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# Project Overview

## General

1. The information in this document is a presentation of our understanding of the project components and performance expectation.

## Project Type

1. Hospital:
  - A. Ambulatory Surgery Center

## Square Footage/Space Needs

1. ~17,400 SF

## Expansion Capability

1. Horizontal Expansion: N/A
2. Vertical Expansion: N/A

## Assessment

1. N/A

## Regulatory Requirements/Industry Standards

1. Codes: The majority of these codes have been referenced by the by the Town of Leland, and/or the State of North Carolina. Most have been superseded by later versions that may or may not be adopted for the design and construction of this project.
  - A. 2022 FGI
  - B. 2017 ASHRAE Standard 170 and applicable addenda
  - C. 2018 IBC
  - D. 2018 IMC
  - E. 2018 IPC
  - F. North Carolina Energy Code
  - G. 2020 NFPA 70 (NEC)
  - H. 2012 NFPA 99
  - I. 2012 NFPA 110
  - J. 2018 IFC
  - K. Zoning Ordinance and Regulations for the Town of Leland
2. Standards:
  - A. Corporate: Novant Health
3. Guidelines:
  - A. ASHRAE.
  - B. JCHAO.
4. Acoustical Limitations defined by zoning ordinance:
  - A. Maximum sound pressure at property line: \_\_\_\_\_ dBA.
5. Authorities Having Jurisdiction (AHJ):
  - A. State of \_\_\_\_\_ – Electrical Building Permits
  - B. State of \_\_\_\_\_ - Department of Health
  - C. State of \_\_\_\_\_ - Department of Transportation
  - D. FAA
  - E. City of \_\_\_\_\_ Building Inspection Department
  - F. Fire Marshal
  - G. Environmental Protection Agency (state or federal)
  - H. City of \_\_\_\_\_ Water Department
  - I. City of \_\_\_\_\_ Public Works Department
  - J. City of \_\_\_\_\_ Electrical Department

6. Seismic Requirements: \_\_\_\_\_

## **Sustainability**

1. Water Reduction: TBD
2. Carbon Reduction: A determination was made not to extend Natural Gas to this site.

# Mechanical

## Utilities/Energy Sources

1. Natural Gas:
  - A. A determination was made not to extend Natural Gas to this site.
  - B. Site will target zero carbonization.
2. Domestic Water Service:
  - A. Refer to Plumbing.
3. Fire Service:
  - A. Refer to Fire Protection.
4. Sanitary Sewer:
  - A. Refer to Plumbing.
5. Storm Sewer:
  - A. Refer to Plumbing.
6. Onsite Fuel:
  - A. Diesel: Emergency generators and/or boilers.
  - B. Sizing/Hours of Capacity:
    1. Boilers: Electric TBD
    2. Generators: TBD
  - C. Security/Aesthetics:
    1. Aboveground: Containment and fencing for aesthetics and security.
    2. Underground: Will require monitoring and containment of tank and piping.

## Energy Efficiency Strategy

1. Integral Design Enhancements/Low Cost:
  - A. Occupied/Unoccupied Zoning and Control: HVAC.
    1. Schedule based.
    2. Interfaced with lighting occupancy sensors in the following areas: Offices.
  - B. Surgery: Occupied/unoccupied/on demand HVAC control.
  - C. Low velocity distribution/low RPM equipment.
  - D. Control Optimization:
    1. Sequencing.
    2. Post occupancy loop tuning during warranty period.

3. Static pressure set point reset (air and water).
- E. Premium Efficiency Equipment:
  1. Motors: \_\_\_\_\_
  2. High Efficiency Standard Unit: \_\_\_\_\_
  3. Low KW/Ton for cooling equipment: 300
2. Building Envelope Improvements:
  - A. Infiltration mitigation.
  - B. Glass reflectance.
  - C. Solar shading.
  - D. Vapor barriers.
  - E. Insulation.
  - F. Unitary refrigeration equipment to be standby/emergency power cooling source only if needed.
  - G. See cooling section below.

*All the above should be the basis of design, given conventional system applications, and little additional cost to implement them.*

3. Alternative Design:
  - A. Air atomization technology for non-steam humidification.
  - B. Eliminates need for steam boiler(s) or gas-fired steam generators, condensate return systems, etc. (significant first cost savings).
  - C. Much more energy efficient.
  - D. Higher purity/better quality of moisture injected to air stream (RO water supply, with plastic tank and piping for water storage and distribution).
  - E. May require variance from State Health Department, due to not being a steam source.
  - F. Individual operating Room HVAC zoning (see Alternates).

## HVAC

1. Design Conditions:
  - A. Outdoor:
    1. Summer: 91 deg F DB/ 78 deg F WB (to be confirmed based on local weather data and experience at this site with peak summer conditions).
    2. Winter: 26 deg F (see envelope design section).
  - B. Indoor:
    1. Cooling, unless indicated otherwise: 72 deg F with maximum 60% RH.
    2. Heating, unless indicated otherwise: 72 deg F with minimum 30% RH where humidification equipment is provided.

3. Healthcare Spaces:
    - a. See FGI Guideline for requirements by room type.
  4. Mechanical and Electrical Rooms:
    - a. Cooling: 85 deg F
    - b. Heating: 65 deg F
  5. IT/Communication Rooms:
    - a. Cooling: 75 deg F
  6. Additional indoor conditions are identified in Specialty Room Requirements
2. Systems:
    - A. Space Heat
      1. Heating Water System:
        - a. Heating Water Boilers:
          1. Capacity: 100 kW (341 MBH) input.
          2. Number: 1
          3. Type: Electric.
          4. The boilers shall be provided with electric elements.
          5. The boiler shall have a dedicated primary in-line circulation pump, estimated at 50 gpm and 0.5 hp.
        - b. The heating water system shall be designed based upon a 140 deg F heating water supply temperature with 120 deg F heating water return temperature. The supply temperature shall be reset based on outside air temperature indicated on the drawings.
        - c. The system shall have combination air and dirt separator.
        - d. The building heating water distribution system shall have two (2) inline distribution pumps, estimated at 50 gpm and 1 hp each. Variable frequency drives (VFDs) shall be added to each of these pumps. One (1) pump shall be standby.
        - e. The system shall serve the following:
          1. Variable air volume air terminal units with reheat coils.
          2. Air handling unit preheat coils with circulating pumps.
      2. Materials:
        - a. Heating water piping shall be Schedule 40 black steel with welded or threaded joints, or type L copper with soldered joints. Pro-press joints shall [not] be allowed.
        - b. Piping insulation shall be fiberglass with all service jacket and thickness complying with energy code.
    - B. Humidification and Process Steam
      1. Steam System:
        - a. Point of use electric humidifiers shall be provided at following locations:
          1. Central humidifiers serving the following air handling unit(s): OR



2. Sterile Processing Department, point of use steam:
    - a. Sterilizers and washers requiring steam shall utilize self-contained electric steam generators for point of use needs.
  3. Location of humidification equipment shall be located within the air handlers that they serve.
- C. Cooling:
1. Chilled Water System:
    - a. Chillers:
      1. Capacity: 52 tons. (Trane CGAM)
      2. Number: 1
      3. Outdoor air cooled.
      4. Variable speed
      5. Compressor Type: Scroll
    - b. The chilled water pumping system shall be configured as a variable primary system.
    - c. The primary chilled water distribution system shall have inline distribution pumps, estimated at 176 gpm and 5 hp each. Variable frequency drives (VFDs) shall be added to each of these pumps. One (1) pump shall be standby.
    - d. The chilled water system shall be designed based upon a 42 deg F chilled water supply temperature with 57 deg F chilled water return temperature. The supply temperature shall be reset based on outside air temperature or system demand.
    - e. The system shall have a combination air and dirt separator.
  2. High Heat Areas (Server, Data Rooms, Main Electrical Room, Main Mechanical Room):
    - a. These spaces shall be served by ductless split systems with remote condensing units.
    - b. The main IT room shall be served by a minimum of 1 unit. It is estimated that the unit shall be 3 tons.
    - c. Where load is minimal, these spaces shall be conditioned by normal supply and return/exhaust air ventilation techniques from AHUs that run 24/7 as a normal operating mode.
    - d. Ventilation means and cooling to be on emergency power sources.
  3. Materials:
    - a. Chilled water piping shall be Schedule 40 black steel with welded, grooved, or threaded joints, or type L copper with soldered joints. Pro-press joints shall be allowed.
    - b. Refrigerant piping shall be type L ACR copper with brazed joints.
    - c. Exterior chilled water piping (if present) and refrigerant piping insulation shall be closed cell elastomeric type with thickness complying with energy code and aluminum jacketing.
- D. Ventilation:
1. Air Handling Units (AHUs):
    - a. Semi-Custom AHUs suitable for healthcare environment, good quality units (not light commercial grade packaged units).

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- b. All AHUs will be variable volume type with single duct air terminal units and hot water reheat.
  - c. AHU sizing:
    - 1. AHU-OR (Area served on Attachment) – 10,450 CFM.
    - 2. AHU-PACU (Area served on Attachment) – 8400CFM.
  - d. All units to be outdoor (roof mounted) type.
  - e. Each AHU will have the following components:
    - 1. Preheat coil with inline coil circulating pump.
    - 2. Chilled water-cooling coil.
    - 3. UV lights.
    - 4. MERV 8 Pre filters.
    - 5. MERV 14 final filters.
    - 6. Supply and return fan arrays with variable frequency drives and inlet air flow stations.
    - 7. Air side economizer with air blender.
    - 8. Outside airflow station.
    - 9. Humidifier section for the following AHUS: Serving ORs.
    - 10. Insulated service vestibules for piping connections for outdoor units. The AHU for the surgery operating rooms will have custom, enlarged vestibule along length of unit to allow additional space for piping connections.
  - 2. Return systems:
    - a. All areas: Fully ducted.
  - 3. Zoning for variable volume air handling units:
    - a. Single duct air terminal units with reheat coils will be used throughout the facility. The systems will be zoned as follows.
      - 1. One (1) terminal unit per operating, radiology, or procedure room.
      - 2. One (1) terminal unit per meeting room.
      - 3. One (1) terminal unit will serve a maximum of 4 exam rooms, pre-op rooms, or offices with similar exterior exposure.
      - 4. All other areas will average approximately 700 SF per air terminal unit.
    - b. The following exhaust and return systems will have venturi valves on the return side of each temperature zone to complement the supply air terminal units. This is to allow for improved pressure control and to allow each zone to reduce air changes during unoccupied periods while maintaining positive pressure. The return air terminal unit will maintain a fixed cfm offset between supply and return for each zone.
      - 1. Return system for surgery AHU.
  - 4. Exhaust fans:
    - a. Each area or department will be provided with a dedicated exhaust fan for general exhaust.
    - b. Central sterile will have dedicated exhaust fan due to moisture laden exhaust.

- c. The medical gas bottle room will have a dedicated exhaust fan.
- 5. Materials:
  - a. All ductwork will be galvanized steel constructed per SMACNA Standards and sealed to comply with Class A standards, except as follows:
    - 1. Central sterile exhaust will be Type 304 stainless steel with joints sealed watertight.
  - b. All ductwork will be insulated as required by the energy code. Insulation will be flexible fiberglass with foil scrim Kraft jacket.
- E. Room Pressurization:
  - 1. Per FGI Guidelines and State codes.

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## Plumbing

### 1. Domestic Cold Water:

- A. The facility will have a single 2 ½" water service since it is an Outpatient facility.
- B. City Water Pressure: TBD with new flow test.
- C. The domestic water distribution system will be designed for the fixture load and layout. Backflow prevention details and specification will be noted for all plumbing fixtures where necessary.
- D. Design service water distribution system to maintain a minimum of 35 psig at the most remote fixture outlet in the facility, but not over 80 psig.
- E. The domestic water piping shall distribute in loops with recirculation for hot water.
- F. Freeze-proof wall hydrants with vacuum breakers will be installed on exterior walls at a maximum of one every (150'-0) apart, at loading docks and building entrances.
- G. Where municipal water pressure is inadequate a water booster pump system will be incorporated. System shall be factory assembled, skid mounted unit the includes a duplex variable speed pumps with 100% redundancy.
- H. Above ground piping system shall be type L copper.
- I. Incorporate factory manufactured water hammer arrestors in water supply lines in accordance with Standard PDI-H201. Install at each branch serving patient rooms, at every public restroom.
- J. No water piping shall be routed in or below concrete slabs on grade.
- K. Joints shall be soldered/brazed.
- L. Provide line shut-off valves at locations required for proper operation, servicing and troubleshooting of the domestic water distribution system and connected components. Locations shall include, but not be limited to, the following:
  - 1. Each fixture and piece of equipment.
  - 2. Each branch take-off from mains.
  - 3. Each battery of fixtures.
- M. Cold water and hot water plumbing piping shall not be located in exterior walls except to supply exterior hose bibbs. Piping shall be on the warm side of the insulation.
- N. Require vacuum breakers in the individual cold and hot water fixture supply lines serving mixing valve type faucets or assemblies having hose connection outlets that are not equipped with integral check stops. Install vacuum breakers on mop sinks.

### 2. Domestic Hot Water:

- A. Electric storage type water heater. AO Smith DRE-80-18 or equal. Leaving hot water temperature will be set at 140 F. Mixing valve to be installed to mix water down to 116 F. Circulating hot water system shall be arranged so that the circulating pumps can be turned off automatically when the hot water system is not in operation.
- B. The system will have recirculating system with a pump.
- C. Central manual mixing valve will be utilized at water heater.
- D. Point of use thermostatic mixing valves will be installed per NC Plumbing Code.

### 3. Domestic Water Treatment:

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- A. Softening: Incorporate water softening for the entire facility if entering water hardness exceeds 115 parts per million (ppm) of CaCO<sub>3</sub>.
  - B. The facility will have a water softening connected to the following:
    - 1. Entire domestic water system. TBD with water quality test.
    - 2. Domestic cold water for central sterile equipment.
    - 3. Reverse osmosis pretreatment.
  - C. RO System:
    - 1. A reverse osmosis system with recirculating system is anticipated to be required for the central sterile washing equipment.
    - 2. Polypropylene (PP) pipe, fittings and valves shall comply with ASTM D 2447. Joining shall be by electro-fusion welding.
4. Fixtures and Fixture Hardware:
- A. Hospital grade.
  - B. General Team Member and Public Areas:

Lavatories and sinks for hand washing.

- a. Wall hung vitreous china or molded of solid surface material integral with countertop.
- b. Faucet shall be Chicago Faucet Model 786-GN2FC319XKABCP or approved equal.
- c. Lavatories shall be provided with grid strainer drain with 5/16" holdes.

Lavatories and sinks for process or clinical use

- a. Wall hung vitreous china or molded of solid surface material integral with countertop.
- b. Faucet shall be Chicago Faucet Model 786-GN2FC319XKABCP or approved equal.
- c. Lavatories shall be provided with grid strainer drain with 5/16" holdes.

Water Closets

- a. Floor mounted vitreous china, siphon-jet type.
- b. Elongated bowl, with fully-glazed trapway.
- c. Open front seat.
- d. Manual dual flush valves.
- e. All water closets to be ADA height.

Urinals

- a. Wall hung vitreous china.
- b. Manual flush valves.

Mop Sinks

- a. Floor mounted precast tiled masonry or molded-stone (terrazzo).

- b. Equipped with type 304 stainless steel rim and wall guards.
- c. Faucet shall be wall mounted two-handle mixing faucet complete with wall brace, vacuum breaker, bucket hanger, and hose adaptor.
- d. Provide additional hose bibb at each mop basin.
- e. Check valves shall be installed to keep cold water from mixing into hot water system.

Drinking fountains/water coolers

- a. Tankless type, stainless steel construction.
- b. Surface or semi-recessed mounted.
- c. A cooled refrigeration system to maintain supply water temperature at 45F-50F.
- d. Energy star rated
- e. ADA compliant.

Shower enclosures [Acrylic, Solid Surface or Tiled]

- a. Equipped with automatic temperature control mixing valve and grab bars. Shower heads shall be removable for hand-held use. Installed with adjustable height wall rod mounting system. Shower heads shall be constructed of stainless steel and be designed for routine disassembly and cleaning.

5. Floor Drains:

- a. Floor sinks at SPD equipment.
- b. Cast iron floor drains with sediment buckets in mechanical rooms.
- c. Trap primers or trap guard where determined necessary.

6. Special Requirements:

- a. Reduced pressure backflow preventers will be provided where protection is required by code.
- b. SPD area shall have required emergency eye/face washes.

7. Materials:

- a. All domestic and non-potable water piping will be Type L copper with solder or brazed joints.
- b. Domestic water piping will be insulated with fiberglass insulation with all service jacket and thickness complying with energy code. In addition, all domestic cold water piping and above grade storm drain piping will be insulated with 1" thick fiberglass insulation with all service jacket to prevent condensation.

8. Sanitary Waste and Vent

- a. Facility shall be served with (1) 4" sanitary sewer lateral.
- b. Cast iron sewer above grade shall be service weight no-hub type utilizing heavy duty neoprene couplings and stainless steel clamps. PVC drain, waste and vent pipe and fittings under floor slabs shall be schedule 40 solid wall. PVC drain, waste, and vent (DWV) piping may be used under floor slabs, except in sterilizer locations. Cast iron to be installed.
- c. All interior cleanouts shall be accessible from walls or floors. Provide wall cleanouts in lieu of floor cleanouts wherever possible. A floor cleanout shall be installed only where installation of a wall cleanout is not practical, never in a public area. Locate wall cleanouts no more than twenty four inches (24") above the finished floor. For horizontal cleanouts, provide an access door and blind plug. For vertical cleanouts, provide an access door, wye, and blind plug.

The Designer is responsible for coordinating cleanout and required access door locations for incorporation on the architectural plans. Vent piping shall be cast iron. Plumbing vents shall be terminated with neoprene vent roof flashings with stainless steel clamps.

9. Storm Water Drainage

- a. Facility will be served with (2) 8" storm drain laterals.
- b. Roofs with a slope of four percent or less (<4%) require roof drains. Roof drains shall be located and sized in accordance with the applicable state plumbing code. Provide secondary roof drains (and/or ensure that the architect incorporates roof scuppers) where roof parapets are designed.
- c. Roof drain leaders and horizontal roof drainage piping shall be sized in accordance with the applicable state plumbing code requirements.
- d. All interior roof drain leaders above grade shall be specified to be threaded, galvanized steel pipe with drainage pattern fittings or service weight no-hub type cast iron pipe and fittings utilizing neoprene couplings and stainless steel clamps. Roof drain piping below grade shall sanitary sewer piping.
- e. Specify that interior, horizontal above grade primary and secondary roof drainage piping and the underside of all roof drain bodies shall be insulated.

## Medical Gas Systems

1. Systems shall be Category 1.
2. Types of medical gases, medical air, and medical vacuum systems and outlets typically required in each facility are defined by Table 2.1-3 in the 2022 FGI Guidelines for Design and Construction of Outpatient Facilities; NFPA Standard 99, Health Care Facilities.
  - a. Operating/Procedure Room – (2) oxygen, (3) vacuum, (1) medical air outlets/inlets. The use of nitrogen and/or carbon dioxide shall be decided by owner. Where inhalation anesthesia, including nitrous oxide, will be used a waste anesthesia gas disposal (WAGD) system shall be provided. Use of portable delivery and scavenging equipment shall be permitted in lieu of a permanently installed WAGD system.
  - b. Pre/Post - (1) oxygen, (1) vacuum outlets/inlets.
  - c. PACU - (1) oxygen, (1) vacuum outlets/inlets.
  - d. Sterile processing decontamination/clean work room – (1) instrument air outlet each room. The use of portable equipment in lieu of piped gas system shall be permitted.
3. Design systems in accordance with the following criteria:
  - a. Connections shall be Diameter Index Safety System (DISS) type.
  - b. Pressure piping systems, not to exceed five (5) psi loss from source to point of use.
  - c. Nitrogen piping systems not to exceed twenty (20) psi loss from source to point of use.
  - d. Vacuum piping systems not to exceed three inches (3") Hg from source to point of use.
4. Medical Air and Gases
  - a. Branch lines and drops to individual outlets for the pressure gases shall be a minimum of one-half inch (1/2").
  - b. Branch lines serving more than one room or zone valve shall be a minimum of three-quarters inch (3/4") vacuum.
  - c. Branch lines and drops to individual vacuum inlets shall be a minimum of three-quarters inch (3/4").

- d. Branch lines serving more than one room or zone valve shall be a minimum of one inch (1").
5. Place a source shut-off valve for each vacuum and gas system at the immediate outlet or inlet of the source of supply, in the room with the equipment, so that the entire supply source, including all accessory equipment, can be isolated from the entire pipeline system.
6. Provide zone valves within recessed wall cabinets for all branch piping serving station outlets and inlets. Locate zone valves in corridor, visible and accessible to team members for operation of valves. All zone valve locations shall be in conformance with NFPA 99. Zone boxes shall be dual purge port with back feed valves.
7. Medical Air: 2x2 Manifold
  - a. Manifolds with primary and secondary banks will be provided.
  - b. Piped system.
8. Medical Vacuum:
  - a. The facility will be provided with a new duplex 5.4 hp claw type medical vacuum pump.
  - b. Piped system.
9. Waste Anesthesia Gases (WAGD):
  - a. Combined with medical vacuum.
  - b. Piped system.
10. Oxygen: 4x4 Manifold
  - a. Manifolds with primary and secondary banks will be provided.
  - b. Piped system.
11. Nitrogen, Nitrous Oxide, Carbon Dioxide: As required. 2x2 Manifold
  - a. Manifolds with primary and secondary banks will be provided.
  - b. A dedicated medical gas storage room will be provided.
  - c. Piped system.
12. Alarms:
  - a. Two (2) master alarm panels will be provided in the facility. They are anticipated to be located in the check-in and the other at the nurse's station.
  - b. Each zone valve serving patient care areas will have area alarm.
13. Valves:
  - a. Each department will have a dedicated zone valve.
  - b. Service valves will be provided at base of each riser, each floor, and at other locations to facilitate phasing or limit impact of shutdowns.

## Building Automation

1. Type and Vendors:
  - A. All Direct Digital Controls (DDC) for all equipment to be from a single source/not factory; package DDCs with interfaces.



2. System Architecture:
  - A. Web-Based (Easy Remote Access).
  - B. Primary network will have BacNet compatible protocol. Unitary controllers for terminal units may be proprietary network.
3. Refer to other sections for requirements associated with the following:
  - A. Energy Efficiency
  - B. HVAC
  - C. Specialty Room Requirements
4. Measurement and Verification Requirements:
  - A. Total facility measurement and verification shall be deployed including power factor, watts per phase, amps per phase, BTUH metering on heating, BTUH metering on cooling, as well as delta T on heat exchangers.
5. Allowable Manufacturers:
  - A. Trane.
  - B. Johnson Controls.
  - C. Siemens
  - D. Schneider Electric
  - E. Allerton

## Fire Protection

1. Sprinklers:
  - A. The facility will be served by a new 6" fire service.
  - B. Where municipal water pressure is inadequate a fire pump system will be incorporated. Flow test to be performed.
  - C. Automatic sprinkler fire suppression systems shall be applied as follows in compliance with NFPA Standard 13:
    - a. Sprinkler fire suppression shall be provided in all spaces required by applicable standards, state building codes, and/or Owner's room data sheets, including, but not limited to, computer rooms, telephone switch rooms, electrical rooms.
    - b. Attached canopies shall be sprinklered with a dry system. If it looks like it is attached, even though structurally it is not, it must be sprinklered.
    - c. Sprinklers shall be concealed pendent quick response type with white cover plates.
    - d. Occupancy Hazard: Light or Ordinary Group I indicated on plans.
    - e. Each sprinklered zone will have a dedicated tamper and flow switch.
    - f. Pipe Schedule:
      1. 2" and Under: Schedule 40.
      2. 2-1/2" and Over: Schedule 10.
    - g. Piping for dry systems will be galvanized.

- H. Main IT rooms (MDF) shall be designed with a pre-action dry sprinkler system.
  - I. The Fire Suppression Systems Contractor must hydraulically calculate sprinkler pipe sizes by a design approach allowed by NFPA Standard 13.
2. Pre-action (Dry) Systems:
- A. Main data center/IT space.
  - B. Exterior entry canopy.
3. Smoke Control:
- A. Passive (Fire/Smoke Partitions):
    - 1. Ductwork will be configured to minimize fire and smoke dampers.
      - a. Electric 120 volt operators will be used.
4. Insurance
- A. Fire protection systems will comply with Owner Insurance requirements.

## Emergency Power and Environmental Considerations

1. Emergency Power:
- A. Heating and ventilation systems as required by FGI.
  - B. Domestic hot water systems.
  - C. Domestic booster pumps.
  - D. Sump and sewage ejector pumps.
  - E. Medical gas systems.
  - F. Cooling for the following special areas:
    - 1. IT/Communication Rooms.
    - 2. Main mechanical and electrical rooms.
  - G. Life safety systems required by code.
  - H. One (1) chiller/pump on emergency power (see Alternates).
2. Interior Sound and Vibration Standards/Mitigation:
- A. Refer to FGI Guidelines.
  - B. Refer to ASHRAE Guidelines.
3. Exterior Noise Emissions:
- A. Generators:
    - 1. Will use exterior sound attenuated enclosure in lieu of indoor space.
4. Exhaust Air/Stack Emissions:
- A. Generators:
    - 1. Should be remote from intakes considering prevailing winds.

2. Most likely will be diesel, which may be a bigger issue. Same as above.

## Specialty Room Requirements

Room requirements and design features beyond the minimum code requirements and specialty features are identified below and will be reviewed during user group meetings. The following are the highlights of those features deemed important for specialty rooms. This listing is not all inclusive. Other features are identified in other locations of this document.

1. Operating Rooms:
  - A. HVAC:
    1. Minimum Air changes Per Hour: 20.
    2. Occupied/unoccupied control.
    3. Laminar flow ceiling system with HEPA filtration.
    4. System to have an "occupied" control to start full ventilation rate when room is being prepped for surgery (increases air changes only when being prepped or occupied).
    5. Room pressure monitors.
    6. Low wall return grilles.
    7. Design Conditions: 65 deg F with 30-60 % RH.
  - B. Medical Gases:
    1. Outlets on Booms/Column: \_\_\_\_\_
    2. Nitrogen: \_\_\_\_\_
2. Central Sterile:
  - A. HVAC:
    1. Design Conditions: \_\_\_ deg F with \_\_\_ to 60 % RH.
  - B. A separate oilless duplex utility air compressor with desiccant dryer will be provided for cleaning and equipment needs.

## Alternates

The above generally represents lower cost design features. However, several features may have a higher first cost, and as such, are placed on this add alternate list. Each should be evaluated prior to or during the schematic design phase to determine if they are actually add costs, considering the tradeoffs between all disciplines, not just from a General Contractor's viewpoint.

1. City Water Backup:
  - A. Ability to use tank truck water for backup.
  - B. Will require booster pump.
  - C. May allow reducing the size of the domestic water piping throughout with increased system pressure capability.
2. All cooling system equipment on Emergency Power:
3. Operating Room Supplemental Cooling:

- A. Will require the ability to direct limited chilled water to selected areas only, via BAS override of chilled water delivery to other air handling units.
4. Individual OR HVAC:
- A. Use common rooftop air handling unit with dedicated HVAC sections for each OR.
  - B. Separate supply and return isolation dampers, heating and cooling coils, humidification, and final filtration for each OR.
  - C. Rapid heating and cooling functions (rate of change) for each OR.
  - D. On demand occupied/unoccupied control for each suite.
  - E. Much higher energy efficiency.
  - F. All maintenance functions to be done in RTU, not in OR suites.
5. 96-hour fuel oil storage (other than belly tank under generator).

# Electrical

## Distribution and Power

1. Normal Power Distribution:
  - A. Primary Distribution and Utility Service:
    1. **Utility** owned primary distribution provided by Utility
    2. Source: \_\_\_\_\_
    3. Primary Conduit: From \_\_\_\_\_ to transformer with \_\_\_\_\_ (qty-size) directional bored or direct buried ducts.
    4. Primary Cables: by Utility
  - B. Building Electrical Service:
    1. Utility owned transformer furnished by Utility
    2. 480V, 3-Phase, 4-Wire service.
    3. Single Transformer with Single Feed Secondary:
      - a. Transformer Location: \_\_\_\_\_
      - b. Copper secondary conductors from transformer to main electrical room buried concrete encased ducts.
    4. Primary conduit, concrete pad, secondary conduit and secondary conductors by contractor. Primary conductors and transformer by Utility.
  - C. Building Electrical Service Equipment:
    1. 1600 A Switchboard located in main electrical room.
    2. Service equipment located separate from generator and automatic transfer switches.
2. Essential Power Distribution (Emergency/Standby):
  - A. One (1) 400 KW diesel driven engine generator
    1. Outdoor **reach-in** style sound attenuated enclosure with sub-base tank.
    2. Fuel Oil Storage:
    3. 12-hour supply from sub-base tank
    4. Fuel for testing and refill before turnover provided by owner.
    5. Generator Location: See site plan.
    6. Portable Generator/Load Bank connection provisions in addition to required generator output breakers.
  - B. Essential System Configuration:
    1. Type 1 Essential Electrical System per NFPA-99 and NFPA-70 Article 517
  - C. ATS Branches:
    1. Life Safety:
      - a. Building-wide life safety components (Egress Lighting, Fire Alarm, Medical Gas Alarm, etc.)

- 2. Critical:
  - a. Essential lighting and receptacles in critical areas
  - b. Refer to "Application of Alternate Power" below for additional details.
- 3. Equipment:
  - a. Essential mechanical equipment serving critical areas
  - b. Refer to "Application of Alternate Power" below for additional details.

D. Application of Alternate Power:

- 1. Base Loads – The following are Code Required and will be provided with an alternate power source:

Egress Lighting	Fire Alarm	Exit Signs	Medical Gas Alarms
Overhead Paging	Automatic Doors	Nurse Call System	Access Control
Temperature Control	Telephone/Data Network	Patient Mon. Network	Data Room Ltg/Cooling
LV Room Ltg/Cooling	Electrical Rm Ltg/Cooling	Med Gas / Air/ Vacuum	Generator Accessories
Surgery Dept Vent/Htg	Surgery Dept Ltg/Rec	Operating Rm Vent/Htg	Operating Rm Ltg/Rec
Heating System Pumps	Sump Pumps	Medication Refrigerators	

- 2. Optional Loads – The following are Not Code Required but identified as essential to patient care and will also be provided with an essential power source:

Surgery Dept Cooling	Operating Rm Cooling	Video Surveillance	Automatic Plumbing
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- 3. Non-Essential Loads – The following are Not Code Required and have not been identified as essential to patient care. These will not be provided with an essential power source:

Office Ltg/Rec	Office Vent/Heat	Office Cooling	Nourishment Ref's
Sterilization Equipment			

E. Automatic Transfer Switches:

- 1. Open transition.
  - a. In-Phase Monitor: Life Safety, Critical (Branches)
  - b. Delayed Transfer: Equipment (Branches)
- 2. Electronic metering.
- 3. Bypass isolation with manual switch operation when automatic portion is out of service for life safety and critical branches.
- 4. Features to accommodate remote initiation of ATS testing, and remote monitoring of ATS status.
- 5. Surge protection device at first load-side distribution point of each transfer switch.

3. Distribution of Electrical Equipment:

A. Switchboards:

- 1. Single Ended. Front access only.

2. Fixed insulated case main breaker with full feature electronic trip and GFP
  3. Fixed molded case electronic trip with rating plug feeder/branch breakers with GFP
  4. Zone selective interlocking and ground fault protection – two levels.
  5. Surge Protection Device
  6. Copper bus - non-tapered
  7. Full-feature owner meter.
  8. Space for future circuit breakers.
- B. Panelboards:
1. Bolt-on molded case branch breakers
  2. Door-in-door cover
  3. Copper bus
  4. Surge protection device at life safety panels
  5. Isolated Power:
    - a. Normal and Critical panels in each Operating and Procedure room.
    - b. Laser receptacle power in each Operating and Procedure room.
- C. Interior Distribution Transformers:
1. Dry type
  2. Aluminum windings. 150-Deg C Rise, Standard DOE Efficiency.
- D. Wiring Methods:
1. Branch Circuit Application: Both Normal and Critical Branch lighting and receptacles in most areas.
  2. Conduit: EMT. 3/4" minimum. Color coded by distribution branch and system. Set-screw fittings, steel or cast.
    - a. Conduit Color Code
      1. Life Safety Branch: Yellow
      2. Critical Branch: Orange
      3. Equipment Branch: Green
      4. Normal Branch: None/Silver
  3. Conductors: Copper. Stranded. THHN-THWN2. Dedicated neutrals for each branch circuit (with color tracers). Minimum #12 AWG.
    - a. No aluminum conductors, No MC/AC or HCF Cable.
  4. Grounding: Continuous copper grounding backbone for power distribution and telecommunications rooms (routed separately). Insulated equipment grounding conductors in all branch circuits and feeders.
  5. Boxes: Steel device and pull boxes. Back supports on device boxes.
  6. Receptacles: 20A 120V hospital grade throughout. Tamper resistant throughout patient rooms, exam rooms, public waiting areas, and consult rooms.

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- a. Individual GFCI receptacles. GFCI breakers where receptacles are not readily accessible.
  7. Switches: Toggle switches 20A 120V
  8. Devices: Stainless steel device plates and ivory color devices. Essential Electrical System devices to be red.
  9. Device Labels: Adhesive labels on all devices. Devices in heavily cleaned areas will be engraved plates (operating rooms, procedure rooms, sterile processing, etc.)
  10. Fire Alarm Labels: Adhesive labels on addressable fire alarm devices to indicate address.
  11. Junction Box Labels: Label junction and pull boxes with permanent marker to indicate system and circuit number
  12. Disconnects: Heavy duty
  13. Equipment Nameplates: Color coded detailed engraved nameplates for all electrical distribution equipment, owner equipment disconnects, and mechanical equipment disconnects.
  14. Below Slab: No branch circuits below grade or below slab, unless serving site items or on-grade floor boxes. On-grade floor boxes shall utilize rigid metal conduit to maintain redundant grounding. No conduits poured within elevated floor slabs.
  15. Floor Boxes: Metallic with power, data, and AV devices.
  16. Device Application: Numerous receptacles throughout for convenience.
    - a. Bulk quantity of receptacles at: Nurse station
  4. Lightning Protection: NFPA-780 and UL-96A. Conceal down conductors within conduit in perimeter walls. Ground loop counterpoise and column/footing electrodes.
  5. Heat Trace/Snow Melt: \_\_\_\_\_
  6. Power Quality:
    - A. Uninterruptible Power Systems (UPS):
      1. Needed to bridge genset startup upon utility power failure and power isolation/conditioning.
      2. Individual UPS for Specific Equipment:
        - a. Med Equipment (local).
        - b. HVAC controls (local).
  7. Mechanical Equipment Connections:
    - A. Refer to mechanical description of scope for clarification on equipment being provided. Line voltage, fire alarm, and low voltage connections will be provided for mechanical equipment as needed.
    - B. Medical Gas Alarm Panels - 120V Life Safety Branch connection
    - C. Medical Gas Alarm Device Cabling
    - D. Building Management (BMS) / Temperature Controls Cabinets - 120V Equipment Branch connection. Data connection.
    - E. Sensor Operated Plumbing Fixtures - 120V Critical Branch connection (when utilized in critical areas)
    - F. Auxiliary Equipment – 120V Normal Branch or Equipment Branch (as required) circuit connections to auxiliary components specified with mechanical equipment: equipment interior lighting, service receptacles, UV lights, desiccant wheels, control power, etc.



8. Architectural Equipment Connection:
  - A. Exterior building-mount and site signage. Include 120V power and communications link as needed.
  - B. Power Operated Doors
  - C. Smoke Curtains and Shutters – Life safety power and fire alarm control.
  - D. Security Gates – Power and controls.
9. Owner Equipment:
  - A. Power and data connections to owner-furnished equipment. Owner equipment has not yet been fully scheduled or fully illustrated.
    1. Include cabling interconnections between remote mounted equipment components or equipment with remote displays (anticipate within OR's and other specialty spaces).
  - B. Ceiling Articulating Exam Lights in Specialty Rooms: Include light and wall controller installation. In operating and procedure rooms.
  - C. Storage Rooms: Include power and data along all walls to accommodate portable cart and equipment charging and upload/download/update.
  - D. Large Loads: Anticipate large owner equipment loads in: sterile processing department.
10. Floor Boxes (Power/Data – AV as required)
  - A. Procedure Rooms, Conference Rooms, Waiting Areas.

## Lighting

1. Lighting:
  - A. LED within all fixtures.
    1. Exceptions limited to: No Exceptions at this time (All fixtures anticipated to be available in LED)
  - B. Decorative Lighting: Include decorative sconces, pendants, vanities, coves, and highlighting of architectural features. Locations to be determined.
  - C. Exterior Lighting: Roadway, Drive, Parking, Pedestrian, Landscape, Building Façade, and Signage lighting will all be incorporated into the project site configured to provide a safe, inviting, and comfortable environment through effective application of general illumination and highlights of natural elements, building elements, and wayfinding. Light pollution and dark sky ordinance considerations will also be applied.
  - D. See attached lighting plan, for general lighting applications in each general space type. See below for additional space applications.
    1. Standard Volumetric: \_\_\_\_\_ LED
    2. Task Lighting: Locations as identified. (Initially anticipate at all overhead cabinets)
    3. Private Toilets: Initially anticipate one vanity and two downlights per toilet.
    4. Alcoves and Door Pockets: Initially anticipate lighting specifically located in these areas.
    5. Interior Architectural Features: \_\_\_\_\_
    6. Building Façade: Specialty exterior accent and wash lighting, all building faces.
    7. Exterior Architectural Features: \_\_\_\_\_

8. All exterior roadways, drives, and pedestrian walks will be illuminated.
2. Lighting Controls:
    - A. A low-voltage networked addressable lighting controls system, utilizing automatic ceiling occupancy sensors (dual-technology), time scheduling, and low voltage switches in all spaces (excluding Operating and Procedure Rooms).
    - B. All rooms interconnected for total networked system.
    - C. Most LED fixtures will be dimmed.
    - D. Wireless networked lighting control system for remote exterior lighting.
    - E. Daylight dimming at perimeter rooms and windowed areas of corridors, waiting, and other open windowed areas.

## Low Voltage

### Building Systems

1. Fire Alarm:
  - A. Exact requirements to be confirmed with Novant Health.
  - B. Listed addressable fire alarm system, reporting to Novant Health Corporate Monitoring Location.
  - C. Audible Devices: Voice Evacuation with audible coverage throughout.
  - D. Visual Devices: All public and patient locations and additional locations as required by ADA and NFPA-72. Synchronized.
  - E. Manual Button Stations: Double action. At every exit from every level and at the central nurse station of each care unit.
  - F. Spot Smoke Detectors: Spot smoke detection throughout corridors and areas open to corridors and where required for operation of held doors, elevator recall, and other equipment specialties requiring indication of smoke.
  - G. Duct Smoke Detectors: At AHUs 2000cfm or greater and within 5' of each smoke damper. Connected with dedicated addressable control for each, programmed for isolated operation of the component they are required to shutdown.
  - H. Mag Holds: Magnetic door holds at various doors between smoke and fire compartments.
  - I. Fire Suppression: Individual addressable monitoring of each fire suppression supervisory, trouble, or alarm device. Refer to suppression system information in the Mechanical sections of this document.
  - J. Access Control: Addressable connections at doors that restrict egress to release door control upon fire alarm.
  - K. Cabling: Listed fire alarm cabling routed independent of other cabling systems installed in a complete EMT conduit system. No loose cables above ceilings.
  - L. Fire Alarm Control Panel Location: Main Electrical Room
  - M. Remote Alarming: Dedicated reporting of alarm/supervisory/trouble conditions with local dialer.
  - N. Remote Annunciators: Local Fire Department Building Entries and Nurse Station
2. Building Management / Temperature Controls:
  - A. Refer to requirements illustrated in the Mechanical sections of this document.
3. Medical Gas Systems:
  - A. Refer to requirements illustrated in the Mechanical sections of this document.

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## Telecommunications (IT)

All low voltage cabling is owner furnished, owner installed. This project will provide boxes and conduits stubbed to above the corridor accessible ceiling for all systems as coordinated with the equipment locations. Conduit to be minimum 1" for telecommunications conduits.

1. Communications Services:
  - A. (3) 4" Schedule 40 PVC conduits to 3'x3'x3' in-grade box at property line at intersection of Ocean Highway East and Benton Brown Way NE. Novant Health to confirm if conduits need to be concrete encased.
2. Communications Rooms:
  - A. Room Construction: Space for two (2) racks with approximately 3' working space around racks. Fire treated plywood on all walls with two (2) coats of fire resistant white paint on all faces and edges (one fire resistance label per sheet exposed) for mounting of various low voltage system hardware components.
  - B. Ground bar connected to telecommunications ground system. All connections to cable tray, racks, etc. to be by owner.
  - C. Cable Management: By owner.
  - D. Racks: By owner.
3. Data Backbone Cabling: By owner.
4. Analog Voice Backbone Cabling: By owner.
5. Data/Wireless Horizontal Cabling: By owner.
6. Analog Voice Horizontal Cabling: By owner.
7. Data Network Equipment and WAPs: By owner.
8. Telephone System Equipment and Handsets: By owner.
9. Cable Management and Pathways:
  - A. Rough-ins: Deep device boxes complete with conduit stubbed concealed to accessible corridor ceiling.
  - B. Wall Penetrations: 4" STI EZ-Path or equivalent fire rated intumescent pass-thru assemblies. Conduits and fire putty only where pass-thru assemblies are incompatible with construction and application constraints. Pass-thru assemblies at communication room walls, cross corridor walls, and floor penetrations. Minimum (3) 4" pathways through fire rated walls along main routing path.
  - C. Conduit Color Codes:
    1. Voice, Data, Video, Optical Fiber: Blue
    2. Overhead Paging: Black
    3. Nurse Call/Code Blue Systems: White
    4. Fire Alarm: Red
    5. Security Systems, Access Control, BAS Controls: Purple

## Security

1. Door Access Control
  - A. Provide box and conduit rough-ins. Cabling and devices by owner.

- B. Power: Provide critical branch power circuits to Door Access Control door controllers and to each controlled door location.
- 2. *Intrusion Alarm*
  - A. To be confirmed with Novant Health.
  - B. Provide box and conduit rough-ins. Cabling and devices by owner.
- 3. *Duress*
  - A. Provide box and conduit rough-ins. Cabling and devices by owner.
- 4. *Exterior Call Boxes*
  - A. Select Manufacturer: Exact Manufacturer yet to be selected.
  - B. Select Vendor: Exact Vendor yet to be selected.
  - C. Exterior 'blue-light' call station with audio 'Push for Help' button and flashing beacon with Voice-over-IP call integration to the building check-in desk location. Fiber optic cabling if required to accommodate station placement distance.
  - D. Locations: At select locations throughout parking areas.
- 5. *Camera Surveillance (Security)*
  - A. Provide box and conduit rough-ins. Cabling and devices by owner.
- 6. *Camera Surveillance (Patient)*
  - A. None anticipated.
- 7. *Infant Security (Exciters and Band Removal)*
  - A. None anticipated.

## **Medical/BioMed**

- 1. Nurse Call – Edwards pull cord system.
  - A. Provide box and conduit rough-ins. Cabling and devices by owner.
- 2. Nurse Wireless Phones (Local SIP):
  - A. Owner provided iPhones.
- 3. Patient Monitoring/Telemetry (Hardwired and Wireless):
  - A. GE patient monitoring, no telemetry.
  - B. Provide box and conduit rough-ins. Cabling and devices by owner.
- 4. OR Video Integration:
  - A. Select Manufacturer: Exact Manufacturer yet to be selected.
  - B. Select Vendor: Exact Vendor yet to be selected.
  - C. System of box and conduit pathways and power provisions required to manage extensive video integration cabling serving cameras, displays, and additional OR equipment.
  - D. Video integration equipment, devices, and cabling will be provided by Owner - under separate contract.
- 5. Sleep Lab Systems:

A. None.

6. eICU, or other 'e' Services:

A. None anticipated.

## **Communications**

1. Overhead Paging:

A. Select Manufacturer: Exact Manufacturer yet to be selected.

B. Select Vendor: Exact Vendor yet to be selected.

C. Zoning: Per department.

D. Speakers and Amplifiers: System shall provide public address paging features – adjustable per zone.

E. Telephone Access: Paging access through the telephone system (by use of telephone system address extensions) with integration for individual paging per zone and defined groups of zones.

2. Sound Masking:

A. None anticipated.

3. Wireless Phones (DAS – Public Cellular):

A. None anticipated.

4. Staff Pagers (Public Cellular):

A. None anticipated.

5. Staff Radio Antenna:

A. None anticipated.

6. Intercom (Audio and Video, Point-to-Point):

A. Provide box and conduit rough-ins. Cabling and devices by owner.

7. Door Bell:

A. None anticipated.

8. Emergency Broadband Radio:

A. None anticipated.

## **Audio/Visual**

1. Television Cabling (CATV):

A. Provide box and conduit rough-ins. Cabling and devices by owner.

2. Television Sets:

A. By Owner - under separate contract.

3. Music:

A. None anticipated.

## Monitoring

1. Temperature Monitoring (Wireless):
  - A. Owner Provided SensoScientific system.
  - B. Each refrigerator utilized to support patient medications, specimens, or blood donation will be monitored by a central system through wireless communications that will notify personnel when temperatures vary beyond identified settings.
  - C. Provide receptacle adjacent to the monitored equipment for monitoring system power.
2. Equipment Tracking (RTLS):
  - A. None anticipated.
3. Staff Tracking (RTLS):
  - A. None anticipated.

## Staff Systems

1. Synchronized Clocks (Wireless):
  - A. By Owner.
  - B. Digital wireless clocks with wireless radio synchronization or wireless IP synchronization.
2. Staff Time Clocks
  - A. Provide box and conduit rough-ins. Cabling and devices by owner.