OST SERVICES

June 28, 2012

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Unit No. 2
PO Box K
Moundsville, WV 26041

Subject: OST Services' (OSTS) Report No. 1440
OST Services' (OSTS) Job No. 005-12
Hot and Cold Inspections of Piping and Supports
Unit No. 2 – Spring of 2012

Mr. Goddard:

Enclosed for your review and files is a copy of the subject report associated with the recent inspection of the pipe supports, hangers and restraints.

In general, the work did not reveal the existence of any acute problems requiring immediate attention or concern. On the other hand, a number of issues were identified that need to be addressed, monitored or evaluated further to minimize the potential development of more significant problems. Recommendations are included in the report.

If you have any questions or require additional information regarding this report, please feel free to contact us.

Very truly yours,

OST SERVICES

Dennis A. Schmedinghoff

DAS:nem
Enclosures

cc: George T. Mulvaney - OSTS
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OST SERVICES

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INSPECTION OF

HIGH ENERGY PIPING AND SUPPORTS

COLD "SHUTDOWN" CONDITION – MARCH 2012

HOT "OPERATING" CONDITION – JANUARY 2012

MITCHELL STATION - UNIT NO. 2

AMERICAN ELECTRIC POWER

MOUNDSVILLE, WV

JUNE 28, 2012

By: Dennis Schmedinghoff

DENNIS A. SCHMEDINGHOFF
OSTS' REPORT NO. 1440
OSTS' JOB NO. 005-12

INTRODUCTION

During the Spring of 2012, inspections were performed on the piping systems and supports associated with the Main Steam, 1st Reheat Steam, 2nd Reheat Steam, HP Turbine Exhaust, 1st Reheat Exhaust, Boiler Feedwater (Discharge and Suction), Superheater Attemperator, Reheat Attemperator, and other miscellaneous piping systems related to Unit No. 2 at the Mitchell Generating Station. The inspections were performed in both the operating and shutdown conditions.

BACKGROUND INFORMATION AND HIGHLIGHTS

The primary purpose of the inspection activity was to identify the existence of situations that could have potential negative consequences on the suspended or connected equipment. While the devices appear to be generally well designed and applied, there are specific problems and concerns. Additionally, while not currently considered serious, some of the findings may influence maintenance activities in the future.

In general, the work did not reveal the existence of any acute or significant problems requiring immediate attention or concern. However, and again a number of specific issues were identified that will need to be addressed, monitored and evaluated further, otherwise more significant damage could occur. Additional information and recommendations associated with our findings and inspections have been enclosed in following sections of the report. Also, to enhance traceability between the supports and

BACKGROUND INFORMATION AND HIGHLIGHTS

their locations and to document design or nameplate data, the following have been developed and included.

- Appendix "A" contains comprehensive isometric sketches of the critical systems (hanger maps). The drawings illustrate the general configuration of the piping systems, the locations of all hangers, restraint control devices, guides, snubbers and the mark numbers assigned to them. This includes isometrics for the Main Steam, 1st Reheat Steam, 2nd Reheat Steam, HP Turbine Exhaust, 1st Reheat Turbine Exhaust and portions of the Feedwater systems. As the program evolves, additional isometrics of other systems, and their hangers, should be developed and incorporated into the data base.

- Appendix "B" contains the hanger inspection record sheets for the systems included in the current inspections. These sheets detail all known nameplate/design information associated with the pipe supports, restraints, guides and snubbers. As information becomes available during future inspection/adjustment activities, the record sheets should be updated accordingly.

Finally, photographs of key situations are also been provided, along with documentation of our findings.

GENERAL COMMENTS AND OBSERVATIONS

A number of the supports associated with the high energy piping systems at the Mitchell Generating facility have been replaced since the start up of the facility. The original supports were all manufactured by the Grinnell Corporation, whereas the replacement supports were manufactured by both Lisega and in some instances, Grinnell (Anvil). The reason that the supports were replaced and the design data relative to them, was not available at the time of the inspections.

As the technical data associated with the "new" supports becomes available, the enclosed record sheets should be updated. For now, the new hanger entries on the data sheets will only include the readings taken during the inspections.

Many of the original supports have been painted over time, and in some cases, the hot and cold position indicators have been obliterated. In other instances, the name plate data which list such data as mark (identification) numbers, loads, movement, size and serial numbers was illegible. When this was encountered at constant support hangers, the travel indicator's position was estimated as if the travel scale were legible and based upon our experiences these reading should be fairly accurate. Where a variable spring is involved, the gap between the top of the position indicator slot, and the top of the position indicator was noted as G =.

INSPECTION HIGHLIGHTS

Main Steam

Specific Hanger Comments

- **2-MS-H1, 2-MS-H2, 2-MS-H3, 2-MS-H4**

  The above supports are located at Elevation 196'-0", and provide for support of the upper two horizontal runs of piping. The load scales are either painted over, or removed.

- **2-MS-H1, 2-MS-H2**

  These variable spring supports are topped out in the cold condition. We recommend exploring the condition of the line before blindly making adjustments.

- **2-MS-H2**

  This variable spring support has a damaged indicator slot, indicating that the load flange was driven into the bottom of the indicator slot (Figure No. 1). Damage of this nature usually is due to shock loading; where the movement of the piping was more than the travel of the spring could accommodate. The damage appears to be old.

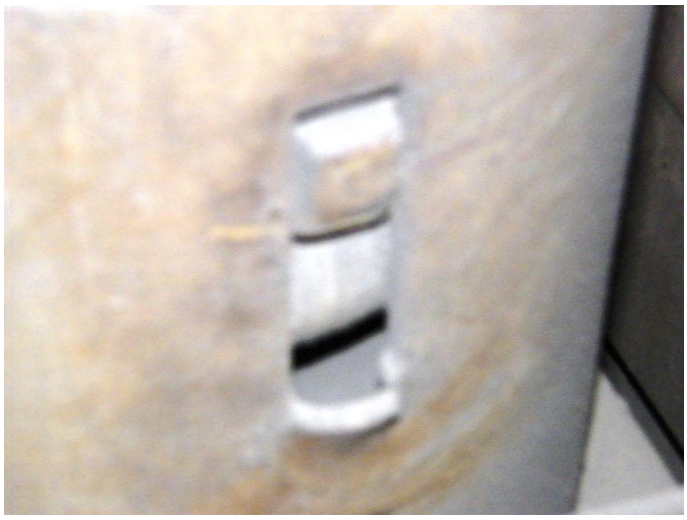


Figure No. 1
2-MS-H2 Topped Out Damaged Indicator Slot

INSPECTION HIGHLIGHTS

Main Steam (continued)

- **2-MS-H3, 2-MS-H4**

  These two mark numbers represent constant support hangers. They are bottomed out in the cold condition (Figure Nos. 2 and 3). We recommend that the supports be load tested prior to making any adjustments. There is also the possibility that the piping is distorted along the upper horizontal run and this should be explored. If distortion is present, then adjustments at this time could exacerbate the condition.

Figure No. 2
2-MS-H3 Bottomed Out Cold

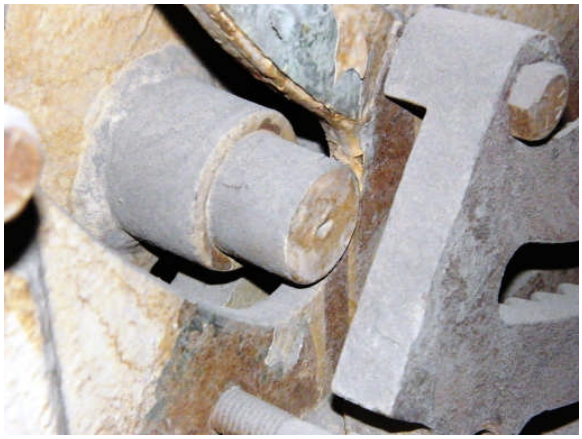


Figure No. 3
2-MS-H4 Bottomed Out Cold

- **2-MS-H17, 2-MS-H18, 2-MS-H19, 2-MS-H20**

  There is insulation damage at these locations along the vertical run of piping (Figure Nos. 4 and 5).

INSPECTION HIGHLIGHTS

Main Steam (continued)

- **2-MS-H17, 2-MS-H18, 2-MS-H19, 2-MS-H20** (continued)

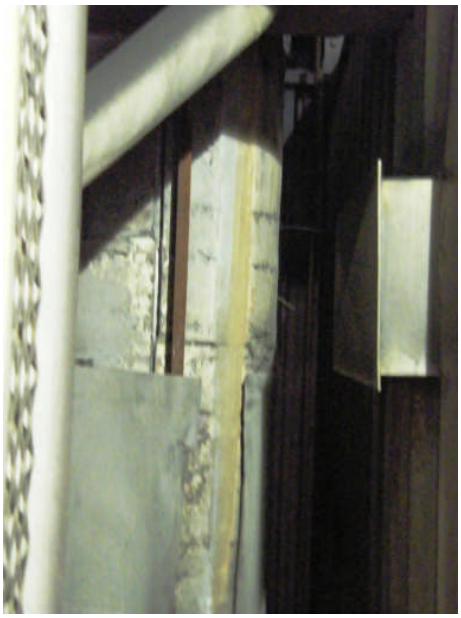


Figure No. 4
Insulation Damage at 2-MS-H17

Figure No. 5
Insulation Damage at 2-MS-H19 and 2-MS-H20

- **2-MS-H9**

  This variable spring trapeze assembly has a loose U-bolt. The southernmost support rod is slightly distorted, and the support is slightly tilted downward to the south. The U-bolt anchors the piping to the support. We recommend that the plant budget for scaffolding and allow manpower to tighten the U-bolt and adjust the support as necessary (Figure No. 6).

INSPECTION HIGHLIGHTS

Main Steam (continued)

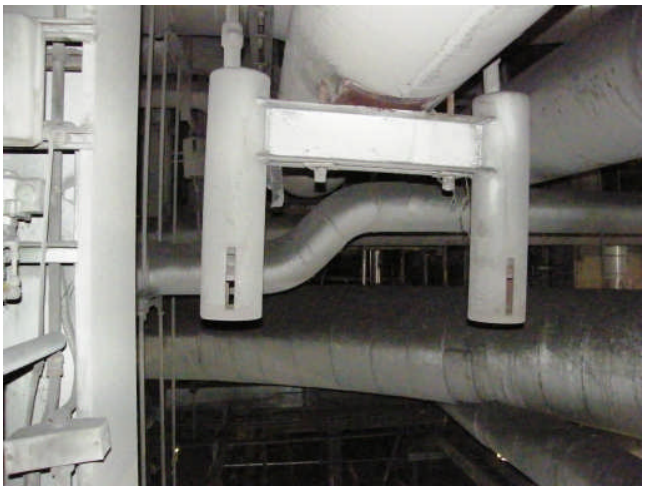


Figure No. 6
2-MS-H9 Tilted Down on South Side

- **2-MS-H11, 2-MS-H12, 2-MS-H15, 2-MS-H16**

  The above variable spring supports have no load scales or position indicators visible. Readings used are the gap between the top of the indicator slot and the top of the position indicator. All the spring supports were in travel in both the hot and cold conditions.

- **2-MS-H14**

  This variable spring assembly is topped out in the hot condition. It has never been viewed in this condition prior to this visit. It could have a broken spring coil. We recommend that the plant budget for scaffolding to gain access to this location to allow for a closer inspection of the spring coils during the outage.

INSPECTION HIGHLIGHTS

Main Steam (continued)

The two variable springs are under supported in the hot condition. We recommend that these be adjusted during the next scheduled outage.

1st Reheat Steam

General Comments

Based on the readings of the supports on the lower horizontal run, we recommend the plant perform some closer investigation. Initially the readings point to the possibility of line deformation, and or poor support performance. However; notations found written on a support suggest that at least one of the locations has experienced adjustments that over time, could have contributed to unfavorable changes to the piping. We recommend that the plant budget for scaffolding, and load testing of a number of strategic supports along the lower horizontal run. We feel the first step would be to test some of these supports to determine their operational characteristics. It would also be advisable to verify elevations of the pipe at these locations and determine the pitch of the piping along this run. We recommend that this work be done before contemplating performing adjustments to the supports.

Specific Hanger Comments

- **2-FRSH-4, 2-FRSH-5**

  These two mark numbers represent constant support hangers. They are bottomed out in the hot condition (Figure No. 7). We recommend that the

INSPECTION HIGHLIGHTS

1st Reheat Steam (continued)

- **2-FRSH-4, 2-FRSH-5** (continued)

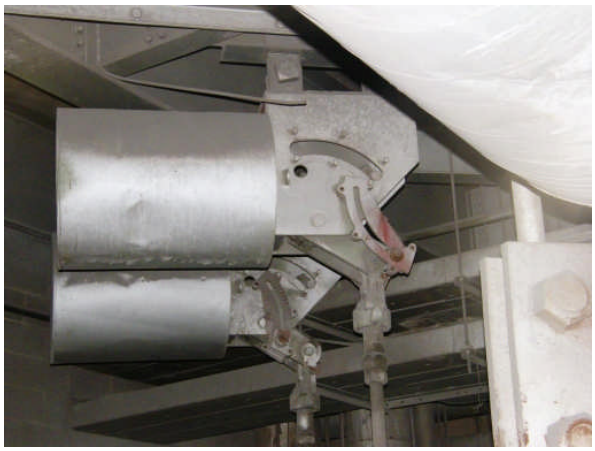


Figure No. 7
2-FRSH-4 Bottomed Out

supports be load tested prior to making any adjustments. There is also the possibility that the piping is distorted along the lower horizontal run and this should be explored. If distortion is present, then adjustments at this time could exacerbate the condition. Another possibility is that the supports were adjusted improperly. During the outage of 2010 scaffolding was built to allow access to support 2-FRSH-5 to verify design information contained on the name plate. The name plate could not be found as they appear to have been removed. There was a notation written on one of the spring cans that stated the spring tension had been increased in April 2000 (Figure No. 8). There is an adjustment that allows for at least 10% adjustability. More likely, the travel was adjusted by a well intentioned, uninformed individual who thought they were adjusting the spring tension.

INSPECTION HIGHLIGHTS

1st Reheat Steam (continued)

- **2-FRSH-4, 2-FRSH-5** (continued)

  It appears likely, that the condition of being bottomed out in the hot condition is due to an adjustment to the travel in the cold condition in 2000.

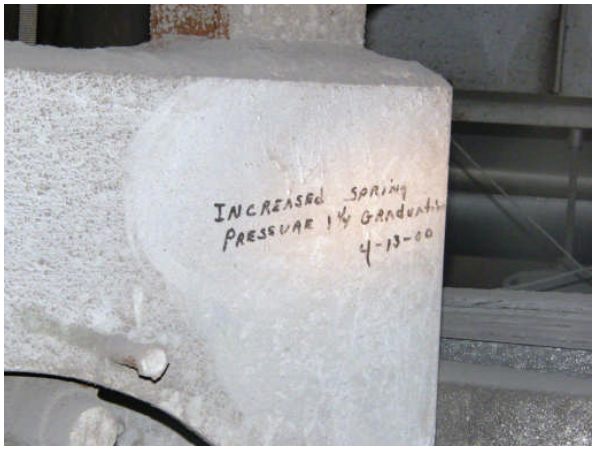


Figure No. 8
2-FRSH-5 Notation

- **2-FRSH-7**

  This constant support designed settings were to be bottomed out hot and 6.5 cold. The support is topped out in the cold condition (Figure No. 9). This could be due to distortion of the piping if it is "humped" at this location, or someone performed adjustments without consulting the original hanger design sketches.

INSPECTION HIGHLIGHTS

1st Reheat Steam (continued)

- **2-FRSH-7** (continued)

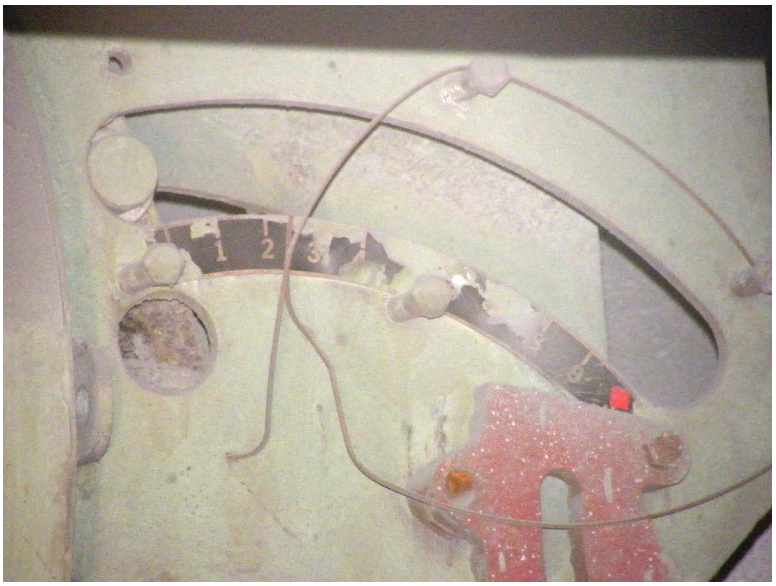


Figure No. 9
2-FRSH-7 Topped Out Cold

- **2-FRSH-16**

  Hanger design sketch 2-814 lists this device as a 4" x10" Grinnell Figure 201 hydraulic shock and sway suppressor. The device in place is a mechanical snubber. These were viewed in the 1970's as a viable replacement for hydraulic unit. History has shown that these units are prone to failure, particularly in dirty environments. We recommend that the plant make budgetary provisions to replace this device with a hydraulic unit. No information could be located on file at the plant detailing the change. Data for the replacement snubber is not available; data sheets reflect original snubber information.

INSPECTION HIGHLIGHTS

2nd Reheat Steam (continued)

- **2-SRSH-8, 2-SRSH-9**

  The above constant supports have missing position indicators.

HP Turbine Exhaust

Specific Hanger Comments

- **2-TEH-7, 2-TEH-13**

  The above mark numbers represent a trapeze assembly that is rather unique. It utilizes two constant support hangers to provide support during normal operating parameters, and two variable spring cans to accommodate the increased loads seen during hydro testing and boil-off conditions. The easternmost constant support is topped out in the cold condition (Figure No. 10).

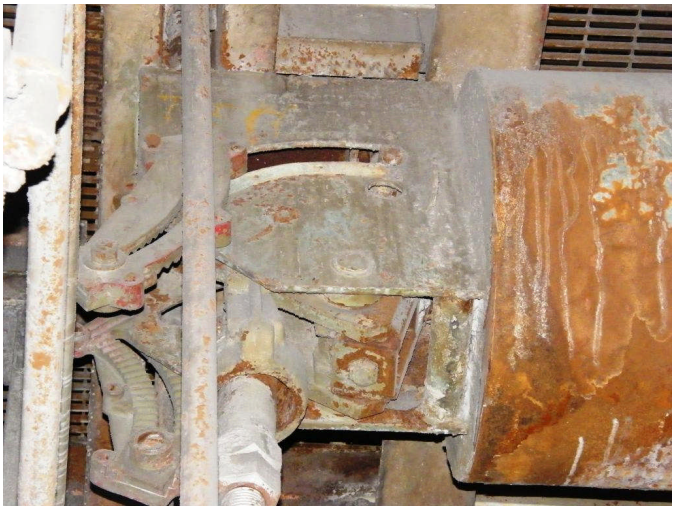


Figure No. 10
2-TEH-7 Topped Out Cold

INSPECTION HIGHLIGHTS

HP Turbine Exhaust (continued)

- **2-TEH-7, 2-TEH-13** (continued)

  The supports are in generally poor condition due to service conditions. The constant supports are rusted, and the variable spring coils are significantly corroded, and the spring cans are packed with fly ash.

  The combined load of the two constant support hangers is 50,746#, and is supported by two welded attachments to the pipe. We recommend that the plant inspect the lugs for indications of cracks at the welds, due to the large volume of piping that would be unsupported if a failure were to occur at this location.

  It is advised to inspect the condition of the spring coils inside the spring can casings as well as those in the constant supports. The variable spring cans (used only in the hydro boil out conditions) are filled with ash. The likelihood for them to function when called upon is questionable, due to the debris in the spring can.

  When the time comes to replace these supports, we would recommend that the new supports be rated for outdoor service. Such service conditions call for

INSPECTION HIGHLIGHTS

HP Turbine Exhaust (continued)

- **2-TEH-7, 2-TEH-13** (continued)

  galvanized spring cans and neoprene coated spring coils. Another issue for the plants consideration is whether or not support 2-TEH-13 is truly required. This support is only engaged during hydro testing and boil-off. The plant should explore the likelihood of future hydrostatic testing of this piping system in the foreseeable life of the plant, and determine if this support has to be replaced in the future.

- **2-TEH-5, 2-TEH-3**

  These two supports, a variable spring and a constant support, are located at the lower horizontal run of piping. They are exhibiting no movement from hot to cold. There is no evidence of binding or interference. All the associated hydro and boilout hangers are unengaged as per design.

1st Reheat Exhaust

Specific Hanger Comments

- **2-RSEH-7, 2-RSEH-13**

  The above mark numbers represents a trapeze assembly that is rather unique. It utilizes two constant support hangers to provide support during normal operating

INSPECTION HIGHLIGHTS

1st Reheat Exhaust (continued)

- **2-RSEH-7, 2-RSEH-13** (continued)

parameters, and four variable spring cans to accommodate the increased loads seen during hydro testing and boil-off conditions. The supports are in generally poor condition due to service conditions. The constant supports are rusted (Figure No. 11), and the variable spring coils are corroded, and the spring cans are filled with ash. The turnbuckle is distorted. It is advised to inspect the condition of the spring coils inside the spring can casing.

Figure No. 11
2-RSEH-7 Rusted Supports
2-RSEH-13 Distorted Turnbuckle

In the cold condition the support is in contact with the access platform suspended from above (Figure No. 12). This interference has caused damage the insulation on the southern side of the piping below the clamp (Figure Nos. 13 and 14). This condition does not exist in the operating condition. The easternmost constant support is topped out in the cold condition.

Figure No. 12
2-RSEH-13 Loaded on Access Platform

INSPECTION HIGHLIGHTS

1st Reheat Exhaust (continued)

- **2-RSEH-7, 2-RSEH13** (continued)

  We recommend continued monitoring of this support, and would advise against blindly making adjustments at this time.

Figure No. 13
2-RSEH-13 Damaged Insulation

Figure No. 14
2-RSEH-13 Insulation Damage

When the time comes to replace these supports, we would recommend that the new supports be rated for outdoor service. Such service conditions call for galvanized spring cans and neoprene coated spring coils. Another issue for the plants consideration is whether or not support 2-RSEH-13 is truly required. This

INSPECTION HIGHLIGHTS

1st Reheat Exhaust (continued)

- **2-RSEH-7, 2-RSEH13** (continued)

  support is only engaged during hydro testing and boil-off. The plant should explore the likelihood of future hydrostatic testing of this piping system in the foreseeable life of the plant, and determine if this support has to be replaced in the future. If this approach was found to be the plants choice, we would recommend installing new constant supports to replace the current units.

- **2-RSEH-5**

  The above mark number represents a constant support hanger. The support is bottomed out in the hot operating condition (Figure No. 15). We recommend that this support be adjusted during the next outage.

Figure No. 15
2-RSEH-5 Bottomed Out

INSPECTION HIGHLIGHTS

#8 Feedwater Heaters To Economizer Inlet

General Hanger Comments

The vast majority of the originally supplied supports have either lost, or had painted, the factory applied hot and cold position indicators. Where this was the case, the gap between the top of the indicator slot, and the top of the position indicator was used to indicate the movement on the variable spring supports. This condition is referenced on the record sheet as G =.

Specific Hanger Comments

- **2-FWH-1, 2-FWH-2, 2-FWH-3, 2-FWH-4**

  The above mark numbers represent four rather unique variable spring supports located at each end of the Nos. 8A, and 8B feedwater heaters. The bolting associated with the keeper rods and top plates is not secured and has backed off from the plates. Because the bolting was factory installed, we recommend that all fasteners be tightened and secured. This is easily accomplished by disrupting the threads on the keeper rods after the nuts are tightened.

- **2-FWH-15, 2-FWH-16, 2-FWH-17, 2-FWH-18**

  The above mark numbers represent constant support hangers that have been replaced by new supports supplied by the Lisega Corporation. No design data of

INSPECTION HIGHLIGHTS

#8 Feedwater Heaters To Economizer Inlet

- **2-FWH-15, 2-FWH-16, 2-FWH-17, 2-FWH-18** (continued)

  the replacement supports could be secured at the plant at the time of the inspections. The supports were witnessed to be in travel, and in the vicinity of their applied hot and cold position indicators.

Feedwater To #7 Heater Inlet

General Hanger Comments

The original piping scheme of the Boiler Feedwater to Heater #7 system has been altered. The modifications to the system include a series of restraints that were added to the system.

No documentation pertaining to the changes could be located at the plant. As originally designed the support scheme relied on trapeze hangers that when subjected to shock loading, or surges in the system, could accommodate movement of the piping but could self-recover. With the introduction of the restraints the piping system has been rendered very rigid and in so doing the pipe attachments (in this case, the U-bolts) are seeing stresses greater than that they were designed to accommodate. We recommend that the plant have a piping analysis performed to determine the current high stress locations of this piping system, and to determine what if any corrective actions are warranted.

INSPECTION HIGHLIGHTS

Feedwater To #7 Heater Inlet (continued)

Specific Hanger Comments

- 2-FWH-20

  This variable spring trapeze assembly is missing the lock nuts on the U-bolt. The washer plates used to anchor the piping to the support have migrated (Figure No. 16). The U-bolt could be loose, damaged or elongated. Scaffolding will be required to gain access to these supports to assess the condition of the U-bolt. Insulation removal could be required, as is potential U-bolt replacement.

Figure No. 16
2-FWH-20 missing locknuts on U-bolt

- **2-FWH-20, 2-FWH-21, 2-FWH-22, 2-FWH-23, 2-FWH-25**

  The above listed supports are all trapeze assemblies. They are exhibiting indications that the U-bolt that secures the piping to the support has shifted (Figure No. 17). The U-bolts could be loose, damaged, or elongated.

INSPECTION HIGHLIGHTS

Feedwater To #7 Heater Inlet (continued)

- **2-FWH-20, 2-FWH-21, 2-FWH-22, 2-FWH-23, 2-FWH-25** (continued)

Figure No. 17
2-FWH-21 washer plate loose

These two variable spring trapeze supports have been modified. They each have two rigid struts added to their design (Figure Nos. 18 & 19). It appears that the intent of the modification was to stop excessive sway at these locations. The result of the addition of the struts was essentially to turn these locations into anchors. We recommend that the plant determine what the long term effects of such a change would be.

INSPECTION HIGHLIGHTS

Feedwater To #7 Heater Inlet (continued)

- **2-FWH-26A, 2-FWH-25A**

Figure No. 18
2-FWH-26A with restraints

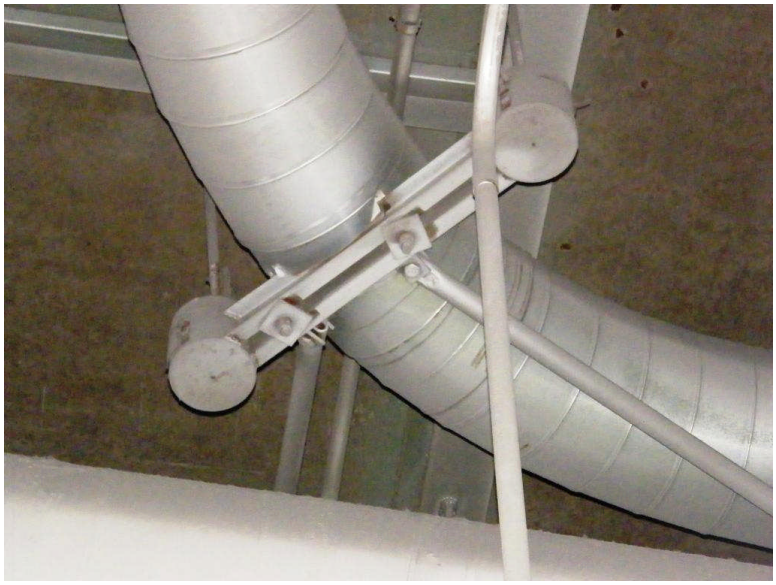


Figure No. 19
2-FWH-25A added restraints

INSPECTION HIGHLIGHTS

Feedwater To #7 Heater Inlet (continued)

- **2-FWH-28**

  This variable spring assembly has a loose locknut present on the U-bolt. We recommend that this be tightened during the spring outage (Figure No. 20).

Figure No. 20
2-FWH-28 loose locknut

- **2-FWH-31**

  This support is part of the modifications made to the piping system. It is a limit stop installed to limit lateral movement to the west (Figure No. 21). The hanger designation was added for purposes of this report, and is not on file at the plant.

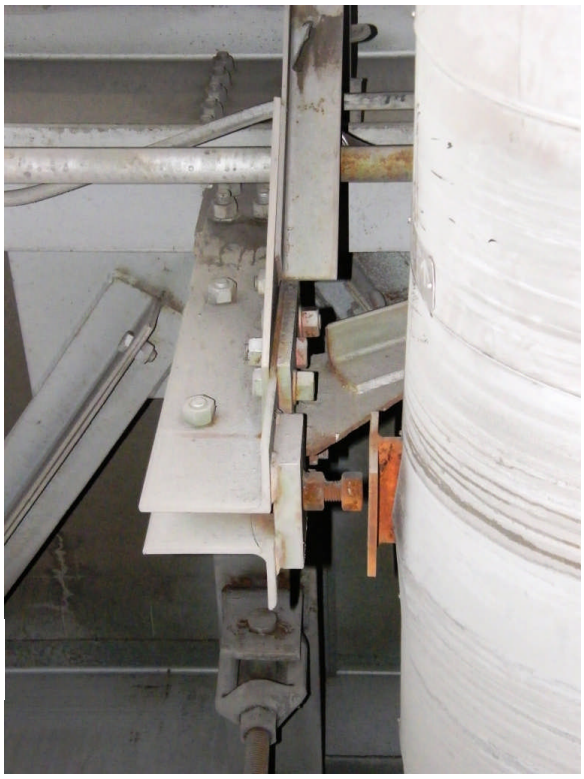


Figure No. 21
2-FWH-31 added modification

INSPECTION HIGHLIGHTS

Feedwater Pump Suction

Specific Hanger Comments

- **2-CH-102**

  This variable spring support has a damaged position indicator. The damage is due to wear against the indicator slot (Figure No. 22).

Figure No. 22
2-CH-102 Damage

- **2-CH-104**

  This is a strut that may have either a loose or over sized bolt in service (Figure No. 23). The other side of the attachment is inaccessible, and cannot be viewed. There is also damaged and missing insulation at this location (Figure No. 24).

Figure No. 23
2-CH-104 Fastener Loose

Figure No. 24
2-CH-104 Missing Insulation

INSPECTION HIGHLIGHTS

Feedwater Pump Suction (continued)

- **2-CH-105**

  This mark number represents a rigid strut. There is a missing hex nut in the clamp assembly (Figure No. 25).

Figure No. 25
2-CH-105

- **2-CH-110**

  The northern steel attachment for this rigid support is damaged (Figure No.26). It is scheduled for repairs during the spring outage.

Figure No. 26
2-CH-110 North steel attachment damaged

INSPECTION HIGHLIGHTS

Superheater Attemperator

The Superheater Attemperator piping system was added to the inspection program during the outage of 2012. Design information for the piping and supports could not be located at the plant at the time of the inspection. As the information becomes available the hanger designations on our isometric drawings will be updated, along with design data.

Reheat Attemperator

The Reheat Attemperator piping system was added to the inspection program during the outage of 2012. Design information for the piping and supports could not be located at the plant at the time of the inspection. As the information becomes available the hanger designations on our isometric drawings will be updated.

Cursory Inspection

- The plant should review the design for the safety valve discharge vent piping related to the Main Steam, First Reheat, Second Reheat, HP Turbine exhaust, and First Reheat Exhaust piping systems. The twelve safety valve discharge lines do not have supports under the elbows. Without being supported from below, the elbow is driven downward when subjected to discharge conditions.

INSPECTION HIGHLIGHTS

Cursory Inspection (continued)

- There are no visible supports on the discharge lines to the roof or wall penetrations. We recommend that the plant review the discharge piping systems to ensure that the designs are adequate when subjected to discharge conditions.

- A constant support associated with the Alternate Steam to Turbine Room piping system was found to have its travel stops engaged (Figure No. 27). We recommend that the support be placed in travel.

Figure No. 27
Travel stops in Alternate Steam support

- Several supports associated with the Feedwater Drains have distorted support steel (Figure Nos. 28 & 29). The damage is not recent.

INSPECTION HIGHLIGHTS

Cursory Inspection (continued)

Figure No. 28
FW drain supports distorted

Figure No. 29
FW drain supports

DISCUSSION

Where applied, pipe supports represent devices that are essential to the continued safe and reliable operation of the suspended equipment. Unfortunately, the devices are often ignored and taken for granted. This general indifference is primarily due to the fact that supports have significant safety margins and thus rarely break or fall down. Due to this indifference, and the accompanying disregard for their performance and integrity, the problems that ultimately do evolve are long term in nature and are typically not traceable to the supports.

A prime example of a long-term problem related to poor support performance is the development of undesirable stresses in a segment of piping system, or at a terminal connection. Often the stress develops from a restriction at a flexible-type support (variable spring hanger or constant support) where the suspended equipment cannot move as desired. Depending on the magnitude of the restriction, the stress created, temperature, and other factors, various stages of metallurgical degradation can develop and provoke a crack. Also, depending on the residual stress that remains, the crack can propagate through the entire thickness of the material.

Areas most prone to this type of cracking are the heat-affected zones (HAZ) in the smallest cross-sectional area next to the restriction. This can involve a branch line and/or girth welds on the main run of piping.

DISCUSSION

Other long-term problems that can typically be resolved by effective and meaningful maintenance programs are the detection and elimination of support disengagement and failures, particularly those involving failures of welded pipe attachments

There are also spillover benefits, such as ensuring that proper pitch is maintained. This is especially true for piping systems or segments where drainage is crucial for avoiding water collection and related problems, such as thermal fatigue, "flashing", or water hammer.

CONCLUSIONS AND RECOMMENDATIONS

Recognizing the limited nature of the inspection and the various problems identified, it is likely that additional inspections will reveal the existence of additional problems. However, a better understanding of the systems and the support/restraint schemes may also tend to minimize initial concerns and classify some issues as maintenance versus design or service related.

Based on the above and the results of the inspection, the following general, and in some instances specific, recommendations apply:

- On an annual basis, or in conjunction with major scheduled outages, the supports and piping systems should be inspected visually. The primary purpose of the work would be to ensure that the supports are intact, properly engaged

CONCLUSIONS AND RECOMMENDATIONS

and suitable for service. The work should also include readings at flexible type supports. At a minimum, the work should be performed during the hot (operating) mode. Cold inspections should also accompany planned outage schedules, if possible. In conjunction with the routine inspections, additional steam and water cycle piping systems, as well as drain and branch lines, should be incorporated into the program as it evolves. The following piping systems should be inspected as a minimum:

- Main Steam
- 1st Reheat Steam
- 2nd Reheat Steam
- HP Turbine Exhaust
- 1st Reheat Exhaust
- 2nd Reheat Exhaust
- Boiler Feed Suction
- Boiler Feed Discharge

- Ultimately, equipment supports and hangers should be incorporated into the data sheets; this includes boiler and turbine supports.

- The pipe support arrangement applied to a number of the steam lines was designed such that significant portions of the pipe loading suspension is dependent on one major support, and this is particularly true for the reheat systems. Recognizing the risk posed by failure of one of the supports it is recommended that enhanced inspections be considered. In particular, due to thermal and/or mechanical fatigue cracks can develop in the welds used to secure the hanger pipe attachments to the piping often resulting in crack

CONCLUSIONS AND RECOMMENDATIONS

propagation into the base material and/or disengagement of the support. Additionally, several of the major supports located on the risers of the systems involve the use of a "bat wing" type welded pipe attachment which is somewhat more prone to these types of problems. Specifically, plates are welded to the piping on two sides. The conventional hangers (constant supports, rigid rod or variable spring hangers) are then applied. In other instances welded pipe attachments are also used at other hangers and restraints throughout the plant and that these should also be inspected. Of particular concern are the attachments used on the hangers that are only engaged for hydrostatic testing or exfoliations. Also, some of hangers also employ a structural arrangement of auxiliary steel or a "cradle" around the pipe to transfer the deadweight loads from the welded attachments to the conventional hangers. There have been instances where the bolts associated with similar designed have failed, thus inspections should also be considered for a select number of these fasteners. Recognizing, that the above recommendations involve considerable planning and a commitment, we have developed a list of the hangers with welded attachments, the type involves and a recommended priority for their inspection. Insulation removal details are also attached in Appendix "C".

CONCLUSIONS AND RECOMMENDATIONS

Main Steam

Mark No	Hanger Type	Pipe Attachment Type	Inspection Priority	Auxiliary Assembly	Inspection Priority
2-MSH-5	Variable Spring	Plates	III	Cradle	III
2-MSN-6	Variable Spring	Plates	III	Cradle	III
2-MSH-7	Rigid	Trunnion/pipes	I	Cradle	I
2-MSH-8	Rigid	Trunnion/pipes	I	Cradle	I

1st Reheat Steam

Mark No	Hanger Type	Pipe Attachment Type	Inspection Priority	Auxiliary Assembly	Inspection Priority
2-FRSH-1 (15)	Constant Support	Plates	I	Cradle	I
2-FRSH-10	Lateral Restraint	Plates	II	N/A	N/A

2nd Reheat Steam

Mark No	Hanger Type	Pipe Attachment Type	Inspection Priority	Auxiliary Assembly	Inspection Priority
2-SRSH-1(15)	Constant Support	Plates	I	Cradle	I
2-SRSH-2	Constant Support	Plates	II	N/A	N/A
2-SRSH-3	Constant Support	Plates	III	N/A	N/A
2-SRSH-4	Constant Support	Plates	III	N/A	N/A
2-SRSH-5	Constant Support	Plates	III	N/A	N/A
2-SRSH-6	Constant Support	Plates	III	N/A	N/A

CONCLUSIONS AND RECOMMENDATIONS

Mark No	Hanger Type	Pipe Attachment Type	Inspection Priority	Auxiliary Assembly	Inspection Priority
2-SRSH-7	Constant Support	Plates	III	N/A	N/A
2-SRSH-8	Constant Support	Plates	III	N/A	N/A
2-SRSH-9	Constant Support	Plates	III	N/A	N/A
2-SRSH-10	Lateral Restraint	Plates	II	N/A	N/A
2-SRSH-11	Hydro Only	Plates	III	N/A	N/A
2-SRSH-12	Hydro Only	Plates	III	N/A	N/A
2-SRSH-13	Hydro Only	Plates	II	N/A	N/A
2-SRSH-14	Hydro Only	Plates	III	N/A	N/A
2-SRSH-15	Hydro Only	Plates	III	N/A	N/A

Notes:

1. Priority No. I is the highest (next 12-24 months); Priority No. II (next 36-48 months); Priority No. III (next 60-72 months).

2. At 1st Reheat Steam hanger 2-FRSH 1, there is also a hydro hanger (2-FRSH-15) secured to the same cradle assembly.

3. At 2nd Reheat Steam hanger 2-SRSH-1, there is also a hydro hanger (2-SRSH-15) secured to the same cradle assembly.

CONCLUSIONS AND RECOMMENDATIONS

- Due to the pipe sizes and loads associated with the large bore steam lines employed at the Mitchell Station specific procedures associated with hydrostatic testing of the steam leads and the temporary engagement of various supports should be reviewed or developed. In addition to the conventional deadweight hangers, a number of the large bore steam leads have a separate network of hangers that should be engaged for hydrostatic testing or exfoliations only. As, the supports could easily be engaged by accident, or not disengaged, after the temporary overload condition, meticulous attention must be given to this issue. Consideration should also be given to marking these individual hangers to minimize improper use.

- The design information that is available is fragmented and inconclusive. Furthermore, it is evident that the information that is available does not represent the latest revision(s). The inspection activities raise some concerns regarding the current revision levels of the hanger design sketches that were supplied to us. In some cases, there are issues regarding design versus "as-built" conditions that exist at the plant. An attempt should be made to secure all updated sketches and design information associated with the piping and supports.

CONCLUSIONS

Fortunately, the specified supports represent some of the best that are available in the industry and are engineered to provide years of reliable service.

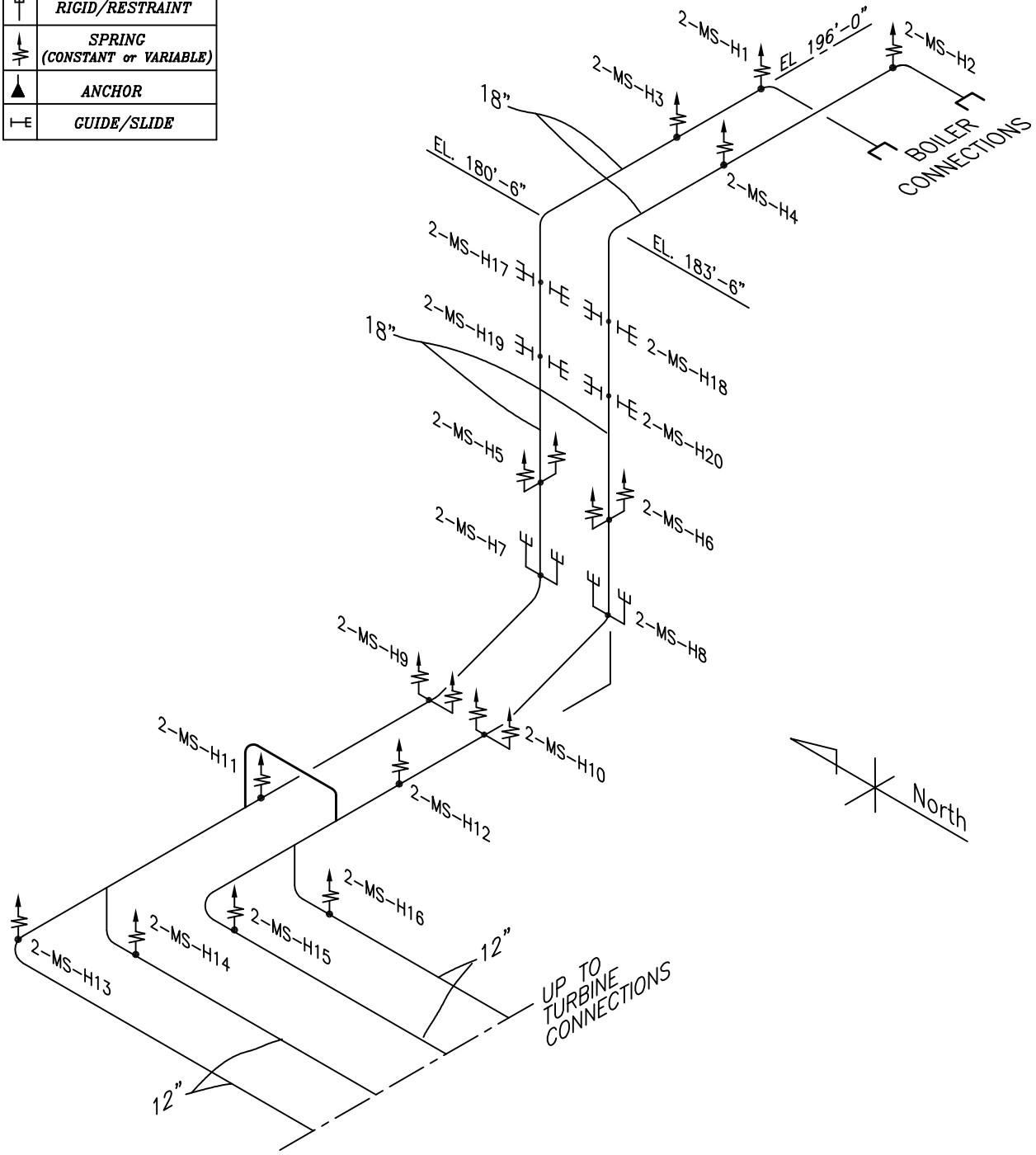
The supports, in general, are in good condition, although evidence of damaged or loose support components was noted on several piping systems. These require monitoring to determine the cause of the damage and subsequent corrective measures.

Continued pipe support inspection and an ultimate nondestructive examination program will provide an excellent means of early problem detection concerning piping, supports and related equipment.

APPENDIX "A"

ISOMETRIC SKETCHES

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE

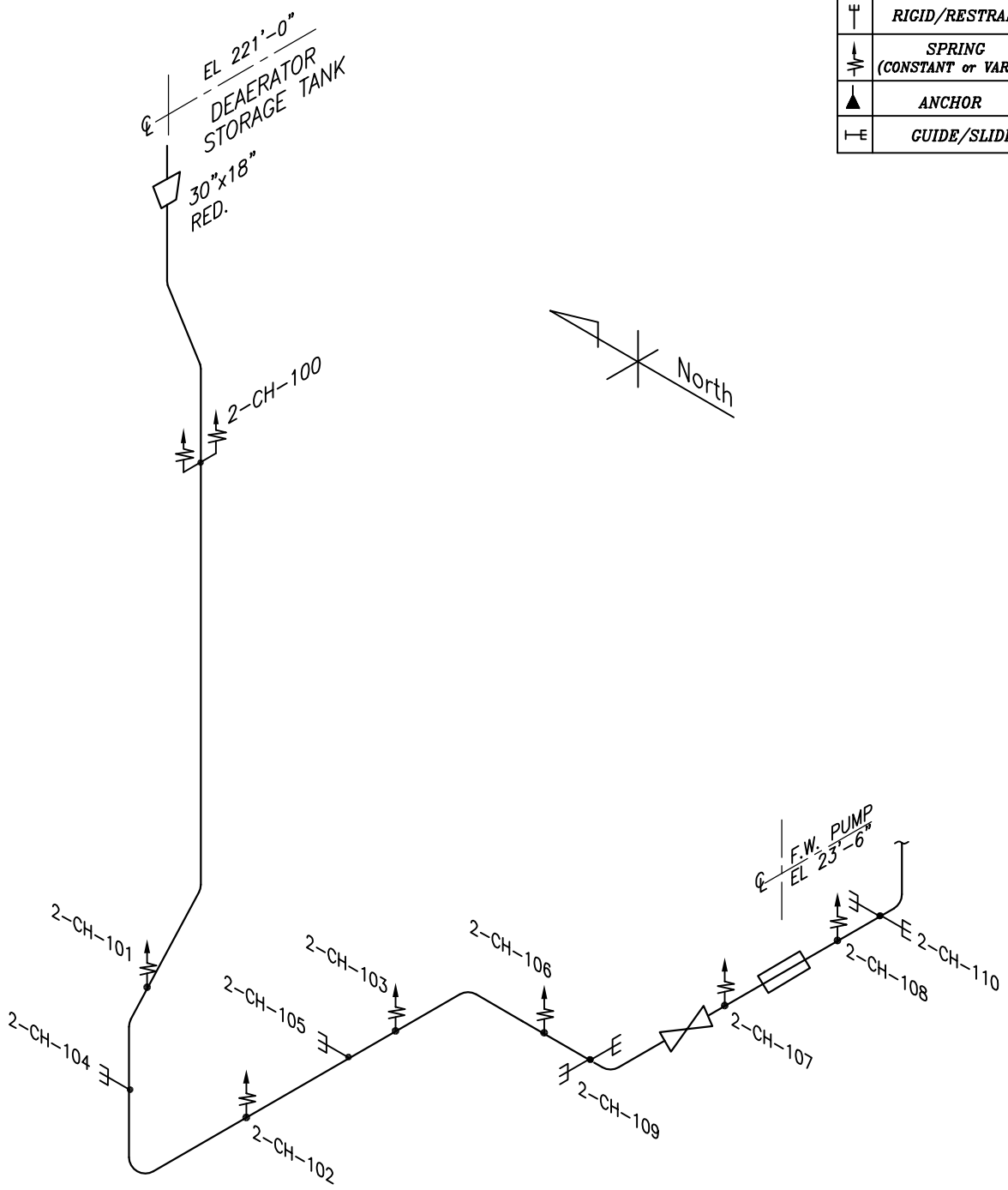


AEP MITCHELL – UNIT NO. 2
MAIN STEAM SYSTEM
OSTS DWG.# MIT2-MSH REV. 1 8-26-10

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE

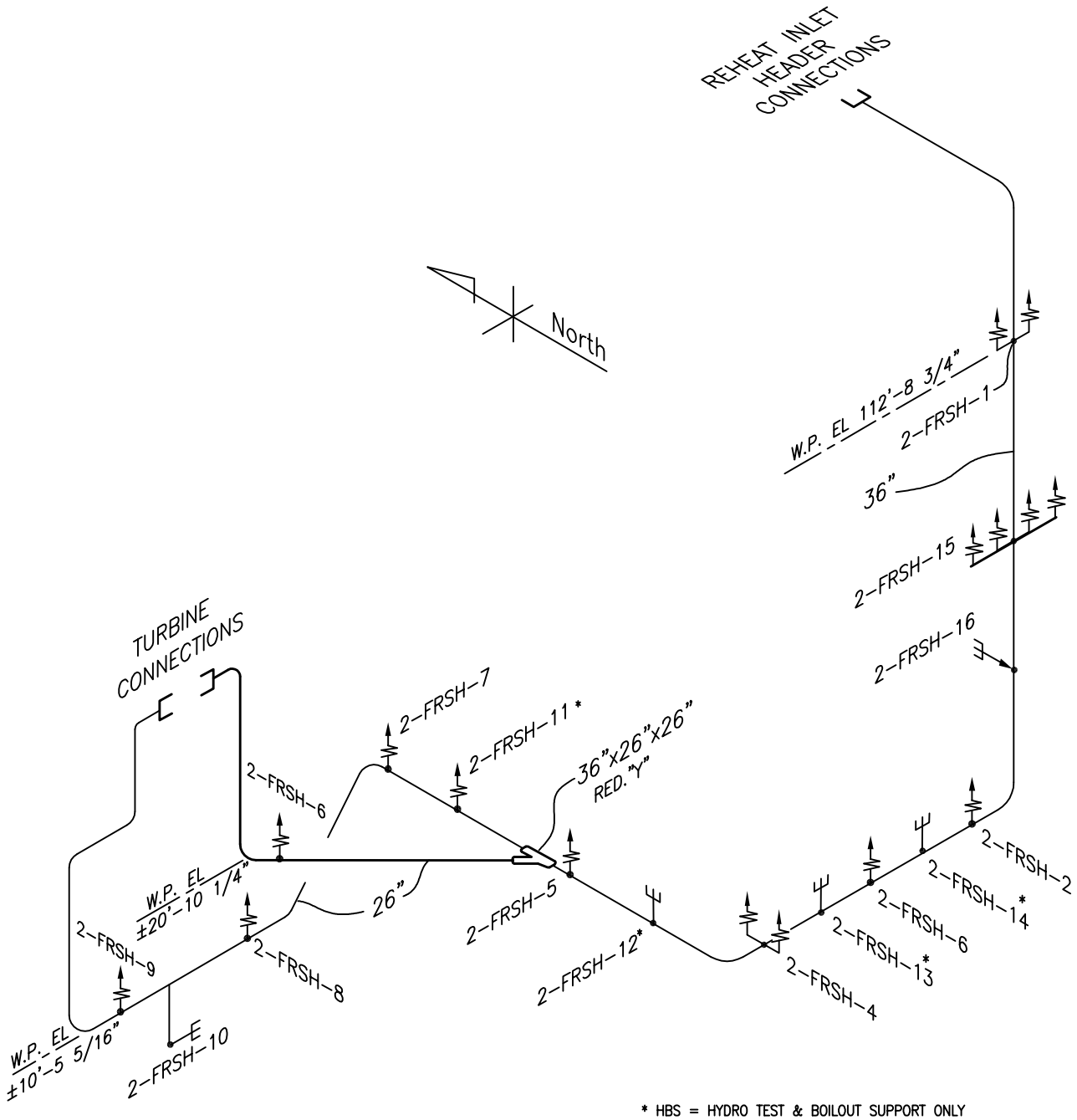


AEP MITCHELL – UNIT NO. 2
FEEDWATER PUMP SUCTION
OSTS DWG.# MIT2-BFS REV. 1 8-26-10

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE



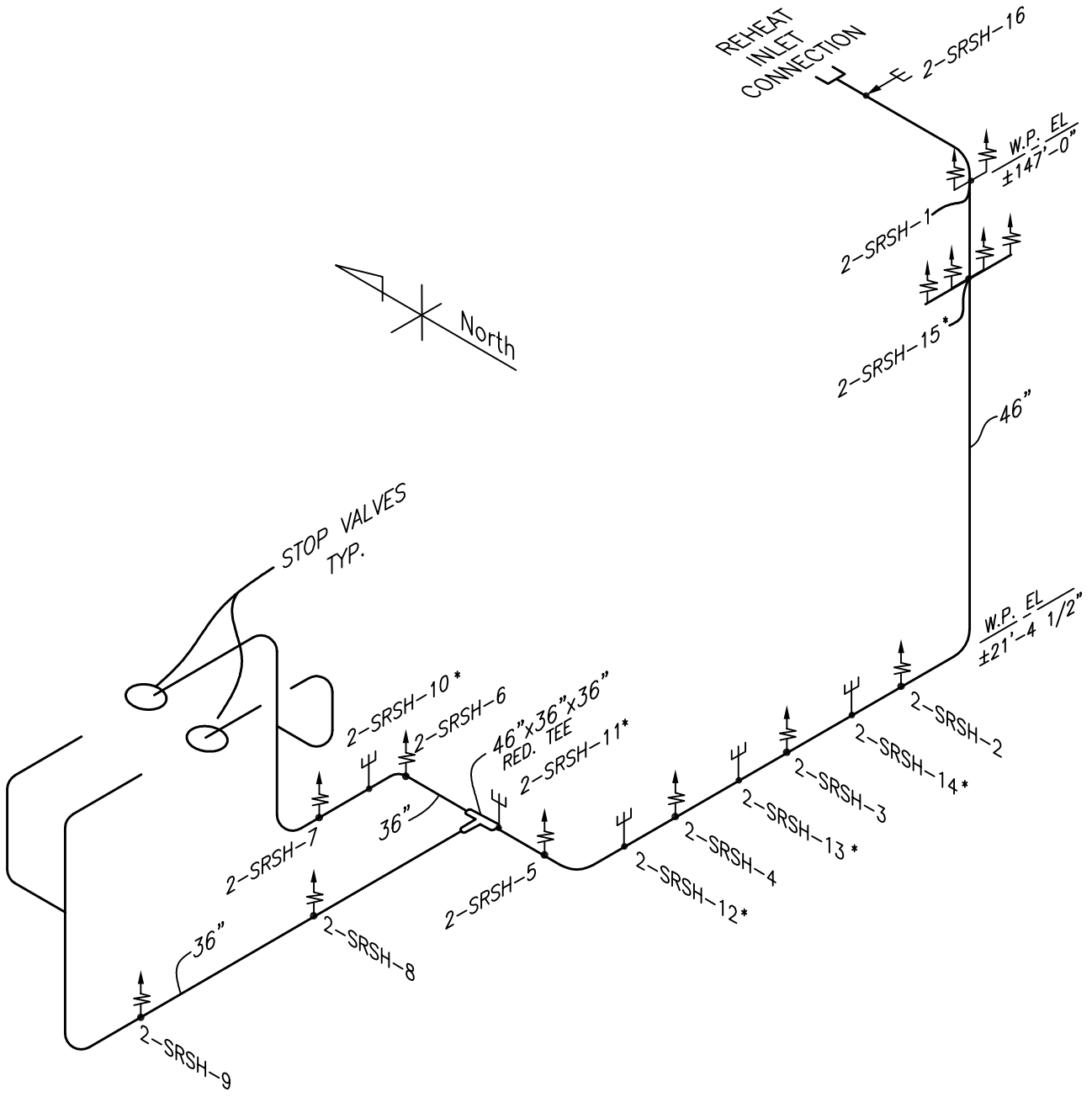
* HBS = HYDRO TEST & BOILOUT SUPPORT ONLY

AEP MITCHELL – UNIT NO. 2
1st REHEAT STEAM SYSTEM
OSTS DWG.# MIT2-1RH REV. 1 9-27-10

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE



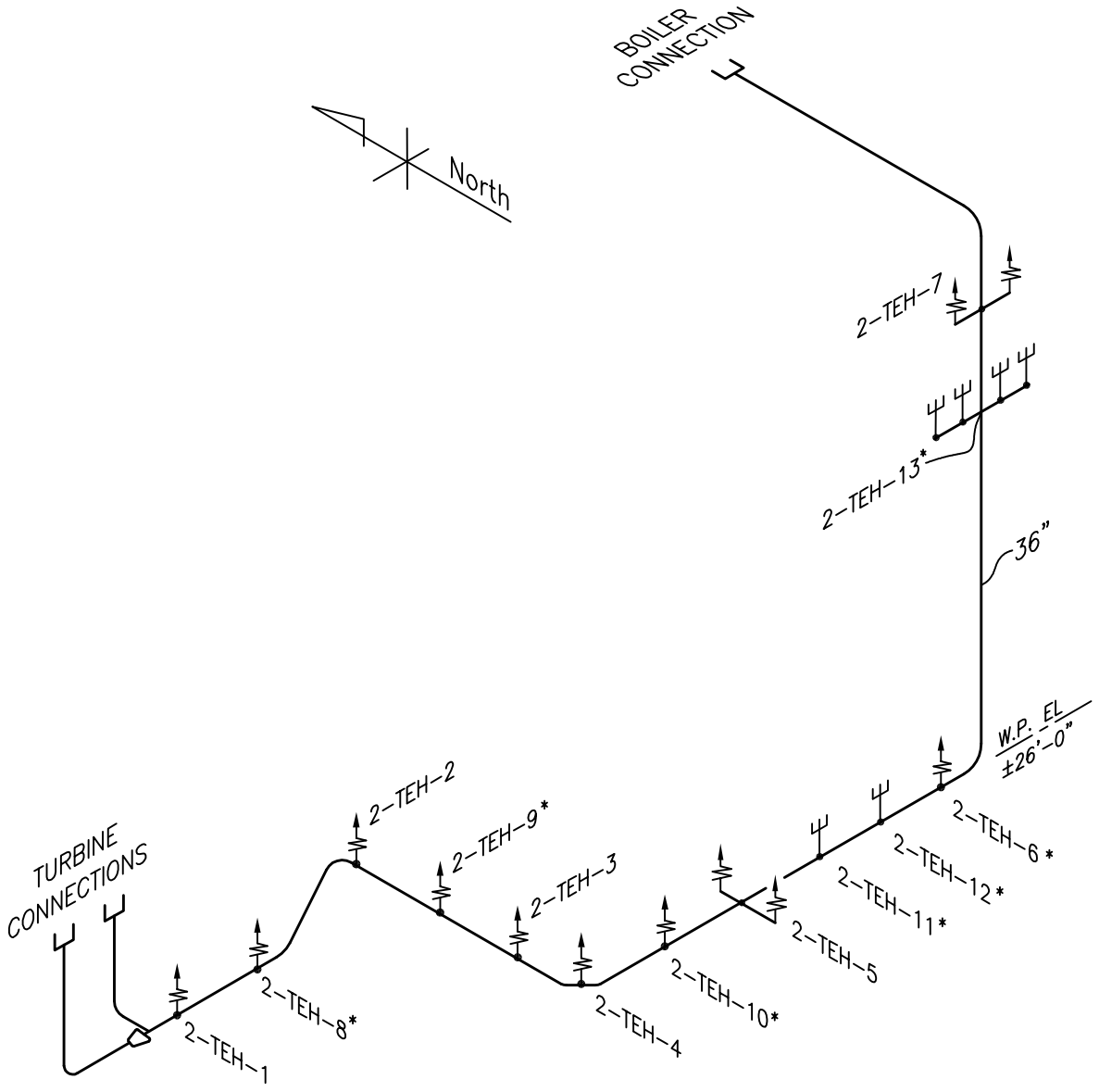
AEP MITCHELL – UNIT NO. 2
2nd REHEAT STEAM SYSTEM
OSTS DWG.# MIT2-2RH REV. 1 9-27-10

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

* HBS = HYDRO TEST & BOILOUT SUPPORT ONLY

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE



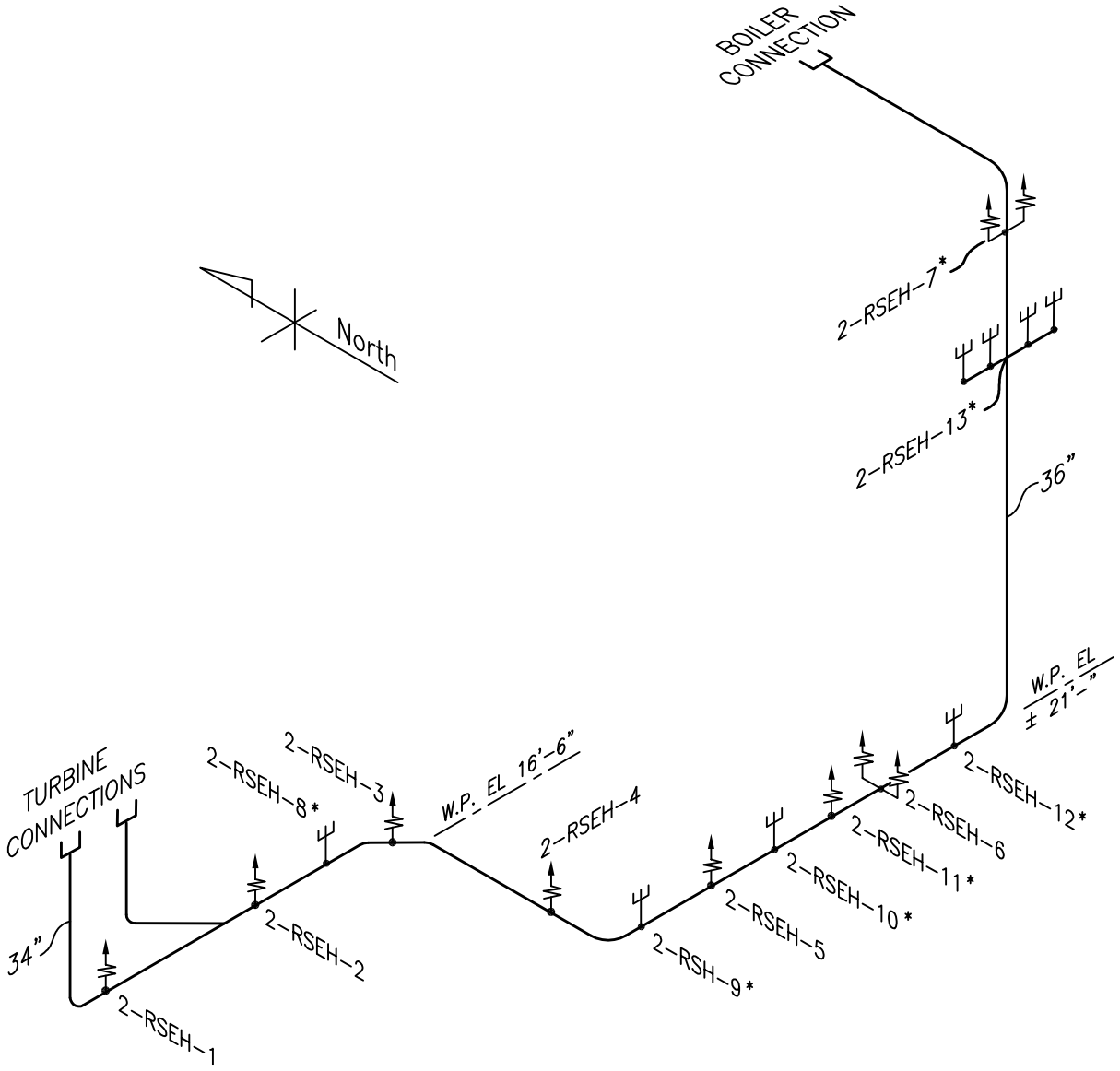
AEP MITCHELL – UNIT NO. 2
H.P. TURBINE EXHAUST
OSTS DWG.# MIT2-HTE REV. 1 8-26-10

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

* HBS = HYDRO TEST & BOILOUT SUPPORT ONLY

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE

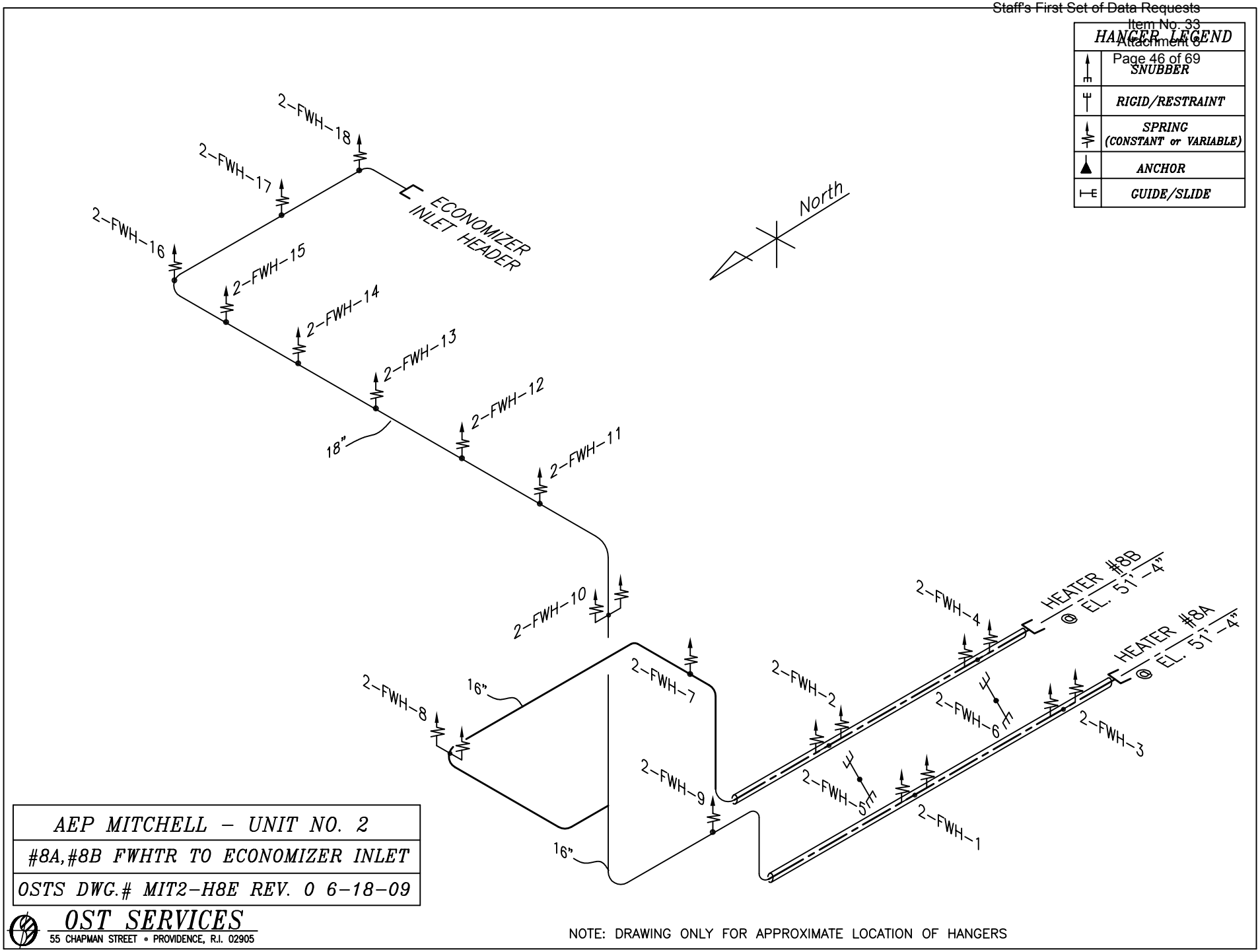


AEP MITCHELL – UNIT NO. 2
1st REHEAT EXHAUST
OSTS DWG.# MIT2-1RE REV. 0 6-18-09

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

* HBS = HYDRO TEST & BOILOUT SUPPORT ONLY

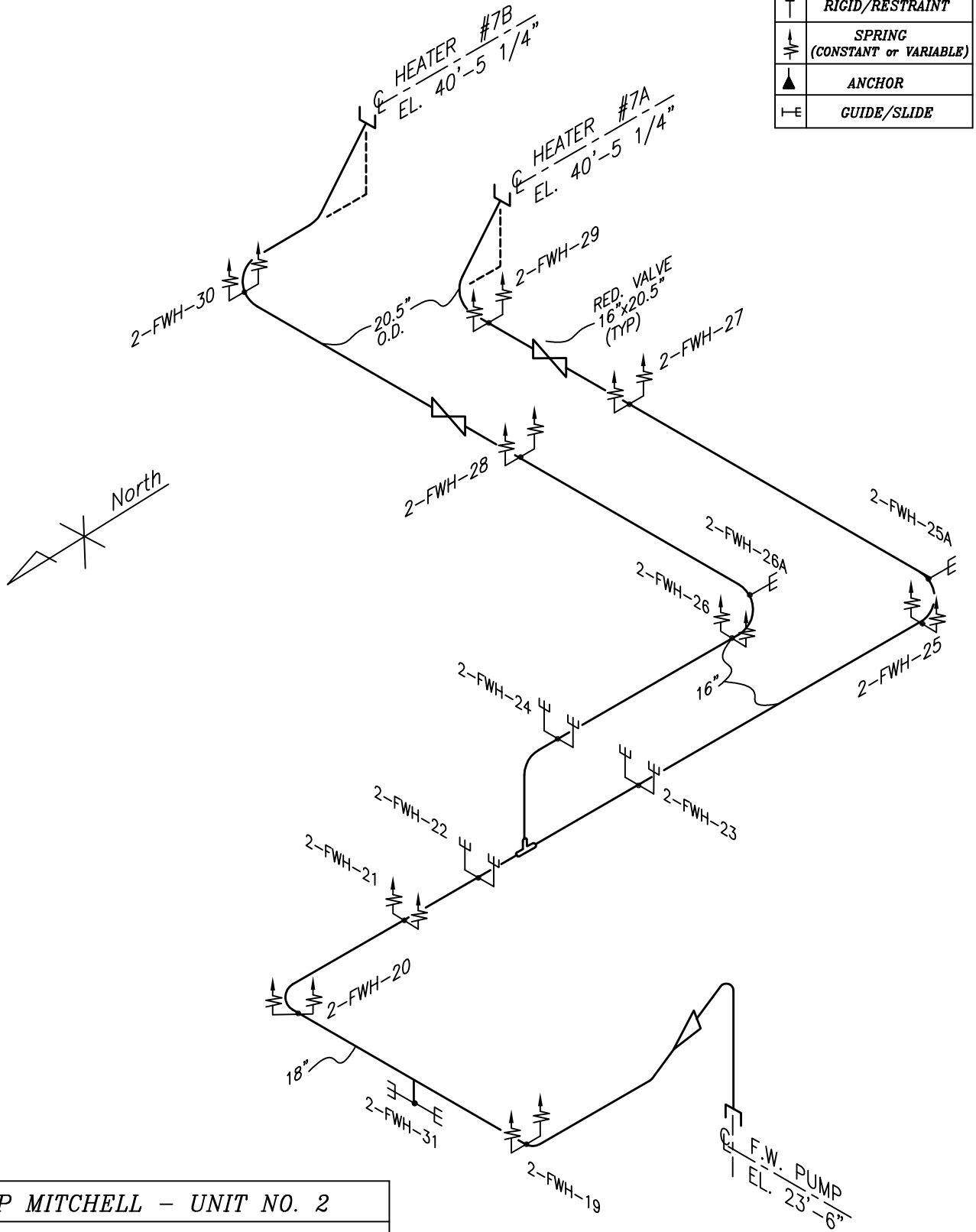
NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS



AEP MITCHELL – UNIT NO. 2
#8A,#8B FWHTR TO ECONOMIZER INLET
OSTS DWG.# MIT2-H8E REV. 0 6-18-09

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

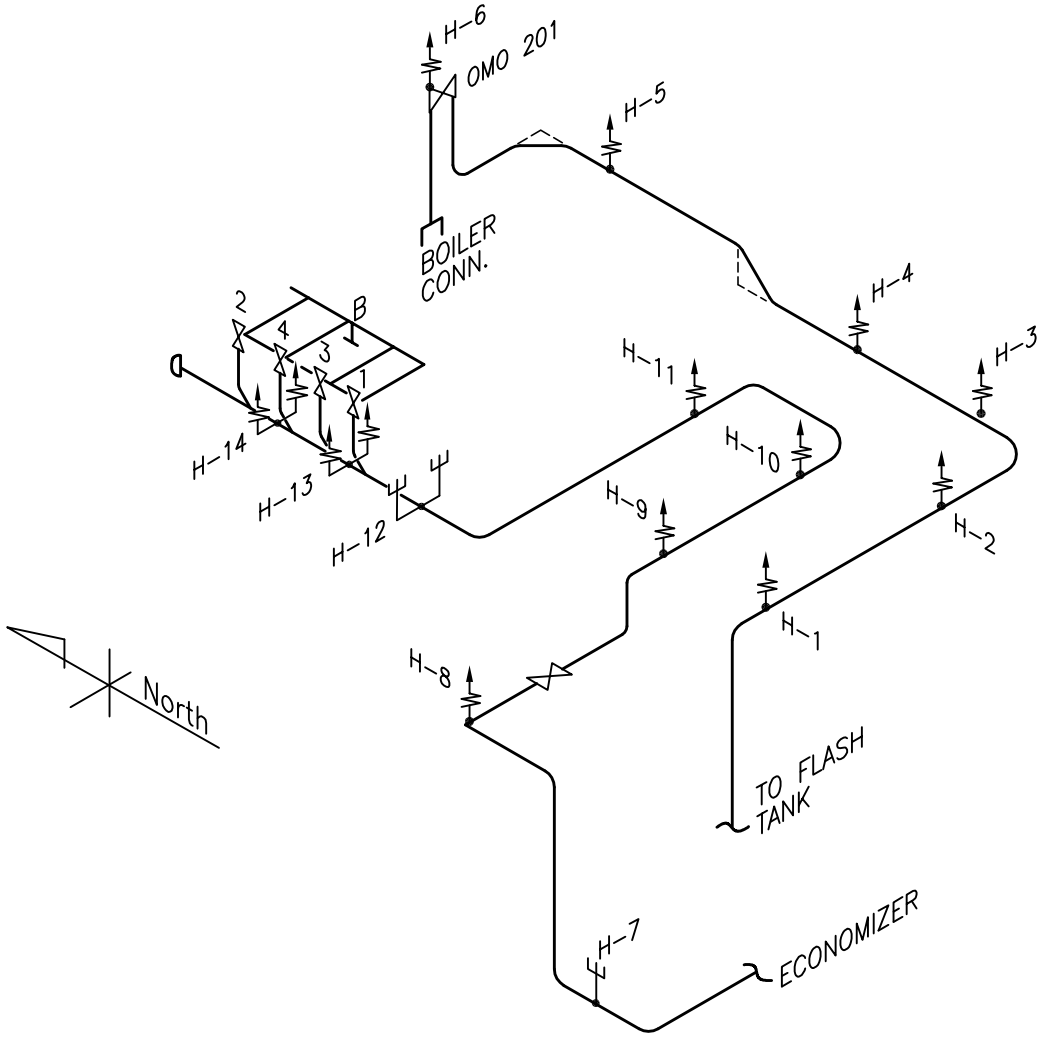


AEP MITCHELL – UNIT NO. 2
FEEDWATER PUMP TO HEATER #7A &7B
OSTS DWG.# MIT2-FH7 REV. 0 6-18-09

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE

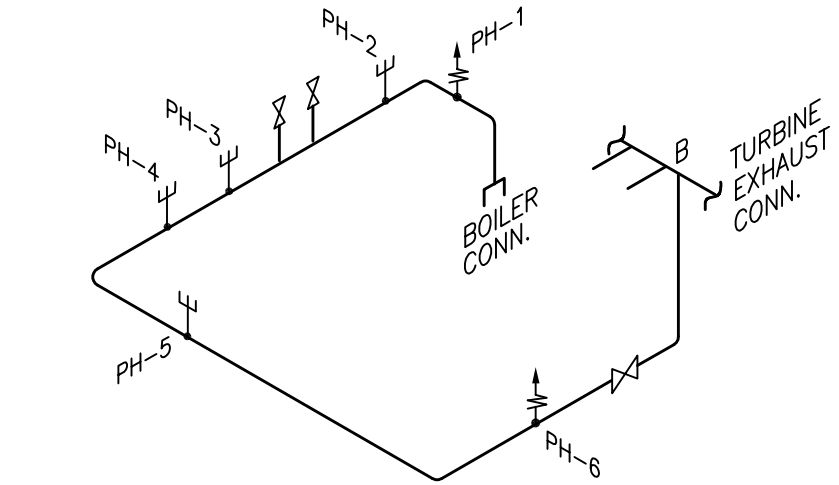


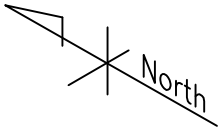
AEP MITCHELL – UNIT NO. 2
SUPERHEATER ATTEMPERATOR
OSTS DWG.# MIT2-SHAT REV. 0 6-28-12

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

HANGER LEGEND	
	SNUBBER
	RIGID/RESTRAINT
	SPRING (CONSTANT or VARIABLE)
	ANCHOR
	GUIDE/SLIDE





AEP MITCHELL – UNIT NO. 2
REHEATER ATTEMPERATOR
OSTS DWG.# MIT2-RHAT REV. 0 6-28-12

OST SERVICES
55 CHAPMAN STREET • PROVIDENCE, R.I. 02905

NOTE: DRAWING ONLY FOR APPROXIMATE LOCATION OF HANGERS

APPENDIX "B"

PIPE SUPPORT INSPECTION RECORD SHEETS

PIPE SUPPORT INSPECTION RECORD SHEET NOTES

MITCHELL GENERATING STATION UNIT NO. 2

ATTACHED ARE PIPE SUPPORT INSPECTION RECORD SHEETS ASSOCIATED WITH THE PIPE SUPPORTS AND RESTRAINTS ON THE FOLLOWING SYSTEMS:

- **MAIN STEAM**
- **1ST REHEAT STEAM**
- **2ND REHEAT STEAM**
- **HP TURBINE EXHAUST**
- **1ST REHEAT EXHAUST**
- **BFW ECONOMIZER TO HEATER #8**
- **FEEDWATER TO HEATER #7**
- **BOILER FEED SUCTION**
- **SUPERHEATER ATTEMPERATOR**
- **REHEAT ATTEMPERATOR**

THE FORMS LIST ALL KNOWN INFORMATION ASSOCIATED WITH THE DEVICES. READINGS AND SETTINGS FROM PRESENT INSPECTIONS ARE ALSO PROVIDED.

NOTES:

1. **THE LETTERS "N", "S", "E", AND "W" DENOTE THE LOCATION OF THE DEVICE AT TRAPEZE ASSEMBLIES.**

2. **"TOTAL TRAVEL" VALUES APPLY TO CONSTANT SUPPORT HANGERS ONLY.**

3. **"0" OR "H" INDICATES THE HIGHEST SCALE POSITION; "5" OR "M" THE MID-POINT; "10" OR THE LOWEST SCALE POSITION.**

4. **WHERE TWO READINGS ARE LISTED IN ONE BOX, THE READING TO THE LEFT REFLECTS THE "AS-FOUND" CONDITION. THE NUMBER TO THE RIGHT IS THE SETTING AFTER ADJUSTMENT.**

5. **WHERE THE FOLLOWING LETTERS ARE LISTED AS A READING:**

"I"	=	INACCESSIBLE	"T"	=	TOPPED OUT
"U"	=	UNLOADED	"B"	=	BOTTOMED OUT
"OK"	=	NO PROBLEMS IDENTIFIED	"IT"	=	IN TRAVEL
"@ H.S."	=	AT HOT SETTING	"@ C.S."	=	AT COLD SETTING
"MID PT"	=	HALFWAY BETWEEN HOT SETTING AND COLD SETTING			
"G"	=	DISTANCE BETWEEN POSITION INDICATOR AND TOP OF INDICATOR SLOT			
"TS"	=	TRAVEL STOPS	"L/HN"	=	LOOSE HEX NUT
"HBS	=	HYDRO/BOILOUT SUPPORT	"M/LN"	=	MISSING LOCKNUT
			"M/HN"	=	MISSING HEX NUT

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: ***AEP MITCHELL***
LOCATION: ***UNIT #2***
SYSTEM: ***MAIN STEAM***

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING HOT	DESIGN SETTING COLD	HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Jan-12
	Note #1						Note #2				Notes #3, 4 & 5					
2-MS-H1		18	82						12,800#	11,470#	G = 1/4"	T	G = 1/4"	T	G = 1/8"	T
2-MS-H2		18	82						12,125#	12,790#	G = 1/4"	G = 1/2"	G = 5/8"	T	G = 1/16"	T
2-MS-H3		48	80-V		23,400#		6"	5-1/4" UP			4.75	B	4.0	B	4	B
2-MS-H4		47	80-V		20,925#		6-1/2"	5-5/8" UP			4.75	B	4.0	B	4	B
2-MS-H5	E	20B	98						19,000#	24,875#	G = 2"	G = 4"	G = 2"	G = 4"	G = 2"	G = 4"
2-MS-H5	W	20B	98						19,600#	24,875#	G = 2"	G = 4"	G = 2"	G = 4"	G = 2"	G = 4"
2-MS-H6	E	20B	98						19,600#	24,475#	G = 2"	G = 4"	G = 2"	G = 4"	G = 2"	G = 4"
2-MS-H6	W	20B							19,600#	24,475#	G = 2"	G = 4"	G = 2-1/2"	G = 4"	G = 2"	G = 4"
2-MS-H7	E											OK	OK	OK	OK	OK
2-MS-H7	W											OK	OK	OK	OK	OK
2-MS-H8	E											OK	OK	OK	OK	OK
2-MS-H8	W											OK	OK	OK	OK	OK
2-MS-H9	N	17	98						9,476#	7,476#	9500#	9400#	G = 4-3/4"	G =3-3/4"	G = 4-3/4"	G = 3-3/4"
2-MS-H9	S	17	98						9,476#	7,476	10500#	11000#	G = 7"	G = 5"	G = 7"	G = 5"
2-MS-H10	N	17	98						9,075#	7,300#	G = 9"	G = 7"	G = 5"	G = 4"	G = 5"	G = 4"
2-MS-H10	S	17	98						9,075#	7,300#	G = 7"	G = 9"	G = 5"	G = 3-3/4"	G = 5"	G = 4"
2-MS-H11		18	B-268						14,340#	11,680#	G = 2"	G = 3-1/2"	G = 3"		G = 2"	G = 2-3/8"
2-MS-H12		18	B-268						13,750#	10,757#	G = 1-3/8"	G = 1-5/8"	G = 2"		G = 1-7/8"	G = 1-1/2"
2-MS-H13		17	82						10,816#	11,566#	7,000#	7400#	T		G = 1/4"	G = 3/8"
2-MS-H14		13A	268						2,915#	3,065#	2000#	1700#	2000#		T	G = 1-1/8"
2-MS-H15		16C	82						8,950#	9,138#	7,200#	9200#	8000#		G = 1"	G = 1-1/8"
2-MS-H16		12C	82						2,225#	2,225#	1,700#	2225#	1700#		G = 1/4"	G = 1-1/8"
2-MS-H17													OK		OK	OK
2-MS-H18													OK		OK	OK
2-MS-H19													OK		OK	OK
2-MS-H20													OK		OK	OK

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: ***AEP MITCHELL***
LOCATION: ***UNIT # 2***
SYSTEM: ***SECOND REHEAT STEAM***

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING HOT	DESIGN SETTING COLD	HOT Jan-09	COLD	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Jan-12
	Note #1						Note #2				Notes #3, 4 & 5					
2-SRSH-1	E	64E	81-H		77,017#		6"	4-1/4" DN	8.5	1.5	9.0	*6.25*	9.25	6.0	9.25	6.0
2-SRSH-1	W	64E	81-H		77,017#		6"	4-1/4"DN	8.5	1.5	9.0	*6.25*	8.75	6.0	9.25	6.0
2-SRSH-15	NE	20A	B-268		21,410#						N/A	N/A	N/A	N/A	N/A	N/A
2-SRSH-15	SE	20A	B-268		21,410#						N/A	N/A	N/A	N/A	N/A	N/A
2-SRSH-15	NW	20A	B-268		21,410#						N/A	N/A	N/A	N/A	N/A	N/A
2-SRSH-15	SW	20A	B-268		21,410#						N/A	N/A	N/A	N/A	N/A	N/A
2-SRSH-2		64E	81-H		33,541#		14"	13-1/2"	9.5	0.5	9.0	3.0	8.75	2.75	8.0	3.25
2-SRSH-14*																
2-SRSH-3		63E	81-H		36,402#		11-1/2"	11"	9.5	0.5	8.75	3.75	8.75	3.0	4.75	3.50
2-SRSH-13*																
2-SRSH-4		62C	81-H		41,300#		9"	8-1/16" DN	9.5	0.5	5.0	1.0	8.75	3.0	7.0	2.00
2-SRSH-12*																
2-SRSH-5		57C	81-H		54,000#		5"	4-7/16" DN	9.5	0.5	B	7.5	B	5.0	7.5	6.00
2-SRSH-11*																
2-SRSH-8		47C	81-H		32,450#		4"	2-7/8" DN	8.5	1.5	6.0	2.5	7.0		7.0	2.00
2-SRSV-9		45C	81-H		27,700#		4"	2-5/8" DN	8.5	1.5	8.0	3.75	8.0	3.5	8.0	2.00
2-SRSH-6		44C	81-H		23,000#		4-1/2"	3-9/16" DN	9.0	1.0	B	6.0	10.5	4.25	10.0	4.25
2-SRSH-7		41C	80-V		24,201#		3"	2-1/2" DN	9.5	0.5	9.5	3.0	10.0	1.5	10.0	1.50
2-SRSH-10*																
* HBS																

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: *AEP MITCHELL*
LOCATION: *UNIT #2*
SYSTEM: *H.P. TURBINE EXHAUST*

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING HOT	DESIGN SETTING COLD	HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Mar-12
	Note #1						Note #2				Notes #3, 4 & 5					
2-TEH-7	E	52	81-H		25373#		7-1/2"	7" DN			6.0	2.0	6.75	T	9.25	T
2-TEH-7	W	52	81-H		25373#		7-1/2"	7" DN			5.0	T	6.75	T	7.25	T
2-TEH-13*	NE										N/A	N/A	N/A	N/A	N/A	N/A
2-TEH-13*	NW										N/A	N/A	N/A	N/A	N/A	N/A
2-TEH-13*	SE										N/A	N/A	N/A	N/A	N/A	N/A
2-TEH-13*	SW										N/A	N/A	N/A	N/A	N/A	N/A
2-TEH-1		22	98						40580#	35371#	40500#	35300#	40350#	32000#	40400#	35300#
2-TEH-2		42	81-H		19350#		4"	1-7/8" DN			6.5	3.25	7.0	3.0	5.5	2.50
2-TEH-3		20	98								23,800#	23800#	G = 3"	23500#	@H.S.	and cold
2-TEH-4											N/A	N/A	N/A	N/A	N/A	N/A
2-TEH-5		50	80-V		26864#		6"	5-3/8" DN			8.0	8.0	7.75	2.25	7.5	2.25
2-TEH-6		58	81-H		24115#		11-1/2"	10-3/4" DN			6.25	1.75	8.75	1.25	4.5	1.50
2-TEH-8*											OK	OK			N/A	N/A
2-TEH-9*											OK	HEX BOLT			N/A	N/A
2-TEH-10*											OK	OK			N/A	N/A
2-TEH-11*											OK	OK			N/A	N/A
2-TEH-12*											OK	OK			N/A	N/A
* HBS																

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: ***AEP MITCHELL***
LOCATION: ***UNIT #2***
SYSTEM: ***1ST REHEAT EXHAUST***

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W Note #1	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL. Note #2	DESIGN MVT.	DESIGN SETTING HOT	DESIGN SETTING COLD	HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Jan-12
											Notes #3, 4 & 5					
2-RSEH-1		19	98						21,229#	18,241#	G = 6-3/4"	G = 4-1/2"	G = 6-3/4"	4-1/2"	G = 4-1/2"	G = 4-1/2"
2-RSEH-2		20	B-268						23,339#	16,875#	G = 3-3/4"	G = 1-5/8"	G = 2-3/4"	G = 1-5/8"	G = 3"	G = 1-3/8"
2-RSEH-3		39	81-H		18,934#		3"	15/16" DN	7.0	4.0	8.75	4.0	8.25	3.75	9.0	5.00
2-RSEH-4											I	I	APPEARS TO BE RIGID			
2-RSEH-5		47	81-H		25,205#		5"	4"	9.0	1.0	B	6.75	B	4.0	8.25	6
2-RSEH-6		59	81-H		28,651#		10-1/2"	9-5/8" DN	9.5	0.5	10.0	4.0	10.0	3.5	9.75	3.5
2-RSEH-7		52	81-H		28,213#		7"	6-1/2" DN	9.5	0.5	8.5	2.0	9.0	2.75	7.0	2.50
2-RSEH-7		52	81-H		28,213#						7.0	1.0	8.0	.75	7.0	0.75
2-RSEH-8*											I	I	I	I	I	I
2-RSEH-9*											OK	OK	OK	OK	OK	OK
2-RSEH-10*											OK	OK		OK	OK	OK
2-RSEH-11*											OK	OK	L/HN		OK	OK
2-RSEH-12*											OK	OK	L/HN		OK	OK
2-RSEH-13*											N/A	N/A	N/A		OK	OK
2-RSEH-13											N/A	N/A	N/A		OK	OK
2-RSEH-13											N/A	N/A	N/A		OK	OK
2-RSEH-13											N/A	N/A	N/A		OK	OK
* HBS																

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: *AEP MITCHELL*
LOCATION: *UNIT #2*
SYSTEM: *BFW ECONOMIZER TO HEATER #8*

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION					DESIGN SETTING		FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	HOT	COLD	HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Mar-12
	Note #1						Note #2				Notes #3, 4 & 5					
2-FWH-1	N	22	B268						47850#	53050#	G = 3"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-1	S	22	B268						47850#	53050#	G = 3"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-2	N	22	B268						47850#	53050#	G = 3"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-2	S	22	B268						47850#	53050#	G = 3"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-3	N	22	B268						47850#	53050#	G = 3"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-3	S	22	B268						47850#	53050#	G = 3-1/2"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-4	N	22	B268						47850#	53050#	G = 3-1/2"	G = 3-1/2	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-4	S	22	B268						47850#	53050#	G = 3-1/2"	G = 3-1/2"	G = 3"	G = 3-1/2"	G = 3"	G = 3-1/2
2-FWH-5		STRUT												OK	OK	OK
2-FWH-6		STRUT												OK	OK	OK
2-FWH-7		19	B268						18400#	21840#	G = 3"	G = 2-7/8"	G = 3"	G = 3"	G = 2-3/8"	G = 3"
2-FWH-8		14	B268						3870#	4670#	3870#	G = 2-9/16"	3870#	G = 3"	G = 2-3/8"	G = 3"
2-FWH-8		14	B268						3870#	4670#	3870#	G = 2-9/16"	3870#	G = 3"	G = 2-3/8"	G = 3"
2-FWH-9		19	B268						16250#	19790#	G = 1-3/4"	G = 2-1/4"	G = 1-1/2"	G = 3"	G = 1-1/2"	G = 3"
2-FWH-10	N	17	98						11100#	12100#	11100#	12100#	11368#	12100#	G = 5-1/2"	12100#
2-FWH-10	S	17	98						11100#	12100#	11100#	12100#	11368#	12100#	G - 5-3/4"	12100#
2-FWH-11		17	98						11040#	12165#	11040#	12000#	11040#	12174#	12000#	12174#
2-FWH-12		18	B268						13250#	14913#	13250#	14913#	13310#	15010#	13,370#	14900#
2-FWH-13											OK		OK	OK	OK	OK
2-FWH-14		18	98						13700#	11572#	G = 5"	G = 3-5/8"	G = 4-3/8"	G = 3-1/2"	G = 4-3/8"	G = 3-5/8"
2-FWH-15		38C	80-V		11840#		4-1/2"	4" DN			6.0	3.0	5.5	3.75	6.0	3.50
2-FWH-16												T	2.5	T	2.5	T
2-FWH-17												.75	3.5	.5	3.875	0.75
2-FWH-18												.5	5.0	.375	5.375	0.50

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: ***AEP MITCHELL***
LOCATION: ***UNIT #2***
SYSTEM: ***FEEDWATER TO HEATER # 7***

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING		HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Mar-12
	Note #1						Note #2		HOT	COLD	Notes #3, 4, 5					
2-FWH-19	N	17C	82						9180#	9680#	G = 7/8"	G = 1"	G = 1/2"	g = 7/8"	G = 7/8"	G = 1"
2-FWH-19	S	17C							9180#	9680#	G = 7/16	G = 3/4"	G = 1"	g = 1"	G = 1"	G = 1"
2-FWH-20	E	16C	82						6780#	7155#	G = 3/4"	G = 3/4"	G = 1-1/4"	G = 3/4"	G = 1"	G = 3/4"
2-FWH-20	W	16C							6780#	7155#	G = 1/2"	G = 1/2"	G = 3/4"	G = 1/2"	G = 5/8"	G = 1/2"
2-FWH-21	E	14C	82						3733#	3833#	G = 1-1/2"	G = 1"	G = 1-1/2"	G = 1"	G = 1-1/2"	G = 1"
2-FWH-21	W	14C							3733#	3833#	G = 1/2"	G = 1/2"	G = 1"	G = 5/8"	G = 1"	G = 5/8"
2-FWH-22	E	RIGID											OK	OK	OK	OK
2-FWH-22	W	RIGID											M/LN	M/LN	M/LN	M/LN
2-FWH-23	E	RIGID											OK	OK	OK	OK
2-FWH-23	W	RIGID											OK	OK	OK	OK
2-FWH-24	E	RIGID											OK	OK	OK	OK
2-FWH-24	W	RIGID											OK	OK	OK	OK
2-FWH-25	E	14G	82						4085#	4085#	G = 1"	G = 1"	G = 1"	G = 1"	G = 1-1/8"	G = 1"
2-FWH-25	W	14G							4085#	4085#	G = 1"	G =1/2"	G = 1"	G = 1/2"	G = 1-1/2"	G = 1/2"
2-FWH-26	E	13G	82						3000#	2925#	G = 2"	G =1"	G = 1-1/4"	G = 1"	G = 1-1/4"	G = 1"
2-FWH-26	W	13G							3000#	2925#	G = 2-1/2"	G =1-1/2"	G = 1-1/4"	G = 1-1/2"	G = 2"	G = 1-1/2"
2-FWH-27	N	13G	82						3600#	3525#	G = 4"	G = 2"	G = 2-3/4"	G = 2"	G =2-3/4"	G = 2"
2-FWH-27	S	13G							3600#	3525#	G = 3"	G = 2"	G = 2-1/4"	G = 2"	G = 2-3/4"	G = 2"
2-FWH-28	N	14 G	82						4000#	3850#	G = 3"	G = 1"	G = 2"	G = 1	G = 2-3/8"	G = 1"
2-FWH-28	S	14G							4000#	3855#	G = 2-1/2"	G = 1-1/4"	G = 2-1/2"	G = 1-1/4	G = 2-3/4"	G = 1-1/4"
2-FWH-29	N	16G	82						7100#	6725#	G = 1"	G = 1"	G = 1-3/8"	G = 1"	G = 1-1/2"	G = 1"
2-FWH-29	S	16G							7100#	6725#	G = 1-1/2"	G = 1"	G = 1-3/8"	G = 1"	G = 3/4	G = 1"
2-FWH-30	N	16G	82						8780#	8405#	I	I	I	I	I	I
2-FWH-30	S								8780#	8405#	I	I	I	I	I	I
2-FWH-31	N															
2-FWH-31	S															

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: *AEP MITCHELL*
LOCATION: *UNIT #2*
SYSTEM: *BOILER FEED SUCTION*

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING		HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Mar-12
	Note #1						Note #2		HOT	COLD	Notes #3, 4 & 5					
2-CH-100		18D	B-268						16,300#	14,667#	I	I	I	I	I	I
2-CH-100		18D	B-268						16,300#	14,667#	I	I	I	I	I	I
2-CH-101		15D	TRIPLE						6,570#	5,246#	G = 14-1/2"	G = 7"	??	G = 6-1/4"	G = 12"	G = 6-1/2"
2-CH-102		15E	TRIPLE						5,422#	4,167#	G = 8"	G = 4"	G = 9"	G = 4-1/2"	G = 9"	G = 4-1/2"
2-CH-103		14D	98						4,331#	3,421#	4500#	4400#	4700#	4540#	4,700#	4650#
2-CH-104			RESTRAINT										L/HN		L/HN	L/HN
2-CH-105												M/HN	G = 9"		M/HN	M/HN
2-CH-106		15	98						5126#	4985#	5200#	G = 4"	G = 4-3/4"	G = 4-3/4"	G = 5"	G = 5"
2-CH-107		17	268						11599#	10474#	G = 4"	G = 2-1/2"	G = 4"	G = 3-1/4"	G = 4"	G = 3-1/2"
2-CH-108		17C	82						11,153#	9,903#	G = 1-3/4"	G = 1"	11,000#	10500"	11,000#	10,500#
2-CH-109			RESTRAINT								OK	OK	OK		OK	OK
2-CH-110	N		RESTRAINT								OK	OK	OK		OK	OK
2-CH-110	S														DAMAGED	REPAIRED

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: *AEP MITCHELL*
LOCATION: *UNIT #2*
SYSTEM: *FIRST REHEAT STEAM*

Page 1 of 1

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING		HOT Jan-09	COLD Apr-09	HOT Apr-10	COLD May-10	HOT Jan-12	COLD Jan-12
	Note #1						Note #2		HOT	COLD	Notes #3, 4 & 5					
2-FRSH-1	E	65	81-H		77,390#		7"	6-1/4" DN			7.0	2.5	8.0	2.0	6.5	2.0
2-FRSH-1	W	65	81-H		77,390#		7"	6-1/4" DN			8.0	2.0	8.0	2.0	8.0	2.0
2-FRSH-15	NE	18	B-268						9,960#		N/A	N/A	N/A	N/A	N/A	N/A
2-FRSH-15	SE	18	B-268						9,960#		N/A	N/A	N/A	N/A	N/A	N/A
2-FRSH-15	NW	18	B-268						9,960#		N/A	N/A	N/A	N/A	N/A	N/A
2-FRSH-15	SE	18	B-268						9,960#		N/A	N/A	N/A	N/A	N/A	N/A
2-FRSH-2		64	81-H		30,603#		15"	14-1/8" DN	9.5	1.0	8.75	*3.5*	8.25	2.75	8.5	3.0
2-FRSH14*															OK	OK
2-FRSH-3		65	81-H		39319#		13-1/2"	12-3/4"	9.5	0.5	9.5	5.25	9.75	4.5	7.0	4.5
2-FRSH-13*															OK	OK
2-FRSH-4	E								9.5	0.5	B	6.0	B	6.0	B	5.5
2-FRSH-4	W	54C	81-H		20,078#		11-1/2"	10-5/8"			B	6.0	B	6.0	B	5.5
2-FRSH-12*															OK	OK
2-FRSH-5		56C	81-H		38,566#		6-1/2"	6" DN	9.5	0.5	B	6.0	B	5.0	B	5.0
2-FRSH-11*															OK	OK
2-FRSH-7		49C	81-H		37,040#		4"	1-5/8"	BO	6.5	4.0	0.0	RECHECK	T	10.0	T
2-FRSH-6		40C	81-H		20,676#		3"	2-3/8"DN	9.5	1.5	8.0	7.0	9.0	2.25	7.0	1.75
2-FRSH-8		37C	80-V		16,294#		3"	2-1/4" DN	8.5	2.0	9.0	7.0	7.25	1.5	6.0	1.75
2-FRSH-10			H.S.68								N/A	N/A	N/A	N/A	N/A	N/A
2-FRSH-9		46C	80-V		29,298#		4"	2-1/2"	8.5	2.0	6.75	6.5	7.0	2.5	2.75	2.5
2-FRSH-16		SNUBBER			20,000#										1-1/4"	1/4"
* HBS																

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: ***AEP MITCHELL***
LOCATION: ***UNIT #2***
SYSTEM: ***SUPERHEATER ATTEMPERATOR***

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING		HOT	COLD Mar-12	HOT	COLD	HOT	COLD
	Note #1						Note #2		HOT	COLD	Notes #3, 4, 5					
H-1			CS									4.0				
H-2			CS									B				
H-3			VS									G = 2-3/4"				
H-4			VS									G = 2-1/4"				
H-5			VS									G = 5"				
H-6			VS									G = 8-1/2"				
H-7			RIGID ROD									N/A				
H-8			VS									I				
H-9			CS									8				
H-10			VS									G = 4-1/4"				
H 11			VS									G = 2"				
H-12			RIGID ROD									N/A				
H-12			RIGID ROD									N/A				
H-13			VS									G = 9/16"				
H-13			VS									G = 1-1/8""				
H -14			VS									G =2"				
H-14			VS									G = 2-3/4"				

PIPE SUPPORT INSPECTION RECORD SHEET

CUSTOMER: ***AEP MITCHELL***
LOCATION: ***UNIT # 2***
SYSTEM: ***REHEAT ATTEMPERATOR***

OST SERVICES

				DESIGN NAMEPLATE INFORMATION							FIELD OBSERVATIONS					
SUPPORT MARK NO.	N-S E-W	SUPPORT SIZE	MODEL NO.	SERIAL NO.	RATED LOAD	ADJ. LOAD	TOTAL TVL.	DESIGN MVT.	DESIGN SETTING		HOT	COLD Mar-12	HOT	COLD	HOT	COLD
	Note #1						Note #2		HOT	COLD	Notes #3, 4, 5					
PH-1			VS									IT				
PH-2			RIGID ROD									N/A				
PH-3			RIGID ROD									N/A				
PH-4			RIGID ROD									N/A				
PH-5			RIGID ROD									N/A				
PH-6			VS									G = 1-7/8"				

APPENDIX "C"

INSULATION REMOVAL DETAILS

OST PROCEDURE OST-EP-103 REV. 0

OST PROCEDURE

OST-EP-103 Rev. 0

INSULATION REMOVAL DETAILS

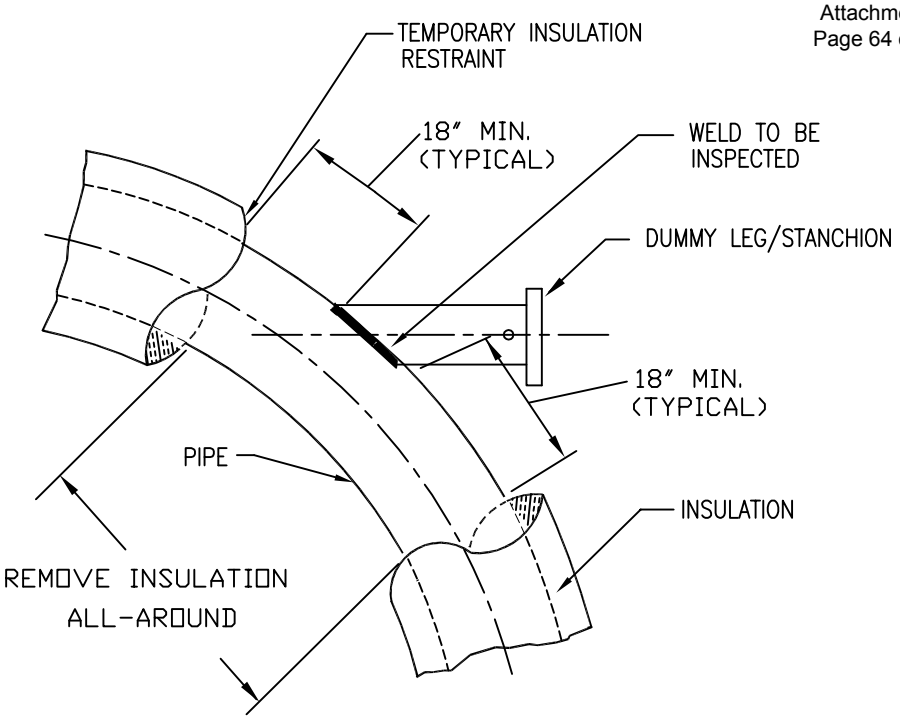
FOR INSPECTION

OF PIPING AND

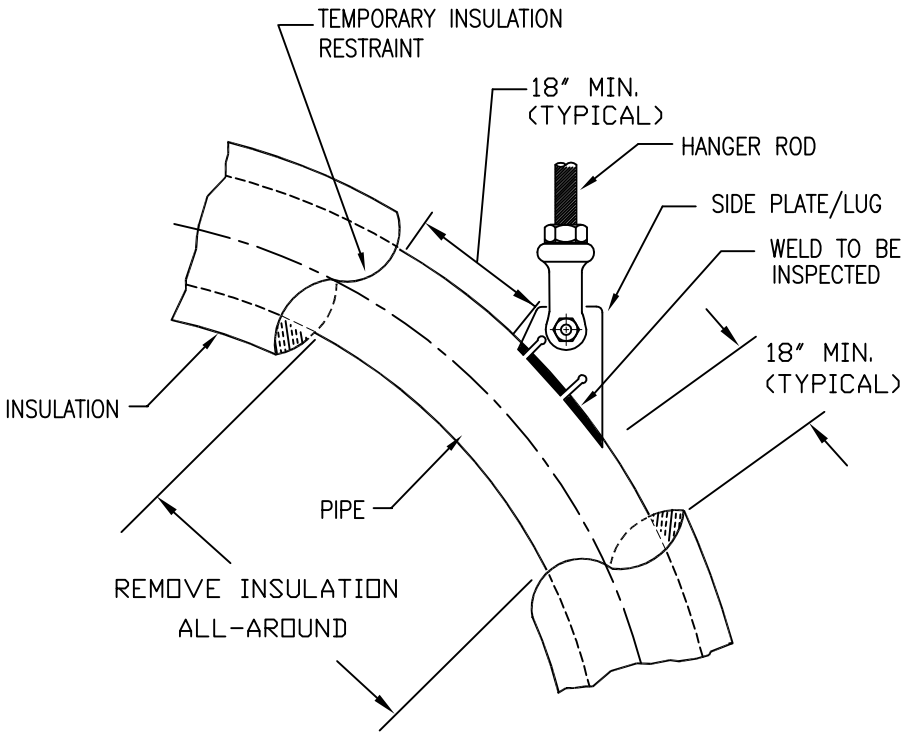
WELDED PIPE ATTACHMENTS

10-1-10

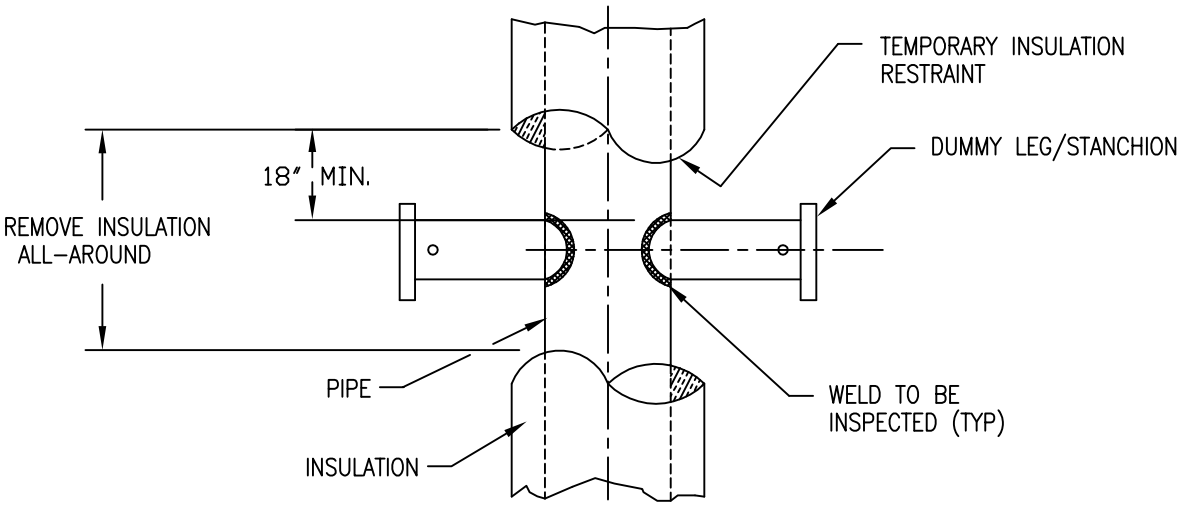
OCEAN STATE TECHNICAL SERVICES
55 Chapman Street ■ Providence, Rhode Island 02905 ■ (401) 467-8661 ■ Fax (401) 467-8662 ■ www.ostservices.com



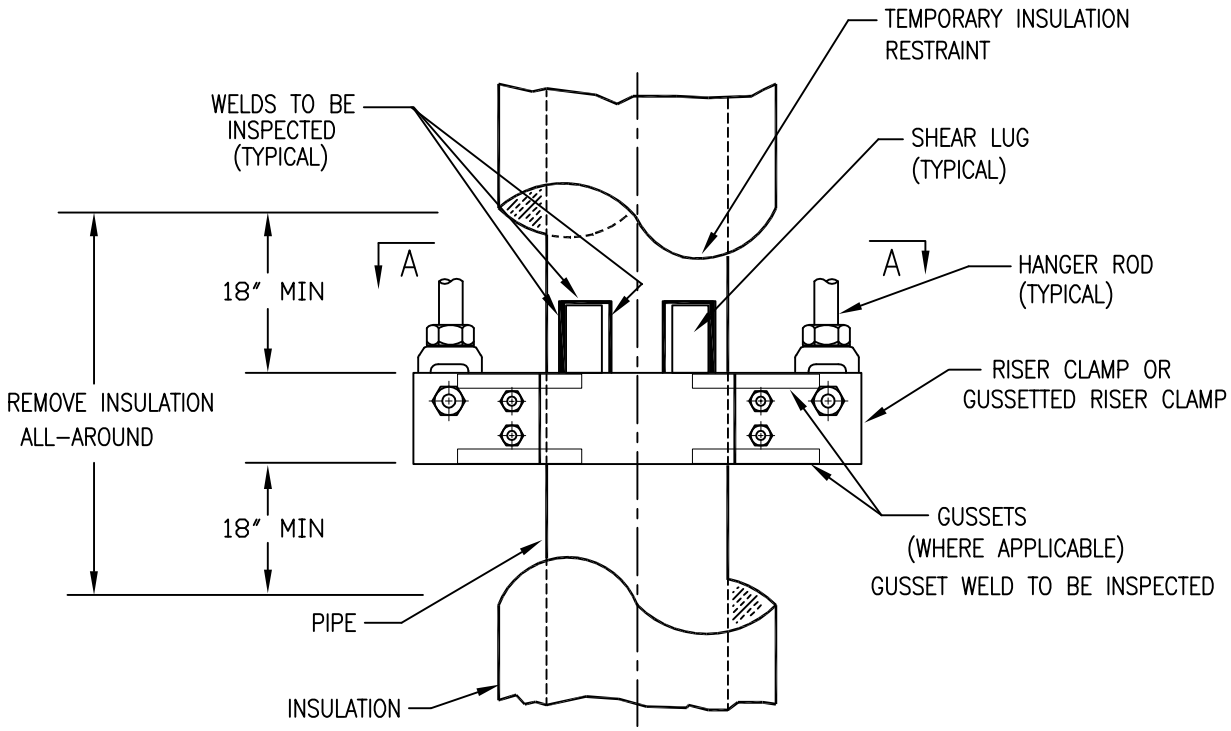
Stanchion Type Attachment on Elbow

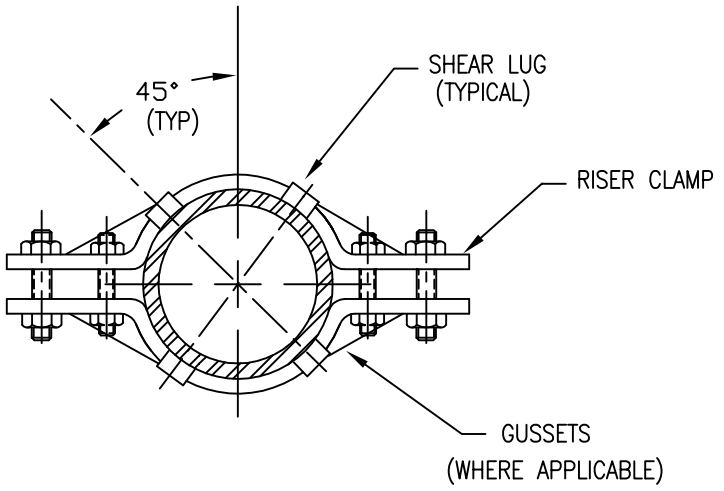


Side Plate / Lug Type Attachment on Elbow



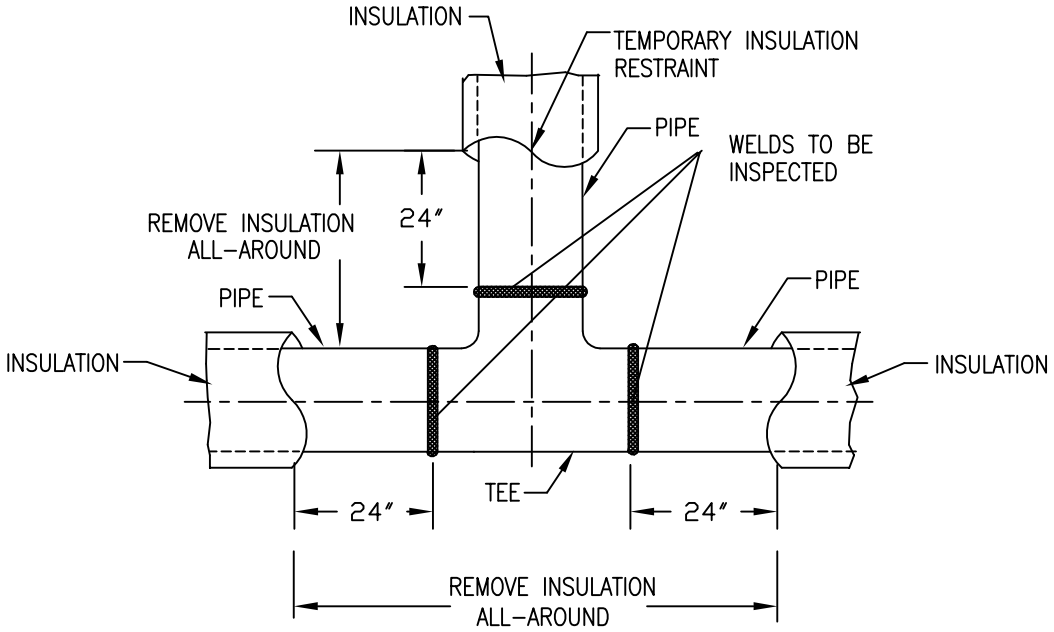
Lug Type Attachment on Stanchion



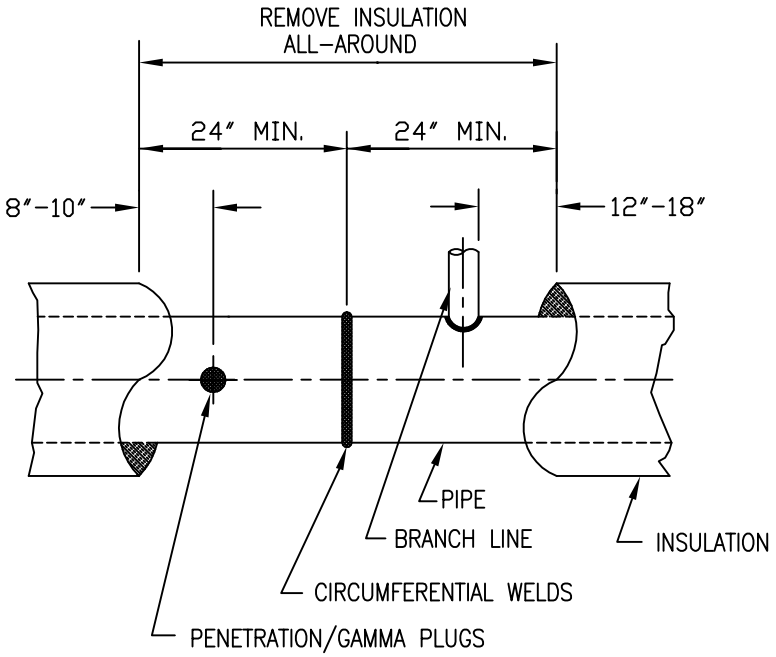


SECTION A–A

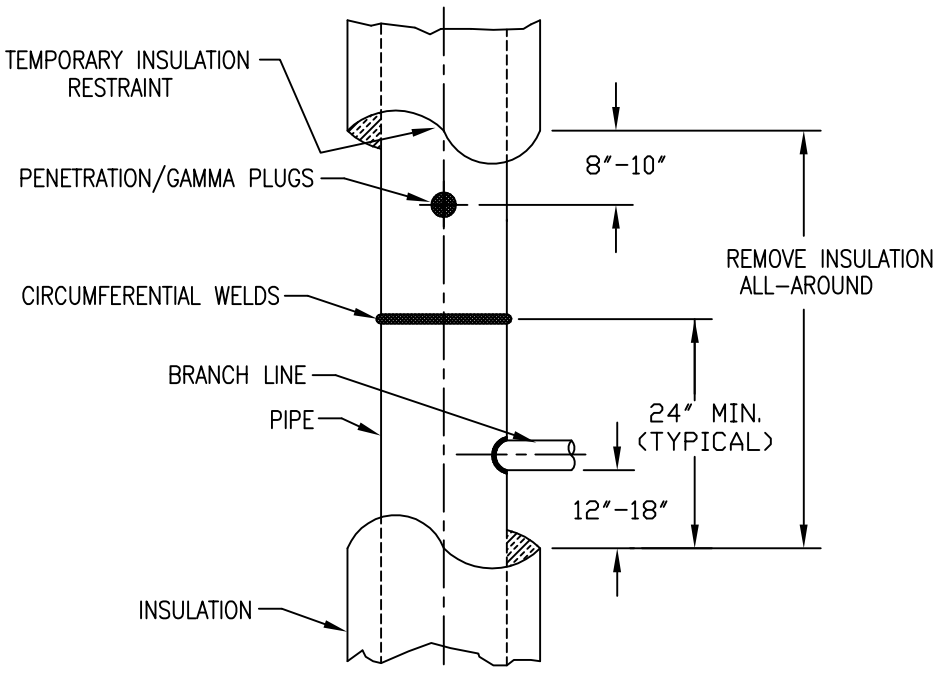
Shear Lug Type Attachment
Gussetted Riser Clamp


INSULATION
TEMPORARY INSULATION RESTRAINT
PIPE
WELDS TO BE INSPECTED
REMOVE INSULATION ALL-AROUND
24″
PIPE
PIPE
INSULATION
INSULATION
TEE
24″
24″
REMOVE INSULATION ALL-AROUND

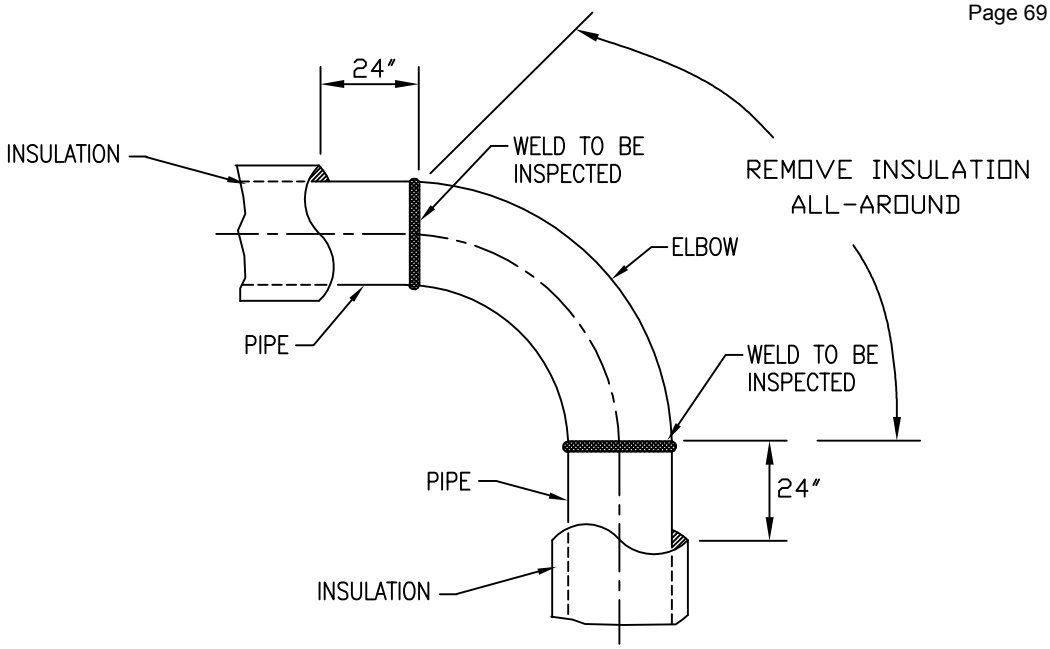
Typical Tee



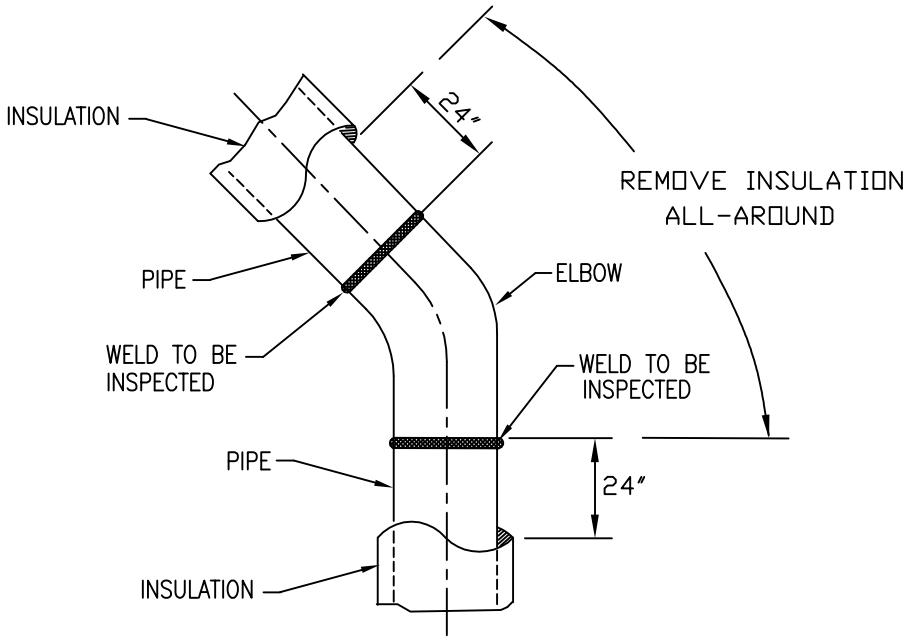
Horizontal Pipe Welds



Vertical (Riser) Pipe Welds



90° Elbow Horizontal or Vertical



45° Elbow Horizontal or Vertical