VIII. Special Design Considerations

A. Construction Type

To meet the life safety requirements listed below, as well as comply with the State Building Construction Act (Uniform Building Code, 1997 Edition), a single story replacement Home could be constructed of non-combustible/non-rated construction provided that it is fully equipped with an automatic sprinkler system, subdivided into smoke compartments of appropriate size and configuration, and adequately separated from other construction with public ways or yards.

B. Mechanical Systems

The mechanical design will include heating, ventilating, air conditioning, controls, fire sprinkler and plumbing systems. Design of these systems will be based on the latest editions of the following publications:

1) ASHRAE Handbooks and Standards
2) Uniform Building Code
3) Uniform Mechanical Code
4) Uniform Plumbing Code
5) Model Energy Code
6) National Fire Protection Association

Design Conditions: The outside summer and winter design conditions used for the load calculations will be based upon 0.4% and 99.6% ASHRAE published values, respectively. The ventilation rates will be based upon ASHRAE standard 62-2001 recommendations. The outdoor design conditions, the indoor design conditions, the ventilation rates, and the exhaust rates will be as follows:

Outdoor Air Conditions:
Summer
95 deg F Dry-bulb (0.4% design dry bulb)
75 deg F Wet-bulb (0.4% design wet bulb)
Winter
-15 deg F Dry-bulb (modified from ASHRAE recommendations)

Indoor Design Conditions:
Summer
78 deg F Dry-bulb (corridors and restrooms)
75 deg F Dry-bulb (member's rooms)
50% relative humidity
Winter
72 deg F Dry-bulb
30% relative humidity (mechanical humidification to be provided)

Ventilation Rates

25 cfm/person – member's rooms
60 cfm/person – smoking lounges
20 cfm/person – general areas

Exhaust Rates for restrooms, janitors closets, etc.:

2 cfm per square foot.

Design Approach – Heating Ventilating and Air Conditioning Systems

Typical HVAC systems used for this type of facility are Variable Air Volume (VAV) air handlers with individual zone air terminal units with reheat coils, VAV air handlers with fan powered air terminal units, and four-pipe fan coil units. Due to the type of occupancy, a perimeter hot water heating system would be used to offset perimeter heat losses regardless of the main system type selected. Any of these systems can be designed to provide individual control for each member's room, which is an important consideration for the type of occupancy.

The VAV air handling system with air terminals and reheat coils consists of central air handlers which bring in outside air for ventilation, mix it with return air from the spaces, filters and then either heats or cools and dehumidifies the air before distributing it to the individual spaces through ductwork. Each member's room as well as other discrete spaces has an air terminal unit with a reheat coil. The air terminal unit contains a damper which modulates the volume of cold air from the air handling unit down to a minimum value and then a hot water coil at the outlet of the air terminal unit re-heats the air as required to provide individual temperature control in each space. Perimeter hot water heating fin tubes offset heat loss through the building envelope to maintain comfort conditions in the occupied spaces by eliminating cold drafts at the exterior walls.

VAV air handling systems with fan powered air terminal units perform a similar function to the VAV system described above. Central air handling units mix outside air with building return air for ventilation, filter and heat or cool and dehumidify air before distributing it to the individual spaces through ductwork. Each member's room, as well as other discrete spaces, has a fan powered air terminal unit which contains a small blower fan that draws air in from the plenum space above the ceiling and mixes it with the primary air from the central air handling unit. The amounts of primary air and plenum air are varied to provide individual temperature control in the space. As in the VAV with re-heat system described above, perimeter hot water heating fin tubes would be provided to offset heat loss through the building envelope to maintain comfort conditions in the occupied spaces.

Four pipe fan coil systems consist of units installed in each member's room as well as other discrete spaces and contain small blower fan(s), a hot water heating coil and chilled water cooling coil. Fan coil units can either be console mounted, usually along the perimeter wall of a space, or mounted above the ceiling and use ductwork

to circulate and distribute heated or cooled air to the occupied space. Horizontal fan coils, mounted above the ceiling and ducted to and from the occupied space would be the type of fan coil units evaluated for use in this facility. The fan coil units contain hot water heating and chilled water cooling coils which provide all of the temperature control of the space. Heating hot water and chilled water is piped to all of the fan coil units from central boilers and chillers. Outside air for ventilation is typically handled by central energy recovery units that condition outside air with exhaust air from toilet rooms and other spaces.

All of the systems described above, rely on central hot water heating boilers and chillers as the main heating and cooling sources. Typically multiple modular, gas fired hot water boilers are used to provide some redundancy as well as good turn down during varying load conditions. A central chiller, or potentially two chillers for partial redundancy, would produce chilled water to be distributed to either the VAV air handlers or the fan coil units in the four pipe system.

Control of the systems ultimately designed for the facility would be provided by a direct digital energy management system, which provides optimum balance between energy savings and occupant comfort. In addition to the energy savings and accurate, responsive occupant comfort the DDC system provides, it also provides remote monitoring, control and trouble shooting capability.

Design Approach – Plumbing Systems

All utilities such as sanitary sewer, storm sewer, natural gas and potable water shall be adequately provided to serve the facility. Restrooms will typically be supplied with wall mounted water closets and lavatories, which meet ADA guidelines. Domestic water heaters will be gas fired. All special kitchen requirements will be coordinated with the food service consultant.

Design Approach – Fire Protection

The entire facility shall be protected with a wet pipe sprinkler system installed in accordance with NFPA 13 and 14 and other local applicable codes.

C. Life Safety/ADA

38 CFR Chapter 1 Part 59 Grants to States for Construction or Acquisition of State Homes requires in Paragraph 59.130(d)(1) that State homes meet the provisions of the National Fire Protection Association (NFPA) 101 Life Safety Code, 2000 Edition and the NFPA 99 Standard for Health Care Facilities, 1999 Edition, as well as State and local fire codes. The State fire code is contained within 153 Nebraska Administrative Code (NAC) 1, Nebraska State Fire Code Regulations. Nebraska HHSS Title 175 Chapter 12 regulations governing Licensure of Skilled Nursing Facilities, Nursing Facilities, Intermediate Care Facilities require compliance with both the State Fire Code

38 CFR Chapter 1 Paragraph 59.130(b) requires that a State home meet the requirements of the Uniform Federal Accessibility Standards, while Nebraska HHSS Title 175 Chapter 12 requires new facilities to comply with 156 NAC 1-12 Nebraska Accessibility Requirements..

D. Phasing

Phased construction is not required for a replacement facility. A plan to implement an orderly transition from the existing building to the new facility would need to be developed.

E. Future Expansion

The ability to add laundry facilities, as well as additional bedrooms, should be included in the design planning, in the event circumstances change.