An eight unit row housing complex is to be built. The complex will have 3000w of roadway and ornamental lighting. Each unit is one storey with outside dimensions of 14m x 12m with full basement. Each unit has a 4000w dryer and 11000w range, and 4000w AC unit. Each unit also has 10kW electric baseboard heat. Voltage is 120/240 single-phase.

Calculate:

1. Basic demand watts for each unit. Area = 14 x 12 x 1.75 = 294 m^2
   
   - 3,500 W for 1st 45 m^2
   - 1,500 W for next 45 m
   - 3,000 W for next 3 - 90 m^2 (or portion thereof)

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   8,000 W Basic Load

2. Total demand watts for each unit.

   - 8,000 W Basic Load
   - 10,000 W Electric heat @ 100%
   - 6,000 W Range
   - 1,000 W Dryer (25% because we have a range)

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   25,000 Demand Watts per Unit

3. Minimum allowable ampacity for the service conductors to each unit.

   Minimum Service Amps = 25,000 W/240 V = 104 A

4. Size of service for each unit. 125 A

5. Minimum allowable ampacity for the main service conductors.

   First we must remove the heating portion of the demand for each unit. 25,000 – 10,000 = 15,000

   - 15,000 W First (largest) unit @100%
   - 19,500 W Next two (largest) units @ 65%
   - 12,000 W Next two (largest) units @ 40%
   - 11,250 W Last three units @ 25%

   2,813 W Roadway lighting located outside dwelling units (3000 x 75% / 80% because it is continuous load)

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   60,563 W Sub Total

   62,500 W Heat back in (1st 10kW@100% balance at 75%)

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123,063 W Total Demand Watts for Complex
Minimum Allowable Ampacity for main service conductors  = 123,063/240 = 512.8A

6. Size of main service. 600 A
7. Conduit size for main service. 1000 kcmil (Using 5% rule) in Trade size 103 (4”)
8. Grounding conductor size for main service. No.1 AWG