DESIGN NARRATIVE – MECHANICAL

Date	12/01/16
Project Name	Bottineau Ridge II Appartments
Project Location	Maple Grove, Minnesota

PART 1. MECHANICAL GENERAL INFORMATION

1.1 OVERVIEW

A. The Bottineau Ridge Apartments are located in Maple Grove, Minnesota will be a four story multifamily dwelling with a below ground parking garage. The facility will have 51 living units.

1.2 SCOPE

A. This narrative document summarizes the design concepts for the major mechanical systems including Fire Protection (Division 21), Plumbing (Division 22), HVAC (Division 23) and Temperature Controls (Division 25)

B. Fire Protection Systems (Division 21) included in this document:

1. Sprinkler Service
2. Sprinkler Piping

C. Plumbing systems (Division 22) included in this document:

1. Plumbing Piping
2. Sanitary and Storm Piping
3. Domestic Water Heater
4. Plumbing Fixtures

D. HVAC (Division 23) included in this document:

1. Heating water piping
2. Perimeter Heating Equipment
3. Boilers
4. Dedicated Outdoor Air System (DOAS)
5. Parking Garage Exhaust
6. Ductwork & Distribution
7. Testing and Balancing.

E. Temperature Controls (Division 25) included in this document:

1. Temperature Control Systems

1.3 TECHNICAL CRITERIA

A. Codes: The following is a partial list of applicable codes governing the systems described herein:

1. 2015 MN Building Code
2. 2015 MN Mechanical and Fuel Gas Code
3. 2015 MN Fire Code
4. 2015 MN Energy Code
5. 2015 MN Plumbing Code
6. NFPA 101 Life Safety Code.
7. NFPA 13 Installation of Fire Protection Systems
8. Americans with Disabilities Act (ADA).
9. ASHRAE 90.1

PART 2. SPRINKLER SYSTEMS (DIVISION 21)

2.1 SPRINKLER SERVICE

A. A new water line will be brought into the building to provide a fire protection service.

B. The building sprinkler riser will be situated in the parking garage and will have 1 sprinkler zone for this project and room for a riser for a future addition. The service will have a double check valve to protect the potable water supply from the domestic water main.

C. A fire department connection will be located along the back of the building, in a location coordinated with the local fire department.

D. A standpipe will be provide in the stairwells.

E. A fire pump will be located in the parking garage to provide 100 psi of pressure at the top of the standpipe.

2.2 SPRINKLER PIPING:

A. Fire sprinkler system piping shall be a minimum wall thickness of Schedule 40 for pipe up to 8 inches in diameter. Where approved by NFPA, State Fire Marshall, and local authorities, Schedule 10 pipe may be used for main piping only.

PART 3. PLUMBING SYSTEMS (DIVISION 22)

3.1 PLUMBING PIPING

A. The water service piping from 5’ outside the building to the final plumbing fixture is by this contractor. A water line will be brought into the building for the domestic water service.

B. Above ground piping - Tubing 1-1/2" size and smaller shall be Type L hard drawn copper. Tubing 2" size and larger shall be Type M hard drawn copper. Soft drawn copper tubing in small sizes may be used adjacent to fixtures and equipment.

C. All water piping will be insulated with a minimum of 1” fiberglass insulation.

3.2 SANITARY AND STORM PIPING

A. All sanitary piping from a point 5' outside the building to the final plumbing fixture is by this contractor.

B. The roof drainage will be handled by exterior downspouts. These downspouts will connect to underground storm which will connect to City's storm sewer in the street.

C. All underground piping will be schedule 40 PVC or no hub cast. All above grade piping will be no hub cast iron pipe. All above grade piping will be allowed to be schedule 40 PVC if the runs are not longer than 35' or in return air plenum spaces.

3.3 DOMESTIC WATER HEATER

A. Domestic hot water will be provided from water heaters located in the parking garage. They will be sealed combustion, gas fired water heaters similar to AO Smith BTH. The water heaters will be piped in parallel to provide redundancy. A recirculation pipe system and pump will be installed to keep the water hot to all fixtures throughout the building.

3.4 SUMP PUMPS

A. Each elevator pit will have a dedicated sump pump discharging into the storm sewer service. Drain tile for the elevator pits will be provided by the general contractor.

3.5 PLUMBING FIXTURES:

A. All fixtures will piped to allow for individual and room isolation valves for servicing.

B. Plumbing fixtures will be similar to the following

1. Lavatory's – under counter mount stainless steel
2. Water Closets – floor mount with flush tank.
3. Water coolers – dual height water cooler.
4. Kitchen Sinks – stainless steel
5. Wall hydrants – wall hydrants will be located at various locations around the perimeter of the building to allow for hose connections every 100-150 feet. Hydrants similar to Woodford B67.
6. Hose Bibbs – parking garage.
7. Mop basins – 2x2 fiberglass basin with wall mounted mop sink faucets

PART 4. HVAC (DIVISION 23)

4.1 HEATING WATER PIPING

A. All piping for the heating water system shall be run level or pitch up toward the end of the piping so that air in the system will move in the direction of water flow. Pitch of mains, where possible, shall be at least 1/4" in 25 feet. Pitch of lines shall be uniform and shall be installed so that entire system can be drained. Eccentric reducers shall be installed wherever pipe size is

reduced in direction of flow. Reducers shall be installed with openings up, on topside of pipe to allow air to pass through. Radiation branches and mains fed by overhead mains shall be connected at the supply side through a plugged tee in place of an elbow to permit draining of radiation, branches or mains. Upfeed risers supplying radiators above the supply main shall come off main either from top or side. Downfeed risers supplying radiation below the supply main shall come off the bottom of the supply main.

B. All piping for the hot water heating system shall be black mild steel pipe, ASA Schedule 40 thickness. Fittings shall be banded black cast iron 125-pound fittings. Grooved piping will be allowed.

C. All hot water piping may be Type L hard drawn copper tubing at Contractor's option. Fittings for copper tubing shall be cast bronze or wrought copper solder fittings. All connections shall be made using 95-5 solder. Press fit fittings will be allowed

D. The entire hot water piping system will have 50% ethylene glycol installed in it for freeze protection.

4.2 PERIMETER HEATING EQUIPMENT

A. In the living units, hot water finned tube radiation will be installed on exterior walls.

B. In stairwells and vestibules, hot water cabinet unit heaters will be installed.

4.3 BOILERS

A. The heating for the building shall be done with high efficiency hot water boilers similar to Aerco Benchmark 3.0. There will be two boilers. The size of the boilers will depend on final heating load calculations and redundancy requirements.

B. The boilers will be located in the parking garage.

C. Redundant, variable primary flow heating pumps will be provided for the boilers and heating loop in the building.

4.4 DEDICATED OUTSIDE AIR SYSTEM (DOAS)

A. The system will provide outside air to the living units and offices. The DOAS unit will take energy from the building's exhaust air to temper the outside flow.

B. Air handling unit will be a modular indoor unit. It will consist of at least the following- exhaust fan, supply fan, MERV 8 and MERV 11 filter sections, heat recovery wheel and a hot water heating coil.

4.5 PARKING GARAGE EXHAUST

A. The exhaust system will be sized to exhaust 0.75 cfm/sq. ft. Carbon Monoxide sensors will be provided to control the operation of the exhaust fan and makeup air.

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3.2 STRUCTURED CABLING FOR TELEVISION DISTRIBUTION

A. Cable TV entrance to the facility will be provided from a service provider. Contractor will provide a 3" PVC conduit stubbed from the main communications room in the building to the property line.

B. The main electrical room will house the terminal board for the cable TV system. Each unit will have a dedicated coax cable routed to this terminal board. Each unit will have a terminal board/cabinet for the unit.

C. Horizontal cabling will be routed from the unit's terminal board to each cable TV outlet. Outlets will be located based on the floor plans.

PART 4. ELECTRONIC SAFETY AND SECURITY SYSTEMS

4.1 FIRE ALARM SYSTEM

A. An addressable fire alarm system will be provided throughout. The system will meet the requirements of NFPA 72 and ADA.

B. Automatic detectors will be provided in mechanical and electrical rooms, storage rooms, janitor rooms, and similar areas.

C. Smoke detectors will be provided in supply and return air ductwork of air handling units rated 2,000 cfm or greater and within 5' of any and all fire-smoke dampers.

D. Addressable relays will used for control of fire-smoke dampers and air handling equipment.

E. Addressable relays will be used for supervision of fire sprinkler valves and switches.

F. Manual fire alarm boxes will be provided at all exit doors.

G. Notification appliances will be located throughout the public and house areas of the facility. Dwelling unit devices will initiate a signal in the unit of initiation only.

4.2 VIDEO SURVEILLANCE AND ACCESS CONTROL

A. The Contractor will provide cabling pathways and outlets for cameras and access control as required.

Respectfully,
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4.6 DUCTWORK & DISTRIBUTION

A. Ductwork and fittings shall be constructed and supported in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1995 Edition with 1997 Addendum except as modified herein.

B. Ductwork and fittings shall be fabricated from G60 galvanized steel sheets complying with ASTM A527.

C. All supply ductwork in spaces with ceilings will be insulated with 2" fiberglass insulation.

4.7 TESTING AND BALANCING

A. All water and air systems will be tested by a 3rd part Testing And Balancing (TAB) agency. The TAB contractor will be either NEBB or AABC certified for balancing commercial HVAC and Plumbing systems.

PART 5. **AUTOMATIC TEMPERATURE CONTROLS (DIVISON 25)**

5.1 AUTOMATIC TEMPERATURE CONTROLS

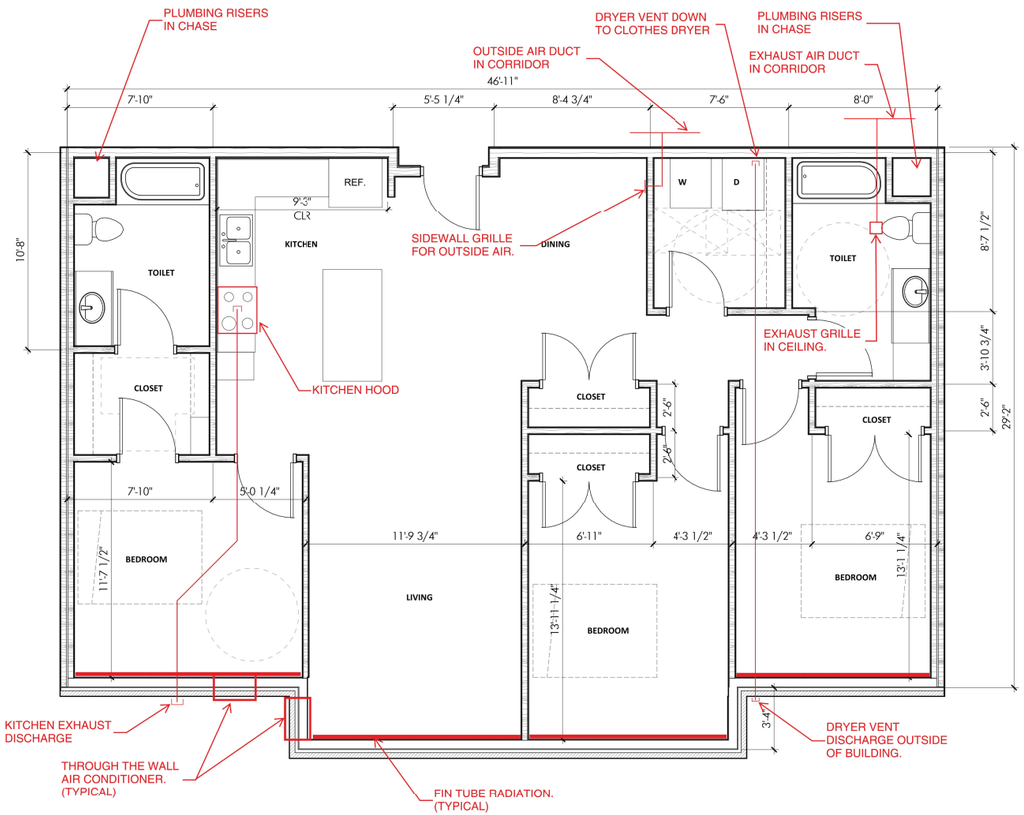
A. A direct digital control (DDC) system will be installed on all HVAC equipment throughout the building.

B. The DDC system will control all heating and air conditioning equipment to allow for automatic temperature control, seasonal adjustments, and maximize HVAC system efficiencies. In addition to controlling HVAC equipment, monitoring of critical air and water temperatures and system operations (fan/pump status), the system shall also alarm all equipment so maintenance personnel can maintain and troubleshoot all equipment.

C. Equipment to be controlled and monitored includes:

1. DOAS Air Handler
2. Pumps
3. Boilers
4. Fin Tube Radiation
5. HVAC Hot Water Temperatures
6. Domestic Hot Water Temperatures
7. Sump Pumps
8. Fans
9. Thermostats
10. VFD's for pumps and fans.

Respectfully,
Obermiller Nelson Engineering, Inc.



TYPICAL MECHANICAL LAYOUT

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Project Name:
Bottineau Ridge II Apartments

Project Location:
Maple Grove, MN

Project Information:

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Date :	11-30-16

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M-1

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DESIGN NARRATIVE – ELECTRICAL

Date	12/01/2016
Project Name	Bottineau Ridge Apartments II
Project Location	Maple Grove, MN

PART 1. ELECTRICAL GENERAL INFORMATION

1.1 OVERVIEW

A. The Bottineau Ridge Apartments are located in Maple Grove, Minnesota will be a four story multifamily dwelling with a below ground parking garage. The facility will have 50 living units.

1.2 SCOPE

A. Electrical systems (Division 26) included in this document:

1. Low voltage power distribution system.
2. Emergency power distribution system.
3. Interior and exterior lighting systems.
4. Emergency interior and exterior lighting systems and egress signage (exit signs).

B. Electronic communications systems (Division 27) included in this document:

1. Structured cabling for voice / data communication systems.
2. Audio / Video systems.

C. Electronic safety and security systems (Division 28) included in this document:

1. Fire alarm system.
2. Video surveillance system equipment (cameras, video recorders, etc).
3. Electronic Access Control and Door Monitoring System.

1.3 TECHNICAL CRITERIA

A. Codes: The following is a partial list of applicable codes governing the systems described herein:

1. Minnesota Building Code, 2015.
2. Minnesota Fire Code, 2015.
3. Minnesota Energy Code, 2015.
4. NFPA 70 National Electrical Code, 2014.
5. NFPA 72 National Fire Alarm and Signaling Code, 2010.
6. Americans with Disabilities Act (ADA).

B. Standards: The following is a partial list of design and installation standards governing the systems described herein:

1. BICSI Telecommunications Distribution Methods Manual.
2. IES Lighting Handbook, Tenth Edition.
3. International Electrical Testing Association (NETA) Standards.
4. National Electrical Contractors Association (NECA) Standards.
5. NFPA 110 Standard for Emergency and Standby Power Systems.

PART 2. DESCRIPTION OF ELECTRICAL SYTEMS

2.1 ELECTRICAL SERVICE AND LOW VOLTAGE ELECTRICAL POWER DISTRIBUTION

A. The building will be designed for 50 units and the house loads, plus a future 50 units. The NEC optional service calculations for multifamily dwellings will be used to size the service. Based on these estimates, the service will be a 2000A 120/208 volt 3-phase service.

1. The main switchboard will have five main circuit breakers. Four 800 amp circuit breakers will feed four unit meter boards and a house distribution panel (two meter boards will be in this phase and two in the future addition), and one 600 amp circuit breaker will feed the house panel. The house panel will have its own CT and meter.
2. The main switchboard will include a surge protection device (SPD). Ground fault protection will not be included.
3. The main electrical room will be located in the basement/garage level. It will house the main switchboard, and one of the unit meter boards, and the house CT/meter and main distribution. The building's phone and cable demarcation equipment will also be located here.
4. The secondary electrical room will be located on the third or fourth floor and it will house the second unit meter board and a house appliance panel.
5. The withstand rating of the system will be sized to exceed the available fault current. Downstream panels will be series rated.

B. Panelboards

1. Distribution panelboards will be circuit breaker type with copper or aluminum bus and lugs, 100% neutral bus, and ground bus.
2. Branch Circuit Panelboards will have bolt-on type branch circuit breakers, 20 ampere minimum, copper or aluminum bus, 100% neutral bus, and hinged cover construction.
3. Unit Panelboards will be load center type with bolt-on type branch circuit breakers, 20 ampere minimum, copper or aluminum bus, 100% neutral bus, and hinged cover construction. Each unit will have its own load center panel. The panel will be recessed in a wall.

C. Raceways

1. All wiring will be in metal conduit except for under floor raceway which will be Schedule 40 PVC. Metal conduit will generally be electrical metallic tubing (EMT) except where exposed to damage where it will be full-weight rigid galvanized steel conduit.
2. Flexible metal conduit will be used at equipment connection where required by the application.
3. Wiring in the units will be with type NM cable.

D. Wire and Cable

1. All feeder and branch circuit wiring for power, lighting, and control will be copper, 98% conductivity, stranded in sizes #8 AWG and larger, with 600 volt THW or THWN-THHN thermoplastic insulation. The exception on insulation will be on VFD motor circuits where 1000 volt high-dielectric XHHW thermoset insulation will be used.
2. Minimum wire size will be #12 AWG except #14 AWG for control circuits.
3. Feeders will be designed to limit voltage drop to 2% as noted in ASHRAE 90.1.
4. Voltage drop will be designed to not exceed 3% on branch circuits, 5% overall.

E. Grounding systems shall be provided with 5 ohms maximum.

1. All bonding and grounding wires will be copper. Terminations will be bronze.
2. Grounding electrodes will be 10'-0", 3/4" copper clad steel.
3. A main ground termination bar will be installed at each main service room and intersystem bonding and grounding termination bars will be provided in each telecommunications room.

F. Wiring Devices

1. Duplex receptacles will be 125 volt grounding types with cover plate type coordinated with the owner.
2. GFCI type receptacle will be provided where required by code.

G. Identification: Wiring devices connected to optional standby branches will be identified by using unique colored devices.

H. The Division 25 Contractor will provide VFDs for pumps, and other HVAC equipment motors that require VFDs. Generally, across the line enclosed motor controllers will be provided for motors smaller than 3 HP by the Division 26 contractor. Fire alarm shut downs will be wired directly into the VFDs.

2.2 MISC EQUIPMENT AND POWER OUTLETS

A. Power connections will be provided for any miscellaneous equipment. Connection type will match equipment requirements.

2.3 GENERAL INTERIOR AND EXTERIOR LIGHTING SYSTEMS

A. Interior and Exterior Lighting systems will be designed in accordance with the recommendations of the Illuminating Engineering Society (IES) and the requirements of the 2015 MN Energy Code.

1. IES and design team direction will be followed in regards to light level recommendations where appropriate. This is not a code requirement but a design guideline.
2. IBC requirements for emergency lighting levels will be followed.
3. The lighting power density requirements listed in the Energy Code for interior and exterior lighting will be followed.

B. LEDs will be used throughout the building, which will include semi-recess downlights, 2'x2' architectural troffers, and decorative sconces.

C. Light sources for all exterior lighting will be LEDs both building mounted lighting, pedestrian scale pole / bollard lighting, and pole mounted area lighting.

1. The main entrance will be well illuminated to draw attention and highlight architectural elements. Fixtures may include recessed LED downlights in canopies, in grade LED uplighting, and / or linear color changing LED wall grazing fixtures.

2.4 LIGHTING CONTROL SYSTEMS

A. Non-dwelling unit spaces will follow the MN Energy Code, and include manual control stations, automatic lighting shut-off, lighting reduction controls, and daylight control zones.

1. In all areas, occupancy sensors and manual control stations will be used. Occupancy sensors will turn on lights to a maximum of 50%. Manual control will allow lighting to be increased to 100% output.
2. In all rooms with daylight zones as defined by the Energy Code, automatic dimming will used to control lighting in daylight zones separate from other lighting in the room. Daylights zones extend a 15' into a space or to the first ceiling height partition whichever is closer to the window and extends 2' beyond the window in each direction (right and left).
3. Mechanical rooms, receiving, electrical rooms, and communication rooms will be controlled via manual switching.

2.5 EMERGENCY LIGHTING AND EGRESS SIGNAGE

A. LED type exit signs will be provided to mark paths of egress.

B. Emergency egress lighting will be provided by battery units integral to selected luminaires or by surface mount battery light units. Emergency lights will be spaced to meet the code minimum lighting level. Battery units will have self-diagnostic feature.

PART 3. DESCRIPTION OF COMMUNICATION SYSTEMS

3.1 STRUCTURED CABLING FOR VOICE AND DATA COMMUNICATIONS

A. Communications entrance to the facility will be provided from a service provider. Contractor will provide a 3" PVC conduit stubbed from the main communications room in the building to the property line.

B. The main electrical room will house the terminal board for the voice and data system. Each unit will have a dedicated network cable routed to this terminal board. Each unit will have a terminal board/cabinet for the unit.

C. Horizontal cabling will be routed from the unit's terminal board to each voice/data outlet. Voice/data outlets will be located based on the floor plans.

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BR2 - SD SUBMITTAL : ELECTRICAL NARRATIVE

JANUARY 03, 2017

JLG architects