Minimum size conductors in the raceway based on actual load *[see Article 100, Ampacity, and 310.15(C)(1) and correction factors to Table 310.16]*:

$$95{,}500 \text{ VA} \div 0.7 \div 0.96 = 142{,}000 \text{ VA}$$

[70% = 310.15(C)(1)] & [0.96 = Correction factors to Table 310.16]

Conversion to amperes:

$$142{,}000 \text{ VA} \div (480 \text{ V} \times \sqrt{3}) = 171 \text{ A}$$

Note that the neutral conductors are counted as current-carrying conductors *[see 310.15(E)(3)]* in this example because the discharge lighting has substantial nonlinear content. This requires a 2/0 AWG conductor based on the 90°C column of Table 310.16. Therefore, the worst case is given by the raceway conditions, and 2/0 AWG conductors must be used. If the utility corridor were at normal temperatures [30°C (86°F)], and if the lighting at each building were supplied from the local separately derived system (thus requiring no neutrals in the supply feeders), the raceway result (95,500 VA ÷ 0.8 = 119,000 VA; 119,000 VA ÷ (480 V × √3) = 143 A, or a 1 AWG conductor @ 90°C) could not be used, because the termination result (1/0 AWG) based on the 75°C column of Table 310.16 would become the worst case, requiring the larger conductor.

In every case, the overcurrent protective device shall provide overcurrent protection for the feeder conductors in accordance with their ampacity as provided by this *Code (see 240.4)*. A 90°C 2/0 AWG conductor has a Table 310.16 ampacity of 195 amperes. Adjusting for the conditions of use (35°C ambient temperature, 8 current-carrying conductors in the common raceway),

$$195 \text{ A} \times 0.96 \times 0.7 = 131 \text{ A}$$

The 150-ampere circuit breaker protects the 2/0 AWG feeder conductors, because 240.4(B) permits the use of the next higher standard size overcurrent protective device. Note that the feeder layout precludes the application of 310.14(A)(2) Exception.

Feeder Neutral Conductor *(see 220.61)*

Because 210.11(B) does not apply to these buildings, the load cannot be assumed to be evenly distributed across phases. Therefore the maximum imbalance must be assumed to be the full lighting load in this case, or 11,600 VA. (11,600 VA ÷ 277 V = 42 A.) The ability of the neutral-to-return fault current *[see 250.32(B) Exception No. 2]* is not a factor in this calculation.

Because the neutral runs between the main switchboard and the building panelboard, likely terminating on a busbar at both locations, and not on overcurrent devices, the effects of continuous loading can be disregarded in evaluating its terminations *[see 215.2(A)(1) Exception No. 3]*. That calculation is (11,600 VA ÷ 277 V = 42 A), to be evaluated under the 75°C column of Table 310.16. The minimum size of the neutral might seem to be 8 AWG, but that size would not be sufficient to be depended upon in the event of a line-to-neutral fault *[see 215.2(B), second paragraph]*. Therefore, because the minimum size equipment grounding conductor for a 150 ampere circuit wired with 2/0 AWG conductors, as covered in Table 250.122, is 6 AWG, that is the minimum neutral size required for this feeder.

Example D4(a) Multifamily Dwelling

A multifamily dwelling has 40 dwelling units.

Meters are in two banks of 20 each with individual feeders to each dwelling unit.

One-half of the dwelling units are equipped with electric ranges not exceeding 12 kW each. Assume range kW rating equivalent to kVA rating in accordance with 220.55. Other half of ranges are gas ranges.

Area of each dwelling unit is 840 ft².

Laundry facilities on premises are available to all tenants. Add no circuit to individual dwelling unit.

Calculated Load for Each Dwelling Unit *(see Article 220)*

General Lighting: 840 ft² at 3 VA/ft² = 2520 VA

Special Appliance: Electric range *(see 220.55)* = 8000 VA

Minimum Number of Branch Circuits Required for Each Dwelling Unit *[see 210.11(A)]*

General Lighting Load: 2520 VA ÷ 120 V = 21 A or two 15-A, 2-wire circuits; or two 20-A, 2-wire circuits

Small-Appliance Load: Two 2-wire circuits of 12 AWG wire *[see 210.11(C)(1)]*

Range Circuit: 8000 VA ÷ 240 V = 33 A or a circuit of two 8 AWG conductors and one 10 AWG conductor in accordance with 210.19(C)

Minimum Size Feeder Required for Each Dwelling Unit *(see 215.2)*

Calculated Load *(see Article 220)*:	
General Lighting	2,520 VA
Small Appliance (two 20-ampere circuits)	3,000 VA
Subtotal Calculated Load (without ranges)	5,520 VA

Application of Demand Factor *(see Table 220.45)*

First 3000 VA at 100%	3,000 VA
5520 VA - 3000 VA = 2520 VA at 35%	882 VA
Net Calculated Load (without ranges)	3,882 VA
Range Load	8,000 VA
Net Calculated Load (with ranges)	11,882 VA

Size of Each Feeder *(see 215.2)*

For 120/240-V, 3-wire system (without ranges)
Net calculated load of 3882 VA ÷ 240 V = 16 A
For 120/240-V, 3-wire system (with ranges)
Net calculated load, 11,882 VA ÷ 240 V = 50 A

D.8.6 Feeder Neutral

Lighting and Small-Appliance Load	3,882 VA
Range Load: 8000 VA at 70% *(see 220.61)*	5,600 VA
(only for apartments with electric range)	5,600 VA
Net Calculated Load (neutral)	9,482 VA