



# Duquesne Light

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June 4, 1985

United States Nuclear Regulatory Commission  
Washington, DC 20555

ATTENTION: Mr. George W. Knighton, Chief  
Licensing Branch 3  
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station - Unit No. 2  
Docket No. 50-412  
Electrical Separation Criteria

Gentlemen:

The attached information is provided to close outstanding issues related to Regulatory Guide 1.75 electrical separation at BVPS-2. This attachment consists of the following information:

1. Test Report on Electrical Separation Verification Testing for Duquesne Light Company's Beaver Valley Power Station - Unit 2, including the following Appendices:

- Appendix A: Correlation of FSAR Figures with Test Configuration Justification
- Appendix B: Temperature Versus Time Plots Marked at Appropriate Durations
- Appendix C: Test Results Summary
- Appendix D: Calculation 12241-El11: Determination of 480V Motor Pigtail Failure Times
- Appendix E: Wyle Test Report on Electrical Separation Verification Testing for Duquesne Light Company's Beaver Valley Power Station - Unit 2

2. FSAR changes based on this test program including:

- ° FSAR 1.8 (Regulatory Guide Position)
- ° FSAR 8.3.1.4 (Independence of Redundant Systems)
- ° FSAR Figures 8.3-16 through 8.3-73

We are presently revising the appropriate installation documents based on the information provided in this submittal.

SUBSCRIBED AND SWORN TO BEFORE ME THIS  
3rd DAY OF June, 1985.

*Anita Elaine Reiter*  
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC  
ROBINSON TOWNSHIP, ALLEGHENY COUNTY  
MY COMMISSION EXPIRES OCTOBER 20, 1986

DUQUESNE LIGHT COMPANY

By *J. J. Carey*  
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Vice President

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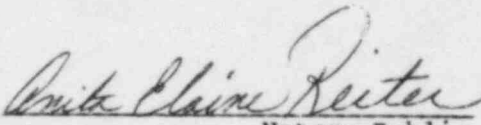
United States Nuclear Regulatory Commission  
Mr. George W. Knighton, Chief  
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Attachment

cc: Mr. R. DeYoung, Director (3) (1-w/a; 2-w/o)  
Mr. S. Ebnetter (w/a)  
Mr. J. Knox (w/a)  
Mr. B. K. Singh, Project Manager (w/a)  
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COMMONWEALTH OF PENNSYLVANIA )  
 ) SS:  
COUNTY OF ALLEGHENY )

On this 3rd day of June, 1985, before me, a  
Notary Public in and for said Commonwealth and County, personally appeared  
J. J. Carey, who being duly sworn, deposed and said that (1) he is Vice  
President of Duquesne Light, (2) he is duly authorized to execute and file  
the foregoing Submittal on behalf of said Company, and (3) the statements set  
forth in the Submittal are true and correct to the best of his knowledge.

  
Notary Public  
ANITA ELAINE REITER, NOTARY PUBLIC  
ROBINSON TOWNSHIP, ALLEGHENY COUNTY  
MY COMMISSION EXPIRES OCTOBER 20, 1986

1.8 Conformance to NRC Regulatory Guides

R.G. No. 1.75 Rev. 2

FSAR Reference Sections 7.1.2.2.1, 8.3.1.4, 8.3.2.2

PHYSICAL INDEPENDENCE OF ELECTRIC SYSTEMS (SEPTEMBER 1978)

Beaver Valley Power Station - Unit 2 (BVPS-2) complies with Regulatory Guide 1.75 for physical independence of electrical systems with the following clarifications:

1. General

For the purposes of electrical separation, equivalent protection is provided through enclosure by rigid aluminum conduit, rigid steel conduit, electro-metallic tubing (EMT), flexible aluminum conduit, and flexible steel conduit. Enclosures provided to meet the requirements of BTP CMEB 9.5-1 are considered equivalent to enclosures provided for electrical separation and will have 1 hour or longer fire rating.

Metal clad cable, type MC, utilized in low energy, 120 V ac and 125 V dc nominal, circuits and in low density applications is considered adequately protected. As such, the minimum separation between these cables and other cables, or raceway (where required) is 1 in. These cables are further described as follows:

- a. Type MC cable is a factory assembly of conductors, each individually insulated, enclosed in a metallic sheath of interlocking tape or a smooth or corrugated tube.
- b. Largest conductor size is number 10 AWG.
- c. No more than six conductors.
- d. No more than three number 10 AWG conductors with remaining conductors of smaller size.
- e. Aluminum sheath cable (a Type MC cable in which the aluminum is continuously welded) and/or interlocked armor cable may have an overall jacket of neoprene or hypalon.

Type SO or SJO cords for lighting drops to fixtures are size 12 AWG or smaller and supply low energy, 120 V ac or 125 V dc, in low density applications. Adequate protection is provided by 1 in. or greater distance to Class 1E raceways.

A raised floor panel can be used as a barrier. Panels are 1 in. thick particle board with 22 gauge steel top and bottom sheets, and are fire rated Class A. These panels are considered a barrier when used in a configuration as shown in IEEE Standard 384-1974, Figure 2, 3, or 4.



The Cable Spreading Areas (CSA - Main Control Room, Cable Spreading Room, and Computer Room) are protected areas and are not exposed to potential hazards such as high pressure piping, missiles, flammable material, flooding, or wiring that is not flame retardant. They do not contain high energy equipment such as switchgear, transformers, rotating equipment, or potential sources of missiles or pipe whip and are not used for storing flammable materials.

The General Plant Areas (GPA) have been analyzed for potential hazards and as such are categorized as areas where the damage potential is limited to failures or faults internal to the electrical equipment or circuits.

2. Position C.6

Analyses of potential hazards in Section 5.1.1.1 of IEEE Standard 384-1974 are accomplished as follows:

- a) The high pressure piping and missile analyses are described in Sections 3.6 and 3.5, respectively.
- b) The fire protection analyses are outlined in Section 9.5.1 and the Fire Protection Evaluation Report (see Table 1.7-3)
- c) Flame retardant characteristics of cable systems are described in Section 8.3.3.

- d) The building design for external and internal flooding is described in Sections 3.4 and 3.8, respectively. The environmental effects on safety-related components due to internal flooding are described in Sections 3.6B, 3.4, and 3.11.

An extensive test program has been conducted at Wyle Labs in Huntsville, Alabama in accordance with Section 5.1.1.2 of IEEE Standard 384-1974, "IEEE Trial-Use Criteria for Separation of Class 1E Equipment and Circuits", to establish minimum separation distances for BVPS-2. A test report, "Test Report on Electrical Separation Verification Testing for Duquesne Light Company's Beaver Valley Power Station - Unit 2", including the Wyle test report has been submitted under separate submittal. (See Table 1.7-3). The conclusions of this report are as follows:

- a) In the General Plant Areas the minimum horizontal spatial separation is reduced from 3 feet to 1 foot.
- b) Ventilated tray covers and cable bus enclosures are equivalent to solid tray covers.
- c) Protective Wraps
  - i) Lengths of cable enclosed in a protective wrap of woven silicon dioxide with a minimum of one inch free space

protects adjacent cables from electrically induced problems in the cables within the protective wrap.

ii) Lengths of cable enclosed in a protective wrap of woven silicon dioxide with a minimum of one inch free air space are protected from electrically induced problems in adjacent cables.

iii) Lengths of cable enclosed in a protective wrap of woven silicon dioxide are protected from electrically induced problems in adjacent cables when the adjacent cables are also enclosed in a protective wrap of woven silicon dioxide.

iv) The protective wrap of woven silicon dioxide (Trade Name: SIL-TEMP) is normally 54 mils thick and is wrapped longitudinally around cable(s) with a 100% overlap (i.e. two thicknesses). The protective wrap of woven silicon dioxide may also be a tape, nominally 125 mils thick, applied helically with a 50% lap (half-lapped). In either case an overall 50% lap (half-lapped) of 3M No. 69 glass tape is required.

d. In plant areas (both GPA and CSA) where plant arrangement precludes minimum spatial separation between redundant Class 1E circuits or between Class 1E and nonClass 1E circuits separation is achieved as follows:

i) Tray to Tray (Figures 8.3-16 through 8.3-37)

Vertical - One inch minimum free air space and  
a single tray cover

Horizontal - One inch minimum free air space and  
a tray cover top and bottom on one  
tray

ii) Tray to Conduit (Figures 8.3-38 through 8.3-43)

Vertical - One inch minimum free air space

Horizontal - One inch minimum free air space

iii) Cable in Air to Cable in Air (Figures 8.3-44 through  
8.3-55)

Vertical - One inch minimum free air space and  
enclosure of one circuit (group) in  
conduit or a protective wrap.

or

Zero inch minimum free air space and  
enclosure of both circuits (groups)  
in protective wraps.

Horizontal - One inch minimum free air space and enclosure of one circuit (group) in conduit or a protective wrap.

or

Zero inch minimum free air space and enclosure of both circuits (Groups) in protective wraps.

iv) Cable in Air to Tray (Figures 8.3-56 through 8.3-67)

Vertical - One inch minimum free air space and a tray cover

or

Zero inch minimum free air space with both a tray cover and enclosure of the cable in a protective wrap.

v) Cable in Air to Conduit (Figures 8.3-68 through 8.3-72)

Vertical - One inch minimum free air space

Horizontal - One inch minimum free air space



e. Inside Control Switchboards and Instrument Cabinets separation between redundant Class 1E or Class 1E and Non-Class 1E wire (bundles) is provided by one of the following:

i) A barrier

ii) A minimum of one inch free air space

iii) Enclosing both wire (bundles) in a protective wrap of woven silicon dioxide (no overall glass tape).

For justification refer to the test report.

3. Position C.7 (Section 4.6 of IEEE Standard 384)

Minimum separation between Class 1E and non-Class 1E circuits is as specified in Sections 5.1.3, 5.1.4, or 5.6.2 of IEEE Standard 384-1974, except as discussed under Position C.6.

4. Position C.9

Cable trays for control and instrumentation cables may be filled above the side rails where the overfill has been limited to a maximum of 1 1/2 in. above the top of the side rail and where solid hat covers with a 2 in. raised flat center section are used to enclose the top of the cable tray as shown on Figure 8.3-73.

5. Position C.10

Class 1E cable and raceways shall be marked at intervals not exceeding 15 ft and shall be plainly visible.

6. Position C.12

- a. Power cables that supply power to the control, computer, or cable spreading room panels, limited to 120 V ac or 125 V dc, are enclosed in rigid metallic conduit or flexible conduit at the entrance to panels.
- b. Power cables serving facilities in or traversing the control, computer, or cable spreading room, limited to 480 V ac, 120 V ac, or 125 V dc, are enclosed in rigid metallic conduit or in flexible conduit at the entrance to panels or equipment.
- c. As noted above in items a and b, all power cables are totally enclosed in rigid metallic conduit or in flexible conduit or in enclosed raceway and are not exposed to free air. Any potential electrical fires caused by fault current in the power cables are not considered to be a credible hazard, since fires resulting from fault current would be contained in the conduit. In addition, these rooms are protected areas and are not subject to external energetic events such as floods, high energy pipe breaks, and missiles.

- d. The loss of the above cables, or the control, computer, or cable spreading rooms due to the design basis event of fire, will not compromise the capability to achieve cold shutdown as out-lined in Section 9.5.1 and in the Fire Protection Evaluation Report.
  - e. The Beaver Valley Power Station - Unit 2 design utilizes a single cable spreading room.
7. Position C.16 (Section 5.6.2 of IEEE-Standard 384)

The minimum 6 in. separation (or a barrier) applies to spacing between exposed terminals, contacts, and equipment of redundant Class 1E circuits or Class 1E and non-Class 1E circuits for testing and maintenance purposes. Separation between redundant Class 1E, or Class 1E and non-Class 1E wire (bundles) is as discussed under Position C.6.

Separation requirements for Westinghouse NSSS equipment are specifically addressed in Section 7.1.2.2.

#### 8.3.1.4 Independence of Redundant Systems

##### 8.3.1.4.1 Principal Criteria

The principal design criterion that establishes the minimum requirements for preserving the independence of redundant Class 1E power systems through physical arrangement and separation and for ensuring the minimum required equipment availability during any design basis event (Class 1E power system and design basis event are defined in IEEE Standard 308) is as follows:

Class 1E electrical equipment is physically and electrically separated from its redundant counterpart or mechanically protected as required to prevent the occurrence of common mode failures. Separation of equipment is maintained to prevent loss of redundant features from single failures.

##### 8.3.1.4.2 Equipment, Raceway, and Cable (in air) Considerations

Design features of the major Class 1E system components which ensure conformance to the design bases are described below.

The safety-related portions of the onsite ac power system are divided into two load groups (trains). The safety-related actions of each load group are redundant and independent of the safety actions provided by its redundant counterpart.

Redundant safety-related systems are not subject to common mode failure through failure of the ventilation system. The ventilation systems are discussed in Section 9.4.

Redundant safety-related systems are located in fire protected areas. The fire protection system is discussed and analyzed in Section 9.5.1 and in the Fire Protection Evaluation Report. (See Table 1.7-3).

Safety-related equipment in all plant areas is either protected from automatic fire protection effluents or, on the basis of test data, has demonstrated its operability in the environment that may be caused by the fire protection effluents.

Redundant safety-related systems (including cable, electrical equipment, actuated equipment, sensors, and sensor to processor connections) are located in protected areas. Missile protection is discussed and analyzed in Section 3.5. Flood protection is discussed and analyzed in Sections 3.4 and 3.11. Protection against postulated pipe rupture is discussed and analyzed in Section 3.6. Seismic design is discussed and analyzed in Sections 3.7 and 3.10. Wind, hurricane, and tornado protection is discussed and analyzed in Section 3.3. Environmental (normal and postulated accident) design is discussed and analyzed in Section 3.11. Protection from rain, ice, snow, and lightning is inherent in station building and electrical system design.

The design criteria for redundant safety-related systems ensure that no single equipment maintenance outage, equipment malfunction, or operator



action will prevent a safety-related system from performing its intended safety function.

The loss of the preferred power supply in conjunction with any postulated natural phenomenon will not prevent a safety-related system from performing its intended safety function.

The independence of the redundant safety-related systems is preserved by physical as well as electrical separation.

Separation is accomplished as follows:

1. The emergency generator, switchgear, load centers, motor control centers, and distribution panels associated with one safety-related train are physically separated from their redundant counterparts of the other safety-related train as discussed in Section 8.3.1.1.
2. The physical description of the containment electrical penetration areas is discussed in Section 8.3.1.1.16.
3. Associated circuits per R.G. 1.75 are identified with the same color code as, and meet all the requirements of, the Class 1E circuit with which they are associated up to and including an isolation device. Beyond the isolation device they are identified as nonsafety-related.

4. The minimum separation distance between redundant Class 1E cables and between Class 1E cables and non-Class 1E cables is:

General Plant Areas (GPA)

(Refer to Table 8.3-6 for specific areas)

5 feet vertically

1 foot horizontally

Cable Spreading Areas (CSA)

(Main Control Room, Cable Spreading Room, and Computer Room)

3 feet vertically

1 foot horizontally

The vertical spacing distance between trays is measured from the top of the side rail of the lower tray to the bottom of the side rail of the upper tray. The horizontal spacing distance between trays is measured from outside of side rail flange to outside of side rail flange.

In general, the minimum vertical free air space between trays is 8 inches.

Where plant arrangement precludes the minimum separation distance, actual installations conform to one of the acceptable arrangements

listed below. These acceptable arrangements between redundant Class 1E cables and between Class 1E and non-Class 1E cables is achieved by maintaining lesser distances in conjunction with the use of tray covers, enclosed raceway, protective wraps, or barriers.

Acceptable arrangements are as follows:

a. Tray to Tray Separation

In the GPA, where a 1 in. minimum vertical free air space is maintained between redundant Class 1E trays, a tray cover on the top of the lower tray or a tray cover on the bottom of the upper tray is installed as shown on Figure 8.3-16, Details A and B.

In the GPA, where a 1 in. minimum horizontal free air space is maintained between redundant Class 1E trays, tray covers top and bottom of one of the trays are installed as shown on Figure 8.3-16, Details C and D.

In the GPA, where a 1 in. minimum vertical free air space is maintained between non-Class 1E and Class 1E, a tray cover on the top of the lower tray or a tray cover on the bottom of the upper tray is installed as shown on Figure 8.3-17, Details A, B, C, and D.

In the GPA, where a 1 in. minimum horizontal free air space is maintained between non-Class 1E and Class 1E trays, tray covers on the top and bottom of one of the trays are installed as shown on Figure 8.3-17, Details E and F.

In the GPA, where a 1 in. minimum horizontal free air space is maintained between a Class 1E tray running vertically and a redundant Class 1E tray running horizontally, a tray cover on either tray is installed as shown on Figures 8.3-18 and 8.3-19.

In the GPA, where a 1 in. minimum horizontal free air space is maintained between a Class 1E tray running vertically and a non-Class 1E tray running horizontally, a tray cover on either tray is installed as shown on Figures 8.3-20 and 8.3-21.

In the GPA, where a 1 in. minimum horizontal free air space is maintained between a non-Class 1E tray running vertically and a Class 1E tray running horizontally, a tray cover on either tray is installed as shown on Figures 8.3-22 and 8.3-23.

In the CSA, where a 1 in. minimum vertical free air space is maintained between redundant Class 1E trays, a tray cover on the bottom of the upper tray or on the top of the lower tray is installed as shown on Figure 8.3-24, Details A and B.

In the CSA, where a 1 in. minimum horizontal free air space is maintained between redundant Class 1E trays, tray covers on the top and bottom of one of the trays are installed as shown on Figure 8.3-24, Details C and D.

In the CSA, where a 1 in. minimum vertical free air space is maintained between a non-Class 1E tray and a Class 1E tray, a tray cover on the bottom of the upper tray or a tray cover on the top of the lower tray is installed as shown on Figure 8.3-25, Details A, B, C, and D.

In the CSA, where a 1 in. minimum horizontal free air space is maintained between non-Class 1E and Class 1E trays, tray covers on the top and bottom of one of the trays are installed as shown on Figure 8.3-25, Details E and F.

In the CSA, where a 1 in. minimum horizontal free air space is maintained between a Class 1E tray running vertically and a redundant Class 1E tray running horizontally, a tray cover on either tray is installed as shown on Figures 8.3-26 and 8.3-27.

In the CSA, where a 1 in. minimum horizontal free air space is maintained between a Class 1E tray running vertically and a non-Class 1E tray running horizontally, a tray cover on either tray is installed as shown on Figures 8.3-28 and 8.3-29.



In the CSA, where a 1 in. minimum horizontal free air space is maintained between a non-Class 1E tray running vertically and a Class 1E tray running horizontally, a tray cover on either tray is installed as shown on Figures 8.3-30 and 8.3-31.

In the GPA, where a 1 in. minimum vertical free air space is maintained between a Class 1E tray and a redundant Class 1E tray which cross in a vertical plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown of Figure 8.3-32.

In the GPA, where a 1 in. minimum vertical free air space is maintained between a Class 1E tray and a non-Class 1E tray which cross in a vertical plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-33.

In the GPA, where a 1 in. minimum vertical free air space is maintained between a non-Class 1E tray and a Class 1E tray which cross in a vertical plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-34

In the CSA, where a 1 in. minimum vertical free air space is maintained between a Class 1E tray and a redundant Class 1E tray which cross in vertical plane, a tray cover on the top of the

lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-35.

In the CSA, where a 1 in. minimum vertical free air space is maintained between a Class 1E tray and a non-Class 1E tray which cross in a vertical plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-36.

In the CSA, where a 1 in. minimum vertical free air space is maintained between a non-Class 1E and a Class 1E tray which cross in a vertical plane, a tray cover on the top of the lower tray or on the bottom of the upper tray is installed as shown on Figure 8.3-37.

In the above cases, where tray covers are not used, a barrier is provided per IEEE Standard 384-1974, Figure 2, 3, or 4.

b. Tray to Conduit Separation

In the GPA, vertical separation between a Class 1E tray and a redundant Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-38, Detail A.

In the GPA, vertical separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-38, Detail B.

In the GPA, horizontal separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-38, Detail C.

In the GPA, vertical separation between a Class 1E tray and a non-Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-39, Detail A.

In the GPA, vertical separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-39, Detail B.

In the GPA, horizontal separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-39, Detail C.

In the GPA, vertical separation between a non-Class 1E tray and a Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-40, Detail A.

In the GPA, vertical separation between a non-Class 1E conduit and a Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-40, Detail B.

In the GPA, horizontal separation between a non-Class 1E conduit and Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-40, Detail C.

In the CSA, vertical separation between a Class 1E tray and a redundant Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-41, Detail A.

In the CSA, vertical separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-41, Detail B.

In the CSA, horizontal separation between a Class 1E conduit and a redundant Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-41, Detail C.

In the CSA, vertical separation between a Class 1E tray and a non-Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-42, Detail A.

In the CSA, vertical separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-42, Detail B.

In the CSA, horizontal separation between a Class 1E conduit and a non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-42, Detail C.

In the CSA, vertical separation between a non-Class 1E tray and a Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-43, Detail A.

In the CSA, vertical separation between a non-Class 1E conduit and a Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-43, Detail B.

In the CSA, horizontal separation between a non-Class 1E conduit and a Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-43, Detail C.

c. Conduit to Conduit Separation

In the GPA and CSA, separation between Class 1E and redundant Class 1E conduit or Class 1E and non-Class 1E conduit may be reduced to 1 in.

d. Cable in Air to Cable in Air Separation

In the GPA, where cables are appropriately grouped together and either Class 1E group is installed in conduit or enclosed in protective wrap, separation between the redundant Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-44, Details A, B, C, and D.

In the GPA, where cables are appropriately grouped together and both Class 1E groups are enclosed in a protective wrap, separation between the redundant Class 1E cables may be reduced to 0 in. as shown on Figure 8.3-45.



In the GPA, where cables are appropriately grouped together and the non-Class 1E group is installed in conduit or enclosed in a protective wrap, separation between the Class 1E cables and the non-Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-46, Details A, B, and C.

In the GPA, where cables are appropriately grouped together and are enclosed in a protective wrap, separation between Class 1E cables and non-Class 1E cables may be reduced to 0 in. as shown on Figure 8.3-47, Details A, B, and C.

In the GPA, where cables are appropriately grouped together and the Class 1E group is installed in conduit or enclosed in a protective wrap, separation between the non-Class 1E cable and the Class 1E cable may be reduced to 1 in. as shown on Figure 8.3-48, Details A, B, and C.

In the GPA, where cables are appropriately grouped together and are enclosed in a protective wrap, separation between non-Class 1E cables and Class 1E cables may be reduced to 0 in. as shown on Figure 8.3-49, Details A, B, and C.

In the CSA, where cables are appropriately grouped together and either Class 1E group is installed in a conduit or enclosed in a protective wrap, separation between redundant Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-50, Details A, B, C, and D.

In the CSA, where cables are appropriately grouped together and both Class 1E groups are enclosed in a protective wrap, separation between redundant Class 1E cables may be reduced to 0 in. as shown on Figure 8.3-51.

In the CSA, where cables are appropriately grouped together and the non-Class 1E group is installed in conduit or enclosed in a protective wrap, separation between the Class 1E cables and the non-Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-52, Details A, B, and C.

In the CSA, where cables are appropriately grouped together and are enclosed in a protective wrap, separation between Class 1E cables and non-Class 1E cables may be reduced to 0 in. as shown on Figure 8.3-53, Details A, B, and C.

In the CSA, where cables are appropriately grouped together and the Class 1E group is installed in conduit or enclosed in a protective wrap, separation between the non-Class 1E cables and the Class 1E cables may be reduced to 1 in. as shown on Figure 8.3-54, Details A, B, and C.

In the CSA, where cables are appropriately grouped together and are enclosed in a protective wrap, separation between non-Class 1E cables and Class 1E cables may be reduced to 0 in. as shown on Figure 8.3-55, Details A, B, and C.

In the above cases, where conduit or protective wraps are not used, a barrier is provided in accordance with IEEE Standard 384-1974, Figure 2, 3, or 4.

e. Cable in Air to Tray Separation

In the GPA, where a 1 in. minimum vertical free air space is maintained between redundant Class 1E trays and a tray cover is provided in accordance with Figure 8.3-16, Detail A, where a cable enters the upper tray, separation between the Class 1E cable and the redundant Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-56.

In the GPA, where a 1 in. minimum vertical free air space is maintained between redundant Class 1E trays and a tray cover is provided in accordance with Figure 8.3-16, Detail A, where a cable enters the upper tray and is enclosed in a protective wrap, separation between the Class 1E cable and the redundant Class 1E cable tray may be reduced to 0 in. as shown on Figure 8.3-57.

In the GPA, where a 1 in. minimum vertical free air space between Class 1E and non-Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-17, Detail A, where a Class 1E cable enters the Class 1E tray, separation between the Class 1E cable and the non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-58.

## BVPS-2 FSAR

In the GPA, where a 1 in. minimum vertical free air space between Class 1E and non-Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-17, Detail A, where a Class 1E cable enters the Class 1E tray and is enclosed in a protective wrap, separation between the Class 1E cable and the non-Class 1E tray may be reduced to 0 in. as shown on Figure 8.3-59.

In the GPA, where a 1 in. minimum vertical free air space between non-Class 1E and Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-17, Detail C, where a non-Class 1E cable enters the non-Class 1E tray, separation between the non-Class 1E cable and the Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-60.

In the GPA, where a 1 in. minimum vertical free air space between non-Class 1E and Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-17, Detail C, where a non-Class 1E cable enters the non-Class 1E tray and is enclosed in a protective wrap, separation between the non-Class 1E cable the Class 1E tray may be reduced to 0 in. as shown on Figure 8.3-61.

In the CSA, where a 1 in. minimum vertical free air space is maintained between redundant Class 1E trays and a tray cover is provided in accordance with Figure 8.3-24, Detail A, where a cable enters the upper tray, separation between the Class 1E cable and

the redundant Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-62.

In the CSA, where a 1 in. minimum vertical free air space is maintained between redundant Class 1E trays and a tray cover is provided in accordance with Figure 8.3-24, Detail A, where a cable enters the upper tray and is enclosed in a protective wrap, separation between the Class 1E cable and the redundant Class 1E cable tray may be reduced to 0 in. as shown on Figure 8.3-63.

In the CSA, where a 1 in. minimum vertical free air space between Class 1E and non-Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-25, Detail A, where a Class 1E cable enters the Class 1E tray, separation between the Class 1E cable and the non-Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-64.

In the CSA, where a 1 in. minimum vertical free air space between Class 1E and non-Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-25, Detail A, where a Class 1E cable enters the Class 1E tray and is enclosed in a protective wrap, separation between the Class 1E cable and the non-Class 1E tray may be reduced to 0 in. as shown on Figure 8.3-65.

In the CSA, where a 1 in. minimum vertical free air space between non-Class 1E and Class 1E trays is maintained and a tray cover is provided in accordance with Figure 8.3-25, Detail C, where a



non-Class 1E cable enters the non-Class 1E tray, separation between the non-Class 1E cable and the Class 1E tray may be reduced to 1 in. as shown on Figure 8.3-66.

In the CSA, where a 1 in. minimum vertical free air space between non-Class 1E and Class 1E tray is maintained and a tray cover is provided in accordance with Figure 8.3-25, Detail C, where a non-Class 1E cable enters the non-Class 1E tray and is enclosed in a protective wrap, separation between the non-Class 1E cable and the Class 1E tray may be reduced to 0 in. as shown on Figure 8.3-67.

f. Cable in Air to Conduit Separation

In the GPA, separation between Class 1E cables and a redundant Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-68.

In the GPA, separation between Class 1E cables and a non-Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-69, Detail A.

In the GPA, separation between non-Class 1E cables and a Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-69, Detail B.



In the CSA, separation between Class 1E cables and a redundant Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-70.

In the CSA, separation between Class 1E cables and a non-Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-71, Details A, B, and C.

In the CSA, separation between non-Class 1E cables and a Class 1E conduit may be reduced to 1 in. as shown on Figure 8.3-72, Details A, B, and C.

5. In addition to separation by train and channel, there is also separation by voltage level and service within a train or channel. A computer program for the routing of cables prohibits the scheduling of a Class 1E cable in an assigned raceway of either a redundant Class 1E cable or a non-Class 1E cable. In addition, cables are routed in separate raceway systems according to the voltage service levels given in Table 8.3-4. Each voltage service level corresponds to the raceway/cable identification letter given in this table (i.e., H, L, K, C, or X). Each cable with one identification number would be separated from cables with a different identification number (i.e., H (4160 V) cables are not run with L (large 480 V) cables). In special cases, C and K cables may be run together in the same tray and the raceway would be designated a K tray. In other special cases, K and L cables may be run together in the same tray if maintained spacing is provided to the

cables in accordance with the L spacing in Table 8.3-4. The raceway would then be designated an L tray.

Trays for cables of different voltage levels are generally stacked in descending voltage order with the highest voltage cables in the uppermost trays. Instrument cables are generally installed in the lowest tray.

6. In general, Class 1E equipment is not installed in potential missile-producing areas. Where this is not practical, suitable missile protection is provided as discussed in Section 3.5.
7. In general, trays in the same vertical stack are separated by 8 3/4 in. minimum as measured from the bottom of the side rail of the upper tray to the top of the side rail of the lower tray.
8. In Seismic Category I areas, H (4160 V) and L (large 480 V) cables will be enclosed either by use of rigid or flexible conduit, protective wraps, or top and bottom tray covers. In Seismic Category II areas, H (4160 V) and L (large 480 V) cables whose separation is reduced below 5 ft vertical and 1 ft horizontal will be enclosed as detailed for Seismic Category I areas above. Refer to Section 3.2 for explanation of Seismic Category I and Seismic Category II areas and listing of Seismic Category I areas.
9. Ventilated cable tray covers are equivalent to solid cable tray covers.

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10. Lengths of cable enclosed in a protective wrap of woven silicon dioxide (trade name - Sil-Temp) and glass tape are considered to be protected from electrically induced problems in adjacent cables to the same degree as the same cable in an enclosed raceway.
11. Enclosures provided to meet the requirements of BTP CMEB 9.5-1 are considered equivalent to enclosures provided for electrical separation and will have 1-hour or longer fire rating.
12. Fire barriers are installed at all locations where trays penetrate a fire rated wall or floor.
13. Cable splices in raceways are prohibited.
14. The cable spreading areas (main control room, cable spreading room, and computer room) are protected areas and are not exposed to potential hazards such as high pressure piping, missiles, flammable material, flooding, or wiring that is not flame retardant. They do not contain high energy equipment such as switchgear, transformers, rotating equipment, or potential sources of missiles or pipe whip and are not used for storing flammable materials.
15. The General Plant Areas (GPA) have been analyzed for potential hazards and as such are categorized as areas where damage potential is limited to failures or faults internal to the electrical equipment or circuits.

16. Cables in the cable spreading areas (CSA), that converge prior to entering control and instrument panels, in general perform control and instrument functions. Power cables are limited to feeders supplying power to equipment or ventilation units used for those areas. Power cables in these areas are installed in conduit.
17. In general, the minimum separation distance between redundant Class 1E circuits and between Class 1E and non-Class 1E circuits, internal to control switch boards and instrument cabinets is as follows:

For Exposed Contacts and Terminals

6 inches

For Wire Bundles

1 inch

Where device arrangement precludes the minimum separation at exposed contacts or terminals, a barrier or enclosure is provided. The barrier or enclosure extends 1 inch beyond exposed contacts or terminals.

Where wire bundle arrangement precludes the minimum separation, a barrier is provided or both bundles are enclosed in a protective wrap.

Where the minimum separation between Class 1E circuits and non-Class 1E circuits is not maintained and installation of a barrier is not

possible, the non-Class 1E circuit is classified as part of the Class 1E circuit up to an isolation device to prevent interaction between Class 1E and non-Class 1E circuits.

Separation requirements for Westinghouse NSSS equipment are specifically addressed in Section 7.1.2.2.

18. A raised floor panel can be used as a barrier. Panels are 1 in. thick particle board with 22 gauge steel top and bottom sheets and are fire rated Class A. These panels are considered a barrier when used in a configuration as shown in IEEE Standard 384-1974, Figure 2, 3, or 4.
19. Separation of cables (i.e., between redundant Class 1E circuits and between Class 1E and non-Class 1E circuits) at entrances to control panels and cabinets is consistent with the area in which they are located.
20. Separation is not required between either Train A (orange) and Channel I (red), or Train B (purple) and Channel II (white) except for service (or voltage class) considerations.
21. Each of the four channels of the excore neutron detection system are run in a dedicated conduit system. In addition to the standard separation required between Class 1E and non-Class 1E cables detailed in the above paragraphs of Section 8.3.1.4, cables in this system require the following supplemental separation:



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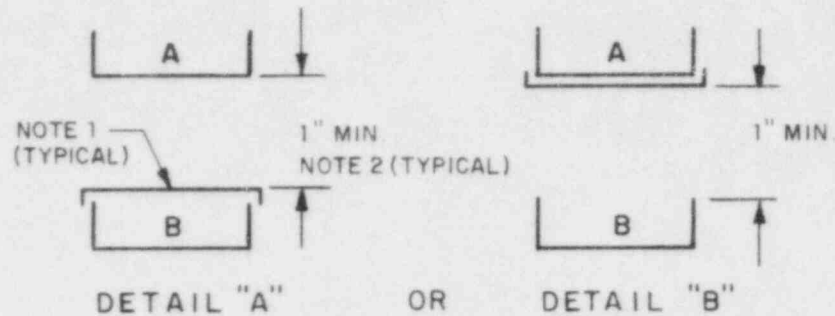
- Each excore channel cable will maintain a separation of 2 ft from another excore channel cable.
- Each excore channel cable will maintain a separation of 2 ft from any 480 V ac, 120 V ac, and 125 V dc power or control cable.
- Each excore channel cable will maintain a separation of 6 ft from any 4160 V power cable.



## GENERAL PLANT AREAS - TRAY TO TRAY

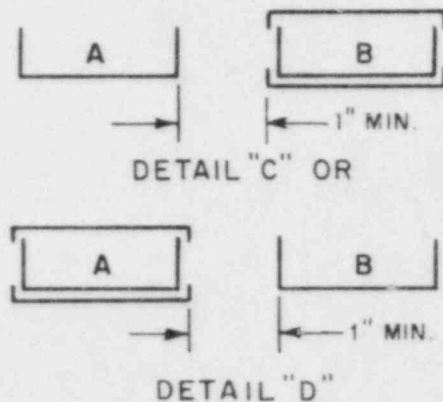
### CLASS 1E TO REDUNDANT CLASS 1E

#### VERTICAL



### CLASS 1E TO REDUNDANT CLASS 1E

#### HORIZONTAL



#### LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

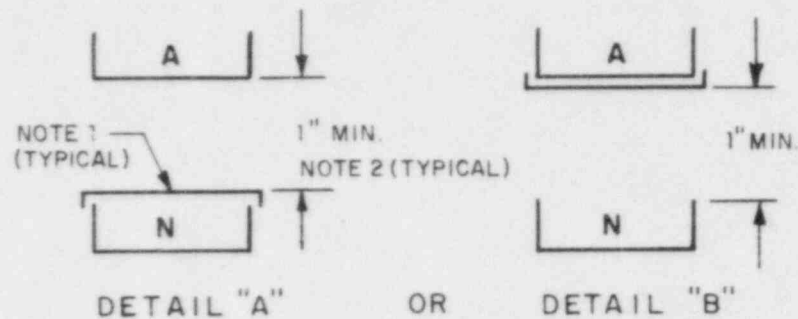
#### NOTES: 1. TRAY COVER

2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

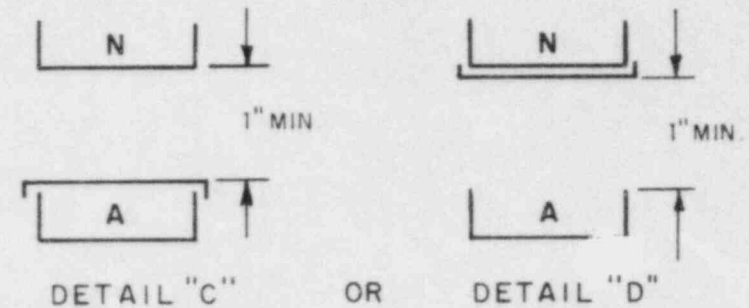
FIGURE 8.3-16  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

## GENERAL PLANT AREAS - TRAY TO TRAY

### CLASS 1E TO NON-CLASS 1E VERTICAL

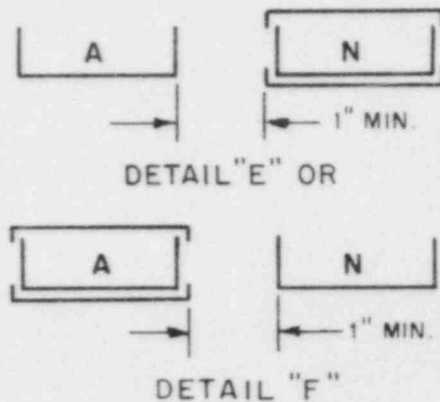


### NON-CLASS 1E TO CLASS 1E VERTICAL



### CLASS 1E TO NON-CLASS 1E; NON-CLASS 1E TO CLASS 1E

#### HORIZONTAL



#### LEGEND

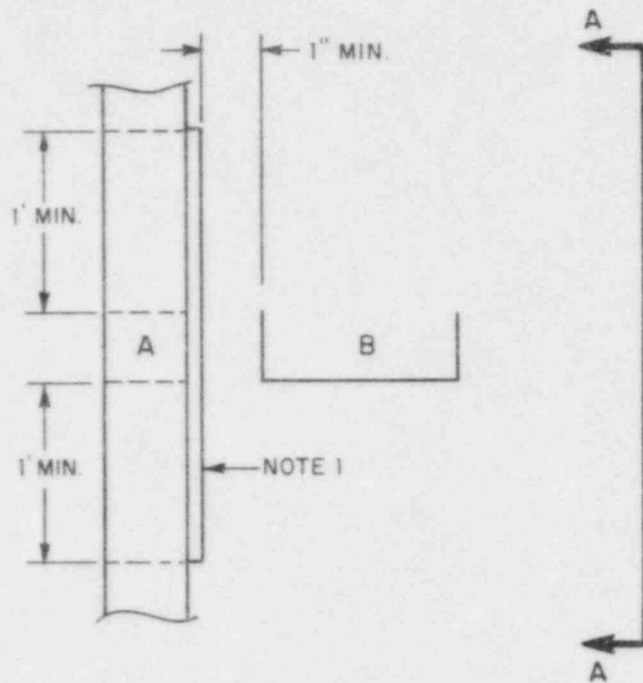
- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

#### NOTES: 1. TRAY COVER

2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-17  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

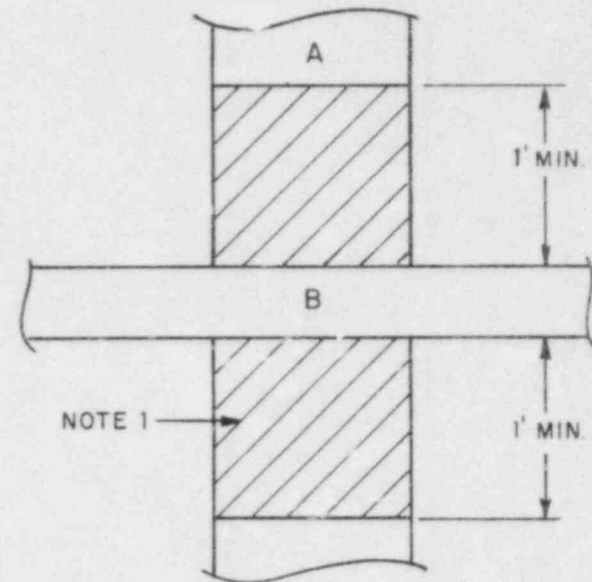
GENERAL PLANT AREAS-TRAY TO TRAY  
CLASS 1E TO REDUNDANT CLASS 1E



LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

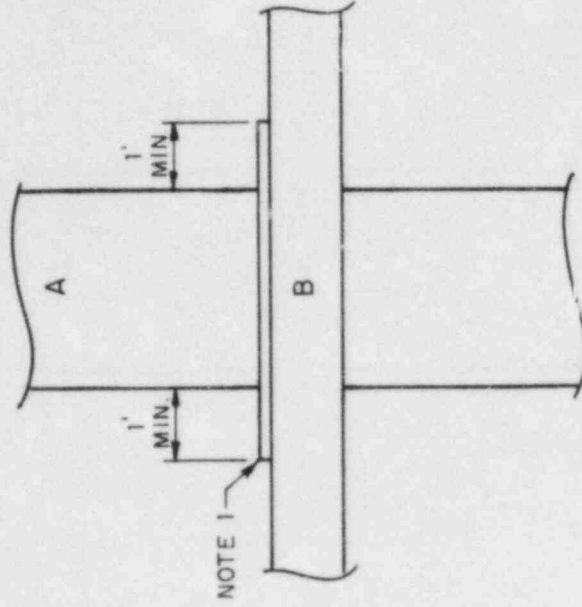
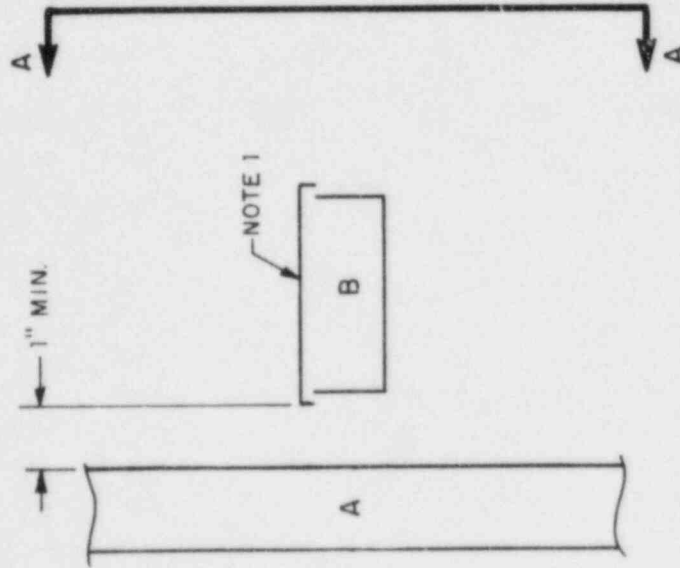
NOTE 1: TRAY COVER



SECTION A-A

FIGURE 8.3-18  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS - TRAY TO TRAY  
CLASS 1E TO REDUNDANT CLASS 1E



SECTION A-A

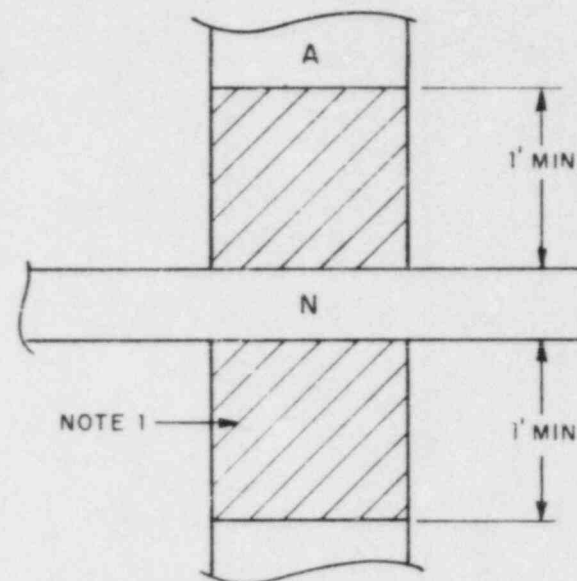
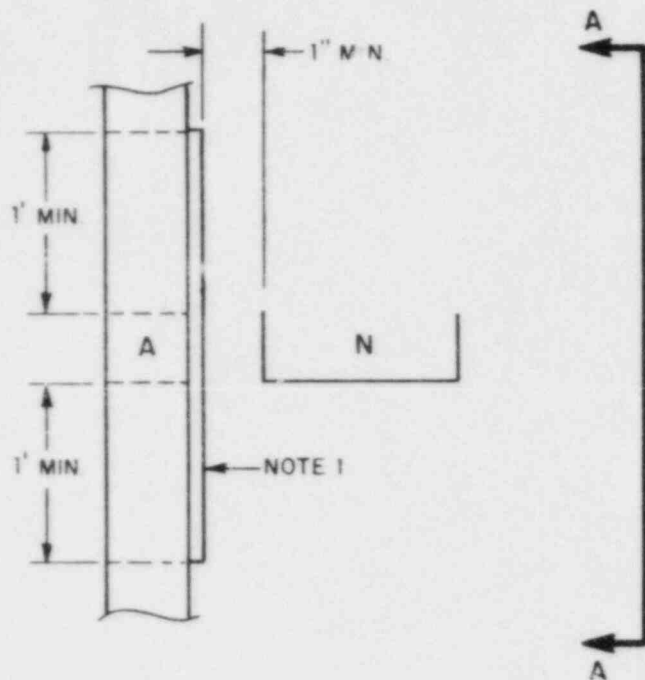
LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-19  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS - TRAY TO TRAY  
CLASS 1E TO NON-CLASS 1E



SECTION A-A

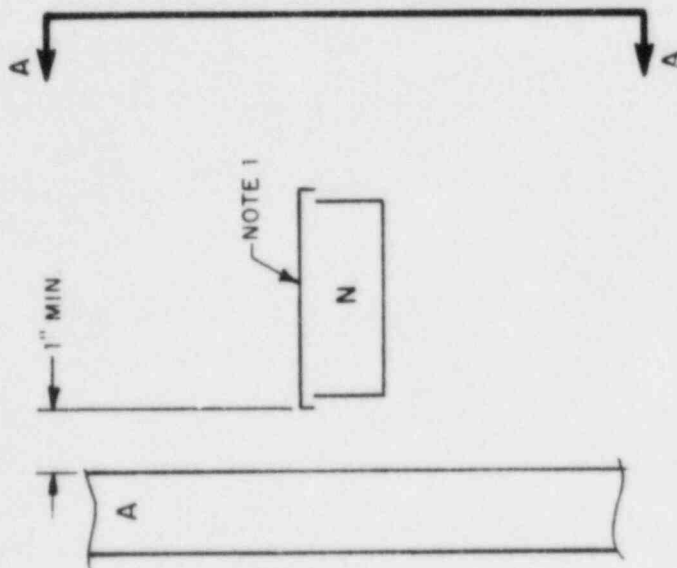
LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-20  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

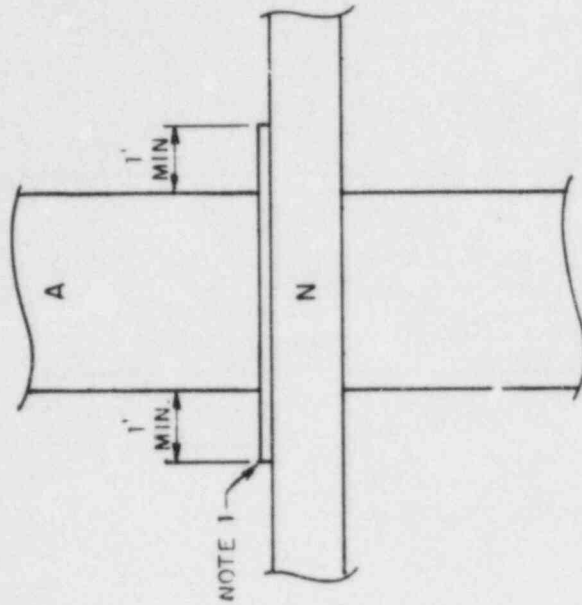
GENERAL PLANT AREAS - TRAY TO TRAY  
CLASS 1E TO NON-CLASS 1E



LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

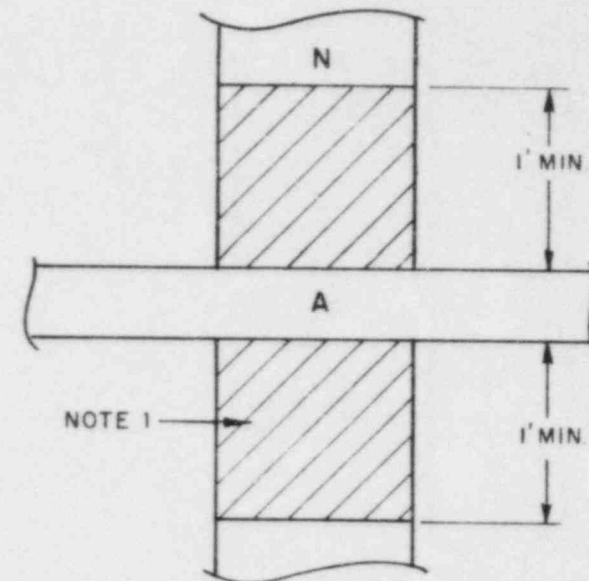
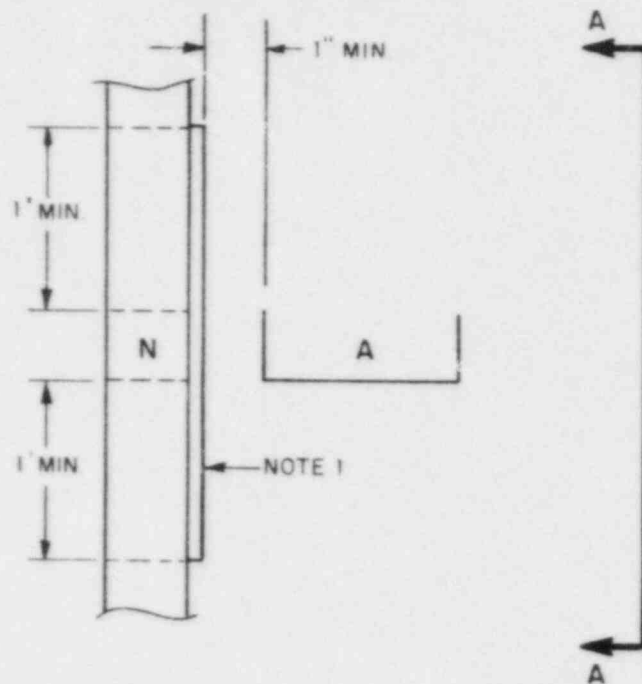


SECTION A-A

FIGURE 8.3-21  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



GENERAL PLANT AREAS-TRAY TO TRAY  
NON-CLASS 1E TO CLASS 1E



SECTION A-A

LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

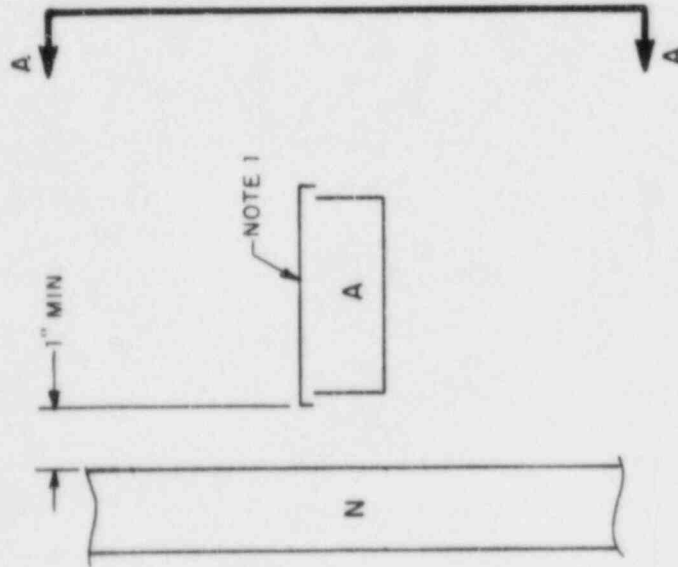
NOTE 1: TRAY COVER

FIGURE 8.3-22

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS - TRAY TO TRAY  
NON-CLASS 1E TO CLASS 1E

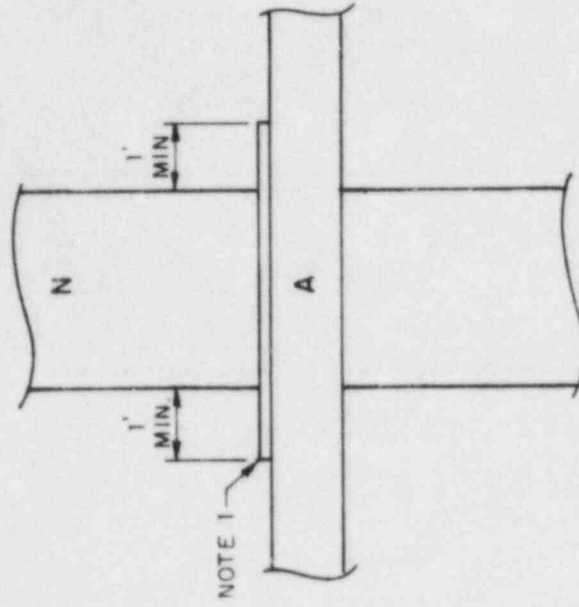


NOTE 1

LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER



NOTE 1

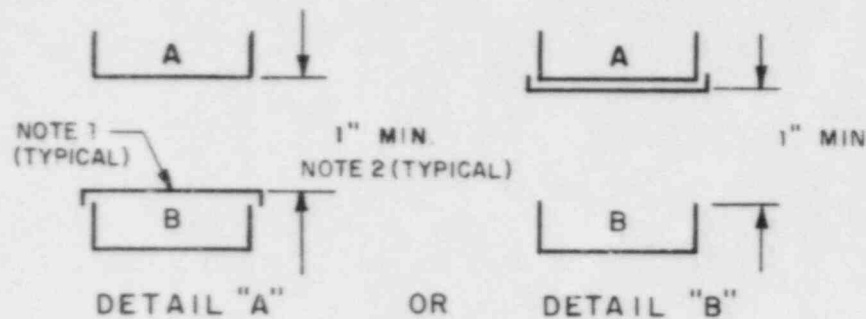
SECTION A-A

FIGURE 8.3-23  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

## CABLE SPREADING AREAS - TRAY TO TRAY

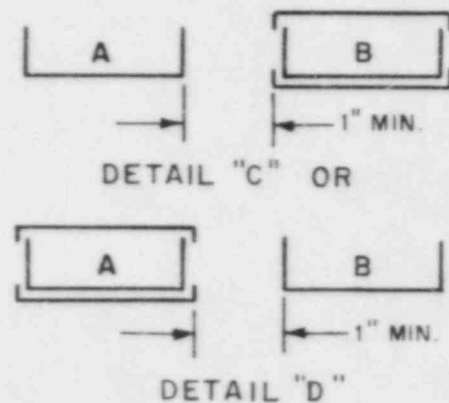
### CLASS 1E TO REDUNDANT CLASS 1E

#### VERTICAL



### CLASS 1E TO REDUNDANT CLASS 1E

#### HORIZONTAL



#### LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

#### NOTES: 1. TRAY COVER

2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-24

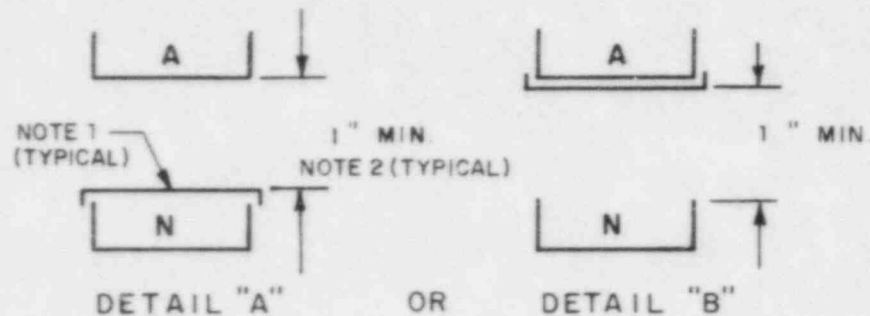
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

## CABLE SPREADING AREAS - TRAY TO TRAY

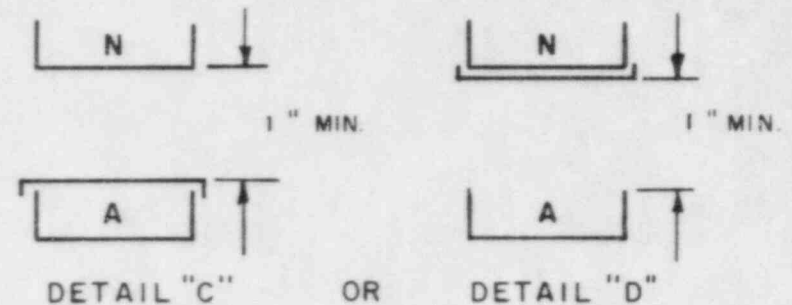
### CLASS 1E TO NON-CLASS 1E

#### VERTICAL



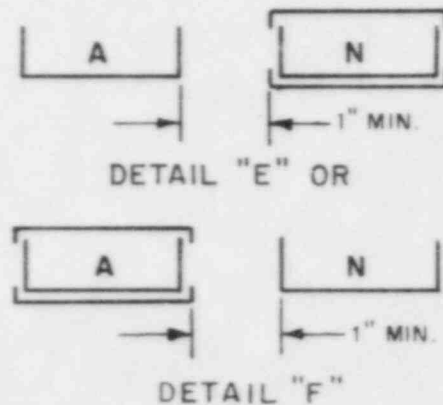
### NON-CLASS 1E TO CLASS 1E

#### VERTICAL



### CLASS 1E TO NON-CLASS 1E; NON-CLASS 1E TO CLASS 1E

#### HORIZONTAL



#### LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

#### NOTES: 1. TRAY COVER

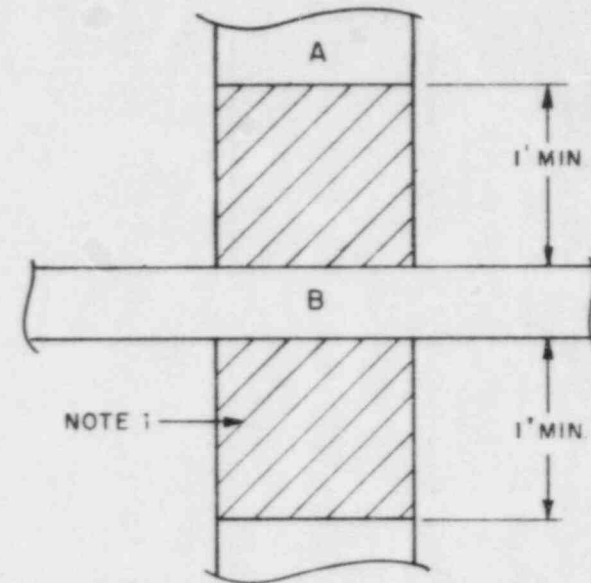
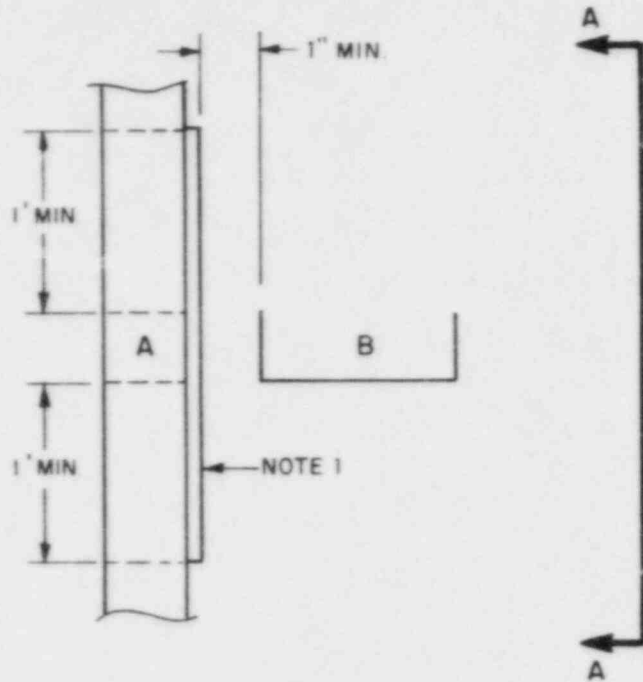
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-25

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY  
CLASS 1E TO REDUNDANT CLASS 1E



SECTION A-A

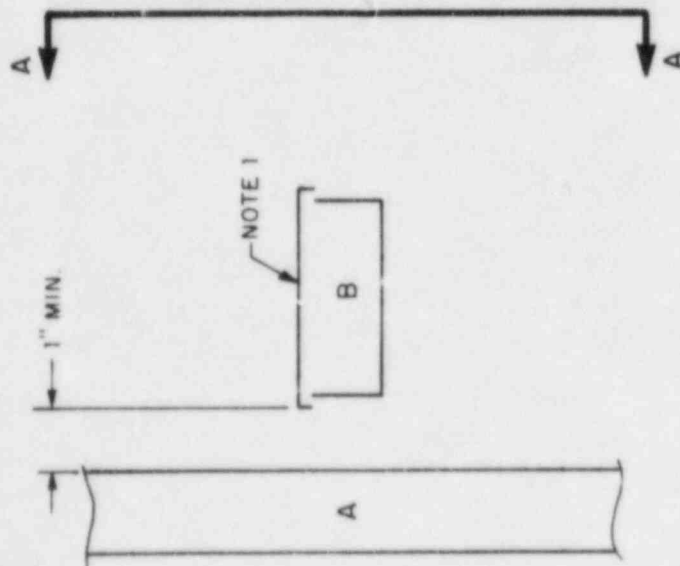
LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-26  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

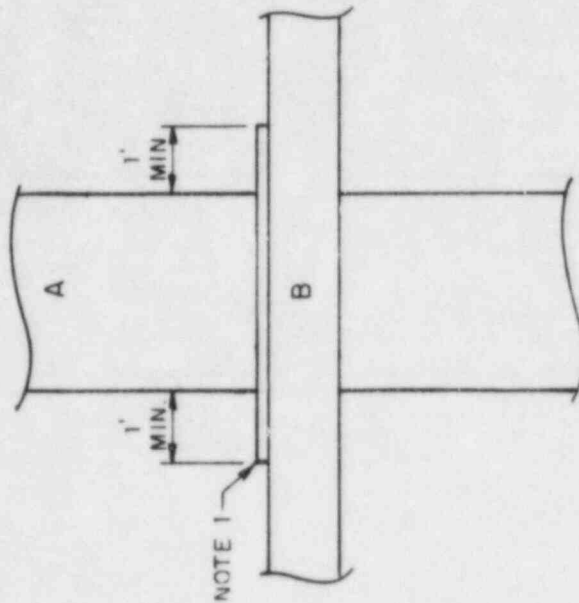
# CABLE SPREADING AREAS - TRAY TO TRAY CLASS 1E TO REDUNDANT CLASS 1E



## LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER



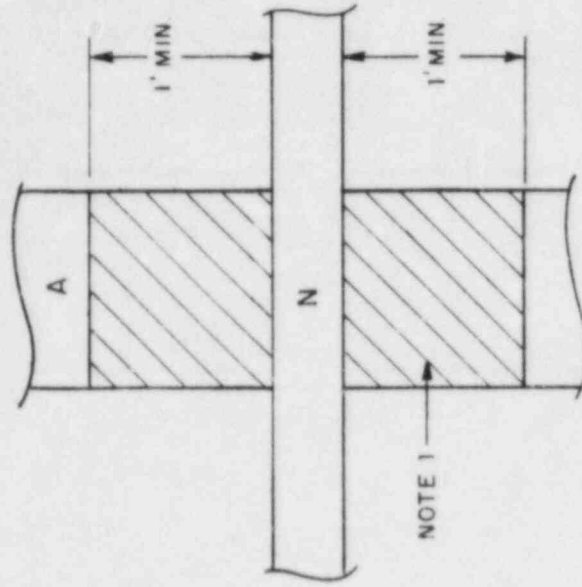
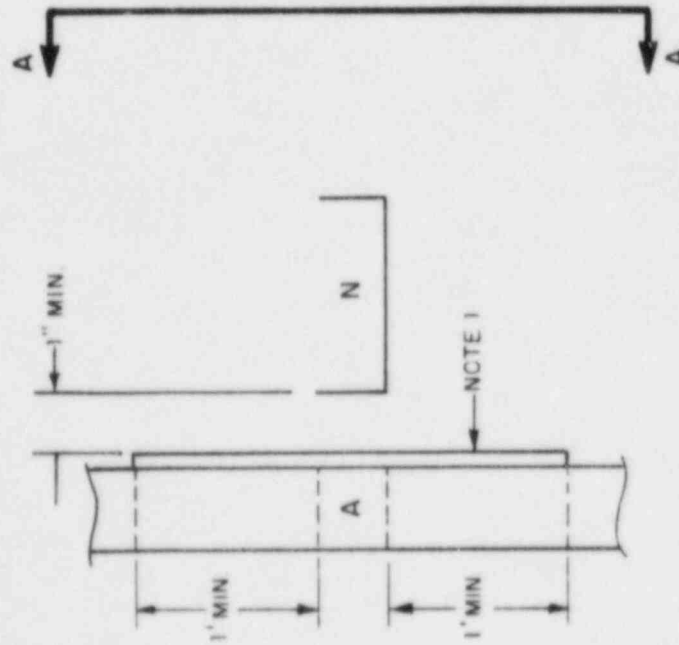
SECTION A-A

FIGURE 8.3-27  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



# CABLE SPREADING AREAS-TRAY TO TRAY CLASS 1E TO NON-CLASS 1E



SECTION A-A

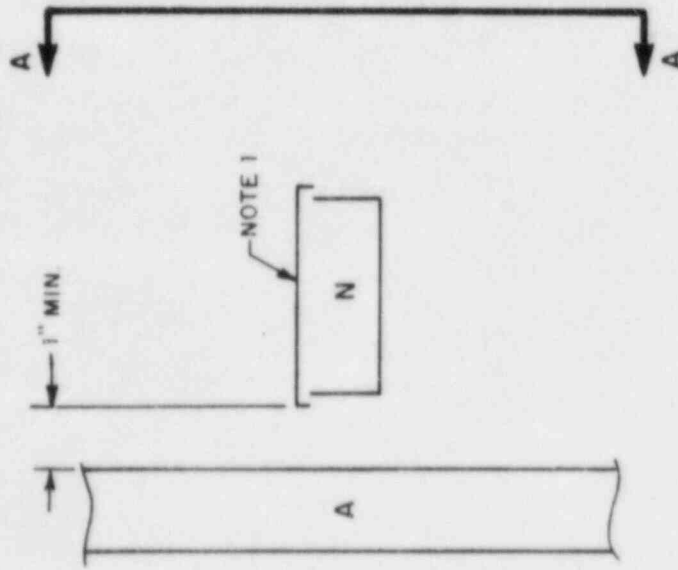
## LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-28  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

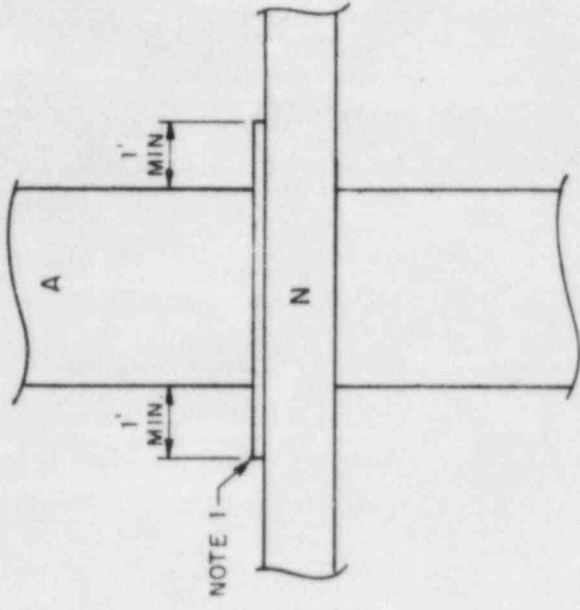
CABLE SPREADING AREAS-TRAY TO TRAY  
CLASS 1E TO NON-CLASS 1E



LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

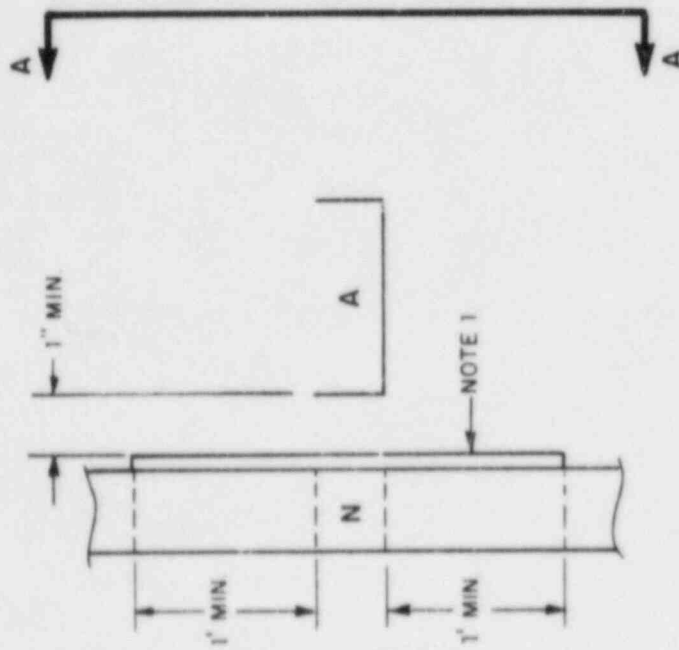
NOTE 1: TRAY COVER



SECTION A-A

FIGURE 8.3-29  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY  
NON-CLASS 1E TO CLASS 1E



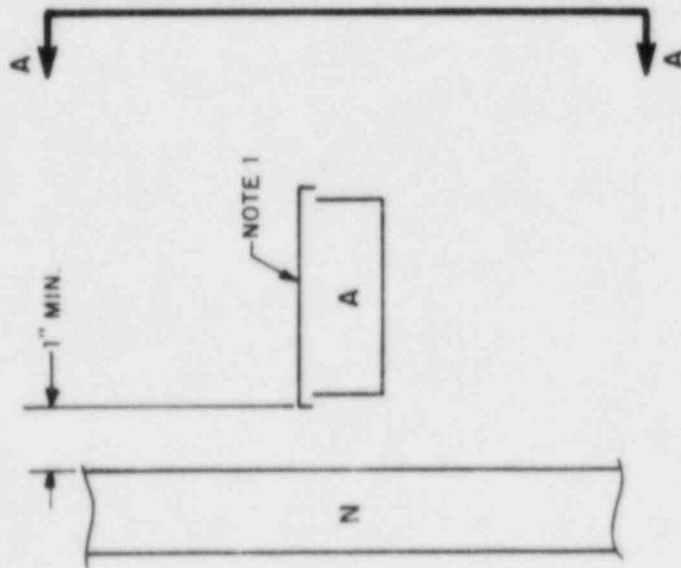
LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

FIGURE 8.3-30  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS - TRAY TO TRAY  
NON-CLASS 1E TO CLASS 1E



LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

NOTE 1: TRAY COVER

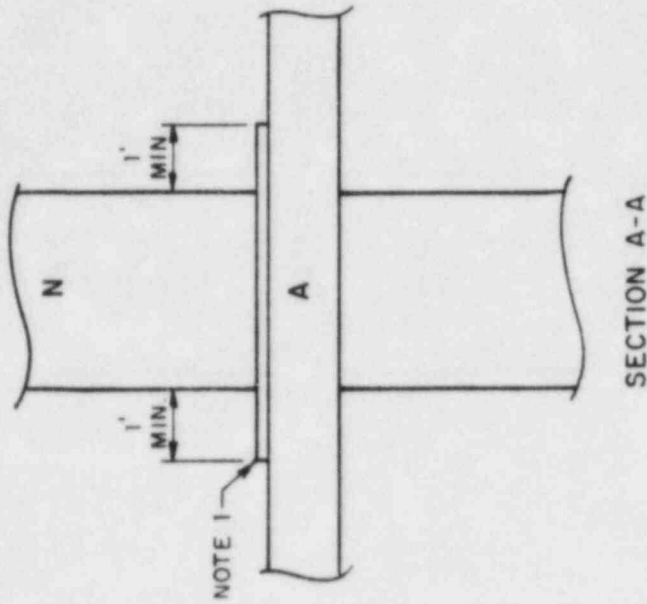
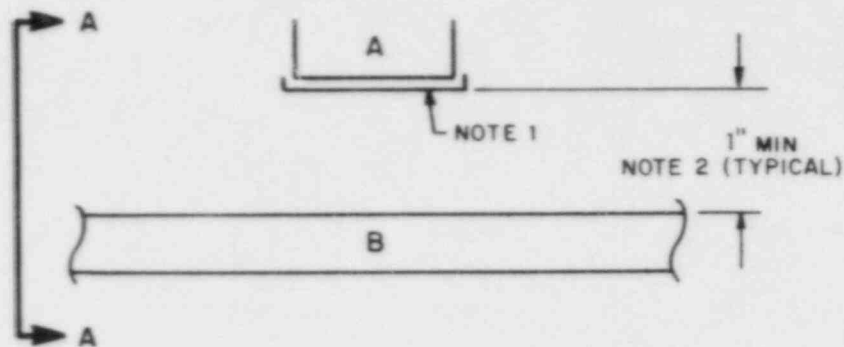
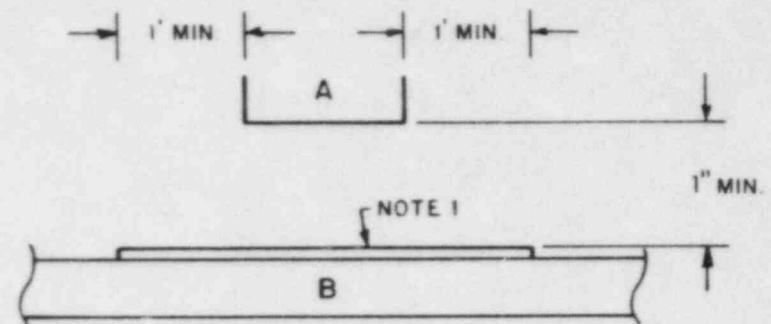


FIGURE 8.3-31  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
TRAY TO TRAY-PERPENDICULAR CROSSING  
CLASS 1E TO REDUNDANT CLASS 1E



OR

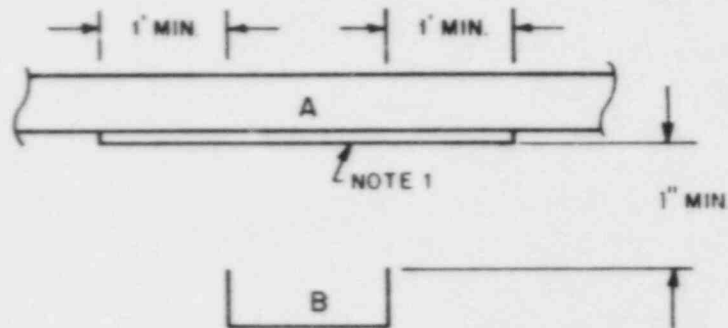


LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY



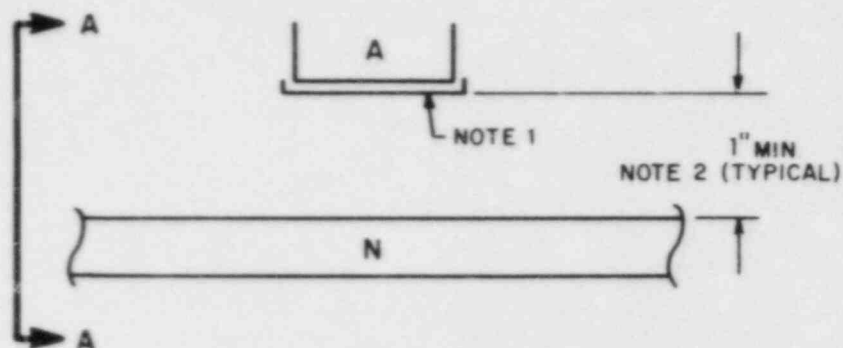
SECTION A-A

FIGURE 8.3-32

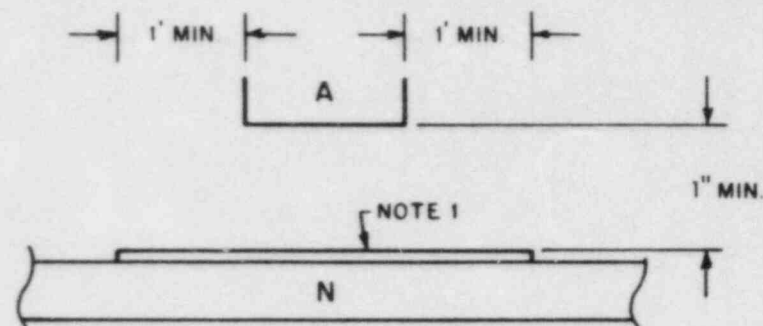
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

**GENERAL PLANT AREAS  
TRAY TO TRAY-PERPENDICULAR CROSSING  
CLASS 1E TO NON-CLASS 1E**



OR

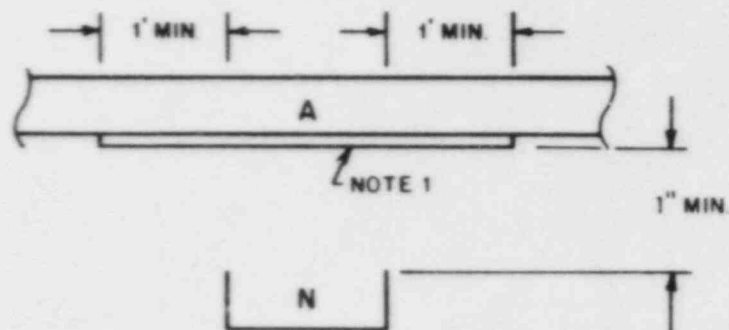


**LEGEND**

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

**NOTES: 1. TRAY COVER**

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY



SECTION A-A

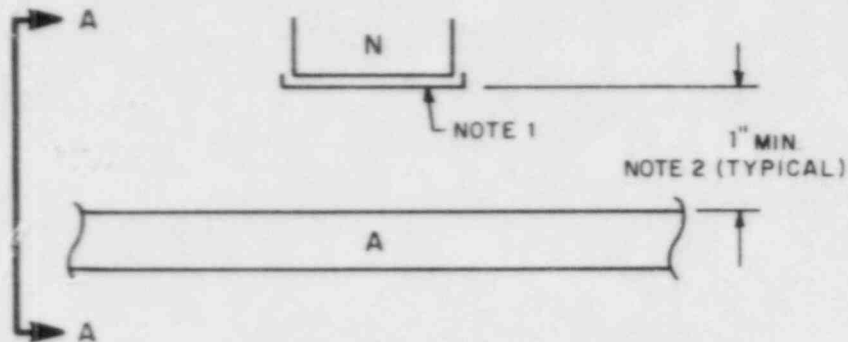
**FIGURE 8.3-33**

**GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS**

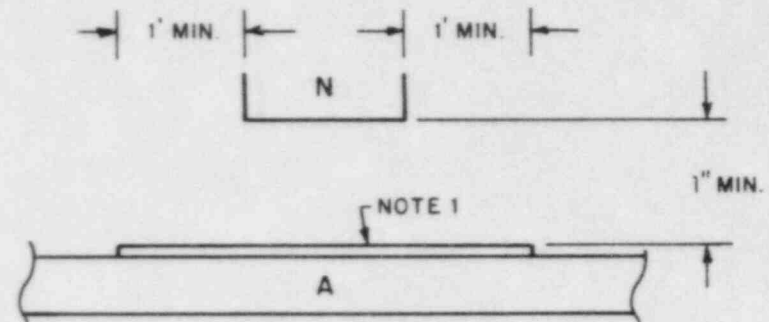
**BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT**



GENERAL PLANT AREAS  
TRAY TO TRAY-PERPENDICULAR CROSSING  
NON-CLASS 1E TO CLASS 1E



OR

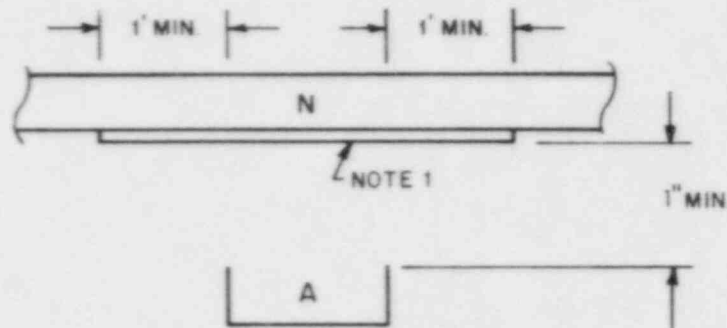


LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

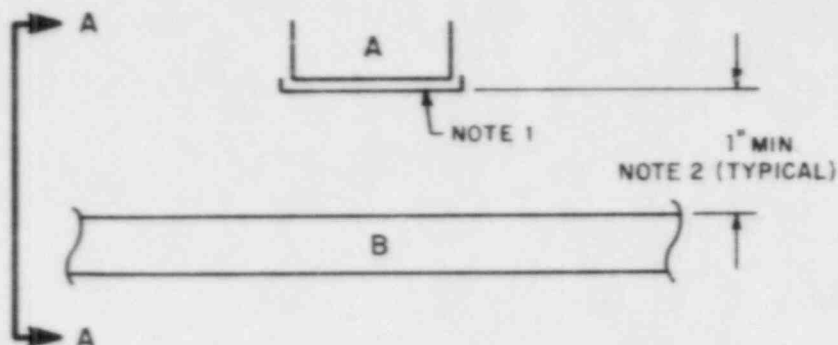
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY



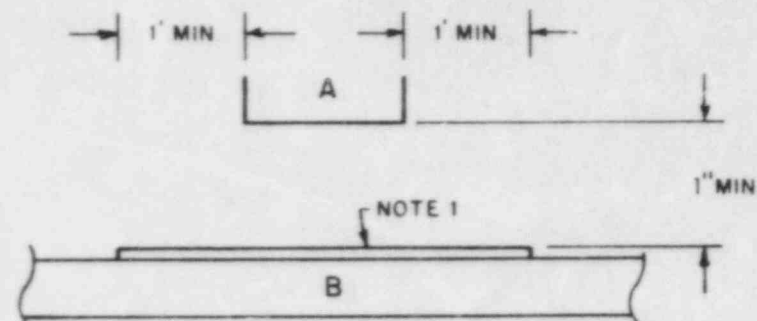
SECTION A-A

FIGURE 8.3-34  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

**CABLE SPREADING AREAS  
TRAY TO TRAY-PERPENDICULAR CROSSING  
CLASS 1E TO REDUNDANT CLASS 1E**



OR

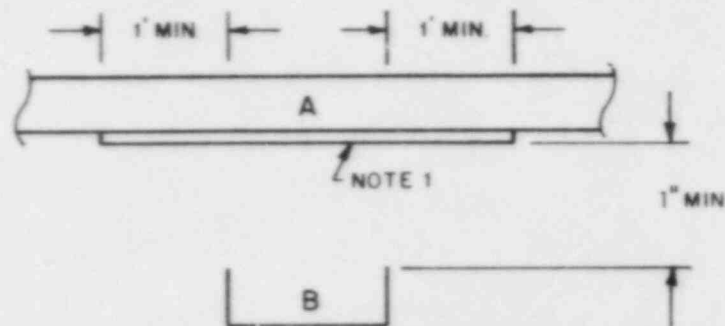


**LEGEND**

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

**NOTES: 1. TRAY COVER**

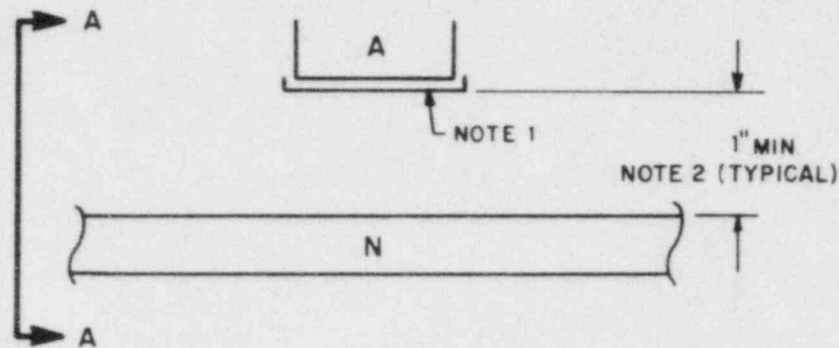
- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY



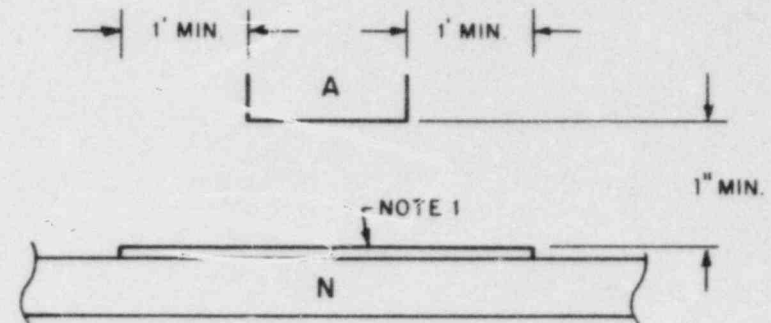
SECTION A-A

**FIGURE 8.3-35  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT**

**CABLE SPREADING AREAS  
TRAY TO TRAY - PERPENDICULAR CROSSING  
CLASS 1E TO NON-CLASS 1E**



OR

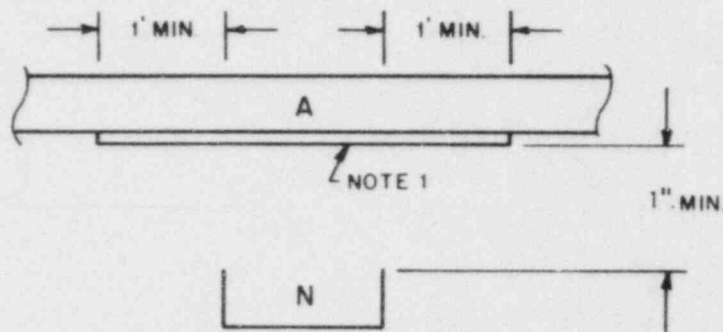


**LEGEND**

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

**NOTES: 1. TRAY COVER**

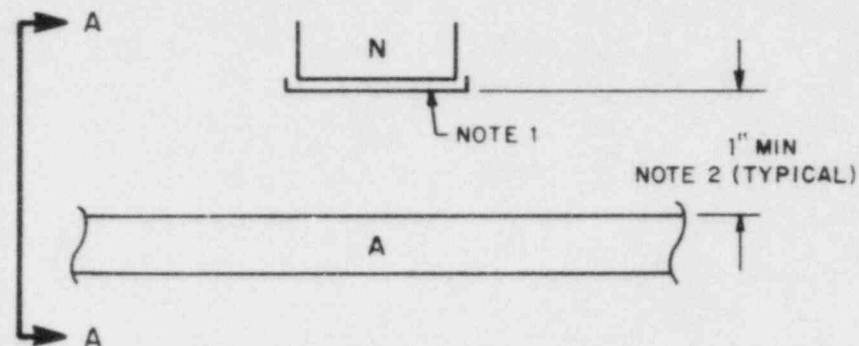
- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY



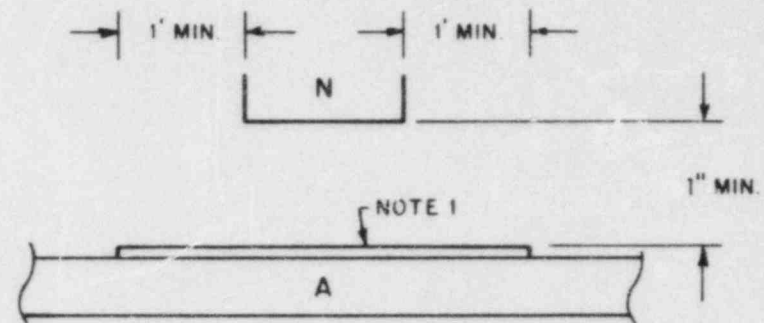
SECTION A-A

**FIGURE 8.3-36  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT**

**CABLE SPREADING AREAS  
TRAY TO TRAY - PERPENDICULAR CROSSING  
NON-CLASS 1E TO CLASS 1E**



OR

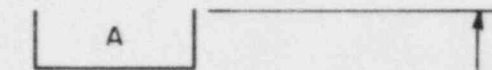
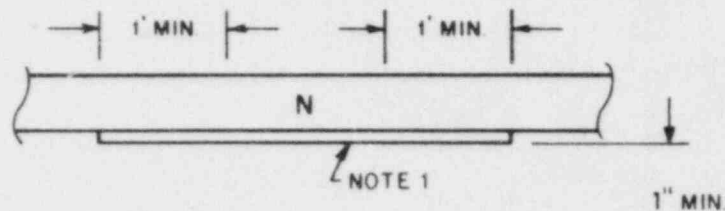


**LEGEND**

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N- NON-CLASS 1E RACEWAY

**NOTES: 1. TRAY COVER**

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY**



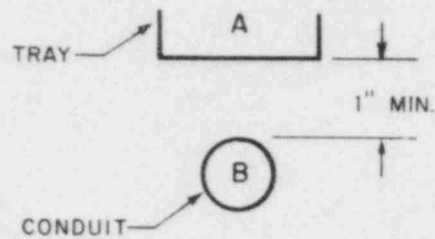
SECTION A-A

FIGURE 8.3-37

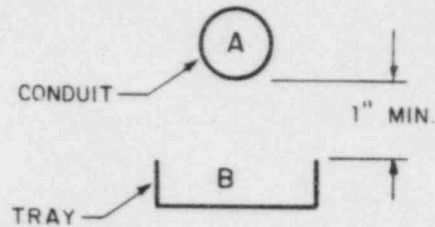
**CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS**

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

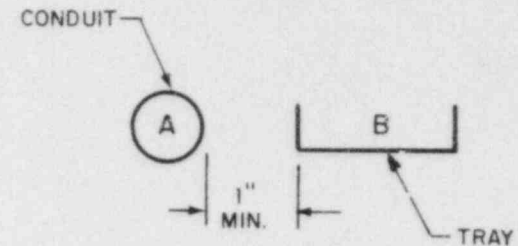
GENERAL PLANT AREAS-TRAY TO CONDUIT  
CLASS 1E TO REDUNDANT CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

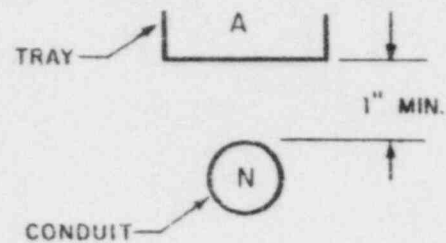
FIGURE 8.3-38

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

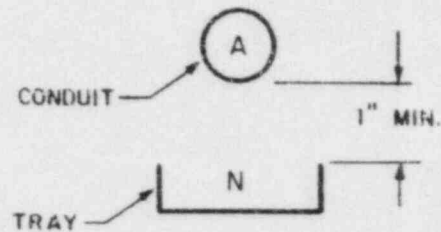
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



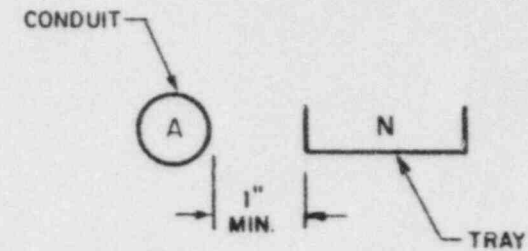
GENERAL PLANT AREAS-TRAY TO CONDUIT  
CLASS 1E TO NON-CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

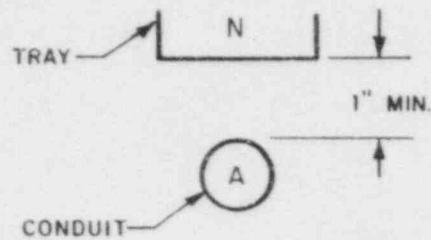
FIGURE 8.3-39

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

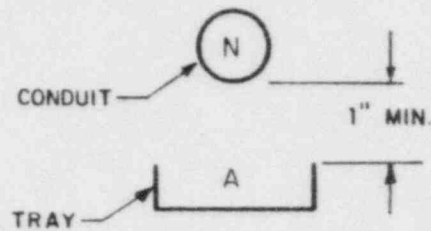
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



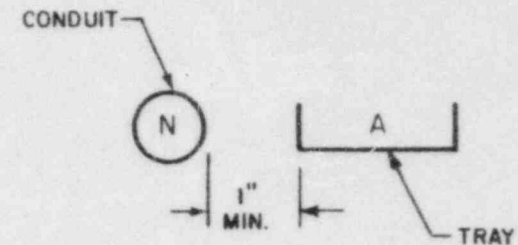
GENERAL PLANT AREAS-TRAY TO CONDUIT  
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND

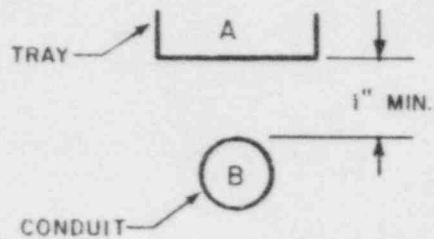
- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

FIGURE 8.3-40

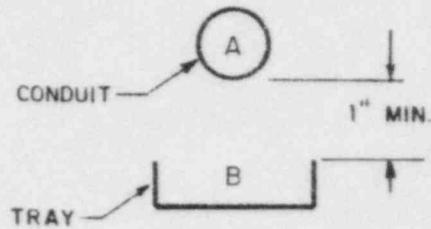
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

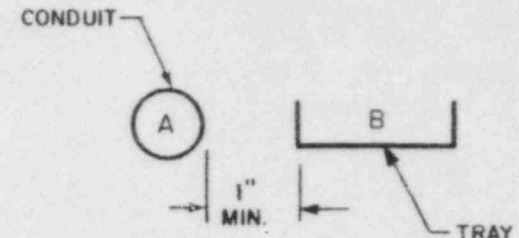
CABLE SPREADING AREAS-TRAY TO CONDUIT  
CLASS 1E TO REDUNDANT CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND

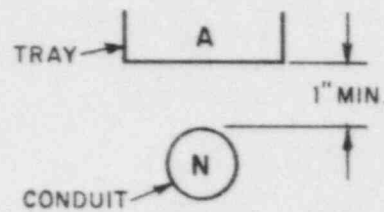
- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON CLASS 1E RACEWAY

FIGURE 8.3-41

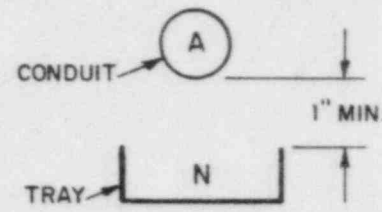
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS-TRAY TO CONDUIT  
CLASS 1E TO NON-CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND

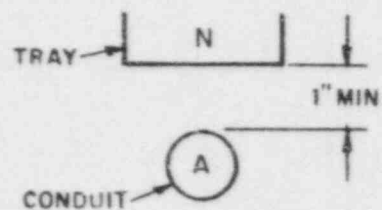
- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

FIGURE 8.3-42

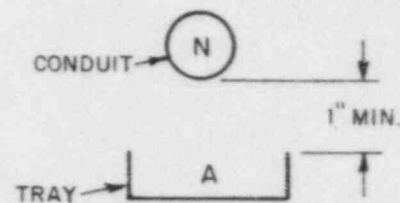
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS-TRAY TO CONDUIT  
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

FIGURE 8.3-43

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CLASS 1E TO REDUNDANT CLASS 1E

Diagram illustrating Detail "A" or "B" showing cable connections to a circular structure. The diagram includes labels for "CABLES (TYPICAL)", "1" MIN.", and "NOTE 1 (TYPICAL)".

Figure 1 consists of two diagrams, A and B, representing details of a test specimen. Diagram A shows a circular specimen with three smaller circles inside. A vertical arrow points down from the top, and a horizontal line with a vertical tick mark is labeled "1" MIN". Diagram B shows a rectangular specimen with three smaller circles inside. A vertical arrow points up from the bottom, and a horizontal line with a vertical tick mark is labeled "1" MIN".

A

1" MIN.

DETAIL "C" OR

A- CLASS 1E RACEWAY/CABLES  
B-REDUNDANT CLASS 1E RACEWAY/CABLES  
N-NON-CLASS 1E RACEWAY/CABLES

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

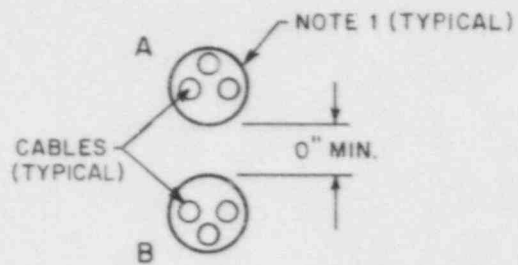
### GENERAL PLANT AREAS (GPA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO REDUNDANT CLASS 1E

HORIZONTAL OR VERTICAL



DETAIL "A"

LEGEND

- A - CLASS 1E RACEWAY/CABLES
- B - REDUNDANT CLASS 1E RACEWAY/CABLES
- N - NON-CLASS 1E RACEWAY/CABLES

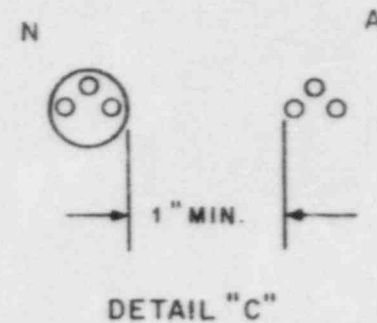
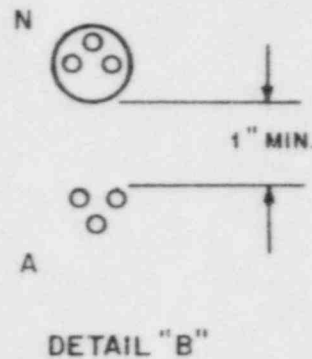
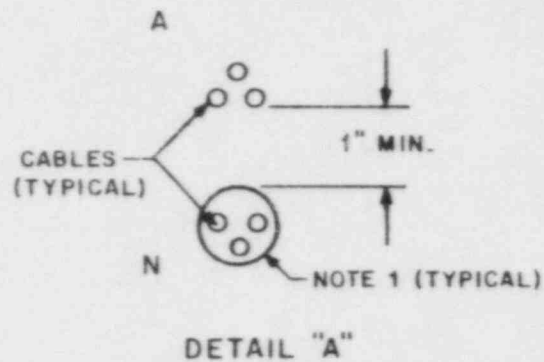
NOTE 1: CABLES IN AIR ARE ENCLOSED IN A  
PROTECTIVE WRAP OF WOVEN  
SILICON DIOXIDE AND GLASS TAPE.

FIGURE 8.3-45  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



# GENERAL PLANT AREAS CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO NON-CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

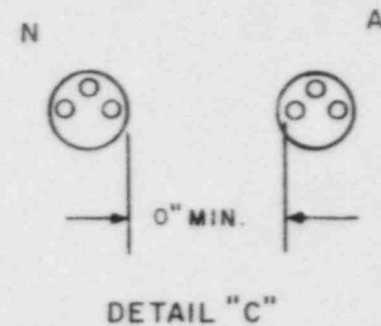
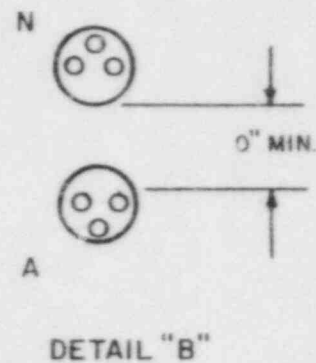
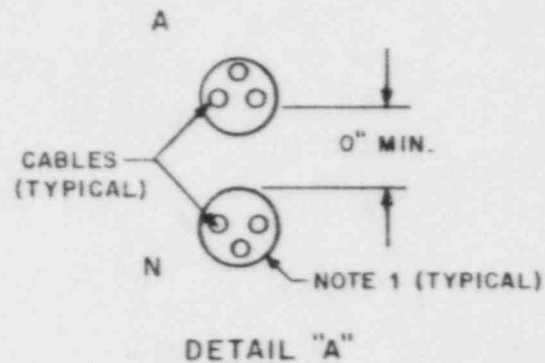
FIGURE 8.3-46

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO NON-CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE

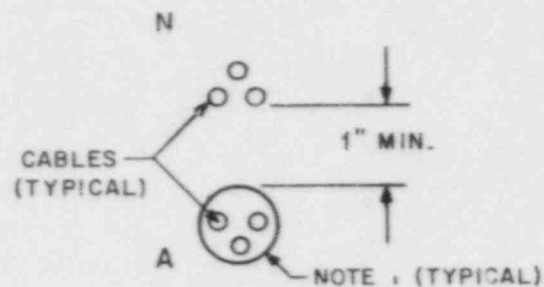
FIGURE 8.3-47

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

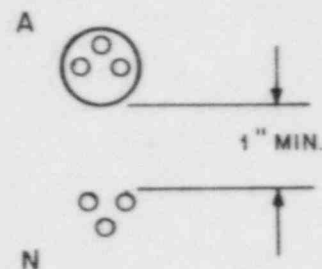
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# GENERAL PLANT AREAS CABLE IN AIR TO CABLE IN AIR

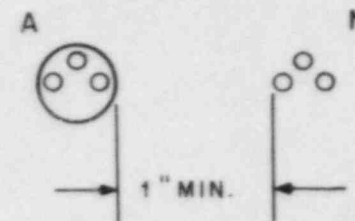
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B-REDUNDANT CLASS 1E RACEWAY/CABLES
- N-NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

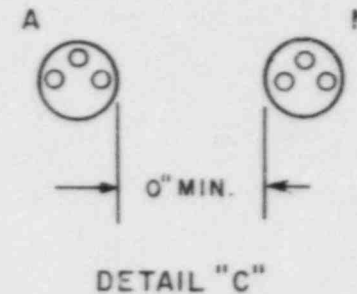
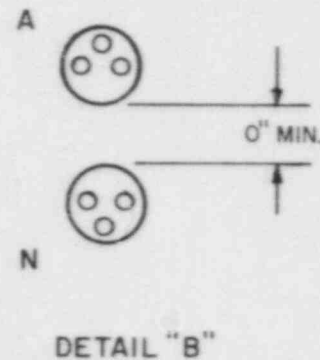
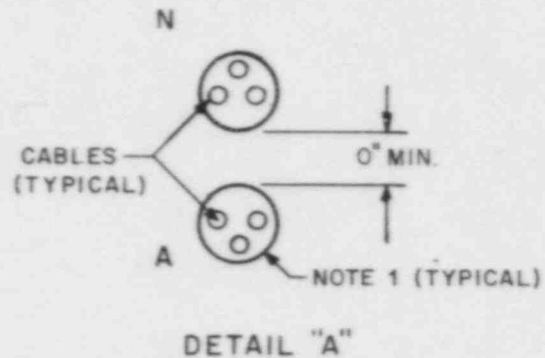
FIGURE 8.3-48

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# GENERAL PLANT AREAS CABLE IN AIR TO CABLE IN AIR

NON-CLASS 1E TO CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

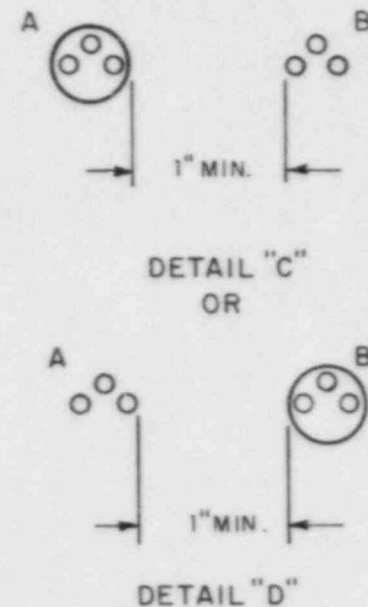
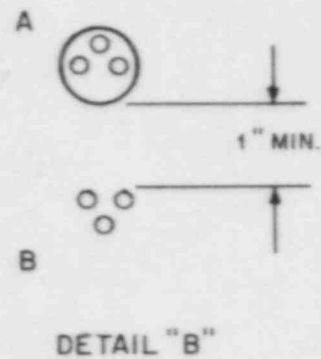
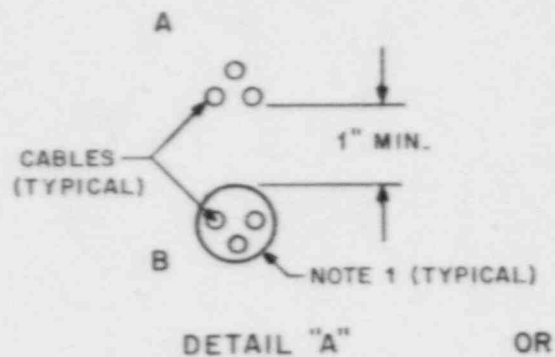
FIGURE 8.3-49

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO REDUNDANT CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B-REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

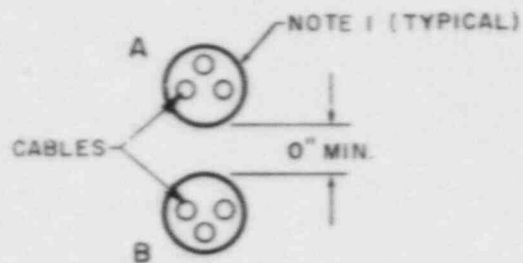
FIGURE 8.3-50

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS  
CABLE IN AIR TO CABLE IN AIR

CLASS IE TO REDUNDANT CLASS IE  
HORIZONTAL OR VERTICAL



LEGEND

- A - CLASS IE RACEWAY/CABLES
- B - REDUNDANT CLASS IE RACEWAY/CABLES
- N - NON-CLASS IE RACEWAY/CABLES

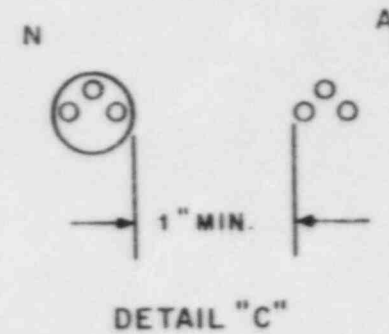
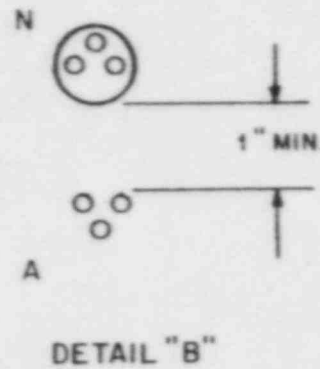
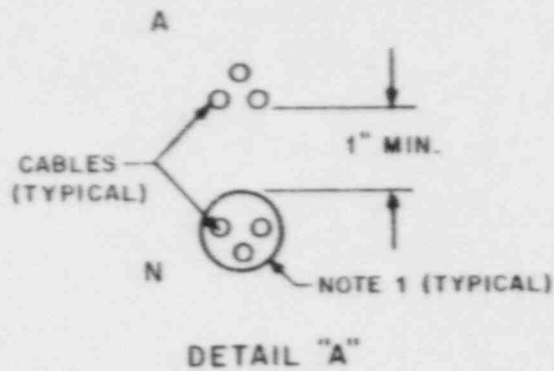
NOTE 1: CABLES IN AIR ARE ENCLOSED IN A  
PROTECTIVE WRAP OF WOVEN  
SILICON DIOXIDE AND GLASS TAPE.

FIGURE 8.3-51  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



# CABLE SPREADING AREAS CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO NON-CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

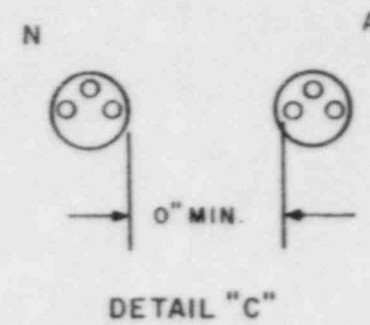
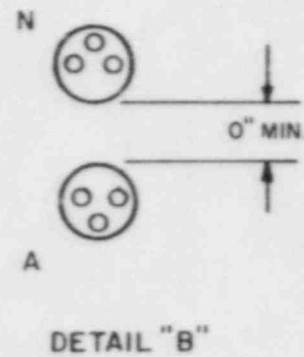
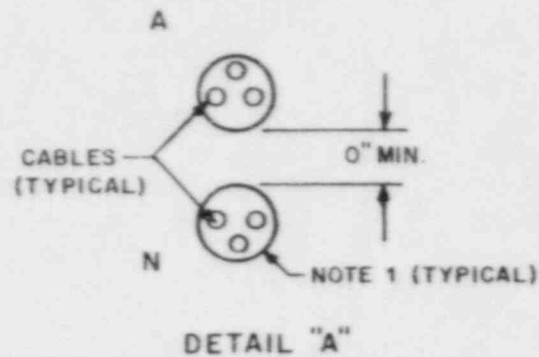
FIGURE 8.3-52

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CABLE IN AIR

CLASS 1E TO NON-CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

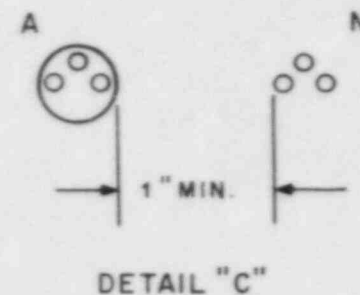
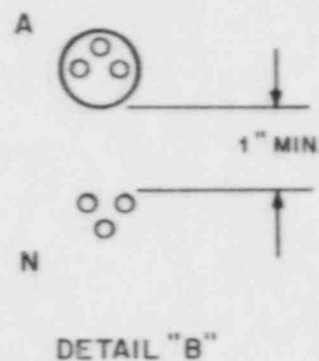
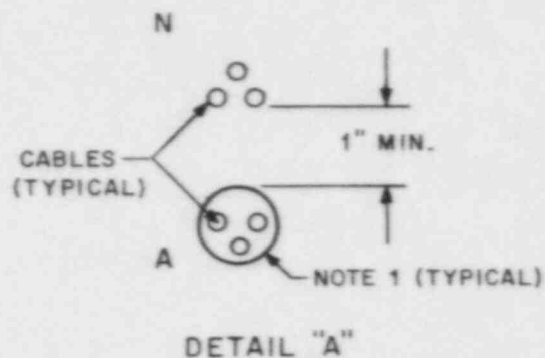
FIGURE 8.3-53

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CABLE IN AIR

NON-CLASS 1E TO CLASS 1E



## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

1. CABLES IN AIR ARE ENCLOSED IN METALLIC CONDUIT OR A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

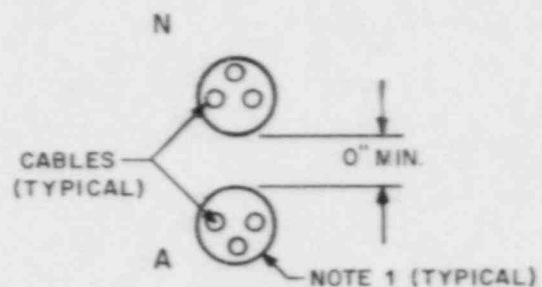
FIGURE 8.3-54

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

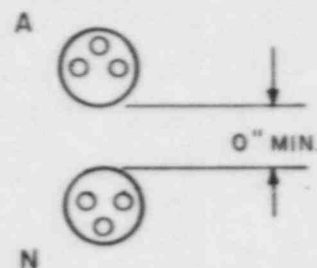
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CABLE IN AIR

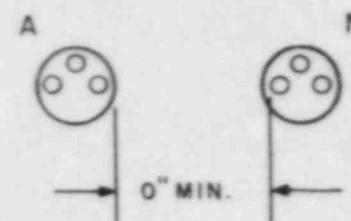
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

## NOTE

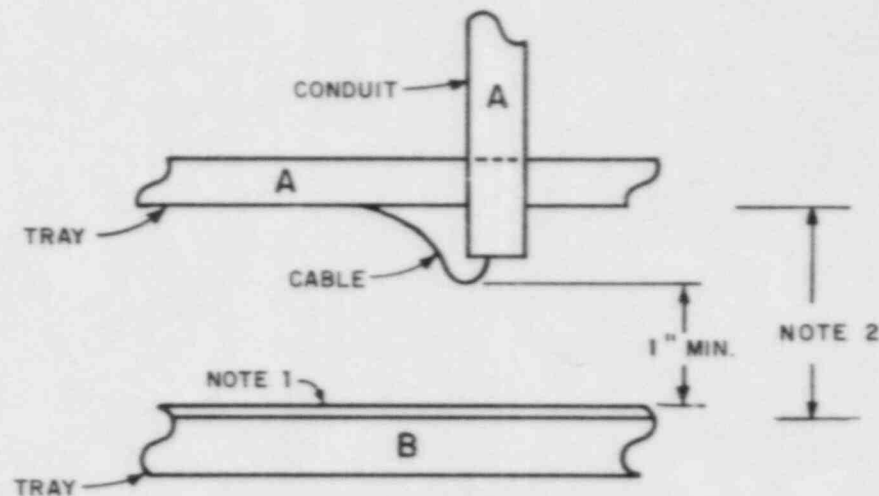
1. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

FIGURE 8.3-55

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT  
  
CLASS IE TO REDUNDANT CLASS IE



LEGEND

- A - CLASS IE RACEWAY
- B - REDUNDANT CLASS IE RACEWAY
- N - NON-CLASS IE RACEWAY

NOTES: 1. TRAY COVER

2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-56

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT  
  
CLASS 1E TO REDUNDANT CLASS 1E

LEGEND:

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

NOTES

1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF SIDE RAIL OF THE UPPER TRAY
3. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

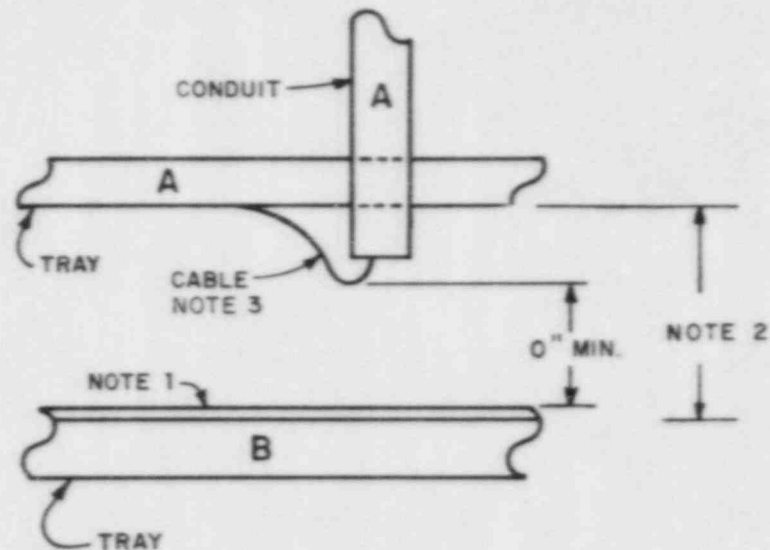
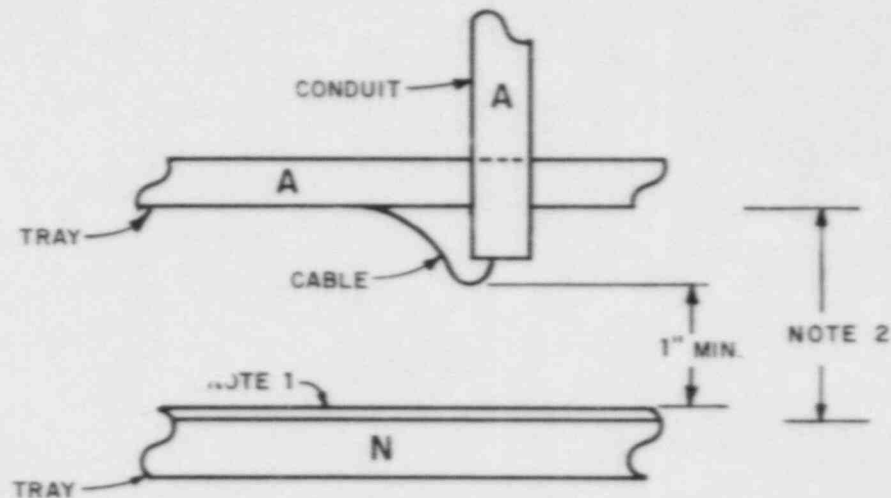


FIGURE 8.3-57  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



GENERAL PLANT AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO NON-CLASS 1E



LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

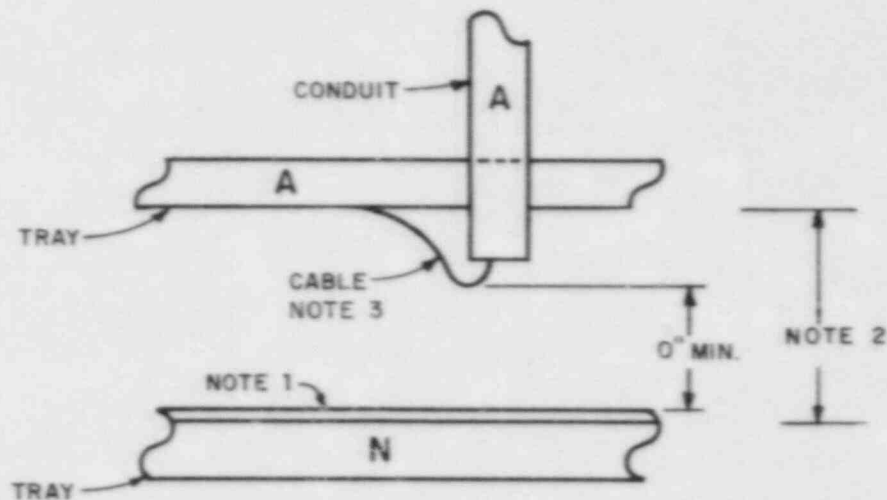
FIGURE 8.3-58

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO NON-CLASS 1E



LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY
- 3. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE

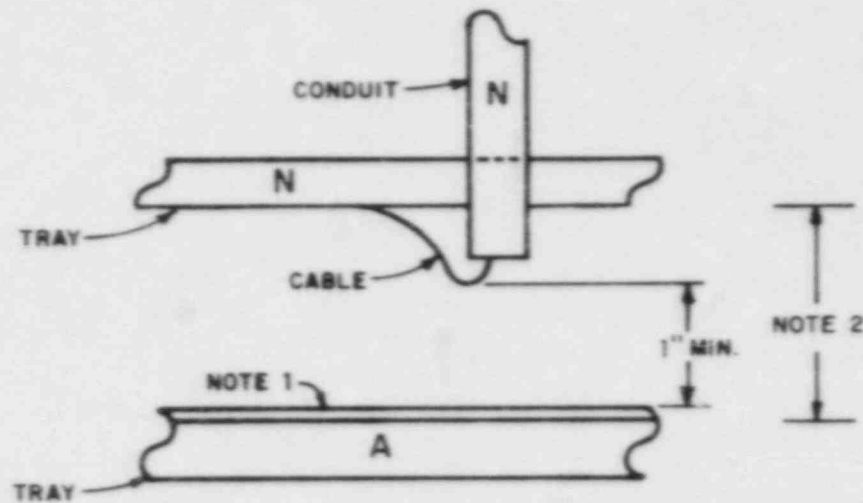
FIGURE 8.3-59

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

NON-CLASS 1E TO CLASS 1E



LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

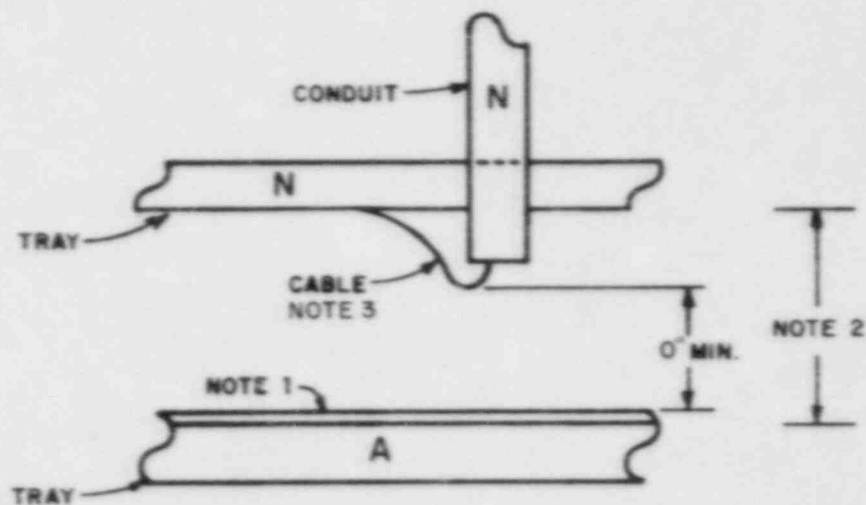
FIGURE 8.3-60

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

NON-CLASS 1E TO CLASS 1E



LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY.
- 3. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

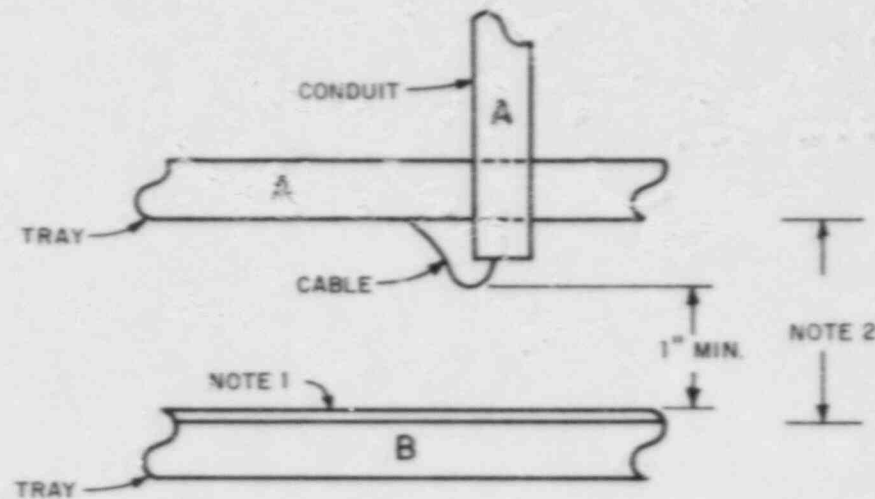
FIGURE 8.3-61

GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO REDUNDANT CLASS 1E



LEGEND

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

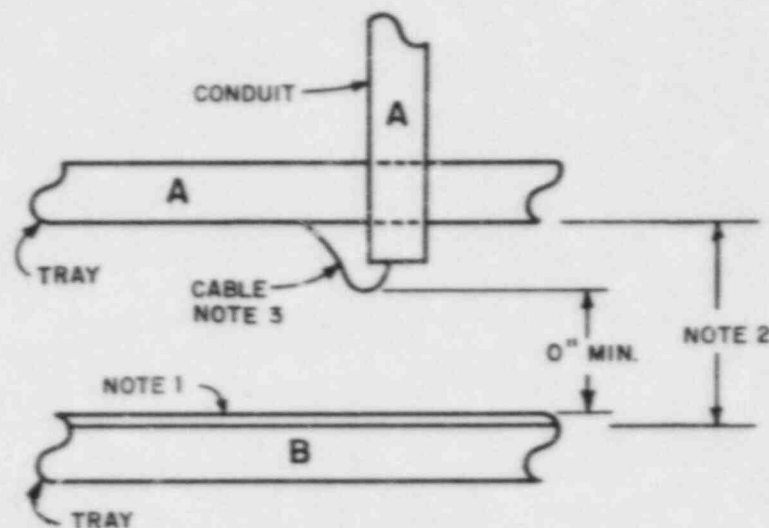
- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-62

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT  
  
CLASS 1E TO REDUNDANT CLASS 1E



**LEGEND:**

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

**NOTES**

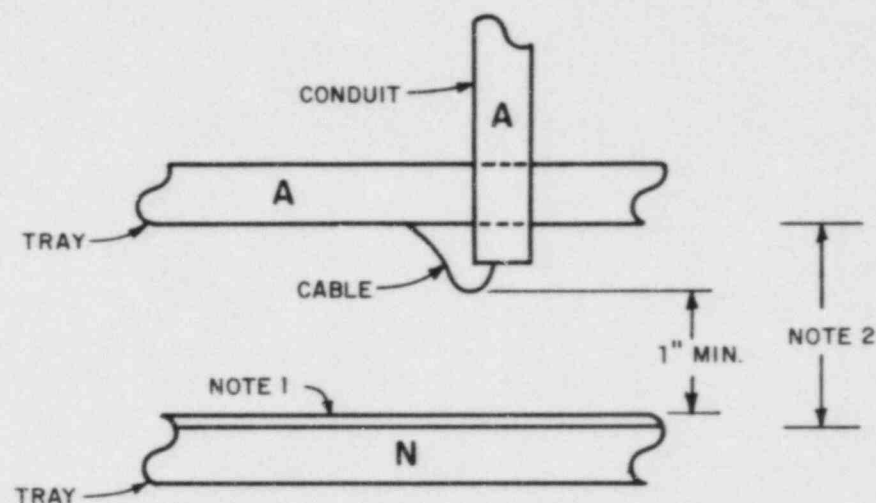
1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY.
3. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

FIGURE 8.3-63  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



CABLE SPREADING AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO NON-CLASS 1E



LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-64

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

CLASS 1E TO NON-CLASS 1E

LEGEND:

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES

1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY.
3. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

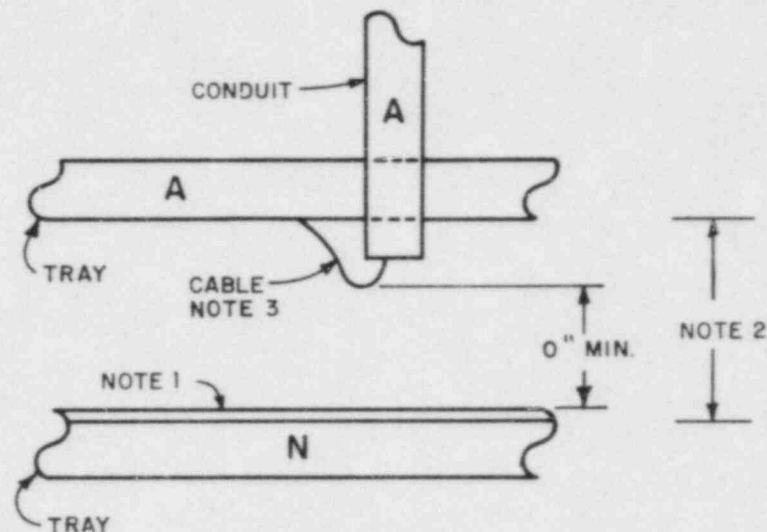


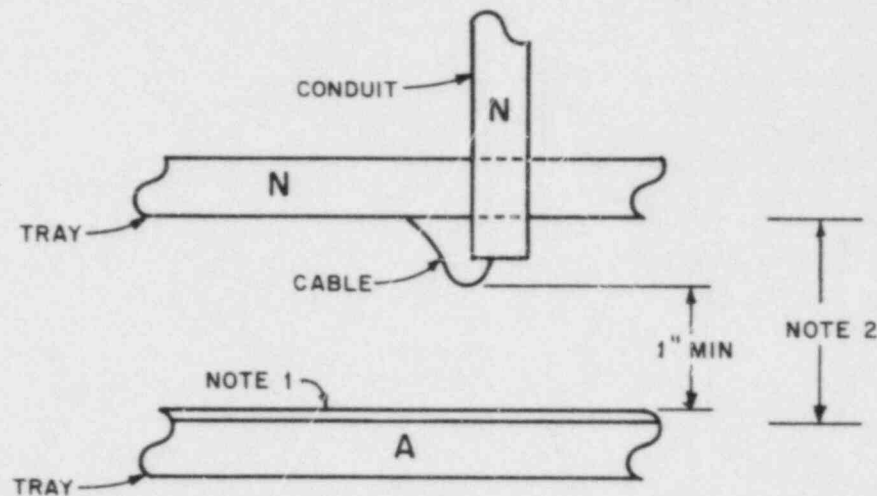
FIGURE 8.3-65

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

CABLE SPREADING AREAS  
TRAY TO TRAY - CABLE ENTRY / EXIT

NON-CLASS 1E TO CLASS 1E



LEGEND

- A-CLASS 1E RACEWAY
- B-REDUNDANT CLASS 1E RACEWAY
- N-NON-CLASS 1E RACEWAY

NOTES: 1. TRAY COVER

- 2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY

FIGURE 8.3-66

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS TRAY TO TRAY - CABLE ENTRY / EXIT

## NON-CLASS 1E TO CLASS 1E

### LEGEND:

- A - CLASS 1E RACEWAY
- B - REDUNDANT CLASS 1E RACEWAY
- N - NON-CLASS 1E RACEWAY

### NOTES

1. TRAY COVER
2. VERTICAL SPACING DISTANCE FOR CABLE TRAYS IS MEASURED FROM THE TOP OF THE SIDE RAIL OF THE LOWER TRAY TO THE BOTTOM OF THE SIDE RAIL OF THE UPPER TRAY.
3. CABLES IN AIR ARE ENCLOSED IN A PROTECTIVE WRAP OF WOVEN SILICON DIOXIDE AND GLASS TAPE.

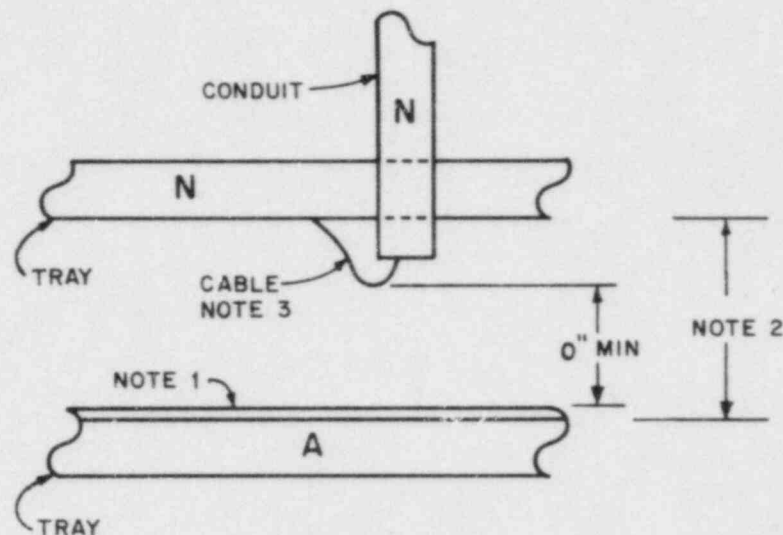


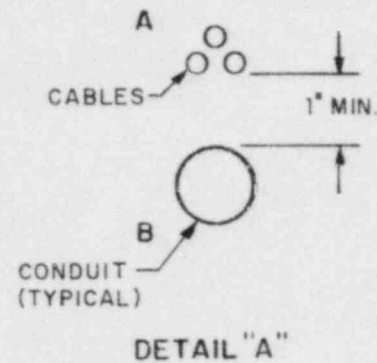
FIGURE 8.3-67

CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

GENERAL PLANT AREAS  
CABLE IN AIR TO CONDUIT

CLASS 1E TO REDUNDANT CLASS 1E  
HORIZONTAL OR VERTICAL



LEGEND

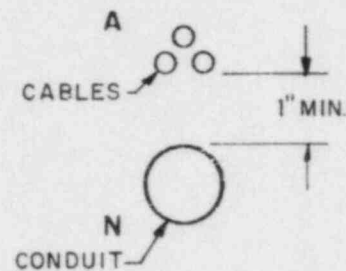
- A - CLASS 1E RACEWAY/CABLES
- B - REDUNDANT CLASS 1E RACEWAY/CABLES
- N - NON-CLASS 1E RACEWAY/CABLES

FIGURE 8.3-68  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# GENERAL PLANT AREAS CABLE IN AIR TO CONDUIT

CLASS 1E TO NON-CLASS 1E

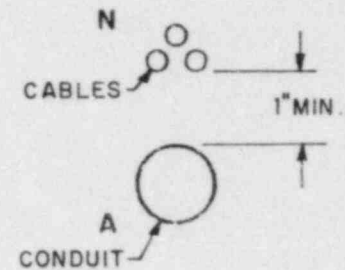
HORIZONTAL OR VERTICAL



DETAIL "A"

NON-CLASS 1E TO CLASS 1E

HORIZONTAL OR VERTICAL



DETAIL "B"

## LEGEND

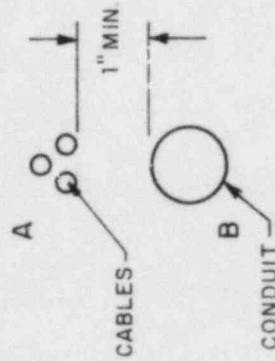
- A - CLASS 1E RACEWAY/CABLES
- B - REDUNDANT CLASS 1E RACEWAY/CABLES
- N - NON-CLASS 1E RACEWAY/CABLES

FIGURE 8.3-69  
GENERAL PLANT AREAS (GPA)  
ACCEPTABLE SEPARATION  
ARRANGEMENTS  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



# CABLE SPREADING AREAS CABLE IN AIR TO CONDUIT

CLASS IE TO REDUNDANT CLASS IE  
HORIZONTAL OR VERTICAL



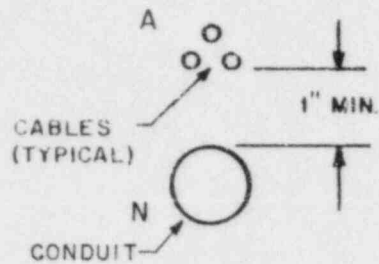
## LEGEND

- A - CLASS IE RACEWAY/CABLES
- B - REDUNDANT CLASS IE RACEWAY/CABLES
- N - NON-CLASS IE RACEWAY/CABLES

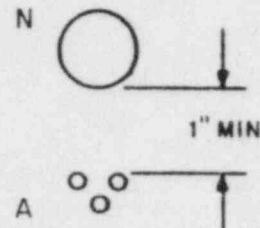
FIGURE 8.3-70  
CABLE SPREADING AREAS (CSA)  
ACCEPTABLE SEPARATION  
ARRANGEMENT  
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CONDUIT

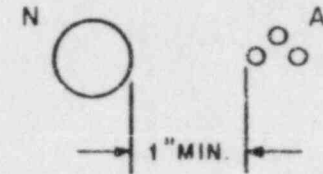
CLASS 1E TO NON-CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

## LEGEND:

- A - CLASS 1E RACEWAY/CABLES
- B - REDUNDANT CLASS 1E RACEWAY/CABLES
- N - NON-CLASS 1E RACEWAY/CABLES

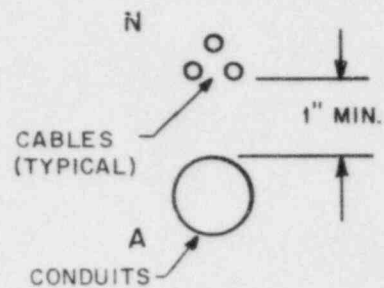
FIGURE 8.3-71

## CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS

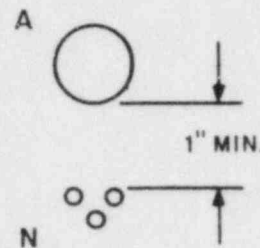
BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT

# CABLE SPREADING AREAS CABLE IN AIR TO CONDUIT

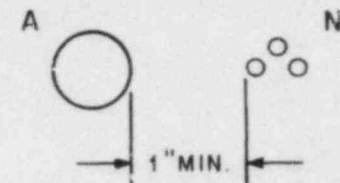
NON-CLASS 1E TO CLASS 1E



DETAIL "A"



DETAIL "B"



DETAIL "C"

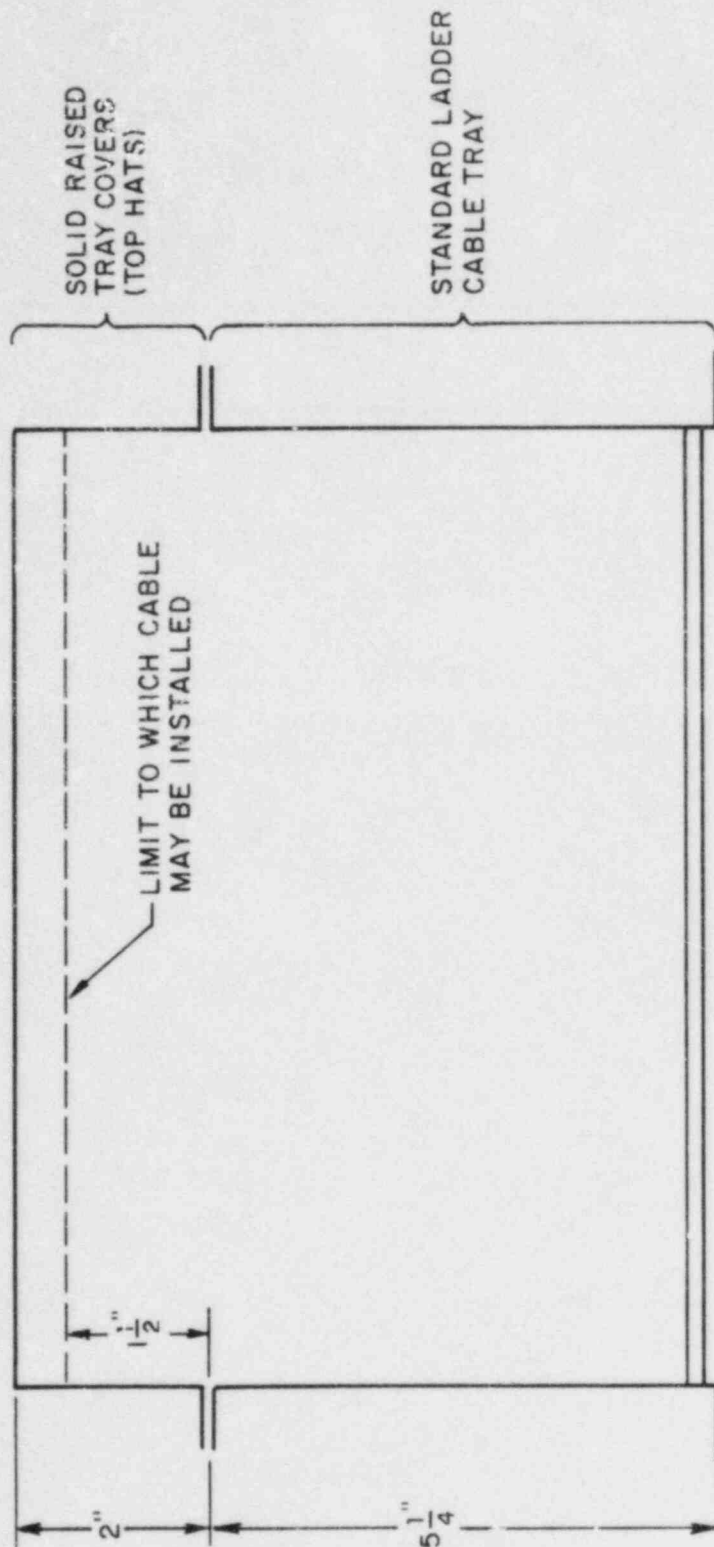
## LEGEND:

- A- CLASS 1E RACEWAY/CABLES
- B- REDUNDANT CLASS 1E RACEWAY/CABLES
- N- NON-CLASS 1E RACEWAY/CABLES

FIGURE 8.3-72

## CABLE SPREADING AREAS (CSA) ACCEPTABLE SEPARATION ARRANGEMENTS

BEAVER VALLEY POWER STATION-UNIT 2  
FINAL SAFETY ANALYSIS REPORT



C&X TRAYS ONLY

FIGURE 8.3-73  
 RAISED HAT TRAY COVER  
 BEAVER VALLEY POWER STATION-UNIT 2  
 FINAL SAFETY ANALYSIS REPORT