Mounted Electronic Trip
Circuit Breaker: Type LL
Standard Trip Unit, Long Time,
Instantaneous