Entergy

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May 17, 2006
JAFP-06-0079

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: **James A. FitzPatrick Nuclear Power Plant**
Docket No. 50-333
Response To NRC Request for Additional Information Regarding FitzPatrick's Proposed Exemption Request For Hemyc Fire Wrap (TAC No. MC7995)

References:

1. Entergy Nuclear Operations, Inc. letter to USNRC (No. JAFP-05-0118), Request For Exemption From 10 CFR 50, Appendix R, III.G.2.c Requirement For A One-Hour Rated Fire Barrier Wrap, dated July 27, 2005.

2. USNRC letter to Entergy Nuclear Operations, Inc., Request for Additional Information Regarding Exemption Request for Hemyc Fire Wrap, dated April 3, 2006 (TAC NO. MC7995).

Dear Sir:

By letter dated July 27, 2005 (Reference 1), Entergy Nuclear Operations, Inc. (ENO) requested an exemption from the requirements of Title 10 of the Code of Federal Regulation, Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979". The exemption request applies to the cable and equipment wrapped in Hemyc in the West Cable Tunnel (Fire Area 1C/Fire Zone CT-1) which are relied on for safe shutdown during a fire.

On April 6, 2006, ENO received a Request for Additional Information (Reference 2) from the NRC to assist them in the review of the Reference 1 Exemption Request. The RAI responses are provided in Attachment 1. Attachments 2 through 8 contain diagrams and photographs to support the RAI responses.

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There are no new commitments made in this letter. Should you have any questions or comments concerning this submittal, please contact Mr. Jim Costedio at (315) 349-6358.

Very truly yours,

Pete Dietrich
Site Vice President

PD/GB/ds

Attachments: 1. Response to Request for Additional Information,
2 thru 8 Diagrams and Photographs

cc:

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Attachment 1 to JAFP-06-0079
Entergy Nuclear Operations, Inc. – FitzPatrick
Docket No. 50-333
Response to Request for Additional Information (RAI)

RAI 1

The Hemyc fire wrap configuration used at FitzPatrick is described as having an inner and outer covering of aluminized Siltemp, which is coated with a reflective material. This configuration is described as reflecting more radiant energy than the non-aluminized Siltemp configuration tested by the NRC. However, the NRC staff has seen no evidence to support this conclusion.

a) Is there testing or additional information (perhaps from the manufacturer) to support the comment that aluminized Siltemp can be expected to have better heat resistive properties than non-aluminized Siltemp?

b) Also, if aluminum is used to line the inner and outer surfaces of the wrap, and aluminum is heat conductive, then what are the effects of convective heat on the performance of this fire wrap?

JAF RESPONSE TO RAI 1:

a. The aluminized Siltemp used at JAF has a thin Mylar film applied to one side to give it its "aluminized" properties. Per the manufacturer's information, the aluminized Siltemp has the high temperature capabilities of standard Siltemp fabrics, and the added qualities of thermal reflectivity, outstanding fabrication characteristics, and high abrasion resistance. The manufacturer's information further states that the aluminized Siltemp can be used as "reflective insulation". Additional information on the "thermal reflectivity" of aluminized Siltemp is provided as manufacturer's literature in the comparison between Siltemp and Refrasil performed by Sandia National Laboratory (Reference 1).

Based on the better thermal reflectivity of the aluminized Siltemp, less heat transfer will occur into the Hemyc wrap because it is reflected away. This gives the material better heat resistive properties than non-aluminized Siltemp.

b) Aluminum is not used to line the wrap. A thin Mylar film is applied to the Siltemp to achieve its "aluminized" properties. The Mylar film allows the Siltemp to have better thermal reflective properties than standard Siltemp and, therefore, will reflect a larger percentage of radiant energy thus resulting in a lower heat up rate of the conduit. Since the Mylar coating is thermally thin compared to the ceramic fabric it encompasses, this coating will have a negligible adverse effect on conductive heat transfer.

RAI 2

The Hemyc fire wrap configuration used at FitzPatrick is described as using overlap collars approximately 8 to 9 inches wide. This is compared to the configuration tested by the NRC, which used 6-inch collars and resulted in the Hemyc fire wrap joints separating (or opening) and exposing cable directly to the heat source. Therefore, the larger collars used at FitzPatrick for this application are described as a means for reducing the potential for openings as documented in the NRC test.

However, subsequent industry tests were done to determine whether improvements to the configuration tested by the NRC would result in improved Hemyc performance. Although the upgrades, including use of increased collar widths, double wrapped elbows, and larger overlap area at joints, resulted in a reduction in exposed conduit due to separated (opened) joints; it also resulted in similar temperature readings at the thermocouples to that observed in the NRC tests, indicating similar thermal failure results. Therefore, although it is possible that the increased collar width contributed to the reduction in joint openings, thermal failure was not mitigated and remains the staff's primary concern. The staff has seen no evidence to support the conclusion that 8-inch collars would reduce the potential for thermal failure of the conduit. Is there testing or additional information to support improved performance by use of the increased collar width?

JAF RESPONSE TO RAI 2:

The statement on collar size was solely intended to qualitatively note that the larger collars overlap more and, therefore, would not result in the same openings seen during the NRC test (Reference 2) that resulted from thermal shrink. This statement was confirmed during the industry test (Reference 1) which used the larger collars. The 4 inch conduit tested during the industry test experienced no structural failures.

Although the Hemyc wrap still failed thermally during the subsequent industry testing, the first thermocouple failure did not occur at the joints and did not occur until 46 minutes into the test on the 4 inch conduit. The JAF exemption request demonstrates that our configuration is expected to provide a minimum 30 minute fire rating. The industry test further confirmed the NRC finding that the JAF configuration can meet this rating regardless of whether 6 inch or 8 inch collars are used.

RAI 3

On page 2 of the licensee's submittal, the last paragraph states that the testing performed by the NRC supports the expectation that the installed configuration at FitzPatrick will meet or exceed a 30-minute fire rating. Although the NRC test results for a 4-inch conduit indicate failure as early as 33 minutes following the onset of a fire, when empty, and 43 minutes when full; other components of the raceway failed in less than 30 minutes. The unbanded junction boxes failed as early as 15 minutes into the event. The FitzPatrick configuration includes a pull box with stitched end pieces that are not banded. These end pieces, which could fail similarly to the stitched portion of the unbanded junction box that failed during the NRC test, are described as being secured by conduit wrap butted against them. Please provide a photograph or drawing of this pull box configuration, illustrating the security added at the end pieces. Also, please describe in detail the rationale for the statement that failure of these end pieces "is not expected to heat up the pull box to the point it would cause the cable to fail."

JAF RESPONSE TO RAI 3:

The banded junction box configurations tested by the NRC are somewhat different than the Hemyc wrapped pull box configuration present at JAF. The pull box is wrapped in manner that is better compared to the actual conduit or condulets tested versus the large junction boxes tested by the NRC. As seen in Attachment 2, the pull box at JAF is wrapped with a single piece of Hemyc, similar to a conduit, with stitched in place end pieces. The end pieces are partially secured in place with the Hemyc that is wrapped around the conduit. This configuration would prevent the end pieces from falling away even if the stitching of the end pieces were to fail. The un-banded junction boxes tested by the NRC had no attachments (i.e. Hemyc wrapped conduit) to the junction boxes, therefore, there were no items to prevent the wrap from falling away once the material shrunk and the stitching failed. Because the pull box at JAF has the 5 inch conduit protruding from both ends the actual area of the exposed end pieces is minimal as seen in the photographs (Attachment 2). The Hemyc on the pull box also has enough excess material such that if minimal shrinkage did occur the stitched joints would not fail.

The primary reason the stitched seam junction box tested by the NRC failed in less then 30 minutes can be attributed to the fact that the material contracted which caused the stitching to fail and subsequently the material pulled away causing direct flame impingement on the junction box. The banded junction box tested by the NRC did not fail until the 31 minute mark because the Hemyc was maintained in place for a longer period of time. In addition, the 31 minute failure was measured on the outside of the junction box (cold side of fire barrier), therefore, it is reasonable to assume the internal pull box temperature would be below the failure point of the cable beyond the 31 minute mark.

JAF RESPONSE TO RAI 3: (cont.)

Additional industry testing on conduits using Hemyc made from actual Siltemp did not experience the same degree of thermal shrink as the Refrasil tested by the NRC. This new test information shows that the Hemyc material on the pull box will not shrink substantially enough to cause the stitched joints to fail. Additionally, the aluminized Siltemp used at JAF has better thermal reflectivity than conventional Siltemp. The improved reflectivity ensures the pull box is sufficiently wrapped to provide a 30 minute fire rating. In addition, there are no plausible fire hazards in the area of the pull box (Reference 4) that would subject it to a fire similar to what was tested. The presence of automatic full area suppression, in tray suppression, and full area detection further ensure the potential for an unmitigated fire is non existent.

The information above validates the statement that the pull box is not expected to heat up to the point where the cable would fail based on a short circuit temperature of 482°F for the internal cables as previously discussed in the exemption request (Reference 2).

RAI 4

The submittal describes Hemyc wrapped structural supports. Steel supports were tested by the NRC separately from the conduit and found to fail as early as 13 minutes into the event. The additional heat load transferred to the conduit by the steel supports was not considered in the conduit tests. The FitzPatrick configuration is described as including five structural supports, completely wrapped except for a portion of the base plate. How has it been determined that the heat transfer from the exposed base plate would not adversely affect the protected cable? In the event of a fire, what would be the impact of heat transfer from the uncovered base plate through the supports to the conduit? In responding to these questions, please include the distance from the baseplate to the conduit containing the cable, and quantify the distance into an hourly rating using the NRC testing for similar supporting structures (angle iron, unistrut). Please also include the area of the base plate that is uncovered.

JAF RESPONSE TO RAI 4:

The effects of heat transfer from the exposed base plate have been evaluated based on a comparison of the JAF structural support configuration with the results of testing performed by the NRC, and engineering judgment.

The JAF structural support configuration utilizes multiple pieces of unistrut horizontally mounted to steel spacers. The spacers consist of square tube steel, steel plate, or "C"` channel mounted to base plates which are mounted to a concrete ceiling with Hilti Kwik Bolt II anchor bolts. The steel support members attached to the base plates are entirely wrapped with Hemyc which results in most of the base plate being covered. The area of the base plates that is uncovered

JAF RESPONSE TO RAI 4: (cont.)

varies, but is roughly the outer 2 inches on either end of the 6 inch by 12 inch plates, and roughly the outer 2 ½ inches on the exposed perpendicular edges and approximately 5 inches exposed at the corners of the 12 inch by 12 inch plate. The distance between the uncovered base plate and the conduit containing the cable is just over 5" for the limiting case. This was determined for support RFSK-1827, considering a linear distance from the uncovered base plate, across the wrapped portion of the base plate, the solid steel spacers, the double unistrut to the point where the conduit with the cable makes contact with the unistrut. See Attachments 3 through 8 for diagrams and photographs of the Hemyc wrapped supports.

The supports tested by the NRC consist of a single run of unistrut and tube steel cut and welded into an "L" shape. By interpolating the thermocouple data contained in the NRC test, the unistrut support would meet a 30 minute temperature rating (single point temperature increase of 325°F above ambient) at less then 4 inches in from the exposed end and the tube steel would meet a 30 minute temperature rating at approximately 6 inches in from the exposed end.

Based on the differences described, no direct comparison could be made between the NRC test results and the JAF configuration. However, in the event of a fire, it is reasonable to expect that given the location of the base plate and its mounting to a concrete ceiling, that the concrete would absorb much of the heat absorbed by the base plate. This absorption would result in less heat transfer along the support members to the protected conduit containing the cable. In this configuration, the concrete ceiling would function as a heat sink. In addition, given the thermal mass of the JAF support configuration that is protected, in comparison to that tested by the NRC (greater than double by observation), it is expected that a greater amount of heat would be required to raise the temperature of the steel support within the wrap, thus resulting in lower overall temperatures at 30 minutes. This is reasoned because there were no attachments to the simple unistrut and tube steel supports tested by the NRC, and heat transfer along the steel member progressed without heating adjacent structural members.

Based on the information presented above, the supports would be expected to provide at least a 30 minute fire rating. However, based on the fact that: (1) there are virtually no fire hazards in the area of the conduit, with the exception of fire retardant cables; (2) the area is protected by a full area wet pipe sprinkler system: (3) complete in tray wet pipe water spray system; and (4) full area fire detection, the potential to have an unmitigated fire substantial enough to challenge the integrity of the protected cable is non existent.

RAI 5

Are the baseplates near cable trays such that, if there is a cable tray fire, they could be directly exposed?

JAF RESPONSE TO RAI 5:

Two (2) of the five (5) structural supports are "near" cable trays, but are not directly above the cable trays such that they would be directly exposed if a cable tray fire occurred. In addition, the base plates as well as the Hemyc wrapped supports and conduit would be shielded from direct impingement from a cable tray fire because they are located above a solid bottom, ladder back cable tray that passes over the cable filled cable trays. The solid bottom tray contains only armored cables and is the tray that contains the armored cable that is wrapped with FP-60, which JAF currently has an exemption for (Reference 5). Due to the size of the area and the massive concrete ceiling, excessive build up of heat at the ceiling level would not occur because it would be rapidly dissipated throughout the area and absorbed by the concrete ceiling which will act as a heat sink.

The exposed cable located in the cable trays in the vicinity of the Hemyc wrap is fire retardant and self extinguishing. There are no other hazards in the area that would expose the cables or the Hemyc wrap to an unmitigated fire. In addition, the area is protected by full area detection as well as full area and in tray fire suppression which will ensure no fire occurs and burns unmitigated to the point it could adversely impact the protected cable. Based on the discussion above, the base plates are not expected to be directly exposed to a cable tray fire.

RAI 6

The submittal identifies structural supports only. Are there any intruding steel supports in this application? Please identify any plant components, such as steel supports, pipes, conduits, trays, etc., that intrude into the fire wrap configuration that may cause additional heat transfer to the protected cable. For each configuration of an intruding component, describe the impact of heat transfer to the protected cables.

JAF RESPONSE TO RAI 6:

There are no intruding items into the Hemyc wrap configuration other than the structural supports evaluated above.

RAI 7

The structural support base plates are described as mounted in place with Hilti bolts to the concrete ceiling. Are these bolts covered by fire wrap? In the event of an intense fire, could concrete spalling compromise the ability of these bolts to function? If not, why not?

JAF RESPONSE TO RAI 7:

The Hilti Kwik Bolt II bolts used to secure the structural supports in place are not entirely covered by the Hemyc fire wrap as seen in the attached photographs. At the time the Hemyc wrap was installed, the need to wrap the base plates and Hilti bolts was evaluated using the guidance contained in NRC Generic Letter 86-10 (Reference 6) and it was determined that wrap was not required.

Generic Letter 86-10, Enclosure 2, Section 3.3.4, states that cable tray supports need not be protected if:

a. the qualification tests were performed on wrapped cable trays with unprotected supports, and the supports are shown to be adequate, or

b. an analysis is performed, which takes into account the fire loading and automatic suppression available in the area, and which demonstrates that the unprotected support(s) will not fail and cause a loss of the cable tray fire barrier required for the postulated fire.

In accordance with option (b) above, this area is equipped with automatic area fire detection, automatic general area suppression and an automatic cable tray suppression system. The area is also equipped with fire hose stations and portable fire extinguishers in the immediate proximity. As discussed in the exemption request (Reference 4), the combustible loading in the area is composed primarily of fire retardant cables which pose a minimal fire hazard. In addition, ignition sources are negligible.

If a fire should occur, the early warning detection system would actuate and transmit an alarm to the control room. Upon confirmation of the fire, the fire brigade would be immediately dispatched to the area and would suppress the fire using available hose stations and/or portable fire extinguishers. If a rapid temperature rise were to occur prior to the arrival of the brigade, the automatic area suppression system would actuate to control and/or extinguish the fire, reduce the area temperature, and thus preclude the potential for support failure or significant concrete spalling. Considering the existence of the fire protection features in the area, it was determined that the exposed base plates and Hilti bolts were acceptable (Reference 7), even when the Hemyc wrap was considered to provide a 1 hour fire rating.

RAI 8

3.75 feet of the 5-inch conduit near the wall of the tunnel is described as flex-conduit. Is this flex-conduit wrapped in Hemyc? The NRC staff did not test flex-conduit wrapped in Hemyc; therefore, the staff has no basis to determine the performance of Hemyc-wrapped flex-conduit. Is there any testing or additional information to support the expectation that Hemyc-wrapped flex-conduit will perform similarly to the rigid conduit tested?

JAF RESPONSE TO RAI 8:

The 3 feet 9 inches of 5 inch liquid tight flex-conduit near the north wall is wrapped with Hemyc. The Hemyc on the flex-conduit is expected to perform the same as the Hemyc on the rigid conduit because the size and geometry of the flex-conduit is identical to that of the rigid conduit. A review of the manufacturer's specification shows that the weight per unit length of the flex-conduit (4.7 lbs/ft) is just under that of the 2 ½ inch rigid conduit tested (5.1 lbs/ft) and roughly 3 times that of the 1 inch rigid conduit tested (1.5 lbs/ft). By reviewing the results of the test performed by the NRC Staff, the worst case 2 ½ inch rigid conduit test failed after 38 minutes and the worst case 1 inch rigid conduit test failed after 34 minutes. Because the thermal mass of the flex-conduit is similar to that of the 2 ½ inch conduit and greater than that of the 1 inch conduit the test results validate that the 5 inch cable filled flex-conduit has enough thermal mass to withstand a 30 minute fire without causing degradation of the protected cable.

Although these temperatures are measured on the exterior surface of the conduit, the actual functionality of the cable is not adversely impacted until much higher temperatures occur. The short circuit temperature of the internal cables is 482°F. Based on the testing performed by the NRC the actual internal temperature seen by the cable is expected to be well below this temperature following an unmitigated 30 minute fire. However, based on the presence of a full area automatic fire detection system, full area automatic wet pipe sprinkler system, and an automatic wet pipe cable tray water spray system, the potential for an unmitigated fire is negligible.

REFERENCES

1. Sandia National Laboratories Letter (from B. Levin to F. Wyant), "Documents Supporting Hemyc Tests and Insulation Fabrication", dated April 13, 2005. (ADAMS No. ML051190055)

2. Hemyc 1-Hour Electrical Raceway Fire Barrier Systems: Performance Testing Conduit and Junction Box Raceways, Final Report, dated April 11, 2005. (ADAMS No. ML051190046)

3. Hemyc 1-Hour Electrical Raceway Fire Barrier Systems: Performance Testing Conduit, dated October 17, 2005.

4. Entergy Nuclear Operation, Inc. letter to USNRC (Letter No. JAFP-05-0118), "Request for Exemption from 10 CFR 50, Appendix R, III.G.2.c Requirement for a One-Hour Rated Fire Barrier Wrap", dated July 27, 2005.

5. NRC Letter and SER, G.S. Vissing to M. Kansler (Entergy), James A. FitzPatrick Nuclear Power Plant, "Exemption from Certain Requirements of Section III.G.2.c of Appendix R to 10 CFR 50", dated May 29, 2001. (TAC No. MB0395)

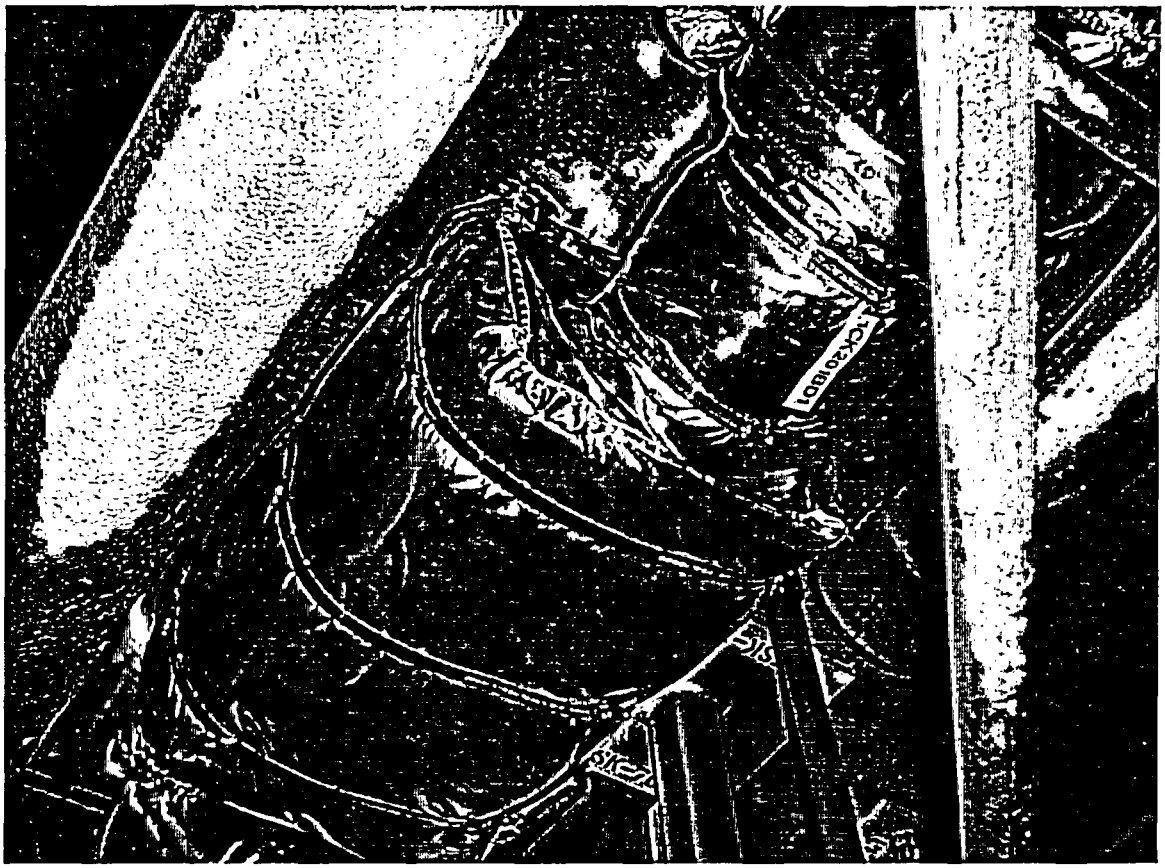
6. NRC Generic Letter 1986-10, "Implementation of Fire Protection Requirements," dated April 26, 1986.

7. James A. FitzPatrick Nuclear Power Plant Analysis No. JAF-ANAL-FPS-00816, Fire Barrier Analysis – Promatec (B & B Insulation, Inc.) Insulco/Hemyc Protective Wrap System, Revision 0.

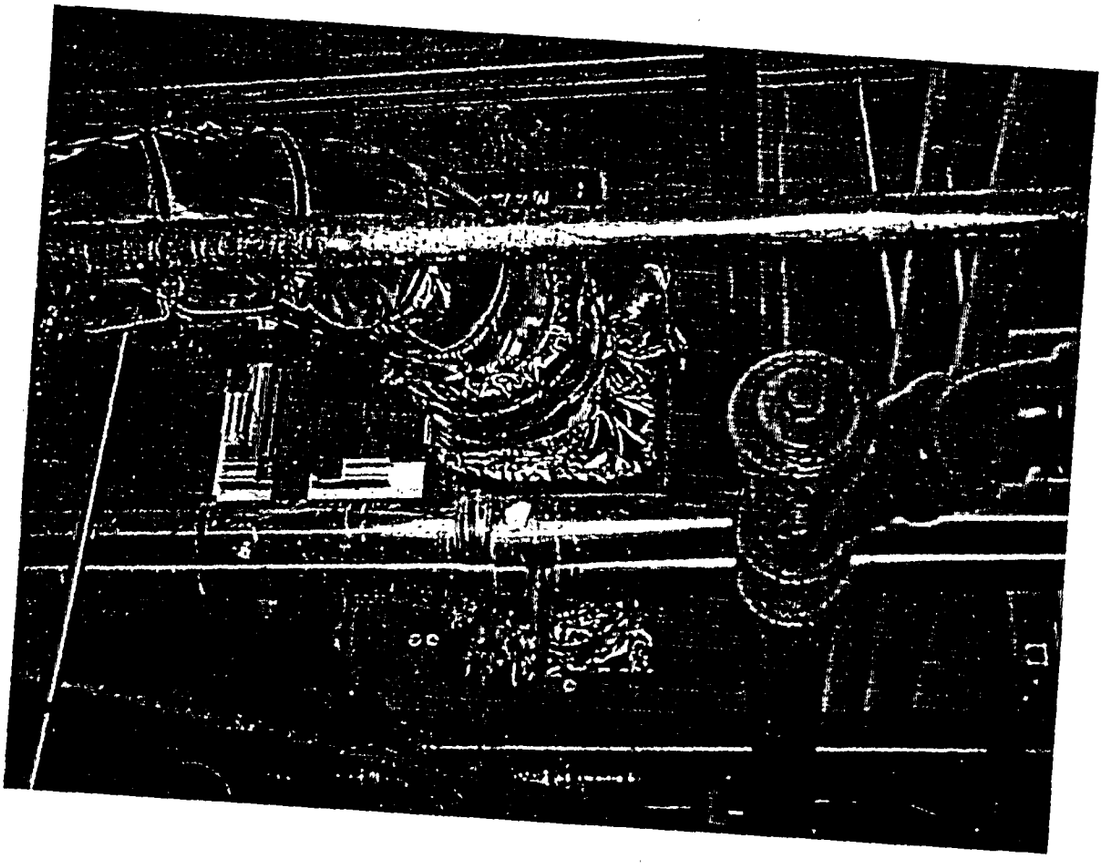
8. NRC Information Notice 2005-07, "Results of Hemyc Electrical Raceway Fire Barrier System Full Scale Fire Testing, dated April 1, 2005.

Attachment 2 to JAFP-06-0079
Entergy Nuclear Operations, Inc. – FitzPatrick
Docket No. 50-333
Response to Request for Additional Information (RAI)

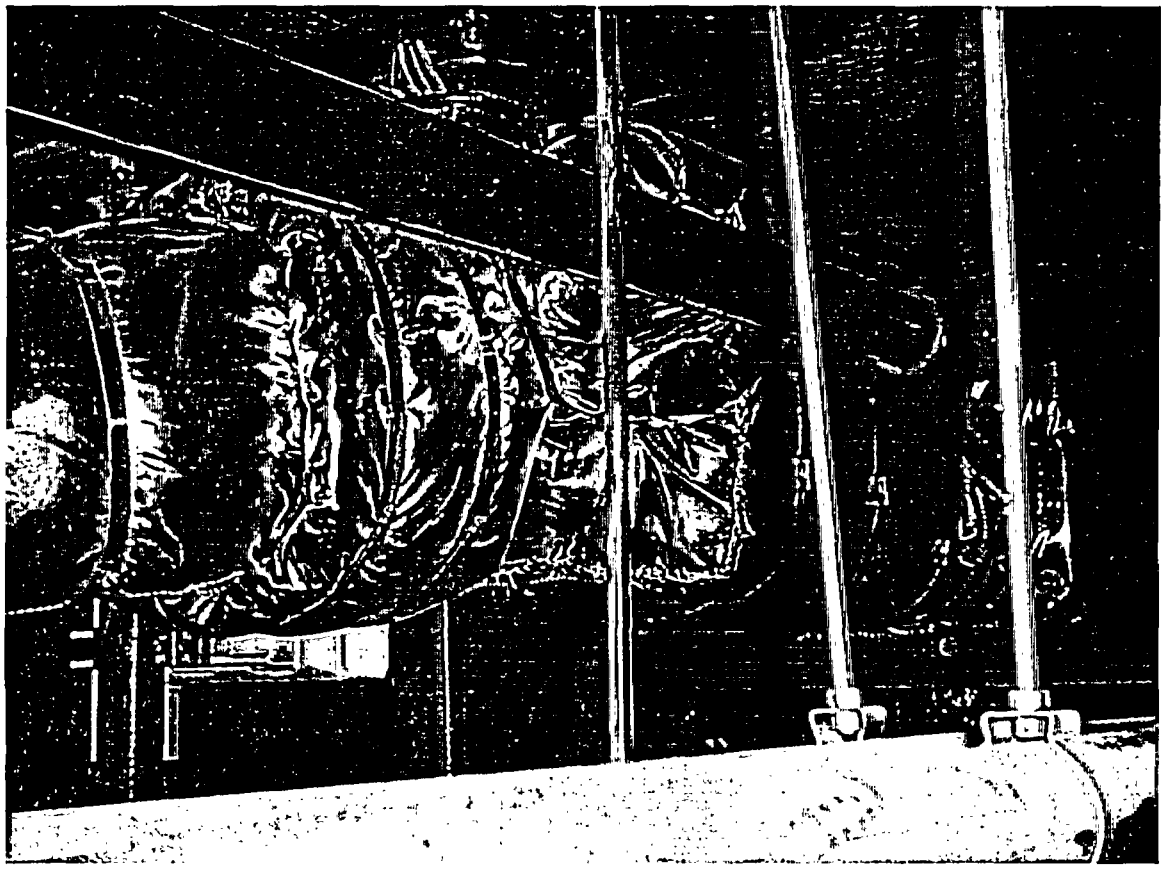
(Pull Box Photographs)



SOUTH END AND WEST SIDE OF PULL BOX



NORTH END OF PULL BOX



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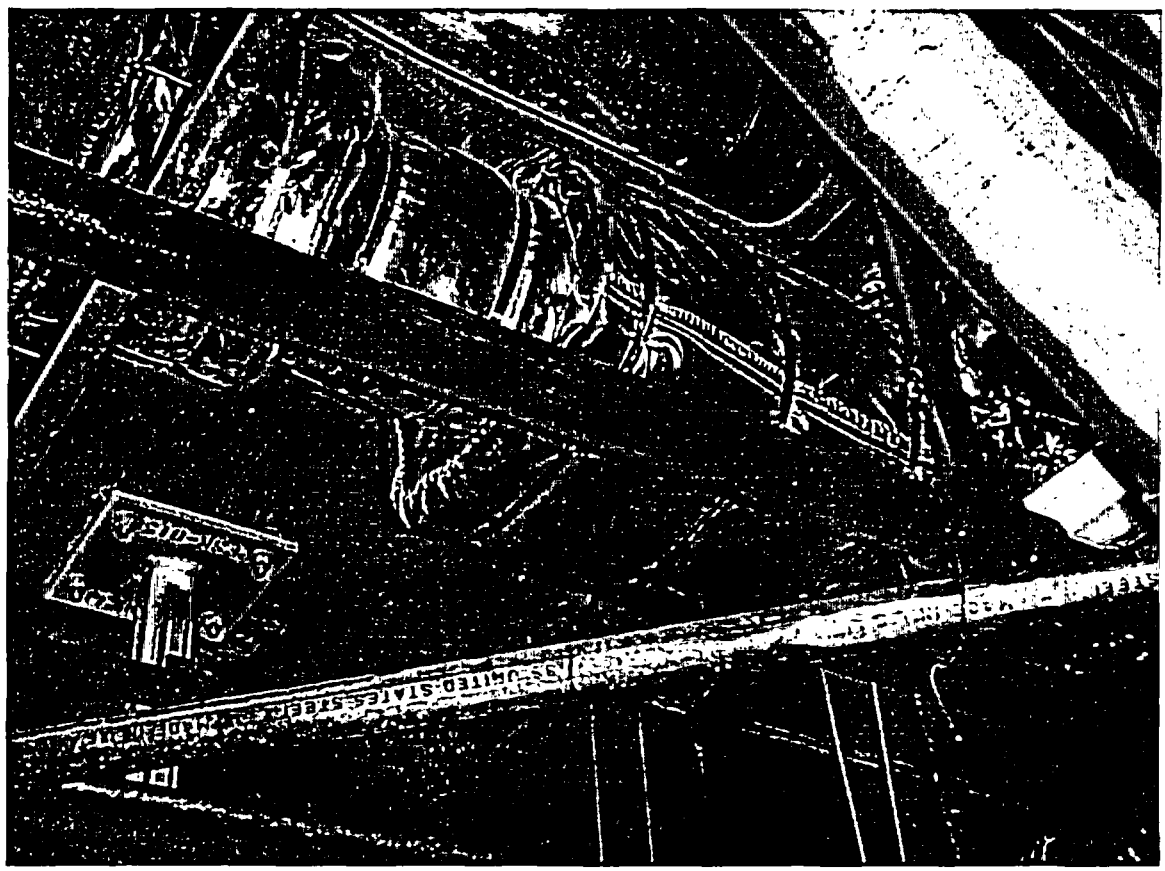

SOUTH END AND EAST SIDE OF PULL BOX

Attachment 3 to JAFP-06-0079
Entergy Nuclear Operations, Inc. – FitzPatrick
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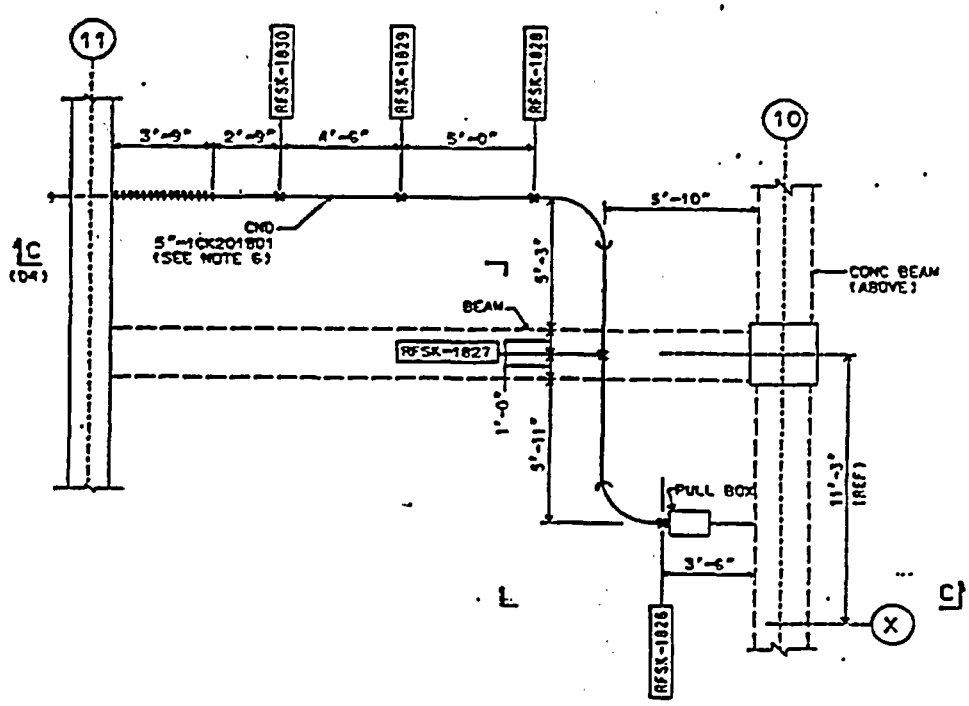
Response to Request for Additional Information (RAI)

(Structural Support Layout)
Page 1 of 2



PART PLAN B
TURBINE BUILDING ELECTRIC TUNNEL EL 260'-0"
DWG FE-45E
1/8"=1'-0"

Attachment 3 to JAFP-06-0079
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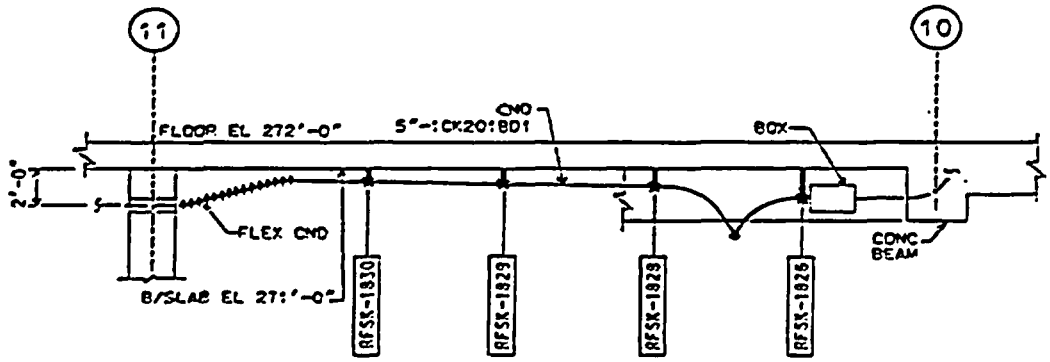

SECTION C–C (G4)
1/4"=1'-0"

(Structural Support Layout)
Page 2 of 2

Attachment 4 to JAFP-06-0079
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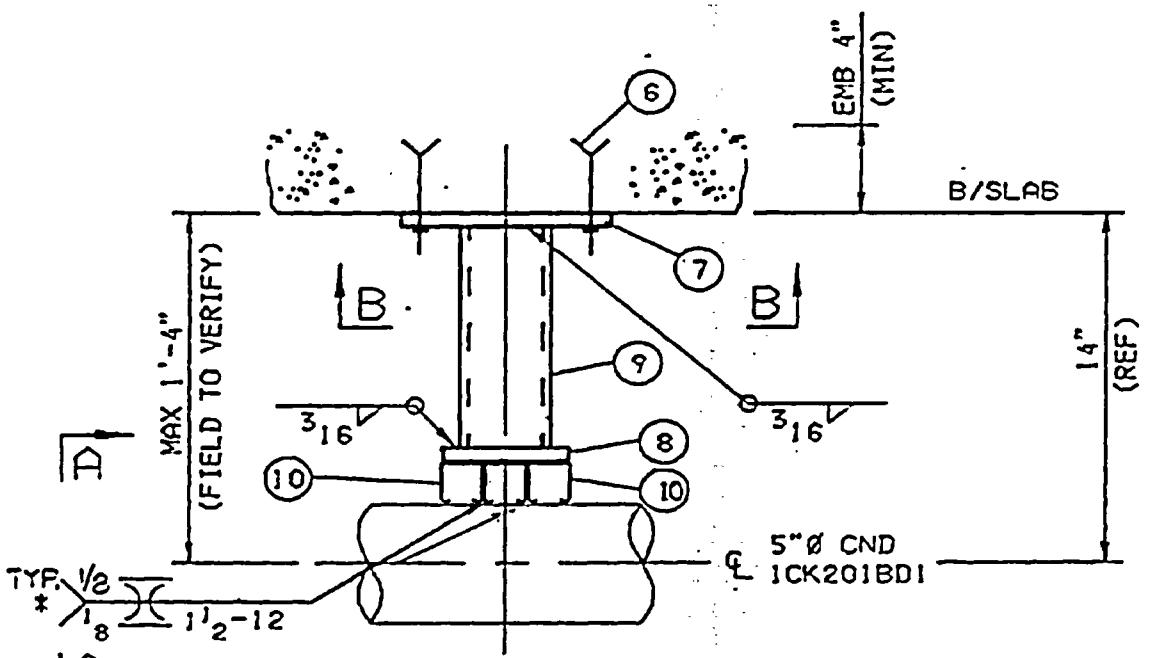
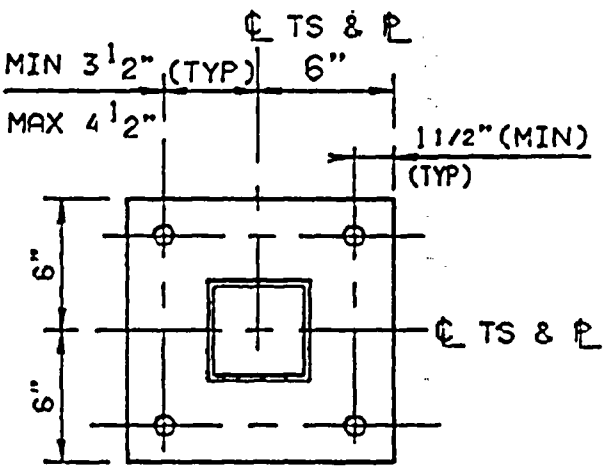
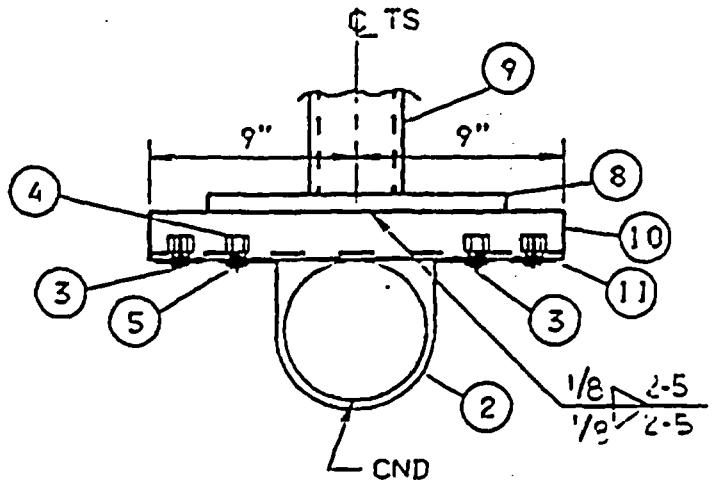
(Support RFSK-1826 Diagram and Photographs)



ELEVATION
LOOKING SOUTH

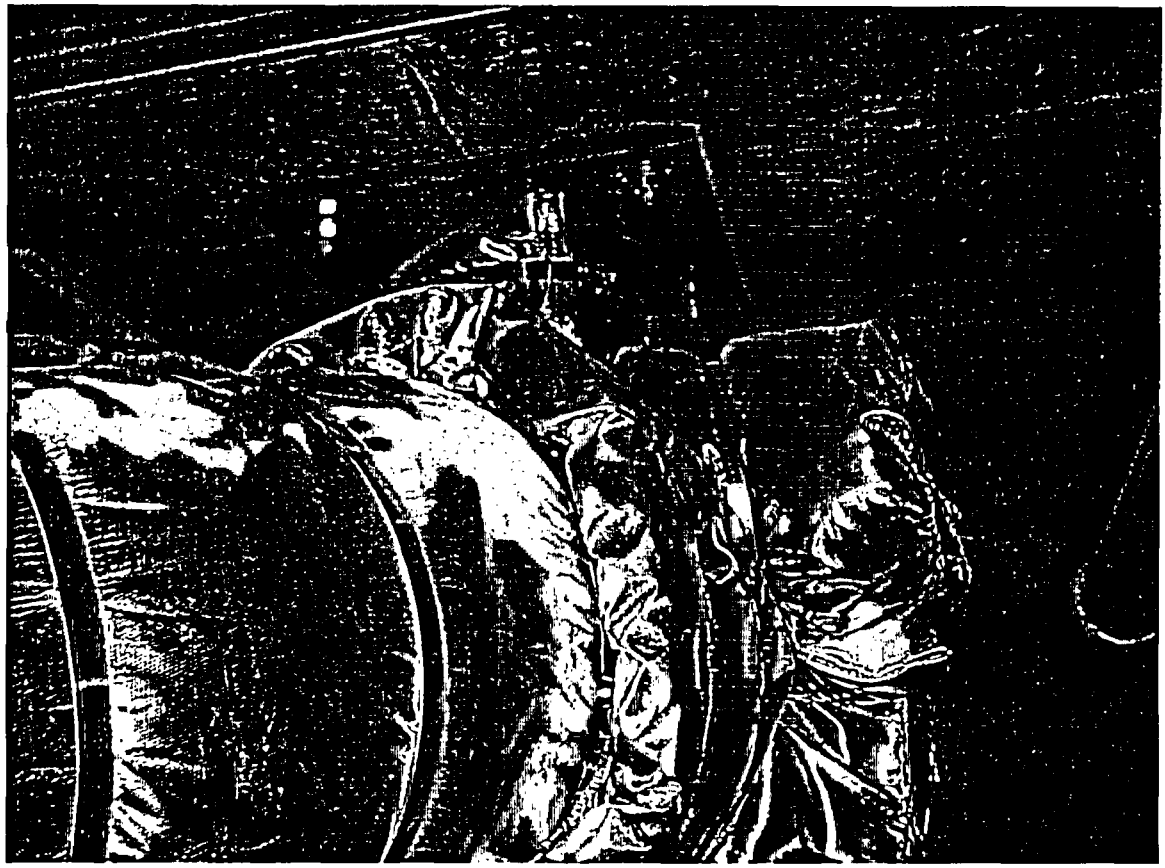


SECTION B-B



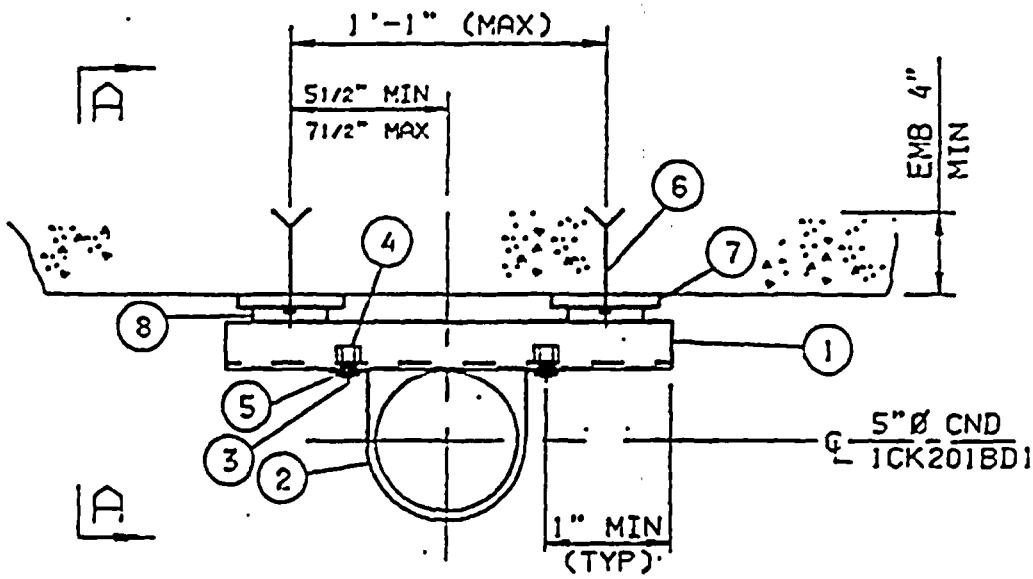
SECTION A-A

ITEM NO	NO REQ	DESCRIPTION	FAB	DWG OR PART NO	REMARKS
2	3	N2558-50 PIPE STRAP	UNISTRUT		
3	12	3/8"Ø X 1" LG. HEX HEAD CAP			TORQUE TO 19 FT-LBS(-0,+2)
		SCREW NHCS037100EG			
4	12	3/8"Ø SPRING NUT N1008			
5	6	3/8"Ø LOCK WASHER NLKW037EG			
6	4	1/2"Ø X 5 1/2" LG. KWIK BOLT II	HILTI		TORQUE TO 65 FT-LBS(+0,-6)
7	1	PLATE 1/2" X 12" X 1'-0" LG	A36		
8	1	PLATE 1/2" X 4" X 1'-0" LG	A36		CUT TO SUIT
9	1	TS 3 X 3 X 1/4 X 0'-11" LG	A500 GR B		CUT TO SUIT
10	3	N1000 X 1'-6" LG	UNISTRUT		CUT TO SUIT
11	2	N1925 FLAT PLATE	UNISTRUT		



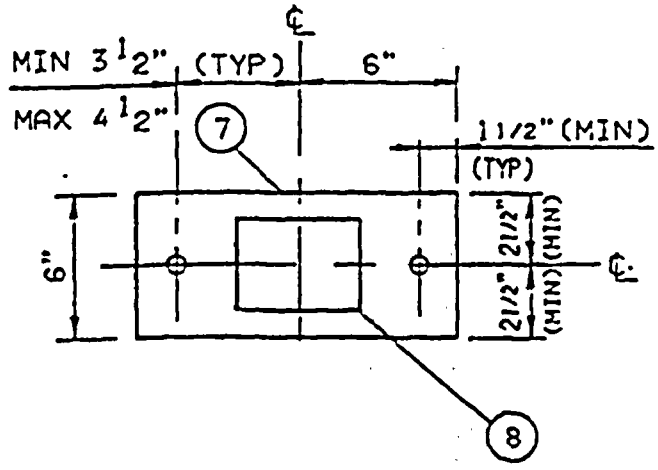
HEMYC WRAPPED RFSK-1826 SUPPORT

(Support RFSK-1827 Diagram and Photographs)



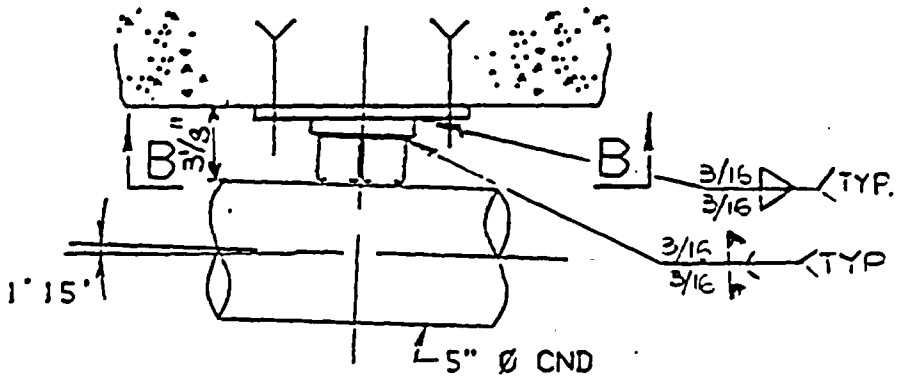
ELEVATION

(LOOKING NORTH)



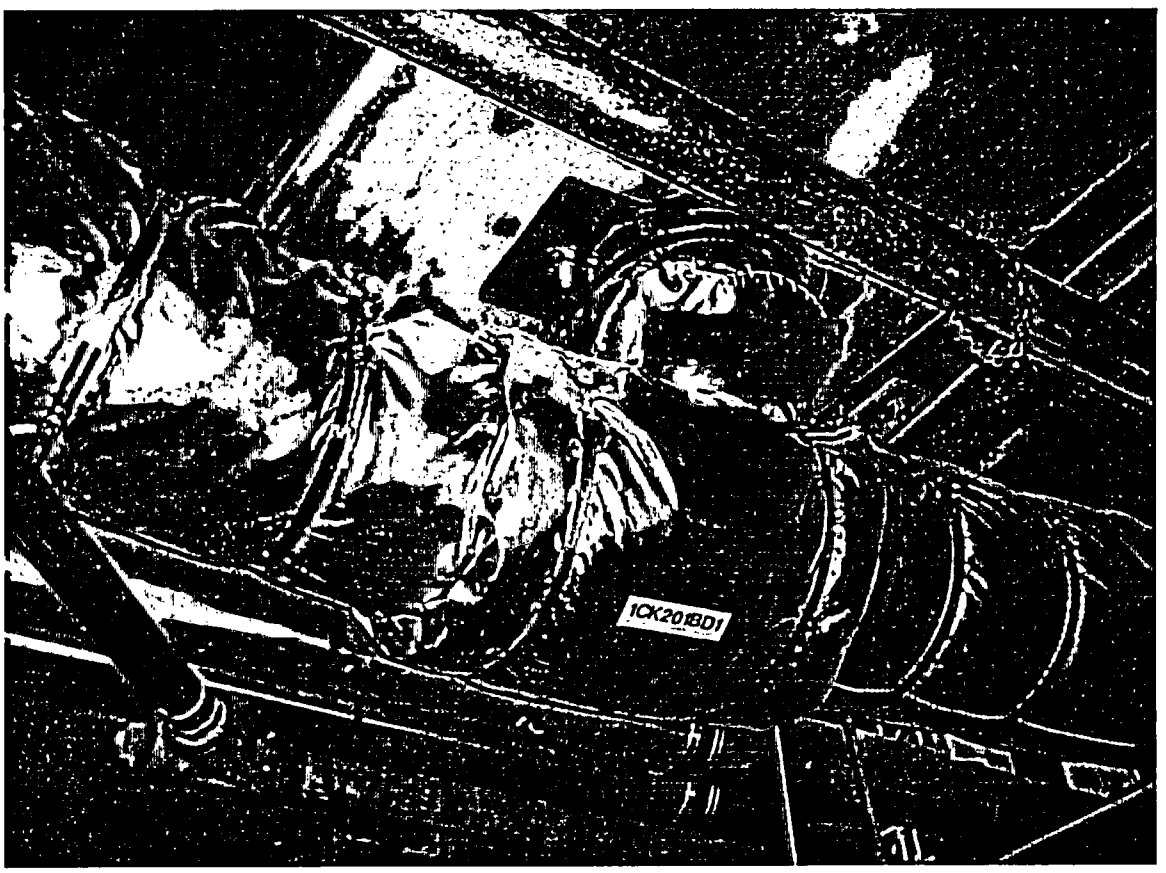
SECTION B-B

N1001A NOT SHOWN FOR CLARITY

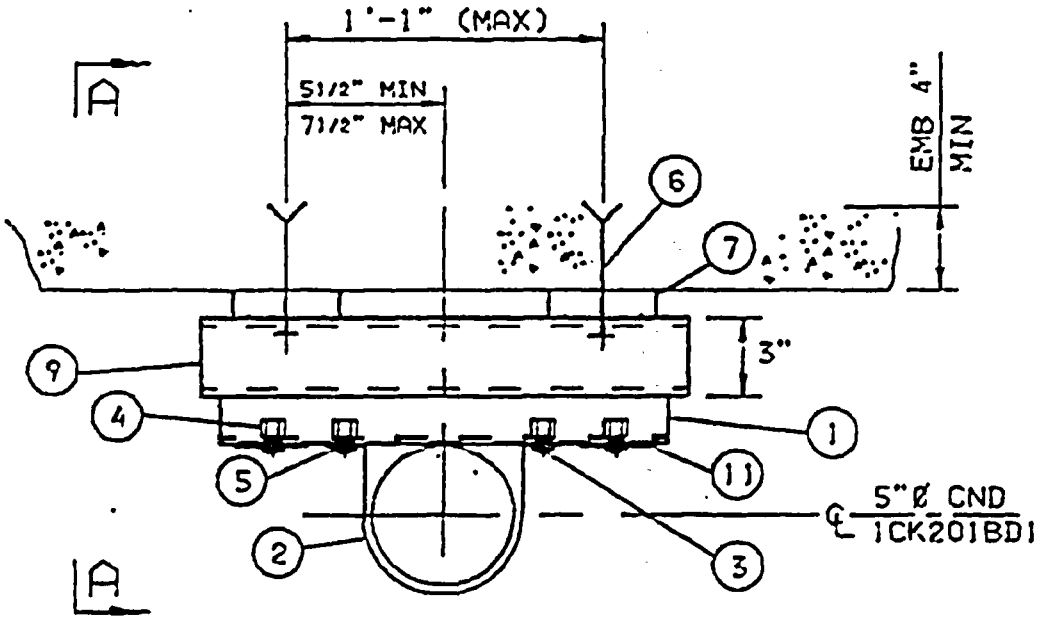


SECTION A-A

ITEM NO	NO REQ	DESCRIPTION	FAB	DWG OR PART NO	REMARKS
1	1	N1001A X 1'-6" LG	UNISTRUT		CUT TO SUIT
2	2	N2558-50 PIPE STRAP			
3	4	3/8"Ø X 1" LG. HEX HEAD CAP			TORQUE TO 19 FT-LBS(-0,+2)
		SCREW NHCS03710OEG			
4	4	3/8"Ø SPRING NUT N1008			
5	4	3/8"Ø LOCK WASHER NLKW037EG			
6	4	1/2"Ø X 5 1/2" LG. KWIK BOLT II	HILTI		TORQUE TO 65 FT-LBS(+0,-6)
7	2	PLATE 1/2" X 6" X 1'-0" LG	A36		
8	2	SPACER 4" X 0'-4"±	A36		

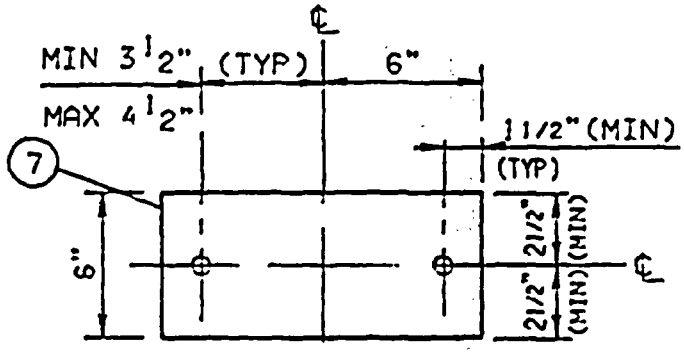


HEMYC WRAPPED RFSK-1827 SUPPORT



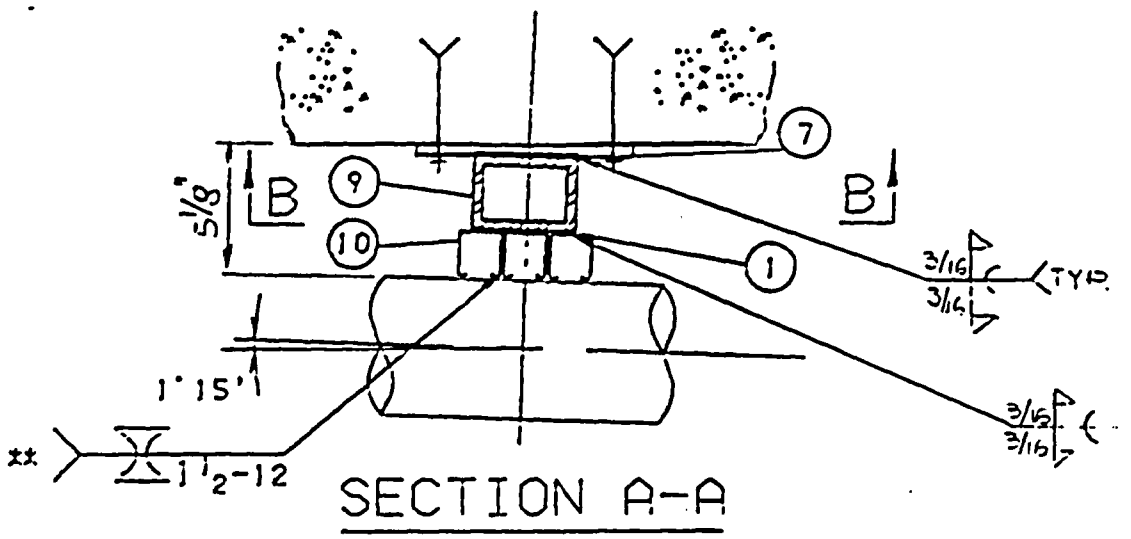
ELEVATION

(LOOKING NORTH)



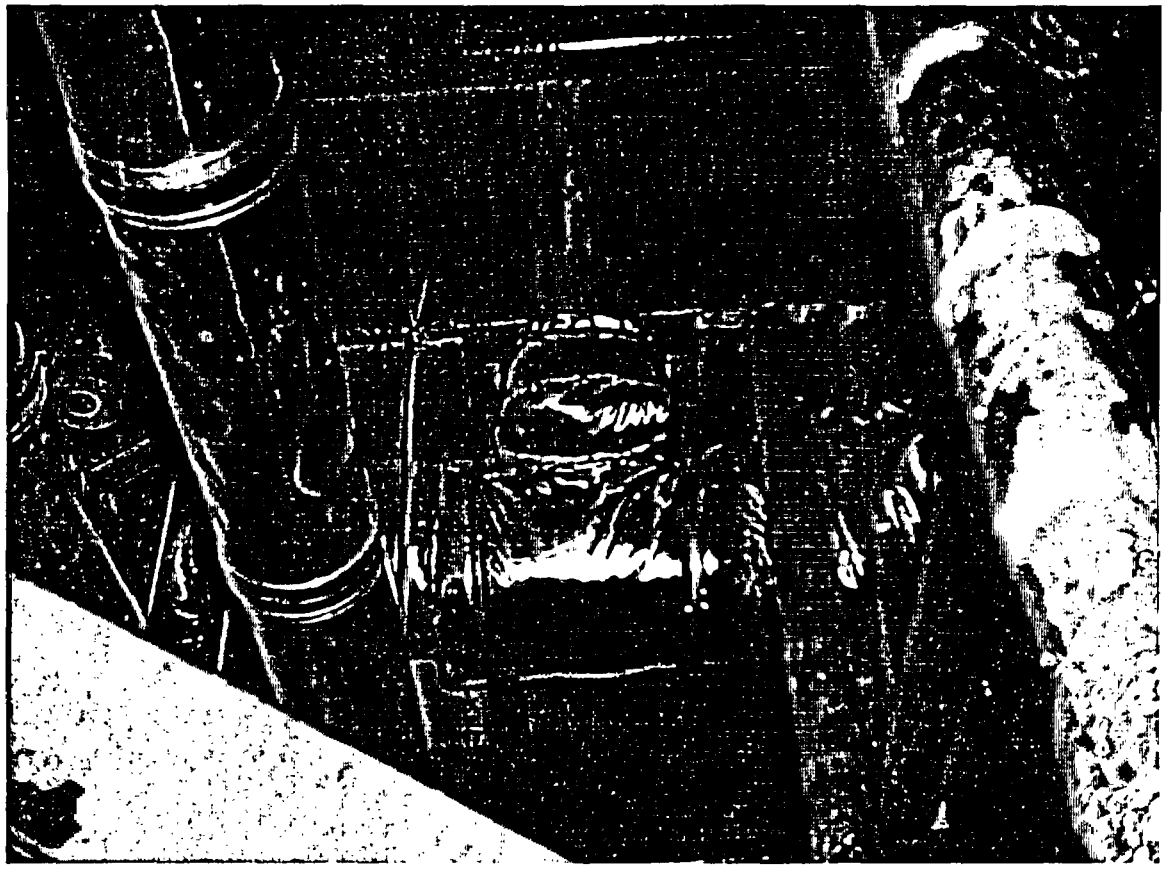
SECTION B-B

TS4 X 3 NOT SHOWN FOR CLARITY

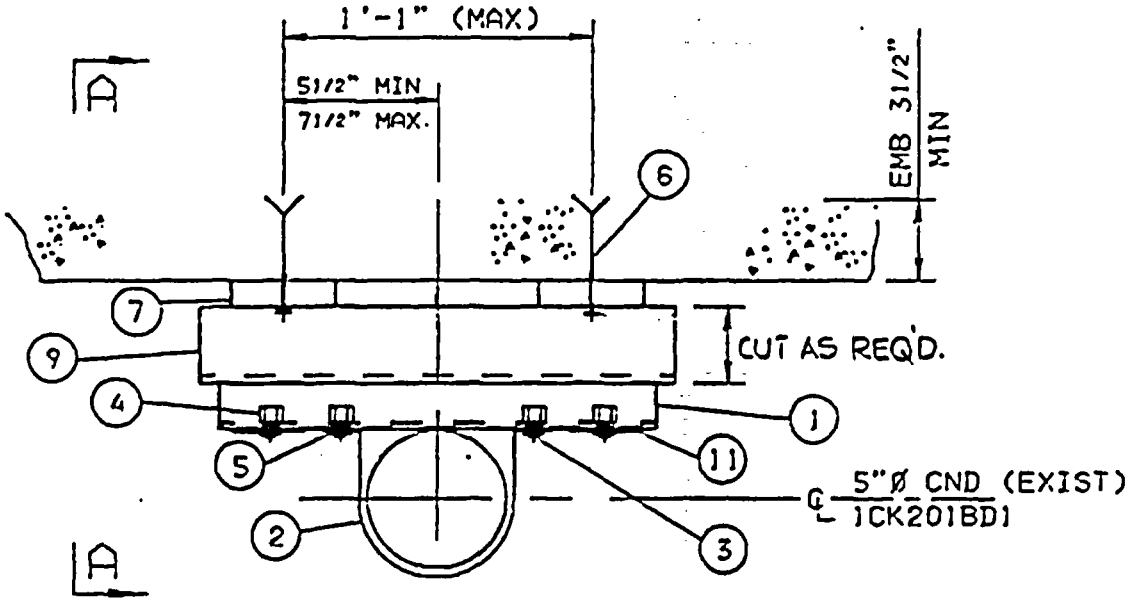


SECTION A-A

ITEM NO	NO REQ	DESCRIPTION	FAB	DWG OR PART NO	REMARKS
1	1	N1001A X 1'-6" LG	UNISTRUT		CUT TO SUIT
2	3	N2558-50 PIPE STRAP			
3	12	3/8"Ø X 1" LG. HEX HEAD CAP			TORQUE TO 19 FT-LBS(-0,+2)
		SCREW NHCS037100EG			
4	12	3/8"Ø SPRING NUT N1008			
5	6	3/8"Ø LOCK WASHER NLKW037EG			
6	4	1/2"Ø X 5 1/2" LG. KWIK BOLT II	HILTI		TORQUE TO 65 FT-LBS(+0,-6)
7	2	PLATE 1/2" X 6" X 1'-0" LG	A36		
9	1	TS 4 X 3 X 1/4 X 1'-6" LG	A500 GR B		CUT TO SUIT
10	1	N1000 X 1'-6" LG	UNISTRUT		CUT TO SUIT
11	2	N1925 FLAT PLATE	UNISTRUT		

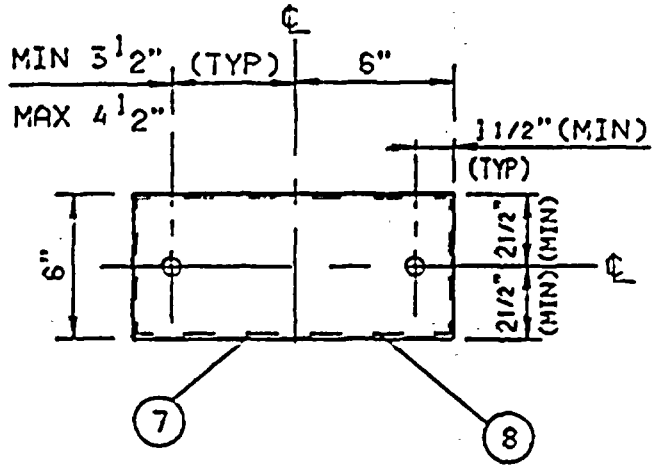


HEMYC WRAPPED RFSK-1828 SUPPORT



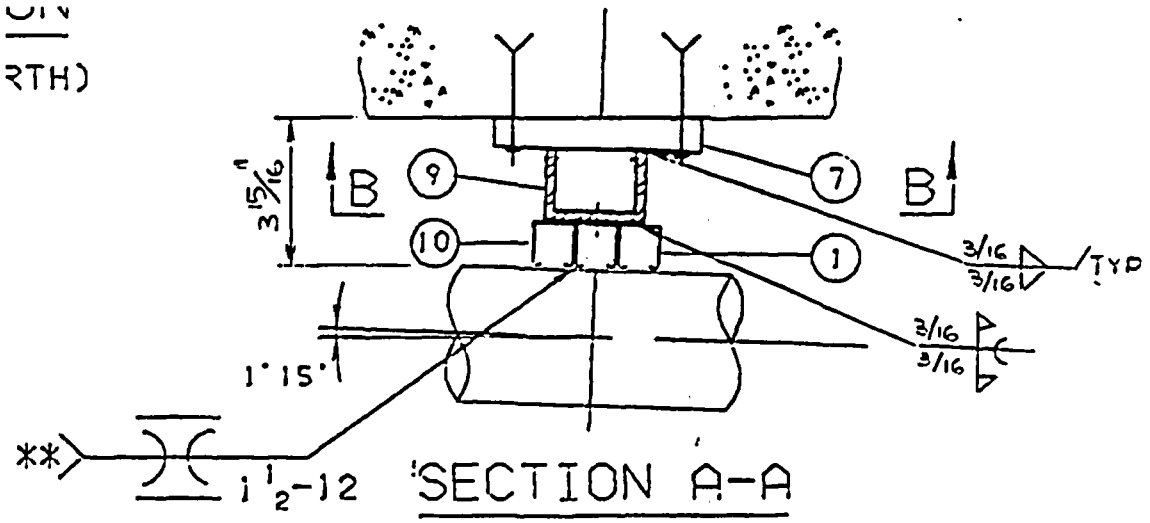
ELEVATION

(LOOKING NORTH)



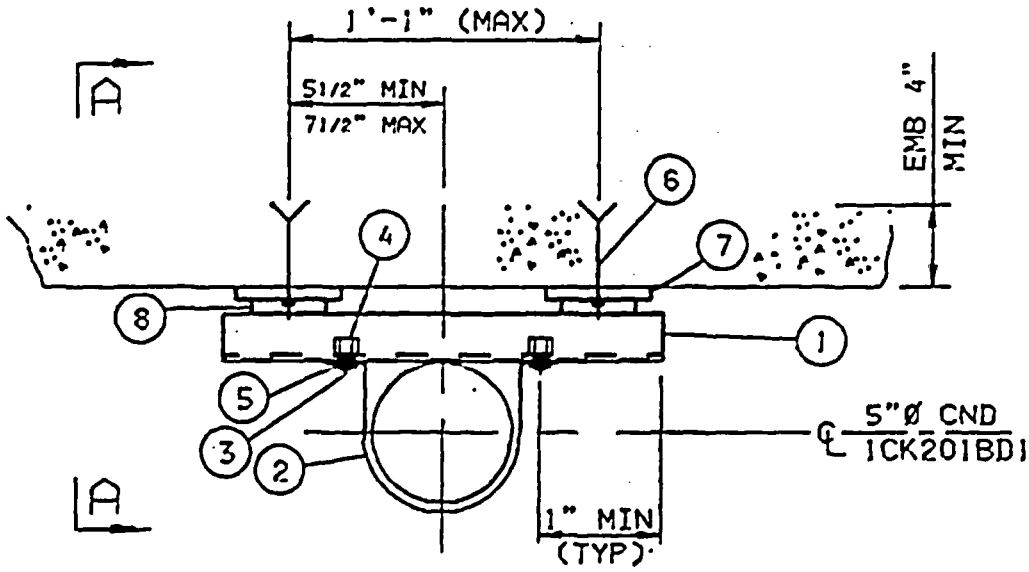
SECTION B-B

TS4 X 2 NOT SHOWN FOR CLARITY



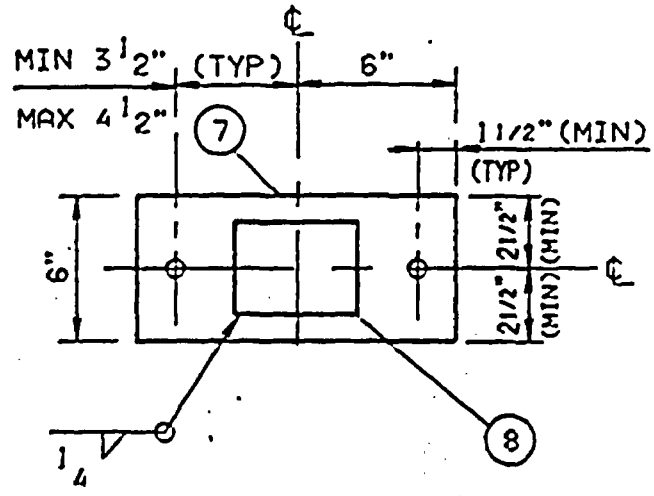
ITEM NO	NO REQ	DESCRIPTION	FAB	DWG OR PART NO	REMARKS
1	1	N1001A X 1'-6" LG	UNISTRUT		CUT TO SUIT
2	3	N2558-50 PIPE STRAP			
3	12	3/8"Ø X 1" LG. HEX HEAD CAP			TORQUE TO 19 FT-LBS(-0,+2)
		SCREW NHCS037100EG			
4	12	3/8"Ø SPRING NUT N1008			
5	6	3/8"Ø LOCK WASHER NLKW037EG			
6	4	1/2"Ø X 5 1/2" LG. KWIK BOLT II	HILTI		TORQUE TO 65 FT-LBS(+0,-6)
7	2	PLATE 1/2" X 6" X 1'-0" LG	A36		
9	1	C 6" X 13# X 1'-6" LG.	A500 GR B		CUT TO SUIT
10	1	N1000 X 1'-6" LG	UNISTRUT		CUT TO SUIT
11	2	N1925 FLAT PLATE	UNISTRUT		

HEMYC WRAPPED RFSK-1829 SUPPORT



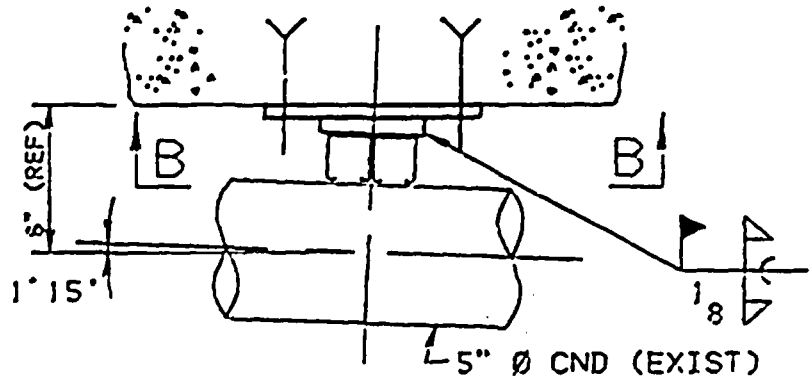
ELEVATION

(LOOKING NORTH)



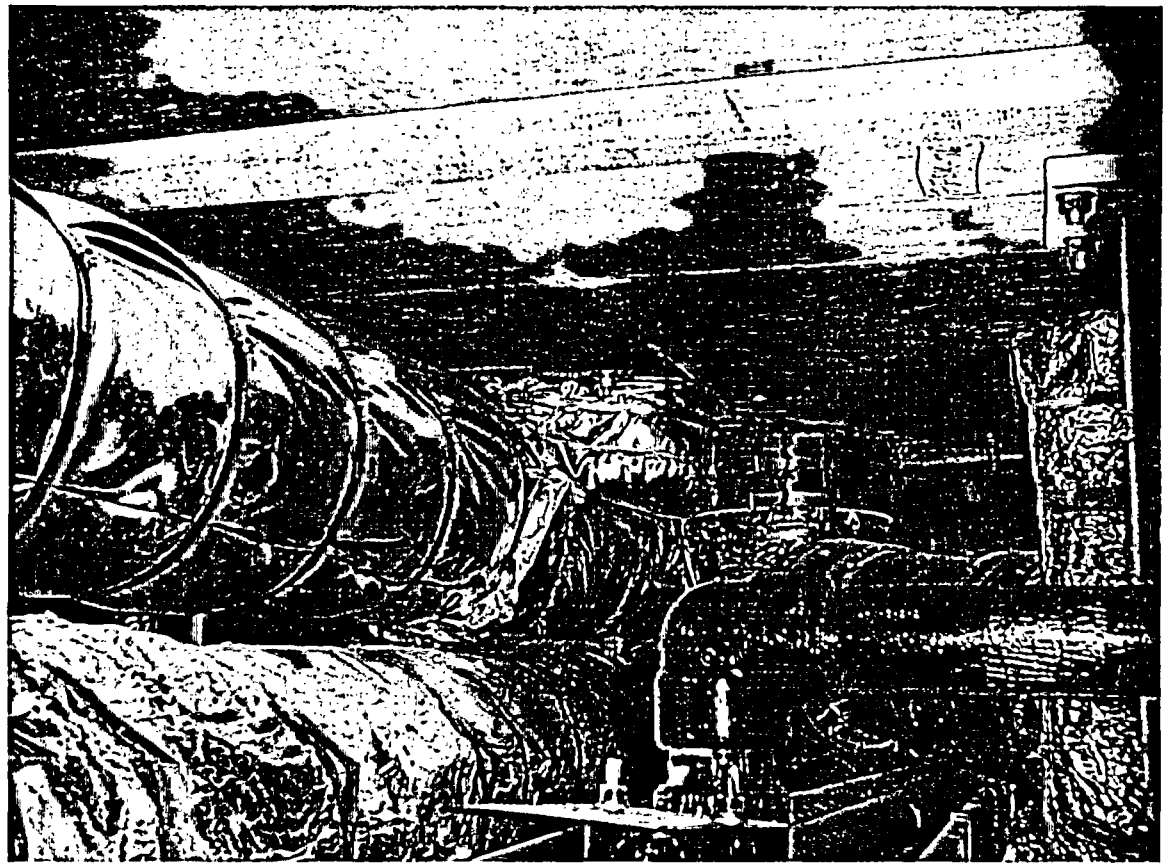
SECTION B-B

N1001A NOT SHOWN FOR CLARITY



SECTION A-A

ITEM NO	NO REQ	DESCRIPTION	FAB	DWG OR PART NO	REMARKS
1	1	N1001A X 1'-6" LG	UNISTRUT		CUT TO SUIT
2	2	N2558-50 PIPE STRAP			
3	4	3/8"Ø X 1" LG. HEX HEAD CAP			TORQUE TO 19 FT-LBS(-0.+2)
		SCREW NHCS037100EG			
4	4	3/8"Ø SPRING NUT N1008			
5	4	3/8"Ø LOCK WASHER NLKW037EG			
6	4	1/2"Ø X 5 1/2" LG. KWIK BOLT II	HILTI		TORQUE TO 65 FT-LBS(+0.-6)
7	2	PLATE 1/2" X 6" X 1'-0" LG	A36		
8	2	SPACER 4" X 0'-4"±	A36		



HEMYC WRAPPED RFSK-1830 SUPPORT