Apartment Calculations

A building has 12 electrically heated apartments with four type A, four type B and four type C. Using Copper RW90 wire single-phase 120/208V power to units (three-phase for main) Heating is central electric

<table>
<thead>
<tr>
<th>Loads</th>
<th>Suite Type A</th>
<th>Suite Type B</th>
<th>Suite Type C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area M²</td>
<td>80</td>
<td>100</td>
<td>120</td>
</tr>
<tr>
<td>Range kW</td>
<td>12</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Water heater kW</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Clothes Dryer kW</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Electric Heat kW</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Demand Wattage</td>
<td>21,000</td>
<td>24,800</td>
<td>26,800</td>
</tr>
<tr>
<td>Minimum Amp Service Conductor Unit</td>
<td>101</td>
<td>119.2</td>
<td>128.8</td>
</tr>
<tr>
<td>Size service Unit</td>
<td>125</td>
<td>125</td>
<td>200</td>
</tr>
<tr>
<td>Minimum Size Bonding Conductor Unit</td>
<td>No.6 AWG</td>
<td>No.6 AWG</td>
<td>No.6 AWG</td>
</tr>
<tr>
<td>Service Conductor Size Unit R90</td>
<td>No.2 AWG 5% Rule</td>
<td>No.2 AWG 5% Rule</td>
<td>No.00 AWG</td>
</tr>
<tr>
<td>Conduit Size for Service Unit</td>
<td>Trade size 27 (1”)</td>
<td>Trade size 27 (1”)</td>
<td>Trade size 41 (1 ½”)</td>
</tr>
</tbody>
</table>

Suite A

3,500 W first 45 m²
1,500 W next 45 m² (or portion thereof)
8,000 W Electric Heat (Central)
6,000 W Range
750 W Water heater (25% because of range)
1,250 W Dryer (25% because of range)

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21,000 W Total Demand Watts/ 208 V = 100.1 A
Suite B
3,500 W first 45 m²
1,500 W next 45 m²
1,000 W next 90 m² (or portion thereof)
10,000 W Electric Heat (Central)
6,800 W Range (6000 for 12kW + 40% of balance)
750 W Water Heater (25% because of range)
1,250 W Dryer (25% because of range)
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24,800 W Total Demand Watts / 208 V = 119.2 A

Suite C
3,500 W first 45 m²
1,500 W next 45 m²
1,000 W next 90 m² (or portion thereof)
12,000 W Electric Heat (Central)
6,800 W Range (6000 for 12kW + 40% of balance)
750 W Water Heater (25% because of range)
1,250 W Dryer (25% because of range)
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26,800 W Total Demand Watts / 208 V = 128.8 A

Calculate the total demand watts for the main building service, the minimum service conductor amperage, size service, pipe size and ground wire

Demands less heat for each unit
A = 21,000 – 8,000 = 13,000
B = 24,800 – 10,000 = 14,800
C = 26,800 – 12,000 = 14,800

Largest unit (C) at 100% = 14,800 W
Next two largest (Both Cs) @ 65% = 19,240 W
Next two largest (B & C) @ 40% = 11,840 W
Last 7 @ 25% (3B & 4As) = 24,100 W
Heat Central (10kW @ 100%) = 92,500 W
Balance @ 75% = 162,480 W
Total Demand Watts = 162,480 W/($\sqrt{3} \times 208$) = 451A
Service is 600A
Actual Service Conductor size is 1000 kcmil
Conduit size is 103 (4”)
Grounding conductor is No. 1 AWG