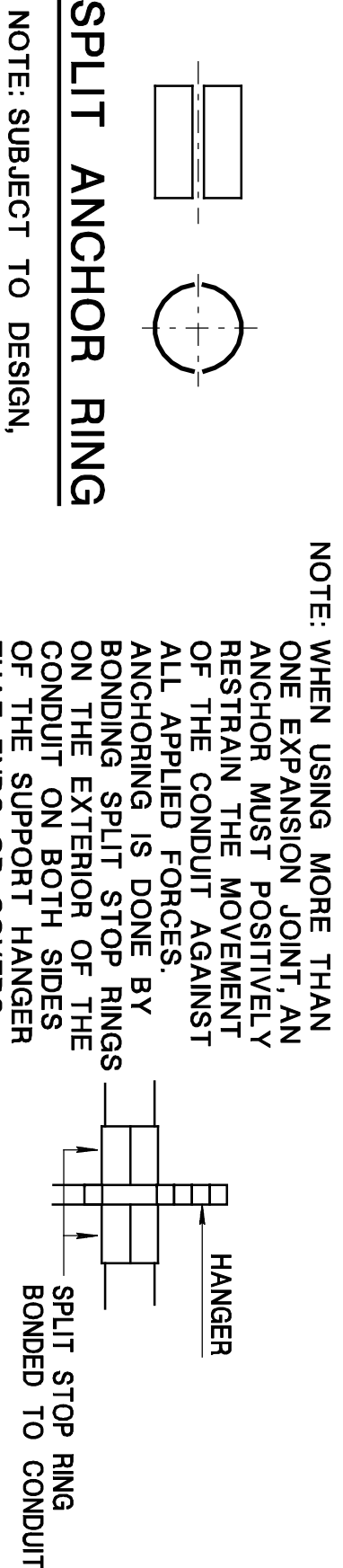
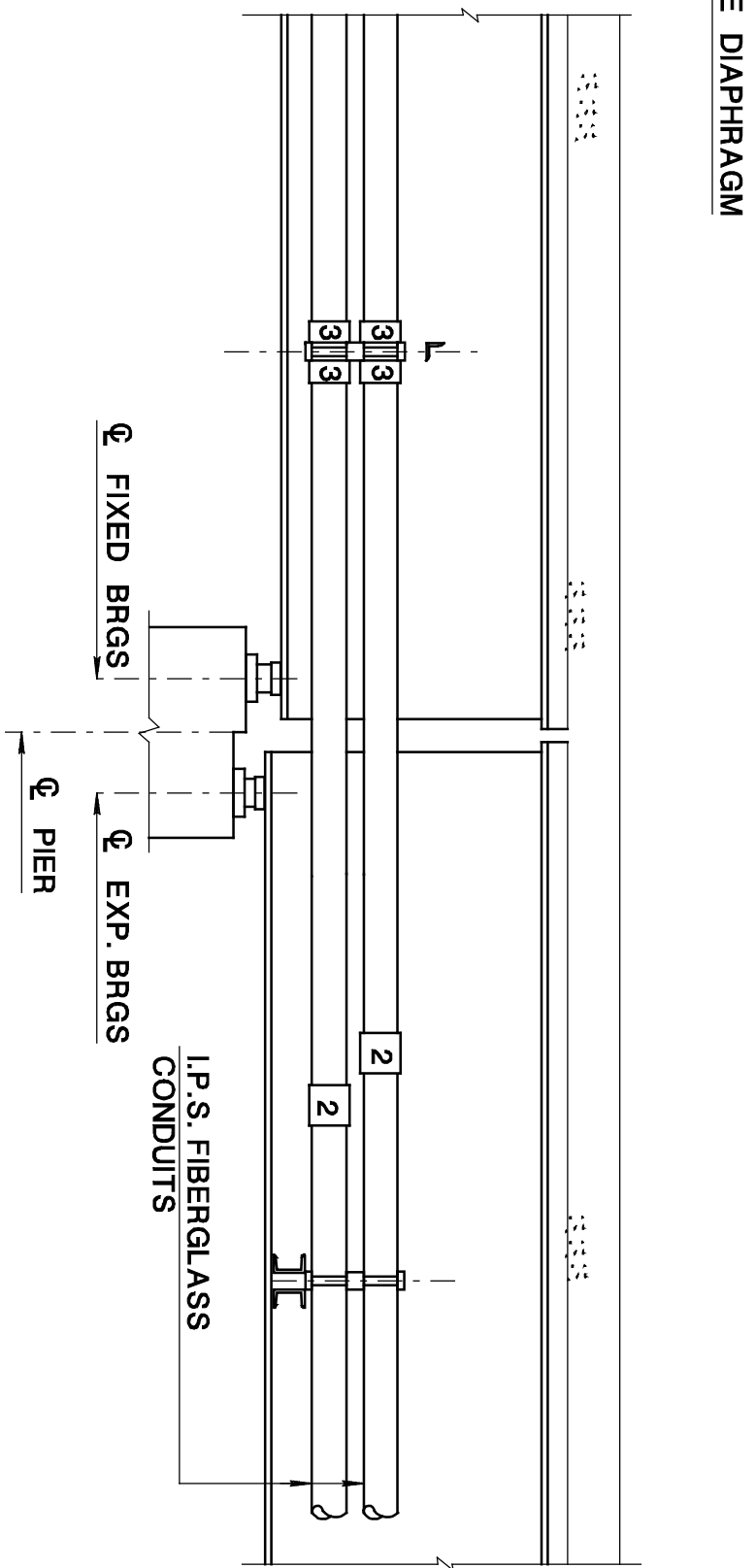
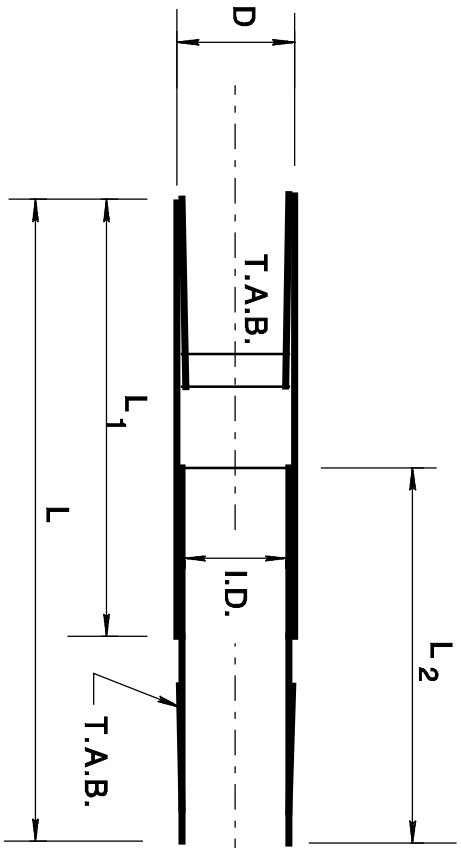


**LONGITUDINAL SECTION**  
(TYPICAL LONGITUDINAL SECTION SHOWING SEVERAL TYPES OF CONDUIT SUPPORTS)



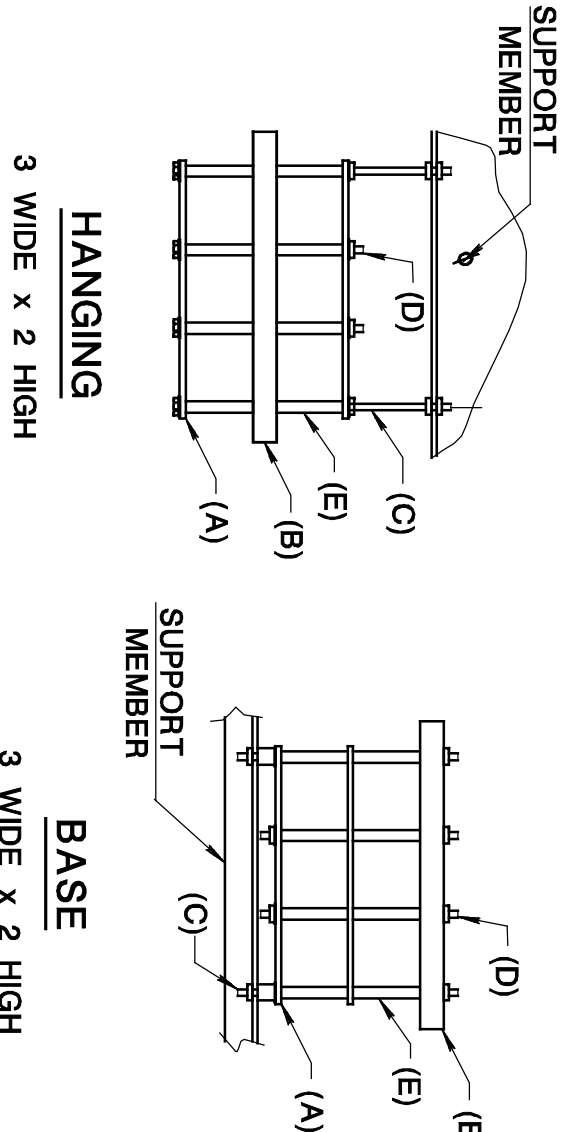
**SPLIT ANCHOR RING**  
NOTE: WHEN USING MORE THAN ONE EXPANSION JOINT, AN ANCHOR MUST POSITIVELY RESTRAIN THE MOVEMENT OF THE CONDUIT AGAINST ALL APPLIED FORCES. ANCHORING IS DONE BY BONDING SPLIT STOP RINGS ON THE EXTERIOR OF THE CONDUIT ON BOTH SIDES OF THE SUPPORT HANGER THAT ENDS OR COVERS THE CONDUIT OR LENGTH OF CONDUIT FOR THAT PARTICULAR EXPANSION JOINT.

## ANCHOR



NOMINAL SIZE	D	L <sub>1</sub>	L <sub>2</sub>	L <sub>min.</sub>	L <sub>max.</sub>	I.D.
4 in	4.97	12.50	11	15	21	4.36

## EXPANSION JOINT



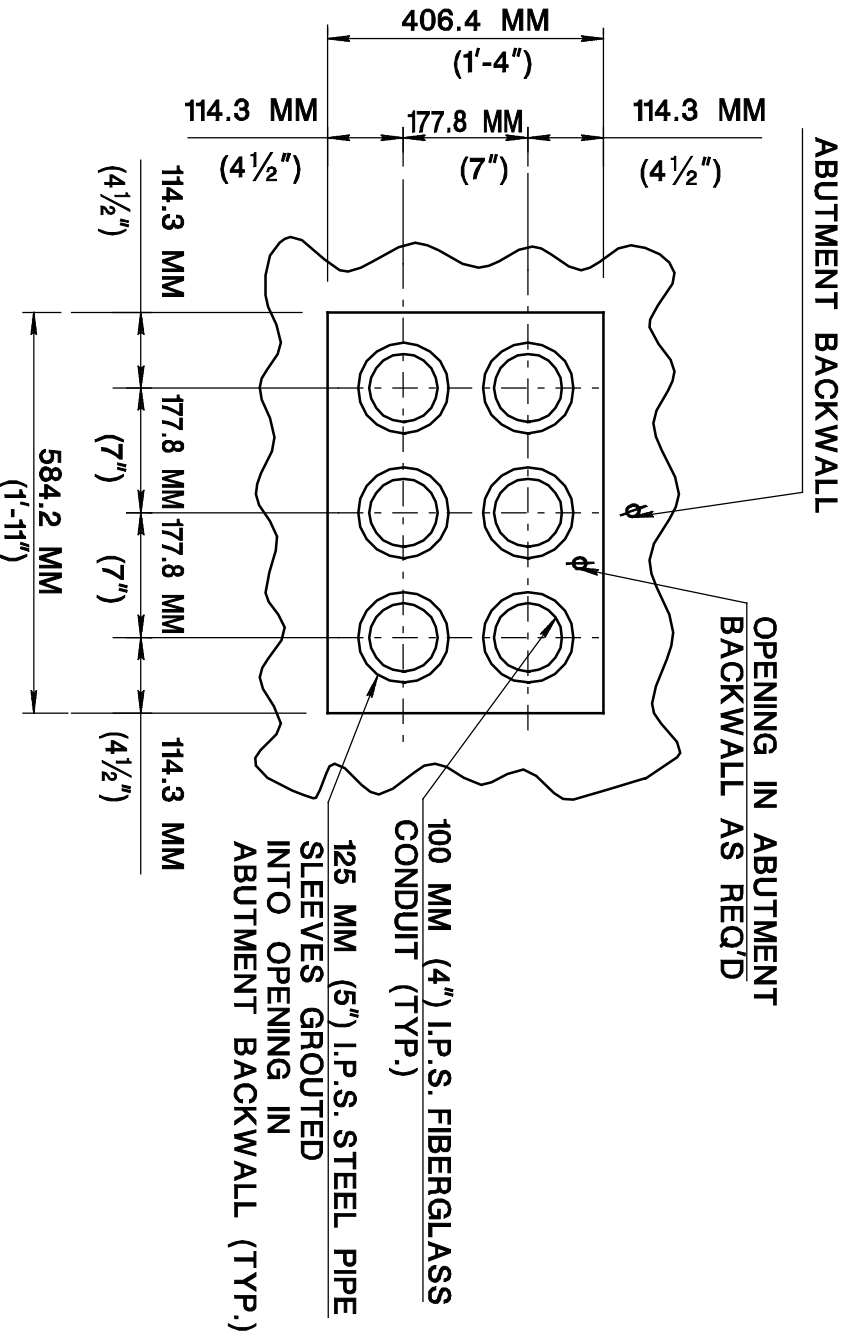
## STANDARD SUPPORT HANGERS IPS SIZE 4" TEL

**HANGING:** HANGS DOWN FROM BRIDGE STRUCTURE. ATTACHMENT RODS (ITEM G) EXTEND AS REQUIRED ABOVE TOP HANGER PLATE. TWO ATTACHMENT RODS (G) ARE INCLUDED UP THRU 4 DUCTS WIDE WITH THREE INCLUDED FOR 5 AND 8 DUCTS WIDE.

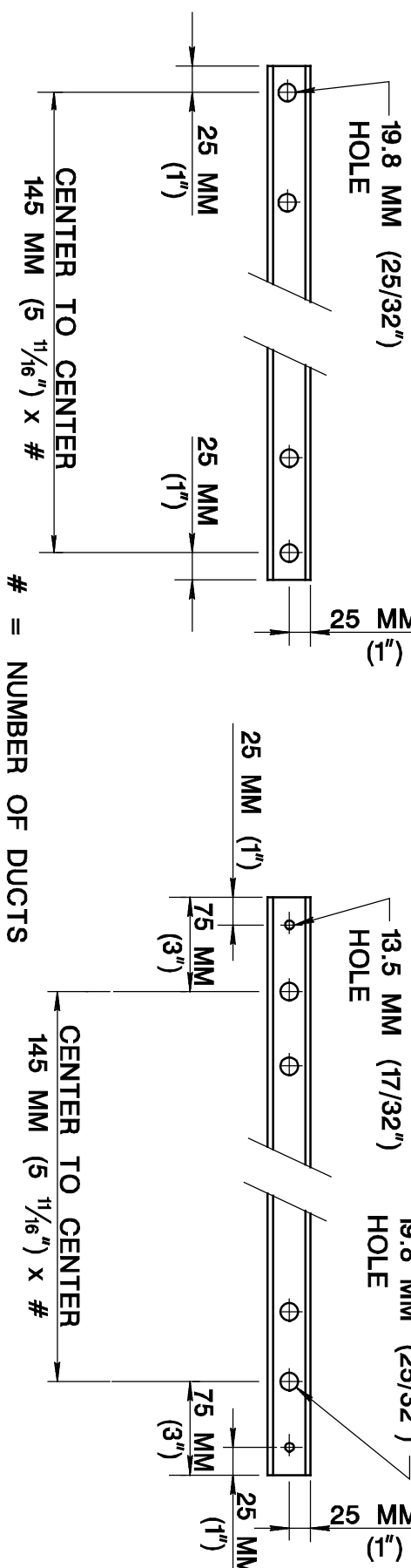
**BASE MOUNT:** MOUNTS IN TOP TO STRUCTURAL MEMBER. THREADED ATTACHMENT RODS (C) EXTEND AS REQUIRED BELOW HANGER AND ATTACHMENT RODS (G) ARE INCLUDED FOR 4 DUCTS WIDE WITH THREE INCLUDED FOR 5 AND 8 DUCTS WIDE.

## FIBERGLASS HANGER

**PART (A)** 13 x 50 MM (1/2" x 2") FIBERGLASS PLATE  
**PART (B)** 50 x 50 MM (2" x 2") FIBERGLASS SQUARE TUBING.  
**PART (C)** 19 MM (3/4") 10NC THREADED STEEL ATTACHMENT RODS, NUTS AND WASHERS (PLATED)  
**PART (D)** SPACER RODS, 19 MM (3/4") 10NC THREADED STEEL RODS, NUTS AND WASHERS (PLATED)  
**PART (E)** 19 MM (3/4") FIBERGLASS SPACER TUBES (25.4 MM O.D. x 19.2 MM I.D. x 19.13 MM LONG (10" O.D. x 0.755" I.D. x 4.69" LONG))



## SECTION A-A



**PART (A)** PLATE 13 x 50 MM (1/2"x2")  
**PART (B)** SQ. TUBE 50 x 50 MM (2"x2")  
**CENTER TO CENTER HANGER ROD DIMENSIONS**

**TABLE 1**

Support Spacing for Interior Spans at 75°F  
At 100° F apply factor of 0.96 - Based on Midspan Deflection not exceeding 1/8"

CONDUIT IPS SIZE	CABLE WT. KG/M (LBS. per ft.)	Moment of Inertia MM <sup>4</sup> (in <sup>4</sup> )	Span M (Ft.)
(4) Inch	4.46 (3) 11.91 (8)	2.37 <sup>5</sup> <sub>4</sub>	21.2 17.2

For other cable weights use formula below:

$$\text{For } 16 \text{ MM Deflection, Span} = \sqrt[4]{\frac{1.0267 \times 10^{13} \times \text{Moment of Inertia}}{(W_{\text{Cable}} + W_{\text{Conduit}}) / 1000}} = \frac{\text{MM}}{1000} = \text{M}$$

$$\left( \text{For } \frac{1}{8}'' \text{ Deflection, Span} = \sqrt[4]{\frac{576,000,000 \times \text{Moment of Inertia}}{(W_{\text{Cable}} + W_{\text{Conduit}}) / 12}} = \frac{\text{Inches}}{12} = \text{Ft.} \right)$$

Property - Physical	Test Method	Value at 24° C	Value at 75° F
Ultimate Tensile Strength	ASTM-D2105	72.4 MPa	10,500 psi
Design Tensile Stress	-	16.1 MPa	2,625 psi
Tensile Modulus of Elasticity	ASTM-D2105	12203.7 MPa	1.77 X 10 <sup>6</sup> psi
Ultimate Compressive Strength	ASTM-D695	122.7 MPa	17,800 psi
Design Compressive Stress	-	30.7 MPa	4,450 psi
Compressive Modulus of Elasticity	ASTM-D695	9652.7 MPa	1.4 X 10 <sup>6</sup> psi
Ultimate Beam Bending Strength	AOSH-TM	116.1 MPa	16,700 psi
Design Beam Bending Stress	-	34.5 MPa	5,000 psi
Coefficient of Thermal Expansion	AOSH-TM 16-3	2.02 X 10 <sup>-5</sup> mm/mm/°C	1.12 X 10 <sup>-5</sup> in/in/°F
Thermal Conductivity	AOSH-TM 16-15	0.37 W/m <sup>2</sup> *K	2.6 Btu*hr/ft <sup>2</sup> *°F*in
Specific Gravity	ASTM-D792	1.85	1.85

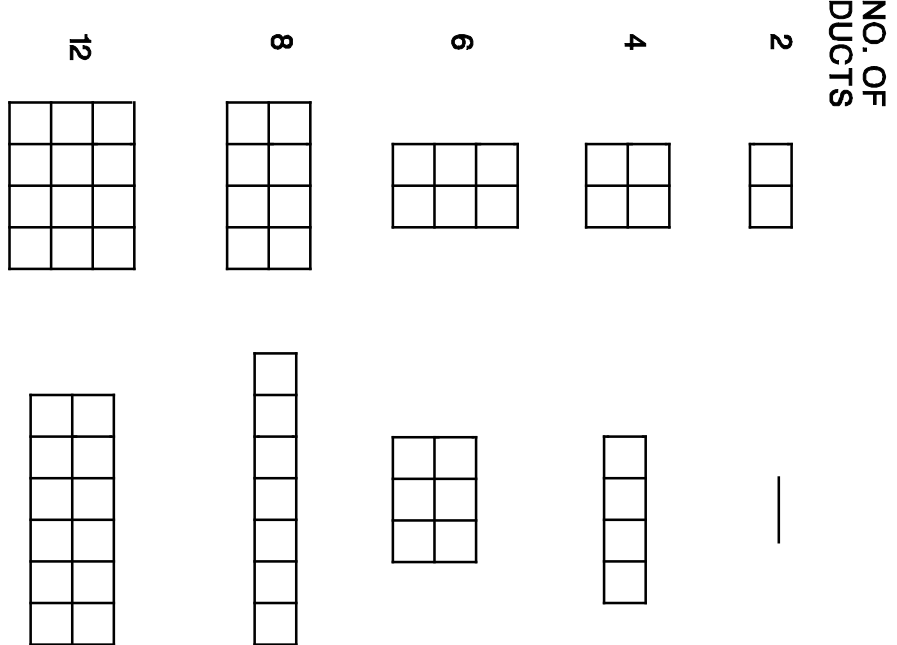
Property - Electrical	Test Method	Value at 24° C	Value at 75° F
Volume Resistivity	ASTM-D150	7.6 X 10 <sup>15</sup> ohm-cm	7.6 X 10 <sup>15</sup> ohm-cm
Surface Resistivity	ASTM-D257	2.4 X 10 <sup>8</sup> megohm	2.4 X 10 <sup>8</sup> megohm
Dielectric Constant	ASTM-D150	4.2 (at 10 <sup>3</sup> cps)	4.2 (at 10 <sup>3</sup> cps)
Dispipation Factor	ASTM-D150	0.06 (at 10 <sup>3</sup> cps)	0.06 (at 10 <sup>3</sup> cps)
Dielectric Strength	ASTM-D348	1800 volts/mm	440 volts/mil

**TABLE 2**

CONDUIT IPS SIZE	O.D. MM (in)	I.D. MM (in)	WALL MM (in)	LENGTHS ±160 MM (±6") M (Ft.)
100 MM (4 inch)	114.3 (4.50)	110.74 (4.36)	1.78 (0.070)	9.1 (30)

## DESIGN NOTES:

- WEIGHT OF 4" IPS DIAMETER FIBERGLASS CONDUIT/DUCT = 0.80 LBS/FT.
- STEEL SUPPORT MEMBERS AND STEEL PRE-CAST REFER TO APPROPRIATE DESIGN MANUALS AND SPECIFICATIONS AS DESIGNATED BY THE GOVERNING AGENCY.
- FIBERGLASS DUCTS TO BE 4" IPS - 4.5" O.D. x 4.36" I.D. x 0.070" WALL - POLISHED BORE 30 FT. LENGTHS WITH THREADED MALE AND FEMALE ENDS WITH 3000 LBS. UNBONDED PULLOUT STRENGTH.
- SELECT CONDUIT LENGTHS SO THAT COUPLING LOCATIONS DO NOT COME WITH SUPPORT LOCATIONS.
- THE NUT ON ALL HANGER BOLTS ARE TO BE TIGHTENED FOR A SNUG ASSEMBLY ONLY AND LOCKED.
- SUBJECT TO DESIGN THE MAXIMUM DISTANCE BETWEEN GASKETED EXPANSION JOINTS CAN BE UP TO 300 FT.
- THE EXPANSION JOINTS ARE TO BE SET ACCORDING TO THE AMBIENT TEMPERATURE AT TIME OF INSTALLATION AS PER GAUGE ON EXPANSION JOINT.
- FOR DIMENSIONS AND PROPERTIES OF DUCT REFER TO TABLE 1.
- ALL ATTACHMENT RODS, NUTS, LOCK AND FLAT WASHERS UTILIZED IN THE DUCT HANGERS ARE TO BE ZINC PLATED UNLESS OTHERWISE SPECIFIED.
- WHEN CEMENTING FIBERGLASS TO FIBERGLASS, A FIBERGLASS ADHESIVE SHALL BE USED.
- ONE DUCT EXPANSION JOINT TO BE PROVIDED BETWEEN ANCHOR POINTS.
- EVERY BRIDGE REQUIRES AT LEAST 1 DUCT EXPANSION JOINT.
- SPECIAL DUCT EXPANSION JOINTS AT THE BRIDGE EXPANSION JOINTS MAY BE REQUIRED.
- DO NOT LOCATE DUCT EXPANSION JOINTS WITHIN DRIP ZONE OF BRIDGE EXPANSION JOINTS.
- THIS DRAWING IS FOR A TYPICAL BRIDGE. SINCE BRIDGE DESIGNS VARY, CONTACT THE PROPER UTILITY COMPANY FOR GUIDANCE.



## SUGGESTED DUCT FORMATION

THIS SHEET FOR DESIGN INFORMATION ONLY, NOT TO BE INCLUDED IN CONTRACT PLANS

## PLATE 2.7 - 3

A	REVISION	DATE	BY	DATE
1	REMOVE COPYRIGHT 1986	12-28-86	VI	12-28-86
2	REVISION	DATE	BY	DATE
3	REVISION	DATE	BY	DATE

TYPICAL INSTALLATION OF 100 MM (4") IPS FIBERGLASS DUCTS ON BRIDGES

OWNER: BELL ATLANTIC - NJ  
JOHN S. DEERKOSKI, P.E. AND ASSOCIATES  
WARWICK, NEW YORK

DESIGNED BY: A.E.	DATE: 5-28-86
DRAWN BY: V.V.	DATE: 5-28-86
CHECKED BY: J.E.	DATE: 5-28-86
ISSUED BY: J.E.	DATE: 5-28-86