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CLERK OF THE BOARD
OF COUNTY COMMISSIONERS
MIAMI-DADE COUNTY, FLORIDA

MEMORANDUM

Agenda Item No. 8(F)(2)

TO: Honorable Chairwoman Rebeca Sosa
and Members, Board of County Commissioners

DATE: October 22, 2013

FROM: R. A. Cuevas, Jr.
County Attorney

SUBJECT: Resolution approving the Partial Settlement Agreement between Miami-Dade County, the Performing Arts Center Trust and PAC Builders Joint Venture for repair to the rain water leader system for the Adrienne Arsht Center
Resolution No. R-849-13

The accompanying resolution was prepared by the Internal Services Department and placed on the agenda at the request of the County Attorney's Office.

R. A. Cuevas, Jr.
County Attorney

RAC/lmp

Memorandum

MIAMI-DADE COUNTY

Date: October 22, 2013

To: Honorable Chairwoman Rebeca Sosa
and Members, Board of County Commissioners

From: Carlos A. Gimenez
Mayor

R.A. Cuevas, Jr.
County Attorney for

Subject: Resolution Approving Partial Settlement with the Performing Arts Center Trust and PAC Builders for Repairs to the Rain Water Leader System at the Adrienne Arsht Center for the Performing Arts of Miami-Dade County

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RECOMMENDATION

It is recommended that the Board of County Commissioners (Board) authorize the attached Resolution authorizing the County Mayor to execute and enforce the attached Partial Settlement Agreement between Miami-Dade County, the Performing Arts Center Trust (PACT), and Performing Arts Center Builders, Joint Venture (PAC Builders). Pursuant to this Agreement, PAC Builders will install, at its own cost, additional sway bracing, pipe bracing, and riser clamps to the rain water disposal system throughout the facility. Additionally, pursuant to a determination to be made through a binding review by a neutral Arbitrator/Engineer, PAC Builders would install, at its own cost, joint restraints on that rain water disposal system.

SCOPE

While the facility is located within District 3, represented by Commissioner Audrey M. Edmonson, the Adrienne Arsht Center for the Performing Arts has countywide impact.

FISCAL IMPACT

PAC Builders will be responsible for the construction costs associated with this partial settlement agreement. However, the County and PAC Builders have agreed to share the cost of a neutral third-party Engineer/Arbitrator to provide a binding opinion on repair items that were identified by Slider in their forensic engineering report but are being disputed by PAC Builders. The Parties shall mutually agree on a not-to-exceed cost for the Engineer/Arbitrator.

TRACK RECORD/MONITOR

Asael Marrero, Manager, Design and Construction Services Division, Internal Services Department (ISD), will monitor the ongoing work performed at the Adrienne Arsht Center.

DELEGATION OF AUTHORITY

Delegates authority to the County Mayor to enter into an agreement with PAC Builders to engage a neutral third-party Engineer/Arbitrator.

BACKGROUND

Settlement Agreement

In a report to the Board dated June 20, 2012, details were provided as to the considerable damage caused by the failure of a storm drain pipe at the Adrienne Arsht Center. On July 17, 2012, the Board authorized the allocation of up to $5,000,000 for the assessment, demolition, repair, and reconstruction of the Arsht Center in response to the water damage to the facility on May 20, 2012. To date, $4,412,000 of those funds have been expended, and $535,000.00 has been reimbursed to the PACT by the Business Income Insurance policy with Chubb Group Insurance Companies.

Slider was engaged by the County to provide a detailed analysis and forensic engineering report identifying the cause of the failure of the rainwater drainage system at the Adrienne Arsht Center. In this report, Slider reviewed all aspects of the systems and provided recommendations as to necessary repairs throughout the facilities. A copy of the Slider report was forwarded to the Board on February 13, 2013, and is attached hereto for reference. Slider recommended that additional pipe bracing, sway bracing, and joint restraints be installed throughout the Adrienne Arsht Center in order to strengthen the rainwater drainage system and to minimize the risk of future incidents.

The additional recommended repairs extend to both facilities, the Ziff Ballet Opera House and the Knight Center Concert Hall. The report notes a continuing risk of similar future failure by the entire storm water drainage systems in both buildings. The most vulnerable and critical areas were identified, and bracing and shoring have been provided as a temporary measure.

PAC Builders, serving as the Agency Construction Manager for the County during the construction of the Arsht Center, was ultimately responsible for the proper installation of the storm water drainage system.

Slider, in conjunction with the County, Adrienne Arsht Center, and PAC Builders has completed a detailed on-site assessment identifying required repairs at both facilities. PAC Builders is not in agreement as to the extent of the overall repairs identified in the Slider report; specifically, PAC Builders does not believe that the majority of joint restraints identified by Slider are necessary for the system to function. PAC Builders additionally argues that the joint restraints Slider is recommending are not required by either the original contract or the South Florida Building Code, the building code in effect during construction. After months of negotiation and review between the PAC Builders, ISD staff, the Mayor's Office and the County Attorney's office, an agreement as to the scope of work to be performed by PAC Builders has been reached.

PAC Builders, in this Partial Settlement, has agreed, at its own cost and expense, to install sway bracing, pipe hangers, vertical support/riser clamps, and the replacement of old couplings as identified by Slider. Joint restraints will be addressed by a mutually agreeable neutral third party Engineer/Arbitrator, who will render a binding opinion as to the whether the disputed joint restraints were required by the contract, the South Florida Building Code, or other industry standards. To the extent the Engineer/Arbitrator determines that some or all of these joint restraints were required, PAC Builders will be responsible for installing these

joint restraints at its own cost and expense. To the extent that the Engineer/Arbitrator determines that such work was not required, that determination would preclude the County from bringing an action against PAC Builders for the costs of such work, to the extent that the County, at its own cost, later had such performed. The decision would not, however, preclude the County from having this work performed by another contractor.

PAC Builders has substantial knowledge of the Arsht Center, and thus a better ability than another contractor to target repairs in such a way as to minimize impacts to the balance of the facility. This is especially critical as the Arsht Center will be in operation while repair work is being performed. With respect to any work performed, PAC Builders will provide a payment and performance bond and insurance.

The hiring of the neutral third-party Engineer/Arbitrator to resolve the issues disputed by PAC Builders is a good avenue for the County to quickly identify items that will ultimately be either the responsibility of the County or PACT, versus the responsibility of PAC Builders. This will avoid lengthy, costly litigation, will provide additional information from a third-party to further verify the Slider report, and will allow the work to proceed expeditiously. Without the partial settlement agreement, the County would likely proceed with having a contractor perform the work recommended by the Slider report, followed by, what is likely to be substantial costs, associated with litigation with PAC Builders, including a lengthy trial, numerous experts, etc. to recover the costs of the repairs that remain in dispute.

Moreover, at trial, PAC Builders may have certain legal defenses which it has agreed to waive in the recommended agreement; this agreement therefore provides a faster, more efficient, and cost effective way of completing the necessary repairs.

This Agreement does not resolve disputes related to the costs incurred to date to repair the initial water damage. The County continues to negotiate with PAC Builders as to this amount, and intends, if a resolution of that claim is not swiftly reached, to instruct the County Attorney's Office to file an action seeking recovery of these costs. Nothing in this agreement would prevent such lawsuit, and recovery of these costs will continue to be pursued.

Recent Events - Main Water Supply and Fire Sprinkler System

On September 18, 2013, a two-inch water supply line failed, causing additional water damage to the Knight Concert Hall. Staff was able to limit the damage to the facility by taking immediate action to contain the leak. However, further investigation is necessary in order to determine if this is an isolated incident, or, indicative of a system-wide problem. Additionally, it was discovered that some of the fire sprinkler heads and caps in the audience chamber of each of the two halls may not have been installed properly, thus requiring further investigation and potential repairs. While we are making the Board aware of these recent issues, it is too early to gauge whether further facility-wide remediation work will be necessary.

Lisa M. Martinez, Senior Advisor
Office of the Mayor

MEMORANDUM
(Revised)

TO: Honorable Chairwoman Rebeca Sosa
and Members, Board of County Commissioners

DATE: October 22, 2013

FROM: R. A. Cuevas, Jr.
County Attorney

SUBJECT: Agenda Item No. 8(F)(2)

Please note any items checked.

_____ **"3-Day Rule" for committees applicable if raised**

_____ **6 weeks required between first reading and public hearing**

_____ **4 weeks notification to municipal officials required prior to public hearing**

_____ **Decreases revenues or increases expenditures without balancing budget**

_____ **Budget required**

_____ **Statement of fiscal impact required**

_____ **Ordinance creating a new board requires detailed County Mayor's report for public hearing**

__✓__ **No committee review**

_____ **Applicable legislation requires more than a majority vote (i.e., 2/3's ____, 3/5's ____, unanimous _____) to approve**

_____ **Current information regarding funding source, index code and available balance, and available capacity (if debt is contemplated) required**

Approved _____ Mayor
Veto _____
Override _____

Agenda Item No. 8(F)(2)
10-22-13

RESOLUTION NO. R-849-13

RESOLUTION APPROVING THE PARTIAL SETTLEMENT AGREEMENT BETWEEN MIAMI-DADE COUNTY, THE PERFORMING ARTS CENTER TRUST AND PAC BUILDERS JOINT VENTURE FOR REPAIRS TO THE RAIN WATER LEADER SYSTEM FOR THE ADRIENNE ARSHT CENTER AND AUTHORIZING THE COUNTY MAYOR OR COUNTY MAYOR'S DESIGNEE TO EXERCISE ANY AND ALL OTHER RIGHTS CONFERRED THEREIN

WHEREAS, this Board desires to accomplish the purposes outlined in the accompanying memorandum, copy of which is incorporated herein by reference,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that this Board hereby approves the Partial Settlement Agreement between Miami-Dade County, the Performing Arts Center Trust, and PAC Builders, J.V. related to certain repairs at the Adrienne Arsht Center and authorizes the Mayor to exercise any and all other rights conferred therein.

The foregoing resolution was offered by Commissioner **José "Pepe" Diaz**, who moved its adoption. The motion was seconded by Commissioner **Audrey Edmonson** and upon being put to a vote, the vote was as follows:

Rebeca Sosa, Chairwoman	**aye**		
Lynda Bell, Vice Chair	**aye**		
Bruno A. Barreiro	**aye**	Esteban L. Bovo, Jr.	**aye**
Jose "Pepe" Diaz	**aye**	Audrey M. Edmonson	**aye**
Sally A. Heyman	**aye**	Barbara J. Jordan	**aye**
Jean Monestime	**absent**	Dennis C. Moss	**aye**
Sen. Javier D. Souto	**aye**	Xavier L. Suarez	**absent**
Juan C. Zapata	**aye**		

The Chairperson thereupon declared the resolution duly passed and adopted this 22nd day of October, 2013. This resolution shall become effective ten (10) days after the date of its adoption unless vetoed by the Mayor, and if vetoed, shall become effective only upon an override by this Board.

MIAMI-DADE COUNTY, FLORIDA
BY ITS BOARD OF
COUNTY COMMISSIONERS

HARVEY RUVIN, CLERK

By: ***Christopher Agrippa***
Deputy Clerk

Approved by County Attorney as
to form and legal sufficiency. APW / Dmm

David M. Murray

Memorandum

MIAMI-DADE COUNTY

Date: February 13, 2013

To: Honorable Chairwoman Rebeca Sosa
and Members, Board of County Commissioners

From: Carlos A. Gimenez
Mayor

Subject: February Status Update: Failure Analysis and Forensic Engineering Report of the Adrienne Arsht Center for the Performing Arts (Arsht Center) of Miami-Dade County

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On July 17, 2012, the Board authorized the expenditure of up to $5 million for the assessment, demolition, repair, and reconstruction of the Arsht Center to address the water damage to the facility that occurred on May 20, 2012. The Board also authorized the engagement of a forensic engineer to review and report on the cause of the damage.

The plan of action has been to fully restore the Arsht Center, identify what caused the failure of the roof rainwater drainage system, develop and implement a plan that would avoid a similar event in the future and pursue and secure restitution for the expenses incurred to accomplish this work.

To date, we have incurred approximately $4.3 million for the initial repairs. We have been able to secure a reimbursement commitment from the insurance provider for approximately $535,000. It is important to note that these initial repairs were made in time for the Arsht Center to open its 2012-2013 season on schedule.

Slider Engineering Group Inc. (the forensic engineer) has provided a detailed failure analysis and forensic engineering report identifying the cause of the failure of the roof rainwater drainage system. The assessment reviewed all aspects of this system. In this report, Slider also provided recommendations as to other necessary repairs throughout the facility. That report is attached for your review.

Our goal remains to secure the reimbursement of all costs incurred to date on these repairs, to perform the necessary remaining corrective actions to the entire facility, and to pursue all necessary avenues to recover these additional costs.

To this end, we have met and discussed the findings of the forensic engineer's report with Performing Arts Center Builders, J.V. (PAC Builders), a joint venture formed by Odebrecht Construction, Inc., The Haskell Company, and Ellis Don Construction, Inc., who were the builders of the Arsht Center. We also met with The Poole and Kent Company and Fred McGilvray, Inc., the subcontractors hired by PAC Builders to install the roof rainwater drainage system. While we have not achieved resolution of these issues yet, we will continue to take any necessary actions to protect our interests.

Should you need any additional information, please contact Lisa M. Martinez, Senior Advisor, at 305-375-2911.

Attachment

c: R.A. Cuevas, Jr., County Attorney
Edward Marquez, Deputy Mayor, Office of the Mayor
Lisa M. Martinez, Senior Advisor, Office of the Mayor
M. John Richard, President & CEO, Adrienne Arsht Center for the Performing Arts
Michael Spring, Director, Department of Cultural Affairs
Jennifer Moon, Director, Office of Management and Budget
Lester Sola, Director, Internal Services Department

SliderEngineeringgroup

Adrienne Arsht Center for the Performing Arts of Miami-Dade County

PN 112046

February 7, 2013

Storm Water System Failure Engineering Evaluation

SliderEngineeringgroup, Inc.
Consulting Engineers
West Palm Beach Miami Sarasota Tampa Clearwater

2301 Centrepark West Drive, Suite 175
West Palm Beach, Florida 33409
Phone: (561) 684-8813
Fax: (561) 689-4456

www.sliderengineering.com

License No. 9681

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Adrienne Arsht Center for the Performing Arts of Miami-Dade County
Miami, Florida

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EVALUATION REPORT

Storm Water System Failure Engineering Evaluation
Adrienne Arsht Center for the Performing Arts of Miami-Dade County
1300 N. Biscayne Blvd.
Miami, Florida

February 7, 2013

SEG Project No. 112046

Prepared for:
Miami- Dade County
Miami, Florida 33128

1.0 EXECUTIVE SUMMARY

On May 20, 2012 a 12" primary roof drain pipe, hereafter referred to as a rain water leader (RWL), in the Ziff Ballet Opera House (ZBOH) failed during a rainfall event causing considerable damage to the facility. Slider Engineering Group, Inc. (SEG) was contracted by Miami-Dade County to investigate the cause of this failure. SEG's evaluation of the storm water drainage system at the ZBOH resulted in the opinion that multiple defects in the installation of the storm water drainage system caused the referenced failure. The installation deficiencies indentified were deviations from the requirements of the applicable building code, contract documents, industry standards, and manufacturer's installation instructions.

2.0 INTRODUCTION

2.1 Purpose

The evaluation was requested by Miami-Dade County. The purpose of the evaluation was to provide an opinion regarding the reported failure in the storm water system at the Adrienne Arsht Center for the Performing Arts of Miami-Dade County (PAC). The comments and conclusions presented are the professional opinion of Slider Engineering Group, Inc.

2.2 Evaluation Background

The evaluation and investigative effort were directed by Harold Sturm, P.E., an Architectural Engineer with SEG. The evaluation included interviews of PAC Management personnel; a review of project related documentation provided by PAC Management including: photographs, construction drawings and contract documents; a review of the applicable Building Code and relevant technical standards; and by visual observations and limited testing of the storm water system components. A list of the primary relevant documents reviewed to date for the purposes of this evaluation is included in Appendix "A". Observations were made of piping system components including areas where components were concealed by interior drywall, insulation and interior finishes, and piping insulation. A list of the primary SEG staff who participaed in the generation of this report is presented in Appendix "B".

The conclusions presented here are the professional opinions of Slider Engineering Group and are based on a reasonable degree of engineering certainty.

2.3 Construction Documents- to Date

Drawings obtained from the contract document records of PAC Management include record drawings titled, *Performing Arts Center of Greater Miami, Ballet/Opera House 1300 Biscayne Blvd. Miami Florida*. The record set was dated December 4, 2006.

Sheet B-LS 1.00 lists the design code for the project as the South Florida Building Code (SFBC) 1994 Dade County Ed. with Supplement No. 5 dated January 1998.
The Project Manual, containing applicable project specifications, was issued for construction on October 24, 2001 and lists Cesar Pelli & Associates Inc. as the Architect and Fraga Engineers as the Plumbing and Fire Protection Engineering Consultant; Cosenti Associates, MEP Engineering;

2.4 Applicable Building Code

The public records of the City of Miami Building Department reflect that building master permit #

015022470 for the PAC was applied for on March 15, 1999 and issued on November 2, 2001. Based on the application date of the construction permit, the South Florida Building Code (SFBC) 1994 Dade County Ed. with Supplement No. 5 dated January 1998 as referenced on sheet B-LS 1.00 was the applicable Building Code.

2.5 Contractor and Mechanical Subs

Pool & Kent Company of Florida, Mechanical Contractor
Fred McGilvery Inc, Mechanical Subcontractor.

2.6 Project Description

The PAC includes two buildings: The Ziff Ballet Opera House (ZBOH) and the Knight Concert Hall (KCH). The buildings are respectively located on the west and east side of Biscayne Blvd (see Figure 1- Site Aerial).

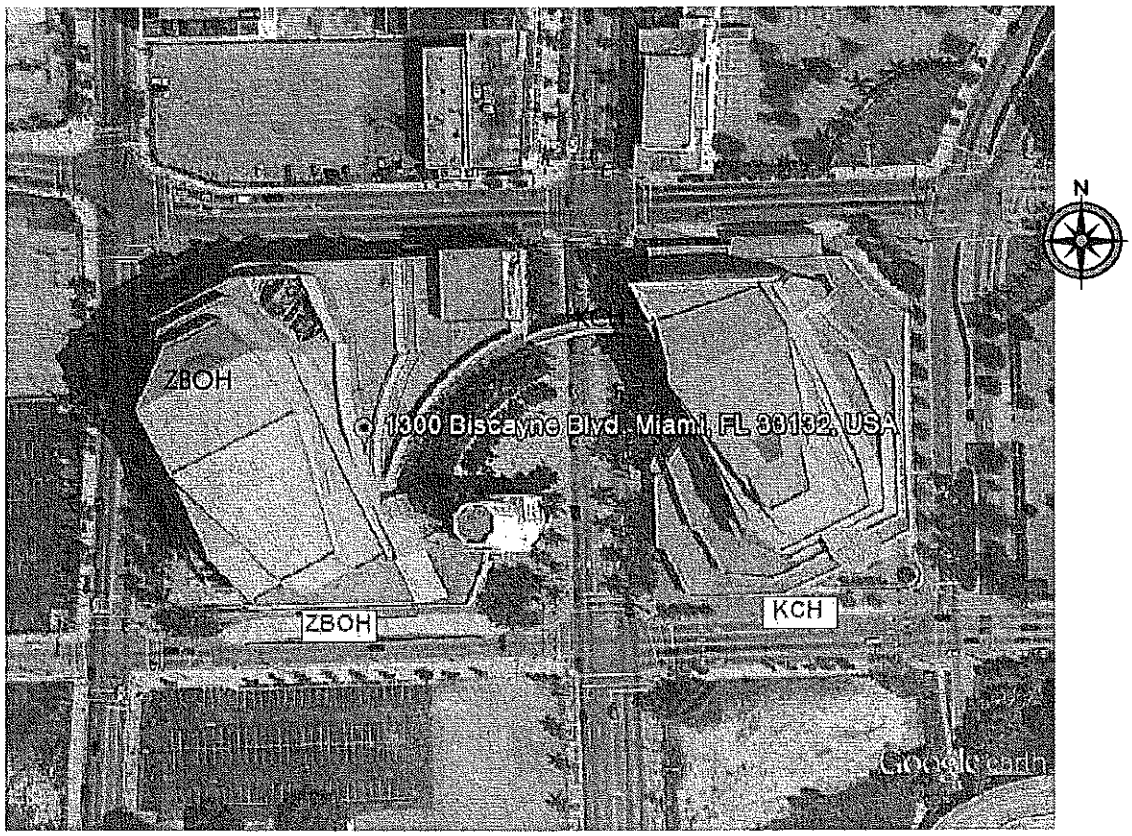


Figure 1: Site Aerial

Both buildings incorporate a primary rainwater drainage system that utilizes roof drains, RWL, and piping to conduct rain water from roof drainage areas to in-ground drainage wells surrounding the buildings at street level. No-hub (aka Hubless) cast iron soil pipe and fittings were used to construct the primary drainage systems. No-hub piping systems are assembled using a coupling comprised of an elastomeric sleeve secured by means of multiple metal bands to both connect and seal the pipe-to-pipe connections, and the pipe-to-fitting connections (see Photo 1). Each building is also equipped with a separate emergency overflow drainage piping system in the event that the primary system becomes overburdened or blocked. The emergency systems were constructed using PVC piping and fittings.

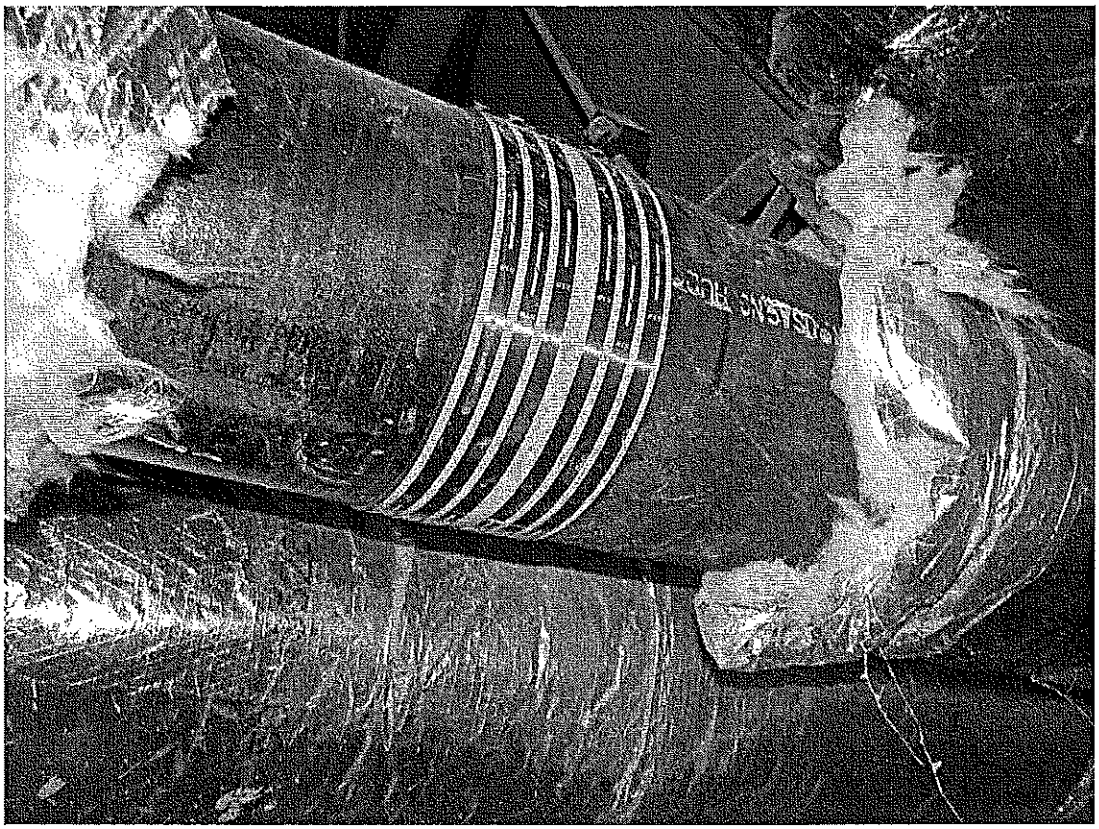


Photo 1: Typical Hubless Coupling with Stainless Steel Bands Securing an Elastomeric Sleeve

2.7 Storm Water Drainage System Point of Failure

On May 20, 2012, a 12" diameter RWL above the east restroom ceiling on the 4th Tier of the ZBOH failed during a rain event. The point of failure was a no-hub coupling used to connect a 90 degree elbow fitting at a transition from a vertical (down flow) pipe to a horizontal pipe. The fitting reportedly became disengaged from the coupling during the rain storm leading to separation of the piping assembly at the joint (see Photo 2) causing storm water to flood the facility. Photo 3 is the point of failure, post temporary repair.

This failure of the storm water drainage system resulted in considerable damage to the interior finishes of the ZBOH building (See Appendix "C" for damage summary). Because the point of failure was located above the 4th tier of the ZBOH, the areas of water damage extended to the 4th tier, 3rd Tier, 2nd tier, Ballet Box Tier, Intermediate Level and Orchestra Level (see Photos 4 thru 7).

Photo 2: Point of Failure Showing Elbow Detached from Vertical Rainwater Leader

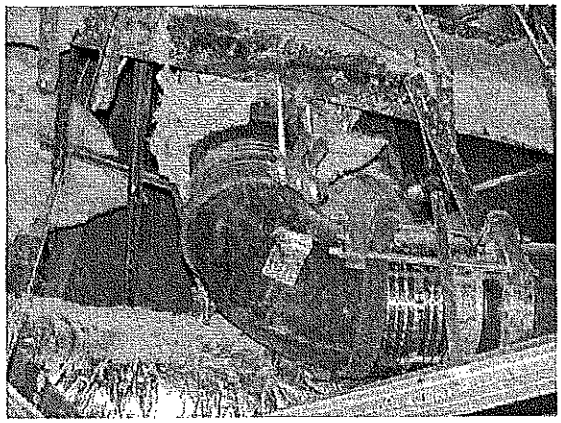


Photo 3: Post Failure Temporary Repairs at Point of Failure Illustrating New Code Compliant Joint Restraints and Couplings (Noted by Arrows

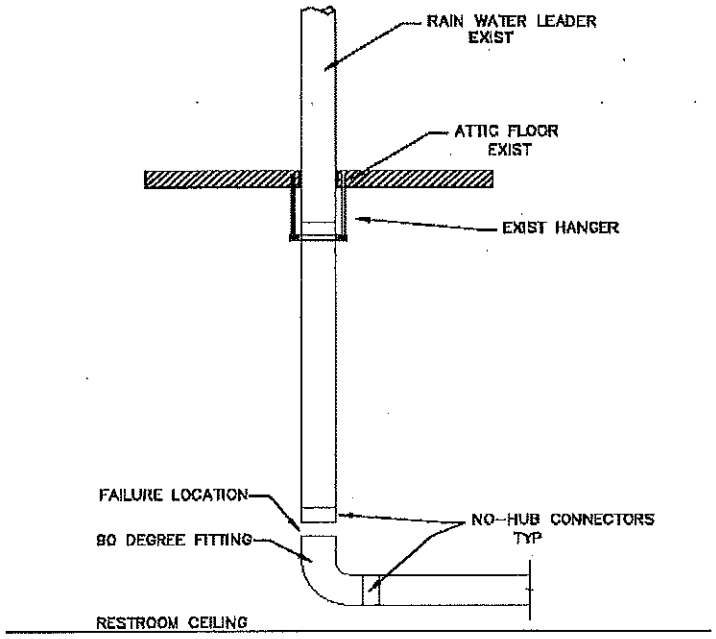


Figure 2: Failure location

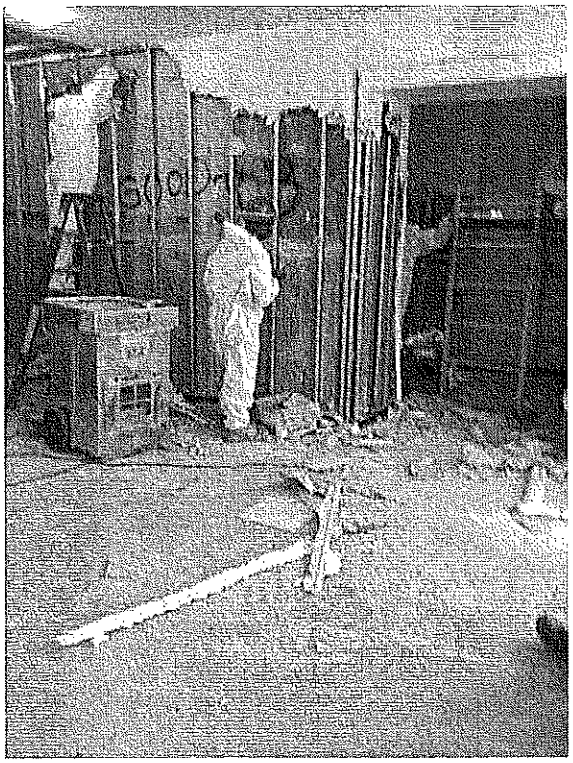


Photo 4: Damage to Interior Finishes

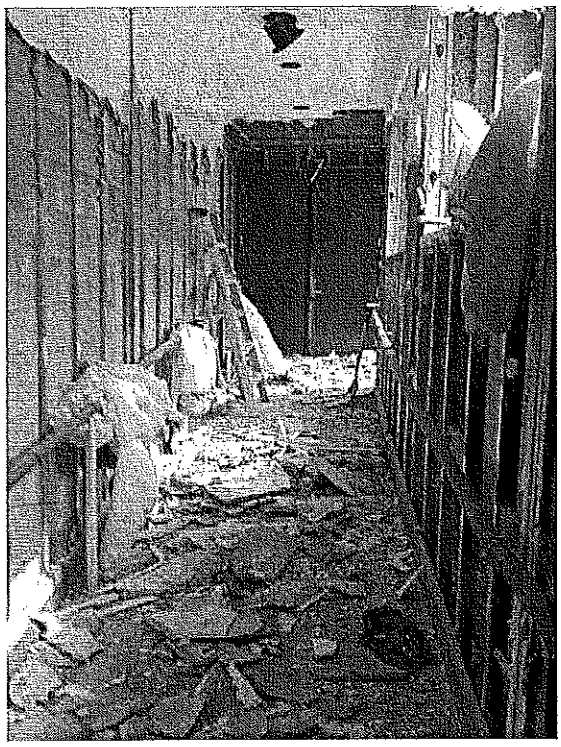


Photo 5: Damage to Interior Finishes

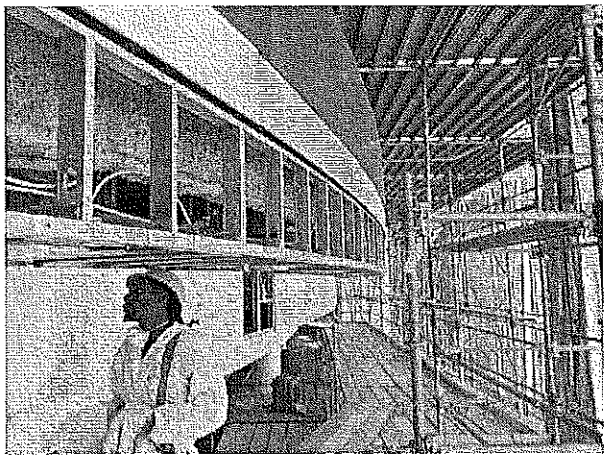


Photo 6: Damage to Interior Finishes

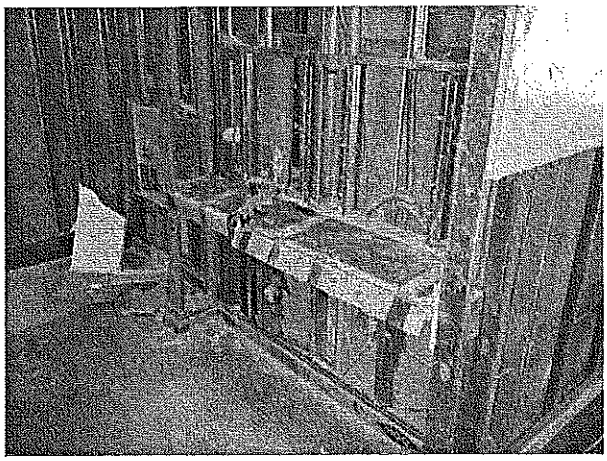


Photo 7: Damage to Interior Finishes

2.8 Temporary Repairs at Point of Failure

It was reported that PAC Management directed the temporary repairs of the area on the night of the incident. These repairs included re-assembling the failed pipe joint with a new no-hub coupling, the installation of temporary joint reinforcement at both ends of the elbow fitting, and the installation of a new pipe support hanger (see Photo 3).

3.0 FINDINGS

3.1 Joint Reinforcement not Installed

When water is flowing down the pipe and changes direction due to a fitting or branch opening, the water imposes a force on the fitting in the direction of the water flow. This force acts to separate the fitting from the connection. Joint reinforcement acts to prevent this force from separating the joint (as occurred in the ZBOH failure). Additionally, the manufacturer of the no-hub fitting, ANACO, specifies in their installation instructions to follow the joint bracing requirements of CISPI.

Section 1.04 of Project Specification 15011: Plumbing General Provisions specifies that,

> *"All work shall comply with guidelines set in the latest edition of following applicable standards and codes: ...Cast Iron Soil Pipe Institute..."*

The Cast Iron Soil Pipe Institute (CISPI) was organized in 1949 by the leading American manufacturers of cast iron soil pipe and fittings. The Institute is dedicated to aiding and improving the plumbing industry, establishing minimum manufacturing standards and installation guidelines and procedures. CISPI industry specification 301 governs the design and manufacture of cast iron pipe systems. CISPI 310 sets forth installation guidelines and procedures applicable to installation of pipe. For large diameter pipe, CISPI 310 states that:

> *"Horizontal pipe and fittings five inches and larger must be suitably braced....at every branch opening or change of direction.....to prevent movement or joint separation."*

Similarly, this requirement for joint restraint is mandated by the SFBC and the AANACO no-hub coupling installation instructions. (Appendix "D")

Suitable bracing at joint locations, as required by CISPI, is achieved through the installation of a bolted-on joint reinforcement bracket. Figure 3 illustrates typical joint reinforcement as recommended by CISPI.

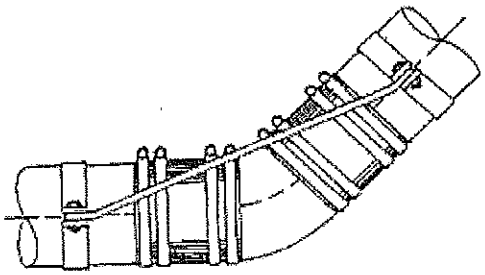


Figure 3: Typical Joint Reinforcement for Large Diameter Pipe (CISPI)

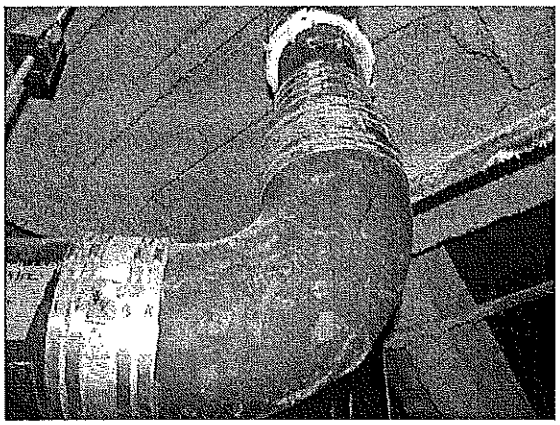


Photo 8: 90 degree Fitting missing Joint Reinforcement

During our review it was observed that no joint reinforcement was installed throughout the storm water drainage system. Photo 8 is a typical example of a 90 degree pipe fitting connected with no-hub couplings, but is lacking the joint reinforcement specified in the contract documents.

It is my professional opinion that the original pipe installer's failure to install joint reinforcement on both ends of the subject elbow was the primary cause of the failure.

3.2 Sway Bracing not Installed

When water moves through a storm water pipe system, it exerts forces on the pipe that cause movement (sway) which results in misalignment between pipe sections and fittings. This misalignment imposes stress on the couplings leading to failure. Sway braces restrict this movement, thereby protecting the connections. If these anticipated forces are not adequately restrained, coupling failure (separation) can result, as it did in the subject failure.

Section 4609.3 (b) of the SFBC 1994 states that:

> *"Suspended lines shall be suitably braced to prevent horizontal movement."*

Also, the installation procedures outlined in the CISPI 310 further explains,

> *"Where components are suspended in excess of 18 inches by means of non-rigid hangers they should be suitably braced against horizontal movement, often called sway bracing."*

Additionally, the ANACO coupling installation instructions (Appendix "D") state that,

> *"Horizontal pipe and fittings five inches and larger must be suitably braced to prevent horizontal movement."*

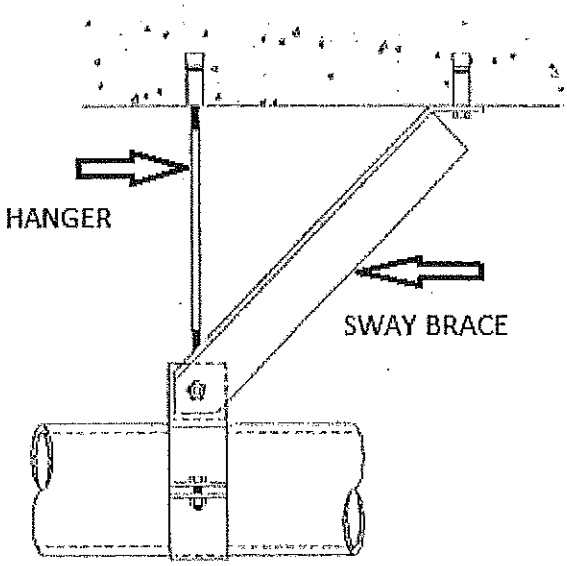


Figure 4: Example of Typical Sway Bracing (CISPI)

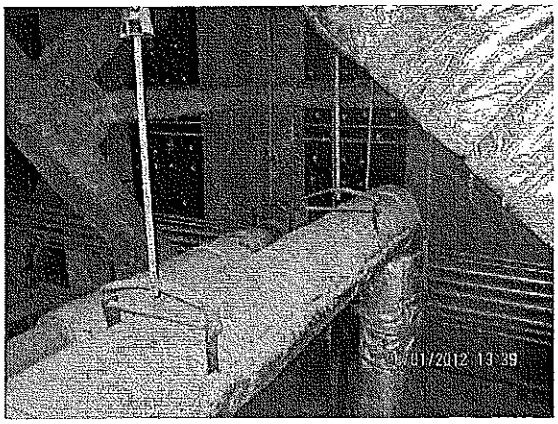


Photo 9: Pipe Installation with no Sway Bracing

During the survey of the pipe installation SEG observed that the piping is primarily suspended from single, threaded rod hangers with no "sway bracing" installed (see Photo 9). Single point rod hangers, incorporating rubber sound isolators, are considered "non rigid" hangers and were observed installed with an un-braced length of up to 20 feet. The installed configuration provides no restraint of horizontal sway motion. Figure 3 above shows an example of typical sway brace as detailed by CISPI.

It is my professional opinion that the original pipe installer's failure to include sway bracing on the storm water drainage system pipe was a significant contributor to the failure.

3.3 Installer's failure to comply w/ Hanger Spacing

Improper support of piping causes the weight of the pipe or fitting, and the water, to be imposed on the elastomeric rubber sleeve of the no-hub coupling. Additionally, the placement of the support too far away from the joint allows the weight of the pipe and water to be placed on the rubber coupling joint. The coupling is not intended to support these loads.

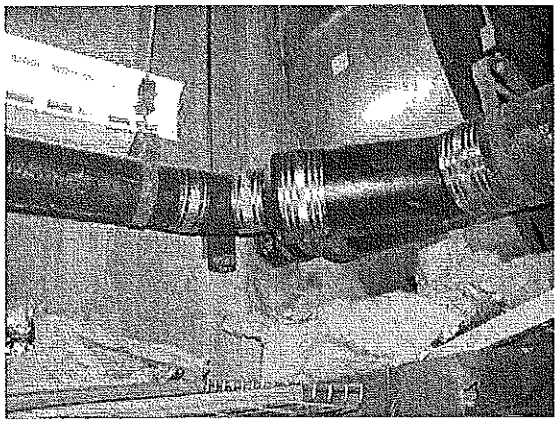


Photo 10: Pipe Installation missing Hangers

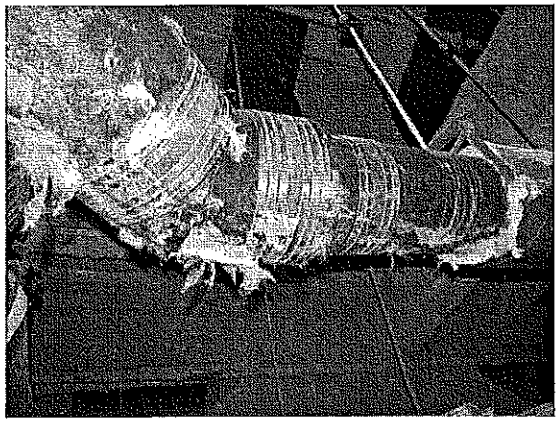


Photo 11: Piping Installation missing Hangers

Section 3.02(C) of Project Specification 15420: Piping Specialties, states:

> *"Hubless Joints: Provide support at every other joint..."*

Also, Section 3.03(C) of Project Specification 15425: Supports/Anchors – Plumbing/Fire Protection, instructs:

"Place a hanger within one foot of a horizontal elbow."

SFBC 4609.3(b) states that supports shall be placed immediately adjacent to the coupling, and that the pipe be suitably braced to prevent horizontal movement.

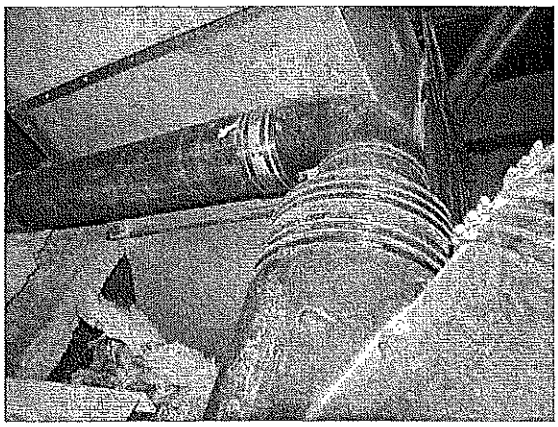


Photo 12: Piping Installation missing Hangers

CISPI General Installation Instructions B.1 state, for 12" pipe, a support should be installed on both sides of a coupling when installing full length (10 FT) pipe sections.

At various points throughout the system, pipe components were observed that were not supported at every joint as required per Contract Documents. Photos 10 thru 12 illustrate examples of these deviations from specifications.

It is my professional opinion that the original pipe installer's failure to include sway bracing on the storm water drainage system pipe was a significant contributor to the failure.

3.4 Vertical Piping Support Improperly Installed

Vertical runs of piping, which are termed a riser, are supported by a bracket (riser clamp) which is clamped around the pipe and rests on the concrete floor. This configuration prevents the weight of the pipe from being put on the no-hub couplings. Section 4609.2(b) of the SFBC 1994 requires that,

> *"Cast-iron soil pipe shall be supported at not less than at every story height and its base."*

Also, CISPI 310 general installation instructions further address these requirements by instructing,

> *"Support stacks* [risers, SEG] *at their bases and at sufficient floor intervals to meet the requirements of local codes."*

SFBC 1994 and CISPI 310 specify that risers be supported by riser clamps at each floor level. Vertical piping supports are intended to transfer the weight of the piping assembly to the surrounding floor system. A lack of these supports will impose additional loads on pipe couplings along the river, leading to separation of the joint.

Photo 13: Vertical Piping missing Riser Clamps

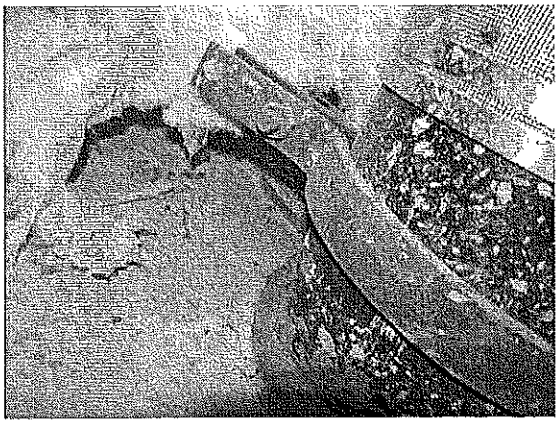


Photo 14: Improperly installed Riser Clamp

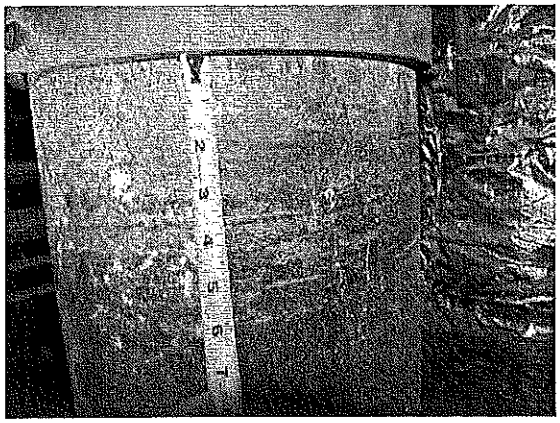


Photo 15: Evidence of Pipe Slippage above Point of Failure

Riser clamps were observed to be missing on several of the vertical risers (see Photo 13). In other locations the riser clamps were improperly installed. Photo 14 shows a riser clamp that is not in contact with the floor and is therefore not supporting the weight of the pipe riser.

Improper vertical support was further evidenced at the piping section directly above the point of failure. Photo 15 shows that the pipe had slipped downwards in the pipe clamp at this location. These observed configurations impose weight on the elastomeric rubber connections of the pipe system. As an additional note, the riser clamps should incorporate sound isolation pads.

This riser section, just above the attic floor, is directly above the failure point of the 90 degree elbow in the 4th tier restroom. The slippage of the pipe is indicative of the downwards force imposed by the storm water pulsing through the inadequately restrained and/or braced piping system impacting on the elbow below. The force of the falling storm water caused a downward load to impact on the fitting, which disengaged the fitting from the coupling. Additionally, the force of the water changing direction in the fitting will generate sway movement of the inadequately restrained piping system.

It is my professional opinion that the original pipe installer's failure to properly install riser clamps on the storm water drainage system pipe was a significant contributor to the failure.

3.5 Improper Installation of No-Hub Couplings

The no-hub fittings incorporate either 4 or 6 hose clamp bands which secure the elastomeric rubber sleeve to the pipes (see Photo 16).

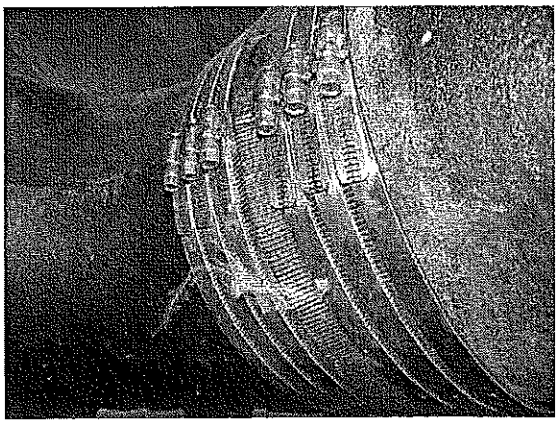


Photo 16: No-Hub Coupling with 6 Hose Clamps

The manufacturer (ANACO) of the couplings specifies that these bands be tightened using a torque wrench to a torque value of 80

inch-pounds for 12 inch diameter pipe and 60 inch-pounds for other sizes. The fitting that failed was 12 inch diameter. (Appendix "D")

A calibrated torque wrench ensures that these values are achieved and not exceeded. An inadequately torqued band will provide a lower clamping/attachment force and a reduced sealing capacity, which makes the connection more likely to separate.

A limited survey of the bands was made to evaluate the torque of the band screws. The survey examined 404 individual bands using a calibrated torque wrench. A majority of these bands were found to be inadequately tightened. (98.5%) Such field testing revealed that the average torque value for 12 inch bands was 51 inch-pounds (80 required). The bands adjacent to the point of failure were evaluated. One of 30 bands exhibited the correct torque. The average value for other sizes was 44 inch pounds (60 required). The values ranged from 6 to 80 inch pounds. 45 bands (13%) were found to be stripped indicating that they were over-torqued or torqued in the improper sequence, and lacking adequate capacity.

Several of the couplings reviewed exhibited a deformation of the metal shield as shown in Photo 17. Deformation of the shield metal indicates that the coupling has been displaced from its original installation configuration. This deformation is indicative of excessive movement of the piping system due to inadequate sway bracing.

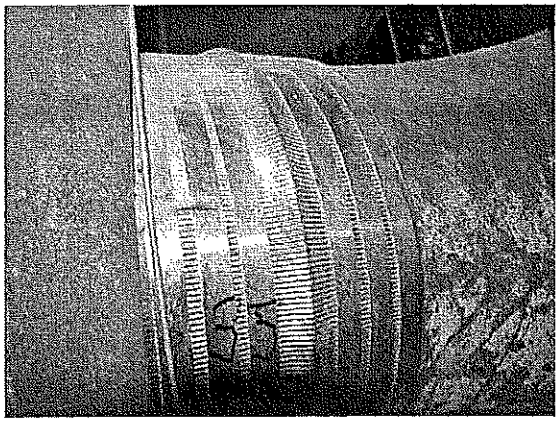


Photo 17: Example of a Coupling with a Deformed Shield

It is my professional opinion that, more likely than not, the original pipe installer's failure to properly install the bands of the no-hub coupling on the storm water drainage system pipe was a significant contributor to the subject failure.

4.0 CONCLUSION

It is my professional opinion that the ZBOH storm water drainage system failure of May 20, 2012, was caused by the original installer's multiple failures to install the storm water drainage system in accordance with the requirements of SFBC, CISPI, the piping and coupling manufacturer's instructions, and the Contract Documents. These installation failures include, but are not limited to, lack of reinforcement installed at either end (joint) of the 90 degree elbow fitting (failure location), lack of sway bracing to prevent horizontal movement of the piping, inadequate vertical pipe supports, and inadequate installation of the ANACO no-hub coupling bands. It is my further opinion that the installation deficiencies referenced above fell below the reasonable standard of care for experienced mechanical/plumbing contractors in the Florida construction industry, and that this substandard installation work was the direct cause of the May 20, 2012 storm water drainage system failure at the ZBOH, resulting in significant water intrusion and the subsequent damage to the facility.

The latent defects and deficiencies noted above also present a continuing risk of similar future failure to the entirety of the storm water drainage system at both the ZBOH and the KCH. Bracing and shoring has been installed as a temporary measure at the ZBOH.

5.0 DAMAGE

To date, the County has spent $4,268,031(numbers provided by Miami-Dade County) repairing the damages to the ZBOH arising from the May 20, 2012 storm water drainage system failure. The damage amount is preliminary amount may increase.

In addition, SEG has inspected both the ZBOH and the KCH to identify areas where the original storm water drainage system was not installed in accordance with the requirements of the SFBC,

CISPI, Contract Documents, and manufacturer's installation instructions. The estimated cost to bring these deficient systems into compliance is presented in Appendix "F".

6.0 CLOSURE

Slider Engineering Group, Inc. is the author of the report. Slider Engineering Group, Inc. and Harold Sturm, P.E. reserve the right to amend and supplement this report as additional information is available.

APPENDIX "A"

Documents Review List

Storm Water System Failure
Adrienne Arsht Center for the Performing Arts of Miami-Dade County
Miami, Florida

Documents:

1. Video provided by the PAC Management taken at the point of failure on 05/20/2012.

2. Photographs taken by the PAC Management dated 05/23/2012 pages 1 thru 42.

3. Adrienne Arsht Center Report by Steven Feller, P.E., PL dated 07/03/2012.

4. Record Drawings for the *Performing Arts Center of Greater Miami, Ballet/Opera House*, prepared by Caesar Pelli & Associates, Inc. dated 12/04/2006

5. As-Built Project Manual for the *Performing Arts Center of Greater Miami,* prepared by Caesar Pelli & Associates, Inc. dated 10/24/2001 (inclusive of revisions up to 06/2006).

6. Repair Project photos from Fachinna Construction of Florida.

Codes and Technical Standards:

1. The South Florida Building Code (SFBC) 1994 Dade County Ed. with Supplement No. 5 dated January 1998

2. *"Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications"* prepared by the Cast Iron Soil Pipe Institute (CISPI 301-04).

3. Manufacturer cut-sheet and instruction submittal *"No-Hub Couplings"* prepared by Anaco.

APPENDIX "B"

List of SEG Contributors

Harold Sturm, PE	Sarasota, FL
Scott Harvey-Lewis, PE	West Palm Beach, FL
Joe Rocchio	West Palm Beach, FL
Steve Mrozinski	Tampa. FL
Ali Lotfi, PE	West Palm Beach, FL
Jamie Weil, PE	West Palm Beach, FL
Myles Uhlir, EIT	Sarasota, FL

APPENDIX "C"

Damage Classification Summary
(Provided by Miami- Dade Architecture and Engineering Services)

Access, Temporary Protection, Scaffolding

Supervision, Labor, Tools, Rentals

Demolition, Disposal, Air Quality

Drywall, Paint, Acoustic Fabric, , Tile, Woodwork

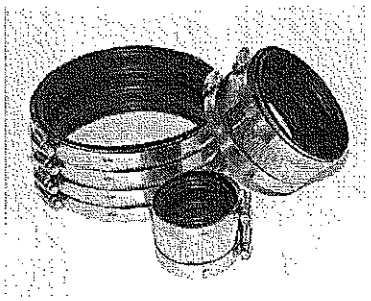
HVAC, Eelectrical, Fire Protection, Plumbing

Insurance, Cleaning, Storage, Safety

On-site project totals to date- $4,268,031(numbers provided by Miami-Dade County)

APPENDIX D

Submittal
No-Hub Couplings



Anaco No-Hub couplings meet CISPI 310 and ASTM C 1277. Couplings consist of a stainless steel shield, clamp assembly and a gasket manufactured from a properly vulcanized virgin compound in which the primary elastomer is polychloroprene (neoprene) conforming to ASTM C 564.

Compliant to BAA, TAA, ARRA, NAFTA & NSF.

NSF
CISPI 310

The coupling is used to join hubless cast iron pipe and fittings made to CISPI 301 and/or ASTM A 888. Coupling sizes range from 1½" through 15" diameters. The stainless steel shield and clamp assemblies are corrosion resistant.

Material Specifications

Clamp: Type 301 AISI stainless steel
Screw: Type 305 AISI stainless steel 5/16 hex head for 1 ½"-10", 3/8 for 12" &15"
Shield: Type 301 AISI stainless steel corrugated. Shield thickness 0.0075
Housing: Type 301 AISI stainless steel

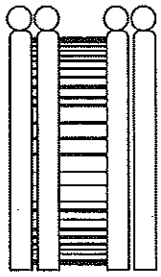
Gasket Test

Test	Physical Tests Min. or Max Requirements	ASTM Method
Tensile Strength	1500 psi min.	D412
Elongation	250 min.	D412
Durometer [Shore A]	70 ± 5 @ 76° F ± 5°F	D2240
Accelerated Aging	15% maximum tensile and 20% maximum elongation deterioration, 10 points maximum increase in hardness, all determinations after oven aging for 96 hours at 158°F	D573
Compression Set	25% maximum after 22 hours at 158°F	D395 Method B
Oil Immersion	80% maximum volume change after immersion in IRM 903 for 70 hours at 212°F	D471
Ozone Cracking	No visible cracking at 2 times magnification of the gasket after 100 hours exposure in 1.5ppm ozone concentration at 100°F. Testing and inspection to be on gasket which is loop mounted to give approximately 20% elongation of outer surface.	D1149
Tear Resistance	150 lbs. minimum per inch of thickness	D624
Water Absorption	20% maximum by weight after 7 days at 158°F	D471

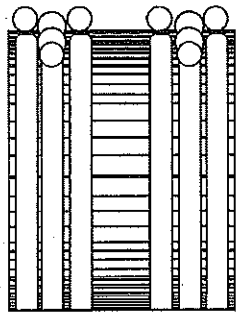
1001 El Camino Avenue • Corona, CA 92879
951/372-2732 • Fax 951/738-1183 • www.anaco-husky.com • Made in USA

No Hub Couplings			
Size	Width	No. of Straps	Torque
1 ½" - 4"	2.125	2	60
5 & 6	3.0	4	60
8 & 10	4.0	4	60
12 & 15	5.50	6	80

Size 1-1/2"
thru 4"
TWO BANDS
Figure 1



Size 5", 6"
8" thru 10"
FOUR BANDS
Figure 2



Size 12"
AND 15"
SIX BANDS
Figure 3

Installation Instructions

1. After making the field cuts square and placing the ends of the pipes against the center-stop of the gasket, slide the clamp assembly into position centered over the gasket.
2. Using a torque wrench, tighten stainless steel screws alternately to 60-inch pounds torque for 1½" to 10" and 80-inch pounds torque for 12" & 15".
3. For 5" to 10" couplings, tighten inner bands first, then tighten outer bands.
4. For 12" & 15" couplings, tighten inner bands, center bands and outer bands. When min-max conditions exist, tighten each band starting on the smaller side: 3,2,1 and 3,2,1 again. Then torque the maximum side: 4, 5, 6 and 4, 5, 6 again. Finally, torque 2,1 on the minimum side and 4, 5, 6 on the maximum side. (See Figure 3 above)

Bracing

Horizontal pipe and fittings five inches and larger must be suitably braced to prevent horizontal movement. This must be done at every branch opening or change of direction by the use of braces, blocks, rodding or other suitable method, to prevent movement or joint separation. *(Chapter IV, Handbook Cast Iron Soil Pipe Institute)*

APPENDIX E

SECTION 15011

PLUMBING/FIRE PROTECTION GENERAL PROVISIONS

PART 1.GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I - Specifications sections, apply to work specified in this Section.

1.02 RELATED WORK IN OTHER DIVISIONS

Division 2 - Site Utilities
Division 9 - Field painting of mechanical equipment
Division 16 - All electrical work for this Division 15 as noted in this Division's sections.
Section 15240 – Vibration Isolation
Section 15245 – Vibration Isolation

1.03 DESCRIPTION OF WORK

A. It is the intent of these plans and specifications to provide complete and operating mechanical systems as hereinafter outlined. The work contained within the scope of this contract shall include furnishing and installing heating, ventilating, air conditioning, mechanical and plumbing systems, as specified, indicated on contract drawings, and as required to constitute complete operating systems.

B. This section applies to each section in Division 15 - Mechanical.

C. Drawings are diagrammatic and indicate general arrangement of systems and work included in contract. Contractor shall follow drawings in laying out work; check drawings of all trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, Architect-Engineer shall be notified before proceeding with installation. If directed by Architect-Engineer, contractor shall, without extra charge, make reasonable modifications in layout as needed to prevent conflict with work of various trades or for proper execution of the work. Where variances occur between drawings and specifications, or within either document itself, the item or arrangement of better quality, greater quantity, or higher cost shall be included in contract price. Architect-Engineer shall decide on item and manner in which the work shall be installed.

1.04 QUALITY ASSURANCE

Standards and Codes: All work shall comply with guidelines set in latest edition of following applicable standards and codes:

ADC	- Air Diffusion Council
AMCA	- Air Moving and Conditioning Association
ANSI	- American National Standards Institute
API	- American Pipe Institute
ARI	- Air Conditioning and Refrigeration Institute
ASHRAE	- American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	- American Society of Mechanical Engineers
ASTM	- American Society of Testing and Materials

CISPI	- Cast Iron Soil Pipe Institute
FM	- Factory Mutual
NBS	- National Bureau of Standards
NEC	- National Electrical Code
NEMA	- National Electrical Manufacturers Association
NFPA	- National Fire Protection Association - National Fire Codes Including Life Safety Code
OSHA	- U.S. Dept. of Labor - Occupational Safety and Health Acts Standards
PDI	- Plumbing Drainage Institute
UL	- Underwriters' Laboratories, Inc.
USAS	- USA Standard
	- Regulation of Florida Industrial Commission Regarding Safety
	- Sanitary Code of the State Board of Health
	- Model Energy Efficiency Code for Building
	- Construction (State of Florida Energy Code)

1.05 FIELD MEASUREMENTS AND COORDINATION

A. Verify all field dimensions and location of equipment, to insure close, neat fit, with work of other trades.

B. Coordinate and install work under this Division in proper sequence with and cooperation with all other trades, to insure that total work is completed within contract time schedule.

C. Carefully examine any existing conditions, piping, and premises, and compare drawings with existing conditions. Notify Architect of any observed discrepancies, who will issue equitable written instructions resolving these discrepancies.

1.06 SINGULAR REFERENCES

Singular references in these specifications are not to be constructed as requiring only one device if multiple devices are shown on drawings or required to complete the work.

1.07 ACCEPTANCE

Prior to requesting final inspection, contractor shall:

A. Complete all work required under this Division. After final installation of all equipment, a complete test and balance shall be performed on all air distribution, refrigerant system or circuits. Four certified copies of final test data shall be submitted to the Architect. Furnish a letter from an authorized representative of the control manufacturer that all controls have been checked for operation and calibration and that system is operating as intended.

B. Furnish the required operating instructions, wiring diagrams, and control diagrams and mount one copy of each in the electrical equipment room framed under glass.

1.08 CLEANUP

A. Thoroughly clean all exposed parts of all apparatus and equipment of cement, plaster, and other materials, and remove all oil and grease spots. Repaint or touch up as required to look like new. Exposed metal work shall be carefully brushed down with steel brushes to remove rust and other spots and touched up with primer.

B. During the progress of work, each Sub-contractor shall carefully clean up after this men and leave premises and all portions of building free from debris and in a clean and safe condition.

1.09 SERVICE

Provide recorded and reported maintenance and service for one (1) year after Owner's substantial completion of all portions of the work. Such service includes the following;

~~A. Necessary adjustments and/or replacement of all defective equipment and materials furnished.~~

~~B. Replacement of any loss of oil.~~

~~C. Replacement of all air handling unit filters in accordance with filter loading and manufacturer's recommended replacement time.~~

~~D. Re-calibration and re-setting of automatic controls as required.~~

~~E. Tightening of belts of all belt driven equipment.~~

~~F. Oiling all bearings, drives, etc., as required by the equipment service recommendations.~~

~~G. Cleaning cooling coils and drain pans of all air handlers every six months.~~

~~H. Adjusting and operation of all variable volume box actuators.~~

A. Perform any other maintenance and service on equipment as recommended in the respective equipment manufacturer's maintenance recommendations.

B. Offer the Owner a full service and maintenance agreement for a period of one year following the previous one year service period. The Owner will have the option to accept or not to accept the service and maintenance agreement.

~~1.10 WARRANTY/GUARANTEE~~

~~The condensing unit compressor shall have a complete 5 year labor and materials warranty. Except for this 5 year compressor warranty, the Contractor shall guarantee all labor and materials for a period of two (2) years after Owner's substantial completion of all portions of the work. In addition, Contractor shall provide included in his bid, manufacturer's warranty for labor and materials on all equipment furnished under this Division.~~

1.10 SUBMITTALS

A. Provide layouts of all piping, ductwork, equipment, etc., fully coordinated with the layout of the other trades, at a suitable scale but not smaller in size than 1/4" = 1'-0" scale.

PART 2.PRODUCTS

2.01 OPERATING AND MAINTENANCE MANUAL

A. Operating and maintenance instructions shall be provided for all mechanical equipment and systems as hereinafter specified.

B. Operating and maintenance manuals will be used for training of and use by the Owner's operating personnel in the operation and maintenance of the mechanical system. The manuals must therefore address themselves not only to equipment but also to the operation of the systems.

C. Format of the manuals shall be based on a separate manual or chapter for each class of system as follows:

1. Air conditioning, heating and ventilating systems

2. Plumbing systems

3. Emergency systems

4. Control systems

D. Content of each manual or chapter shall include but not be limited to the following:

1. Description of system

2. Operating sequence and procedures

a. Step-by-step procedure for system start-up, including a pre-start checklist.
b. Detailed instruction in proper sequence, for each mode of operation.

D. Maintenance instructions and requirements shall be divided into two primary categories: Preventive maintenance and corrective maintenance:

1. Preventive Maintenance:

a. A schedule for preventive maintenance
b. Cleaning
c. Inspection
d. Instruction for minor repairs or adjustments

2. Corrective Maintenance:

a. Corrective maintenance instructions shall be predicted upon a logical effect to cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime
b. Troubleshooting
c. Repair and replacement
d. Safety precautions

F. Manufacturer's Brochures:

This subsection shall include manufacturer's descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views and renewal parts lists. Manufacturer' standard brochures shall be corrected so that the information applying to the actual installed equipment is clearly defined.

G. Submittal of four draft copies of the complete operating and maintenance manual shall be made for review by the Architect-Engineer within 60 calendar days after approval of mechanical equipment shop drawings. One copy will be returned to the Contractor within 30 days after receipt by the Architect-Engineer. Submit final operating and maintenance

manuals bound in three ring binders with tabs and index at least five (5) days prior to the final acceptance inspection.

2.02 TRAINING

A. The Contractor shall train the Owner's representative(s) in the operation and maintenance of all mechanical equipment and systems.

B. Thirty days prior to completion of the building, submit for acceptance the proposed training schedule and scope of materials and techniques.

C. Training shall not commence until the draft copy of the operating and maintenance manual has been approved and returned to the Contractor.

D. The Contractor shall provide training by qualified installation and maintenance personnel for a period of not less than one day. Training shall occur after the project final inspection and shall be performed according to the Operation and Maintenance Manuals and the Design Basis Document for the system.

E. The Contractor shall videotape all training sessions.

F. Furnish three (3) copies of a signed acknowledgement that the Owner's representative(s) have received the specified training.

2.03 MATERIALS

The equipment to be furnished shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these shall be the product of a single manufacturer.

2.04 FLOOR AND CEILING PLATES

Shall be steel, 1-inch split ring type. Finish as noted.
Provide deep dish type over extended floor sleeves.

2.05 ACCESS PANELS

A. Furnish required number of access panels needed to reach and service all service and maintenance points of this Division's work concealed behind finished construction.

B. Indicate the required location of panels to those performing their installation.

C. Panels to be minimum 12"x12" size, and larger where required. Access panels to be (Milcor) Inland-Ryerson Construction Products Co., or (Boico) Birmingham Ornamental Iron Company. Finish steel panels and frames with prime coat or rust inhibitor enamel. Access panel styles to suit location and finish of surface where installed.

D. Furnish panels with the required fire rating where panels are to be installed in a fire treated partition, shaft, etc.

2.06 ANCHOR MATERIALS

Conform materials to Division 5, Metals, for both ferrous and non-ferrous metals. Metal anchors to be same materials as piping, except where Architect-Engineer gives written approval otherwise. Inserts shall be steel, slotted type with end caps. Sleeves shall be 18 gauge mil galvanized sheet metal.

2.07 ELECTRIC MOTORS AND EQUIPMENT

A. U.S. Electric, Westinghouse, General Electric, Allis Chalmers, or accepted equal as required to drive all apparatus specified in other sections of this Division. Motors - sleeve bearing or ball bearing especially selected for quiet operation. Select motors of adequate size to prevent overloading under normal operating conditions. Replace noisy motors with quiet operating motors, where directed by Architect-Engineer.

B. Motors inside building - drip proof, service factor of 1.15.

C. Internal thermal or external low voltage and over current protective device required for each motor.

D. Conform to all other electrical equipment to Division 16 specifications.

E. Starters: Furnish starters under the Mechanical Sections for installation under Division 16. Motor starters as manufactured by Cutler Hammer, Allen Bradley, General Electric or accepted equal, shall meet following requirements:

1. Overload protection on each phase and external to motor overloads with snap-on type connections.

2. Each magnetic starter with red indicating light in the cover.

3. H-O-A switches in cover.

4. Provide necessary auxiliary contacts.

5. Control circuit shall be 24 or 120 volt derived from a suitable sized transformer in each individual starter, one leg grounded and one leg fused or from a separate building circuit.

6. Enclosures: Starters not exposed to weather with NEMA Type 1 enclosures.

7. Each starter shall have an engraved plastic nameplate on the outside cover and an overload heater schedule on the inside cover.

8. Each starter shall be clearly labeled with name of equipment for which is intended as designated on drawings.

2.08 HOISTING, RIGGING, TRANSPORTATION AND SCAFFOLDING

Provide under this Section all necessary hoisting, rigging, transportation and scaffolding to move, position and to install all mechanical equipment and materials.

2.09 EQUIPMENT SUPPORT MATERIALS

Concrete to Division 3 - Concrete. Conform steel to Division 5 -Metals.

2.10 ESCUTCHEONS

Provide chrome plated cast brass spring clamp escutcheons (for 1/4 or 1 inch projecting sleeves as required) at each point where an uninsulated pipe passes through a finished surface.

2.11 INSERTS

Where inserts must be set in poured concrete, use self-drilling screw anchors sized as producer's recommendation for weight and device to be supported. Approved producers are Fee and Mason, J.D. Polis Mf. Co., Phillips Drill Co. or approved equal.

2.11 SLEEVES

Use steel pipe sleeves. Size sleeve lengths to extend through full thickness of sleeved construction and 4 inches above finished concrete floors. Size sleeve diameters to permit clearance for pipe movement and proper grading of pipe. Sleeves for insulated pipe to be of adequate size to clear insulation.

2.13 VEE BELT DRIVES AND GUARDS

A. Cast iron sheave vee belt drives with guard. Motor sheave to be variable pitch type capable of plus or minus 10% speed variation from rated driven RPM. Maximum ratio of driver to driven speed is 6. Size vee belt drives to transmit at least 150% of motor HP.

B. Provide guards for all shaft couplings, rotating and reciprocating machinery.

2.14 NAMEPLATES

Black laminated plastic with white lettering, attached to equipment with screws or rivets.

2.15 FIRE RETARDANT CAULKING COMPOUND

To seal around ducts and pipe sleeves; butyl rubber base single or double components, non-staining type.

2.16 CORROSION COATING

Nokorode Seal-Coat (standard) manufactured by the Lion Oil Company, El Dorado, Arkansas, or approved equal.

2.17 ACCEPTABLE MANUFACTURERS

The design is based on the specified manufacturer only. The Contractor is fully responsible for verifying that any equipment submitted fits the space allotted, and shall bear any costs involved in equipment submitted requires changes in other trades that the submitted equipment affects, ie., electrical, structural, architectural, etc. Equipment shown is as scheduled on the drawings.

PART 3.EXECUTION

3.01 GENERAL

A. Install all materials and equipment in a neat and workmanlike manner, by competent specialists for each subtrade. Installation of materials and equipment not meeting these standards may be condemned by Architect-Engineer and shall be removed and reinstalled by Sub-contractors at no additional cost to Owner. Each Sub-contractor is responsible for safety and good condition of his materials and equipment installed, until Owner's Substantial completion.

B. Make all minor location changes from indications on drawings as necessary to make work conform with building as constructed, to fit work of other trades, or rules of authorities having jurisdiction, at each Sub-contractor's expense.

C. Locate all apparatus symmetrical with architectural elements. Install to exact height and location, where shown dimensioned on drawings. Install work as required to fit structure, avoid obstructions and retain clearance, headroom, openings, and passageways. Do not cut structural members without Architect's prior written approval.

D. Do not deface or endanger any work by cutting, excavating or otherwise altering work previously installed except with written consent of Architects. Each Sub-contractor is to cut all openings and do all excavation and backfill required for installation of his work.

E. Provide pipe sleeves for all piping passing through walls, partitions, slabs on grade or above grade, roof, etc.

F. All welding shall be performed by certified welders. Electric arc welding shall be performed using electrodes conforming with AWS A5.1-69, Classification E6010. Each layer shall be cleaned. Chip out trapped slag and unfused areas before applying next bead. Finished weld shall be visually inspected for cracks, porosity or imperfections. If the weld contains any defects, it shall be repaired to the satisfaction of the Architect-Engineer.

3.02 EQUIPMENT SUPPORTS

A. Provide concrete bases and structural steel to support equipment and piping even where not specifically shown on Structural or Architectural drawings.

B. Provide a raised reinforced concrete base for all floor supported equipment such as air handling units. Provide one common base to support each motor and its driven apparatus.

3.03 ELECTRICAL WORK

Mechanical Sub-contractor will furnish and set all controls necessary for proper operation of this Divisions' systems as identified on Mechanical and Electrical drawings. Furnish starters for all motors. For all equipment provided under this Section, Electrical Sub-contractor will furnish all disconnect switches, manual switches, wiring and conduit.

3.04 PIPING COATING

Coat all ferrous piping with corrosion coating compound. Herein before specified, hand or glove applied, before applying any insulation to the pipes.

3.05 MECHANICAL EQUIPMENT PAINTING

A. Refer to Division 9 - Painting specification section for requirements. Touch-up of damaged equipment painting or finishes is included under this Division.

B. Do not paint nameplates.

C. Stenoil piping with designation of function at 10 foot intervals in equipment rooms and at 50 foot intervals throughout building including roof. Abbreviations acceptable: CWS - Condensing Water Supply.

D. Permanently tag valves with coded brass discs or engraved plastic tags attached with brass chain. Coordinate code with operating instructions. Rivet engraved plastic identification nameplates to electric switches and controls.

3.06 IDENTIFICATION CHART AND DIAGRAM

A. Charts and diagrams shall be photographic or equal non-fading reproductions. Provide framed, wall mounted charts and diagrams covered with 1/8 inch thick clear glass or acrylic plastic giving complete list of applicable piping identification system at mechanical room.

B. Provide a valve chart and insert same in the operation and maintenance manual. Valve chart shall include valve location, valve service and valve number. Format shall be accepted by Architect-Engineer.

3.07 NAMEPLATES FOR MECHANICAL EQUIPMENT

A. Shall identify equipment and its function.

B. Nomenclature and equipment numbers shall correspond to those used in preparation of posted operating instructions.

C. Following items shall receive nameplate minimum 1" x 2 1/2":

1. Pilot lights
2. Panel mounted gauges, instruments and meters
3. Starters
4. Switches and push buttons
5. Air handlers

3.08 CLEANING

A. Refrigerant piping: Pull through a clean, dry lintless cloth.

B. Clean ducts and air terminals inside and out before placing in operation.

C. Before testing and balancing is started, do the following:

1. Clean all strainers in piping system.
2. Replace temporary filters in all air handling units.

END OF SECTION

APPENDIX F

SECTION 15420

PIPING SPECIALTIES (PLUMBING)

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide piping specialties (plumbing) including necessary accessories indicated on drawings and specified in this section.

1.02 SUBMITTALS

A. Submit properly identified Manufacturer's literature to the form defined in Section 01340 before commencing work.

1. Shock Absorbers: Catalog cuts.
2. Unions and Flanges: Catalog cuts.
3. Hangers and Inserts: Catalog cuts.
4. Trap Resealers: Catalog cuts.
5. Vacuum Breakers: Catalog cuts.

1.03 RELATED WORK IN OTHER DIVISIONS

Section 15240 – Vibration Isolation
Section 15245 – Vibration Isolation

PART 2 PRODUCTS

2.01 TRAP RESEALERS

A. Water Closet Valve: Sloan Valve Co. F-72-A1 chrome plated with tubing to wall and wall flange.

B. Lavatory or Sink:

1. Josam 88250 cast brass chrome plated with 1/2 inch female union connection and 1/2 inch female outlets, integral vacuum breaker.
2. Chicago Faucet Co., No. 447, Zurn Industries, Inc., Model Z-1022 or accepted equivalent.

C. Remote Location: Precision Plumbing Products Model P.1 or P.2 as applicable, machined brass valve with integral vacuum breaker, pressure adjustment and distribution unit(s) with visual operations inspection cover where required for multiple connections.

2.02 SHOCK ABSORBERS

A. Josam 75000 stainless steel shell, elastomeric bellows, pressurized argon charge, sized per PDI-WH 201 at each branch of cold and hot water or as shown on drawings and/or required.

B. Zurn Industries, Inc., Model Z-1700 or accepted equivalent.

2.03 VACUUM BREAKERS

A. Hose Bibb Vacuum Breaker: Watts Regulator Co., Model No. 8A non-removable type.

B. Atmospheric Type: Watts Regulator Co., Model No. 288A.

C. For Plumbing Fixtures: As specified under Section 15450.

2.04 UNIONS AND FLANGES

A. Steel Pipe 2-1/2 Inches and Smaller:
1. Malleable iron unions with brass seat.
a. Galvanized pipe requires galvanized unions.

B. Steel Pipe 3 Inches and Larger:
1. Bronze flanged connections 150 pound Class.
a. Galvanized pipe requires galvanized unions.

C. Copper Pipe 2-1/2 Inches and Smaller: Bronze unions.

D. Copper Pipe 3 Inches and Larger: Bronze flanged connections 150 pound Class.

E. Dielectric Unions or Flanges:
1. Meet dimensional requirements and tensile strength of pipe unions or flanges in accordance with Fed. Spec. WW-U-531D.
2. Suitable for required operating pressures and temperature conditions.
3. Provide metal connections on both ends.
a. Ends shall be threaded or soldered to match adjacent piping.
4. Separate metal parts of union to prevent current flow between dissimilar metals.

2.05 ESCUTCHEONS

A. Provide escutcheons securely in place on exposed pipes where they pass thru walls, partitions, floors and ceiling of finished areas unless otherwise noted on drawings.

1. Interior Walls, Partitions and Ceilings:
a. Solid or stamped chrome plated brass or stainless steel, one piece or split pattern.

2. Floors and Exterior:
a. Solid cast brass, rough chrome plated or cast nickel bronze alloy, one piece or split pattern.

2.06 FLEXIBLE CONNECTORS

A. Rubber flexible pipe, 125 psi minimum working pressure rating, 6 inch maximum length.

1. Install in strict accordance with manufacturer's recommendations.
2. Accepted Manufacturers: Metraflex Style 100 or accepted equivalent.

2.07 PIPE HANGERS AND SUPPORTS

A. Provide hangers, supports and supplementary steel as hereinafter specified for different applications.

B. Insert, Hangers, Rods and Clamps:

1. Figure numbers used refer to Grinnell; Elcen or Michigan Hanger Co. are accepted equivalents.

a. Inserts:
1) Universal Concrete Insert: Fig. 282.

2) CB Junior Concrete Insert: Fig. 279.
3) Wedge Type Concrete Insert: Fig. 281.
4) Expansion Case: Fig. 117.
5) Hangers: Adjustable clevis type.
6) Cast Iron Pipe: Fig. 590.

b. Copper Tubing: Fig. CT-65.
c. Insulated Steel Pipe: Fig. 300.
d. Uninsulated Steel Pipe: Fig. 146.
e. Tube Straps: Fig. 9120.
f. Tin Straps: Fig. 231

2. Rods: Continuous Thread, Fig. 146.

C. Horizontal Steel Piping:

Clamp or Hanger Pipe Size	Rod Diameter	Maximum Spacing
Up to 1-1/4 inches	3/8 inch	8 feet
1-1/2 and 2 inches	3/8 inch	10 feet
2-1/2 and 3 inches	1/2 inch	12 feet
4 and 5 inches	5/8 inch	12 feet
6 inches	3/4 inch	15 feet

D. Horizontal Copper Piping:

Clamp or Hanger Pipe Size	Rod Diameter	Maximum Spacing
Up to 1 inch	3/8 inch	6 feet
1-1/4 and 1-1/2 inches	3/8 inch	6 feet
2 inches	3/8 inch	8 feet
2-1/2 inches	1/2 inch	8 feet
3 and 4 inches	1/2 inch	8 feet

E. Horizontal Cast Iron Piping:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 4 inches	1/2 inch	5 feet
4 inches	5/8 inch	5 feet
6 inches and larger	3/4 inch	5 feet

F. Insulation Protection Shield: Fig. 167.

G. Wall Access: As specified under General Provisions.

2.08 BACKFLOW PREVENTOR: Backflow preventer shall be of the reduced pressure principle furnished with shut-off valves, ball type test cocks and air gap connection in drain line. Watts Series 900 and 909, BEEco by Hersey Products, Inc. or equal.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 PIPE HANGERS AND SUPPORTS

A. Provide adjustable hangers, inserts, brackets, rolls, clamps and supplementary steel as required for proper support of pipe lines.

1. Design hangers to allow for expansion and contractions of pipe lines adequately sized to permit pipe covering to run continuously through hangers.
2. Support piping at equipment independently so that weight is not supported by equipment.
3. Coordinate location of hangers with light fixtures.
4. Wire brush steel or iron supports and prepare surfaces ready for painting specified under Section 09900.

CPR 541

PES. SEE END OF PRECEDING SEC.

B. Horizontal Cast Iron Pipe: Place hangers within 18 inches of hub or joint.

C. Hubless Joints: Provide support at every other joint except that when length between supports exceeds four feet, support each joint.

D. Trapeze Clamp or Hangers: Secure pipes supported by trapeze clamp or hangers and not mounted on pipe rolls to trapeze with pipe clamps or "U" bolts.

1. Change of Direction: Place clamp or hangers at each change of direction.
2. Valves and Other Appurtenances in Horizontal Piping: Place clamp or hangers within one foot.
3. Branch Runouts: Place clamp or hangers maximum three feet from end of each branch runout.

E. Insulated Pipes:

1. Provide hangers with a diameter large enough to include insulation.
2. Install a protection shield with each hanger.

F. Special Supports: Clamps, hangers and supports required by equipment manufacturers shall be installed in accordance with equipment manufacturer's recommendations.

G. Plumbers tape, straps, chain, wire hangers or perforated bar WILL NOT be allowed as a means for hanging pipe.

3.03 UNIONS AND FLANGES

A. Provide at connections to piece of equipment and at strainers and control valves.

3.04 ESCUTCHEONS

A. Fit and firmly secure escutcheons to pipes passing through finished floors, ceilings and walls.

1. Size: Provide escutcheons with sufficient outside diameter to adequately cover sleeved openings.

END OF SECTION

APPENDIX G

SECTION 15425

SUPPORTS/ANCHORS – PLUMBING/FIRE PROTECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide supports, anchors and seals including necessary accessories indicated on drawings and specified in this section.

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature to the form defined in Section 01340 before commencing work.

1.03 REFERENCES

A. Pipe supports: ANSI B31.1, Power Piping.

1.04 RELATED WORK IN OTHER DIVISIONS

Section 15240 – Vibration Isolation
Section 15245 – Vibration Isolation

PART 2 PRODUCTS

2.01 INSERTS

A. Malleable iron case of galvanized steel shell expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.

B. Size insert to suit threaded hanger rods.

2.02 PIPE HANGERS AND SUPPORTS

A. Hangers:
1. Pipe sized 1/2 Inch to 1-1/2 Inch: Adjustable wrought steel ring.
2. Pipe sizes Two Inches and Cold Pipe Six Inches and Over: Adjustable wrought steel clevis.

B. Hangers:
1. Hot Pipe Size Six inches and Over: Adjustable steel yoke and cast iron roll.

C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods, cast iron roll and stand for hot pipe six 6 inches and over.

D. Wall Support:
1. Pipe Sizes to Three Inches: Cast iron hook.
2. Pipe Sizes Four Inches and Over: Welded steel bracket and wrought steel clamps.

E. Vertical Support: Steel riser clamp.

F. Floor Support:
1. Pipe Sizes to Four Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange and concrete pier to steel support.

2. Hot Pipe Sizes Six Inches and Over: Adjustable cast iron roll and stand, steel screws and concrete pier or steel support.

G. Design hangers to impede disengagement by movement of supported pipe.

H. Provide copper plated hangers and supports for copper piping or provide sheet lead packing between hanger or support and piping.

2.03 HANGER RODS

A. Provide steel hanger rods, threaded both ends, threaded one end or continuous threaded.

2.04 FLASHING

A. Steel flashing: 26 gage stainless steel.

B. Safes:
1. 5 lbs./sq. ft. sheet lead or 8 mill thick neopreme.

C. Caps:
1. Stainless Steel, 22 gage minimum except 16 gage at fire resistant structures.

2.05 SLEEVES

A. Pipe Through Floors:
1. Form from 18 gage galvanized sheet metal.

B. Pipes Through Beams, Walls, Fireproofing, Footings, Potentially Wet Floor:
1. Form from steel plate or 18 gage galvanized sheet metal.

C. Size large enough to allow for movement due to expansion.

PART 3 EXECUTION

3.01 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSERTS

A. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.

3.03 PIPE HANGERS AND SUPPORTS

A. Support Horizontal Steel and Copper Piping as Follows:

Nominal Size (in)	Pipe Distance Between Support (ft.)	Hanger Rod Diameter (in.)
1/3	6	3/8
3/4 to 1-1/2	6	3/8

Nominal	Pipe Distance Between	Hanger Rod

Size (in)	Support (ft.)	Diameter (in.)
2 & 2-1/2	10	3/8
3 & 4	12	5/8
6 to 12	14	7/8
14 to 18	20	1

B. Install hangers to allow minimum 1/2 inch clear space between finished covering and adjacent work.

C. Place a hanger within one foot of each horizontal elbow.

D. Use hangers which are vertically adjustable 1-1/2 inch minimum after piping is erected.

E. Provide multiple or trapeze hangers where several pipes can be installed in parallel and at same elevation,

F. Support riser piping independently of connected horizontal piping where practical,

3.04 PRIMING

A. Prime coat exposed steel (not galvanized) hangers and supports.

CPR 341

3.05 FLASHING

A. Flash and counterflash where mechanical equipment passes through weather or waterproofed walls, floors and roofs.

3.06 SLEEVES

A. Where piping passes through floor, ceiling or wall, close off space between pipe or duct and construction with noncombustible insulation.
   1. Provide tight fitting metal caps on both sides and calk.

END OF SECTION

Pelli Clarke Pelli Architects AA0002494

CHANGE PROPOSAL REQUEST

C.P.R. NO.: 541

MAR 07 2006
Performing Art Center Builders
RECEIVED

DISTRIBUTION:

PACMO	X	FDA	X
PACB	X	CA	X
PCPA (New Haven)	X	YAS	X
CPA (Miami)	X	IG	X
ARTEC	X	GBBN-Miami	X

PROJECT: PERFORMING ARTS CENTER OF GREATER MIAMI C.P.R. NO.: 541

OWNER: PERFORMING ARTS CENTER MANAGEMENT OFFICE DATE: 03/02/06

TO: PERFORMING ARTS CENTER BUILDERS
4770 BISCAYNE BOULEVARD
SUITE 500
MIAMI, FLORIDA 33128

FROM: PELLI CLARKE PELLI ARCHITECTS
1056 CHAPEL STREET
NEW HAVEN, CT. 06510

SUBJECT: Amendment of Contract Requirement: Paint and Preparation of Supports for HVAC, Plumb, and Fire Protection PROJECT NO: 9501

Provide an itemized quotation for labor, materials, equipment and services to make the following changes to the Contract work in accordance with Document 00510 - Article 11 - Changes in the Work:

Attach complete breakdown for price quote and justification for any Contract time extensions requested.

Item No. Description

Due to the density of the installation in Mechanical Rooms, the A/E team has accepted the partial completion of the following requirements of the contract specifications:

15420-3.02-A.4
Wire brush steel or iron supports of piping and prepare surfaces ready for painting

15425-3.04-A
Prime coat of exposed steel (not galvanized) hangers and supports for plumbing and fire protection

3.03
15890-3.09-A.10
All angles (used for support) shall be galvanized or shop painted with two coats of rust-resistant paint.

These three items were discussed with CM on site on 11/11/05. Refer to Meeting Minutes. Provide credit to the owner for the portion of this work not completed.

Provide credit to the owner for the deletion of this Portion of the Work. Refer to
005100-7.4..3.2
005100-11.1.4
00700-8.3-A
01028-1.04-B-5

ATTACHMENTS: None

By: Celia Toche	By:
Architect's Representative: Celia Toche	Authorized Representative:
Pelli Clarke Pelli Architects	Performing Arts Center Management Office

AGREEMENT REGARDING PERFORMANCE OF RAIN WATER LEADER SYSTEM WORK

This Agreement Regarding Performance of Rain Water Leader System Work (the "Agreement"), is entered into on the 19 day of September, 2013, by and among Performing Arts Center Builders, J.V. ("PAC Builders"), Miami-Dade County, Florida (the "County") and the Performing Arts Center Trust (the "PACT") (and, collectively, the "Parties").

RECITALS

WHEREAS, on or about September 11, 2001, the County and PAC Builders entered into an "Amended Agreement Between Miami-Dade County and Construction Manager with a Guaranteed Maximum Price" in connection with the construction of the Performing Arts Center of Greater Miami (the "Performing Arts Center") and

WHEREAS, on or about July 23, 2004, the County and PAC Builders executed "Change Order 73 to Amended Agreement Between Miami-Dade County and Construction Manager, Project No. 9501, Dated September 11, 2001, to Provide for Services as Agency Construction Manager" (the September 11, 2011 and Change Order 73 collectively referred to herein as the "Amended Agreement"), and

WHEREAS, on May 20, 2012, flooding occurred at to the Performing Arts Center; and

WHEREAS, on or about February 7, 2013, Slider Engineering Group ("SEG") issued a report entitled "Storm Water System Failure Engineering Evaluation" (the "Report") to the County regarding alleged defects in the rain water leader ("RWL") system at the Performing Arts Center, and

WHEREAS, the County and PAC Builders disagree on the ultimate cause of this flooding, as PAC Builders believes that this failure was caused by a lack of redundancy in the RWL system and it is the County's position that the failure was caused by the defects outlined in the Report; and

WHEREAS, on or about April 8, 2013, the County and PAC Builders entered into a "Section 558 Letter Agreement" (a copy of which is attached hereto as Attachment A) pursuant to which PAC Builders, subject to the methodology and conditions set forth in the letter agreement, agreed to perform an agreed upon scope of work to address the findings in the Report, and

WHEREAS, following inspections of the RWL system of the Performing Arts Center performed pursuant to the Section 558 Letter Agreement, the Parties developed an agreed upon scope of work for sway bracing, pipe hangers, vertical support/riser clamps, and the replacement of old couplings (the "Agreed Scope of Work"). The Parties, however, were unable to develop an agreed upon scope of work for joint restraints (the "Joint Restraint Scope of Work") at the Performing Arts Center, and

WHEREAS, the Parties have agreed upon a procedure for resolving the Joint Restraint Scope of Work, and

WHEREAS, upon full execution, this Agreement shall supersede the April 8, 2013 "Section 558 Letter Agreement", and

BHR

WHEREAS, the Amended Agreement, including Change Order 73, remains in full force and effect, and

WHEREAS, PAC Builders was not and is not the designer of the Performing Arts Center project and is not the designer of any of the work required to be performed under a decision of the independent third party engineer/arbitrator as described below, and

WHEREAS, the County is designing and constructing a code compliant redundant system for removing water from the overflow system devices on the roofs of the Performing Arts Center., and

NOW THEREFORE, in consideration of the agreements contained herein, the Parties have agreed as follows upon the terms and subject to the conditions herein contained:

TERMS AND CONDITIONS

1. The Recitals set forth above are true and accurate and incorporated herein by reference.

2. Subject to paragraph 6 below, PAC Builders shall perform the Agreed Upon Scope of Work set forth in Paragraph 2(A), below, and the Joint Restraint Scope of Work set forth in Paragraph 2(B) (collectively, "the Work"), below, in full and complete resolution of the RWL system issues, including those raised by SEG in the Report. Without waiving its rights against insurers or its subcontractors, PAC Builders shall be responsible for all costs, indirect or direct, associated with the permitting and performance of this Work, unless specifically excluded herein; with the exception that PAC Builders shall not be responsible for any costs of the PACT or the County or their consultants. PAC Builders shall coordinate the Work with the PACT and shall use reasonable efforts to minimize the impact the Work has on Performing Arts Center performances and events, which efforts may, as agreed and coordinated between the Parties, include but are not limited to multiple mobilizations or night work. The remedial drywall and other finish work shall be restored as they existed prior to the performance of the Work. The County shall engage an Acoustic Engineer to review the Work and design any necessary acoustic requirements for the Work included in Paragraph 2(A) and 2(B). PAC Builders shall perform, at its cost and expense, the installation of acoustic requirements for all items in the immediate vicinity of the particular element of the Work included to the extent of the acoustic requirements previously installed on similar items of work during the original construction. The Acoustic Engineer shall review the installation to ensure that the Work does not compromise the existing acoustic properties of the facility; the parties contemplate that these acoustic requirements will typically be, but are not necessarily limited to, baffling, insulation, matting, or other local means of vibration control.

(A) Agreed Upon Scope of Work. PAC Builders shall perform the following scope of work at the Performing Arts Center, agreed upon by the Parties, and as more fully described in Attachment B hereto:

Description	Ballet Opera House	Concert Hall
Sway bracing	8 braces	2 braces
Pipe hangers	4 hangers	1 hanger

Vertical support/riser clamps	1 clamp	0 clamps
Misc.--replace old couplings	1 item	7 items

(B) Joint Restraint Scope of Work. The scope of work pertaining to joint restraints shall be resolved on a binding basis by Jorge Reyes, P.E., TLC Engineering, 5757 Blue Lagoon Drive, Suite 400, Miami, Florida 33126, or Rafael Pena, Jr., P.E., RPJ Inc., 4977 SW 74th Ct., Miami, Florida 33155, or such other independent third-party engineer/arbitrator as may be agreed upon by the Parties, the costs of which shall be shared equally by the County and PAC Builders. The Parties shall mutually agree upon a not-to-exceed cost for such engineer/arbitrator prior to his hiring. The aspects of this Agreement relating to the independent third-party engineer/arbitrator are considered an agreement to arbitrate as provided in the Florida Arbitration Code and the arbitration process shall be conducted as follows:

(i) The independent third-party engineer/arbitrator's assessment shall be based on a review of the RWL system at the Performing Arts Center, the design drawings and specifications (including specified manufacturers' requirements), codes, and industry standards-of-care applicable to the Amended Agreement;

(ii) The February 7, 2013 SEG Report shall be the County's expert report. PAC Builders shall provide its experts report(s) no later than 10 days before the hearing commences. The County and PAC Builders shall: (a) submit their positions in writing at least 5 days before the hearing commences; and (b) make a presentation to the independent third-party engineer/arbitrator, with experts being sworn under oath and subject to cross-examination. The engineer/arbitrator may allow oral or written rebuttal, at his discretion. The presentation for each party shall not exceed four hours. Prior to any presentations, the engineer/arbitrator shall conduct a field inspection, in the presence of representatives of the Parties. The engineer/arbitrator shall issue his report with ten days of the close of presentations, unless otherwise agreed to by the Parties.

(iii) The independent third-party engineer/arbitrator shall consider whether (A) joint restraints are required at every joint at every change of pipe direction or, if restraints are not required at every joint, if (B) joint restraints are required at specific locations based on an engineering evaluation on a case-by-case basis. In the event that the engineer/arbitrator determines that all or some joints at the PAC are required to be restrained, the engineer/arbitrator shall identify the appropriate restraints for such joints; and

(iv) The decision from the independent third-party engineer/arbitrator on the Joint Restraint Scope of Work shall be as follows:

Based on a review of the RWL system at the Performing Arts Center of Greater Miami, the design drawings and specifications, applicable codes and industry standards-of-care, the implementation of my developed attached scope of work (joint restraints only) was required by PAC Builders under its Amended Agreement, including Change Order 73, with the County.

The engineer/arbitrator shall not base his decision on a statutes of limitations defense. PAC Builders will not raise as a defense in this engineer/arbitrator process only that the approval of its previous shop drawings or other submittals for what is currently installed is decisive on the ultimate issue as set for the above; however, PAC Builders shall be permitted to argue that the approval of its shop drawings and other submittals reflected a certain interpretation of the existing design drawings and specifications, applicable codes and industry standards-of-care.

(v) The independent third-party engineer/arbitrator shall have no liability to the Parties to this Agreement

3. The hearing shall be held in Miami, Florida.

4. PAC Builders obligation under this Agreement is solely to install, at its cost, the items described in Paragraph 2(A), above, and pursuant to the findings of the independent engineer/arbitrator, the joint restraints under Paragraph 2(B), above (referred to collectively as "the Work"). PAC Builders shall not be construed to be designer of the Work; notwithstanding, PAC Builders shall at its cost provide all shop drawings needed for performance of the Work which shall be reviewed and approved by the County and the acoustic engineer. PAC Builders shall allow the County, for purposes of inspection, reasonable access to the Work throughout its installation, and PAC Builders shall not close any portion of the Work until such Work has been inspected by the County. The County shall provide inspectors so as not to delay the Work. Given that the County will have these inspection opportunities, the County and the PACT will be deemed as having fully accepted (except for latent construction defects) the Work as the installation is completed with PAC Builders having no warranty obligation or obligation to correct or otherwise perform additional tasks regarding the Work.

5. The decision of the independent third-party engineer/arbitrator relating to the Joint Restraint Scope of Work shall be final and binding, and judgment may be entered upon it in accordance with the Florida Arbitration Code.

6. PAC Builders shall execute, deliver to the County and record in the public records the necessary statutory payment and performance bonds in accordance with Section 255.05 of the Florida Statutes prior to performing any work. PAC Builders shall procure at its cost all applicable building permits for the Work. Additionally, PAC Builders shall maintain, during the performance of the Work, insurance as specified n Attachment C.

7. The Parties do not waive and expressly reserve any claims, rights and/or defenses they may have in connection with the costs and expenses incurred prior to the date of this Agreement by the County or PACT in connection with the alleged RWL system defects, including

the costs of containing and repairing the damage caused to the Performing Arts Center by the flooding that occurred on May 20, 2012, and including their respective theories of causation of the May 20, 2012 incident as reflected in the fifth WHEREAS. Although in consideration of this Agreement and its performance, the Parties waive any and all rights, actions and causes of action that they may have against each other and their partners, subcontractors, sureties and insurers and their current and former officers, directors, employees and representatives with respect to the defects to the RWL system that the Work to be performed by PAC Builders is intended to correct, including those raised by SEG in the Report, the Parties do not waive any claims, rights and/or defenses they may have in connection with the costs and expenses incurred prior to the date hereof by the County or PACT in connection with the alleged defects. Neither the execution of this Agreement nor the work to be performed under this Agreement shall be used by any of the Parties, including the PACT, to claim or otherwise assert that any statute of limitation defense of any Party has not run or expired. The waiver in this Paragraph shall only apply to claims, rights, and causes of action related to the RWL system, and nothing herein shall be construed as a waiver of any other claims, rights, or causes of action held by the Parties pursuant to the Contract with respect to any other aspect of the Performing Arts Center or the Amended Agreement.

8. The terms of this Agreement reflect the resolution of contested and disputed claims, allegations and assertions, and the Parties have entered into this Agreement principally to avoid the time, expense and aggravation of litigation. The Parties acknowledge and agree that neither party acknowledges or admits that it was guilty of any wrongdoing of any kind. The Parties acknowledge and agree that by entering into this Agreement or by agreeing to be bound to the decision of the independent third-party engineer/arbitrator, PAC Builders does not admit or confirm any of the claims, allegations, assertions or opinions of the County or PACT and the County does not admit or confirm any of the claims, allegations, assertions or opinions of PAC Builders. The Parties agree that they will not offer or tender this Agreement, any record of the negotiations leading up to this Agreement, the County Mayor's memorandum to the Board of County Commissioners concerning this Agreement, the Board of County Commissioner's deliberation of this Agreement, or the decision of the independent third-party engineer/arbitrator into evidence in any proceeding between or among them or their insurers, including a proceeding by the County or PACT, or an insurer of the County or PACT, regarding the costs and expenses already incurred by the County or PACT in connection with the alleged defects. Notwithstanding the preceding, PAC Builders expressly acknowledges that this Agreement and the decision of the engineer/arbitrator are public records as defined in Florida Statutes, and the County may, without liability and upon request for such public records, provide such documents to third parties. The limitation on the offering of this Agreement or the decision of the arbitrator into evidence does not apply to the Report.

9. The Parties further agree that this Agreement, the negotiations leading to the execution of this agreement, the County Mayor's memorandum to the Board of County Commissioners concerning this Agreement, the Board of County Commissioner's deliberation of this Agreement and the decision of the independent third-party engineer/arbitrator shall remain non-admissible and non-discoverable, as if they were part of a mediation process, in any proceeding of any kind, including a proceeding by the County or PACT or an insurer of the County or PACT (regardless of whether such proceeding involves other entities), except a proceeding between the Parties hereto for breach of this Agreement or except in a proceeding by PAC Builders against its subcontractors, or in any action to enforce the terms of this Agreement.

10. This Agreement shall be governed by, construed and interpreted in accordance with, the laws of the State of Florida.

11. This Agreement may be executed in counterparts. Signatures provided by facsimile or e-mail are acceptable and binding on the Parties.

12. This Agreement shall become effective ten days after its approval by the Board of County Commissioners.

IN WITNESS WHEREOF, the Parties have executed this Agreement on the date first above written.

MIAMI-DADE COUNTY

By: _____
Sign

_____
Print

Its: _____

Date: _____

PERFORMING ARTS CENTER TRUST

By: _____
Sign

_____
Print

Its: _____

Date: _____

PERFORMING ARTS CENTER BUILDERS, J.V.

By: Brad H Rinzler for Luiz Simon
Sign

Brad H Rinzler for Luiz Simon
Print

Its: Project Executive

Date: 19 Sep 13

Attachment A

COUNTY ATTORNEY
MIAMI-DADE COUNTY, FLORIDA

111 N.W. 1 ST., SUITE 2810
MIAMI, FLORIDA 33128-1993
TEL. (305) 375-5151
FAX (305) 375-3911

April 8, 2013

James E. Moye, Esq.
Moye, O'Brien, O'Rourke, Pickert & Dillon, LLP
800 South Orlando Avenue
Maitland, Florida 32751

Section 558[1] Letter Agreement

Re: Adrienne Arsht Center for the Performing Arts of Miami-Dade County ("Arsht Center")

The following proposal is made by the County to PAC Builders to address the findings of the Slider Engineering Report titled Storm Water System Failure Engineering Evaluation dated February 7, 2013 (the "Report") at the Arsht Center.

1. Subject to the methodology and conditions described below, PAC Builders agrees to perform the agreed upon scope of work (the "Scope of Work") to address the findings of the Report and using the Report as a guideline.

(a) Inspections. The Scope of Work shall be developed in the following manner and in coordination with the Performing Arts Center Trust (the "PACT") in order to minimize the impact to the operations of the Arsht Center: (1) the Parties will identify the specific locations of the storm drain piping; (2) the Parties will determine the means of access to the storm water piping system; (3) the Parties will jointly inspect the storm water piping; (4) following the inspections, PAC Builders will restore the areas to a finished condition acceptable to the PACT and the County; and (5) PAC Builders will be solely responsible for all costs associated with identifying such access, establishing access and restoring the areas to a finished condition acceptable to the PACT and the County, including the costs of any necessary destructive testing; with the exception of any costs of PACT or the County or their consultants.

(b) Scope of Work. Within 20 days after completion of the Inspections, the County shall deliver to PAC Builders a Scope of Work plan, including a proposed schedule and phasing plan to accomplish the work with minimum impact to the facility. PAC Builders shall approve, reject or approve in part the Scope of Work plan. In the event the Parties agree upon a Scope of Work plan, PAC Builders shall perform all of the work described in the Scope of Work plan (the "Work") in accordance with the agreed upon schedule and plan. In the event such an agreement is reached, PAC Builders shall be responsible for all costs, indirect or direct, associated

[1] This Agreement is not an admission that Section 558 is applicable to this Project.

BHR

with the performance of the Work; with the exception of any costs of PACT or the County or their consultants. PAC Builders shall not perform any of the Work without a prior written agreement of the Parties. Notwithstanding any other provision of this Agreement, in the event the Parties do not agree upon a written Scope of Work plan within 60 days from the date of this letter, the County may perform the Work and any other necessary repairs to the Arsht Center through other means with both Parties fully reserving their rights against each other, including with respect to any disagreements with the Scope of Work.

(c) PAC Builders shall coordinate the Work with the Performing Arts Center Trust and shall use best efforts to minimize the impact the Work has on Arsht Center performances and events.

(d) PAC Builders shall execute, deliver to the County and record in the public records the necessary statutory payment and performance bonds in accordance with Section 255.05 of the Florida Statutes prior to performing any work.

2. The Parties do not waive any rights and/or defenses they may have in connection with the costs and expenses already incurred by the County in connection with these alleged defects. The County further reserves any rights to recover the incremental costs to the County from the continued engagement of its Consulting Engineers, the costs of its staff engaged in the activities set forth in this plan, and other reasonable third party costs incurred to address the Work.

3. The Parties agree that any statutory, contractual, equitable or other deadlines that the Parties may have to bring a lawsuit or a claim against each other in connection with the storm water drainage system at the Arsht Center and any damages and costs associated with this system shall be tolled until completion of the Work.

4. Any final resolution of this matter that conclusively allocates costs or liability or that waives any rights or defenses may be subject to Board of County Commissioners approval.

5. The Parties agree that that this settlement offer is made in privilege, and nothing contained herein shall be deemed admissible in any court or proceeding, including any Florida state or federal court.

Sincerely,

Danny Frastai
Assistant County Attorney

BHR

I confirm my agreement and acceptance to the terms listed in this letter,

For and on behalf of Miami-Dade County

LISA MARTINEZ

Print

Date 4/10/13

For and on behalf of PAC Builders

LUIZ SIMON

Print

Date 4/8/2013

cc: Lester Sola, Director
Miami-Dade County
Internal Services Dept.

BHR

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers

**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
31	Pipe	3"	1	B-P2.18	Intermediate	West MER	None	None	1				Brace 3" vent piping which appeared not to be sufficiently braced.
8	Pipe Sway Brace	4"	1	B-P2.07	Box Tier	Donor's Lounge	None	None	1				4" pipe appeared not to be solid or well braced - will add sway brace.
34.2	90 Elbow	5"	3	B-P2.19	Fourth Tier	Main Lobby	None	None	None			3	Pipe appeared to be solid and well supported. These 90 elbows pick-up RD above with short vertical drop from RD - no JR needed.
5	90 Elbow	6"	2	B-P2.04	Orchestra	Main Lobby	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow which may be subjected to thrust loads - JR to be specified. 2nd 90 is at the top of a riser and JR not needed.
5.1	45 Elbow	6"	1	B-P2.04	Orchestra	Main Lobby	None	None	None			1	Pipe found to be solid and well braced. Horizontal 45 elbow has no load, no thrust and no JR needed.
7	90 Elbow	6"	4	B-P2.07	Box Tier	Restaurant	None	None	None			4	Using access panels, confirmed that pipe was solid and well braced. Pipe run is above Venetian Plaster Ceiling. Pipe fittings are not at the base of a riser and not subjected to thrust loads - no JR needed.
7.1	45 Elbow	6"	1	B-P2.07	Box Tier	Restaurant	None	None	None			1	Pipe found to be solid and well braced. Vertical (turned down) 45 elbow has no load, no thrust and no JR needed.
7.3	Wye	6"	1	B-P2.07	Box Tier	Restaurant	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal and has no load, no thrust and no JR needed.
8.1	90 Elbow	6"	4	B-P2.07	Box Tier	Donor's Lounge	None	None	None			4	Pipe found to be solid and well braced. Elbow picks-up RD above. Primarily horizontal pipe, not a base 90 under tall riser. Has short vertical drop, no thrust load, no JR needed.
8.2	45 Elbow	6"	2	B-P2.07	Box Tier	Donor's Lounge	None	None	None			2	Pipe found to be solid and well braced. 45 elbow is horizontal pipe with no thrust load, no JR needed.
8.4	Wye	6"	2	B-P2.07	Box Tier	Donor's Lounge	None	None	None			2	Pipe found to be solid and well braced. Wye is horizontal pipe with no thrust load, no JR needed.
9.1	90 Elbow	6"	1	B-P2.07	Box Tier	Chorus Restroom	None	None	None		1		Pipe found to be solid and well braced. However, 90 elbow is at the bottom of a riser - JR to be specified.
9.2	45 Elbow	6"	1	B-P2.07	Box Tier	Chorus Restroom	None	None	None			1	Pipe found to be solid and well braced. 45 elbow is horizontal pipe with no thrust load, no JR needed.
9.3	Wye	6"	1	B-P2.07	Box Tier	Chorus Restroom	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal pipe with no thrust load, no JR needed.
10	90 Elbow	6"	3	B-P2.08	Box Tier	Chorus & Perf Lounge	None	None	None			3	Pipe found to be solid and well braced. One elbow picks-up RD above, not a base 90 under tall riser. Has short vertical drop from RD. Second 90 is horizontal and third 90 is at top of riser (turned down). These are not subjected to thrust loads, no JR needed.

Attachment B

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers

**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
10.1	45 Elbow	6"	2	B-P2.08	Box Tier	Chorus & Perf Lounge	None	None	None			2	Pipe found to be solid and well braced. 45 elbow is vertical turned down fitting with no thrust load, no JR needed.
11.2	90 Elbow	6"	1	B-P2.08	Box Tier	Chorus & Toilet	None	None	None			1	Pipe found to be solid and well braced. This 90 elbow picks-up RD above with short vertical drop from RD. Not subjected to thrust loads, no JR needed.
12	90 Elbow	6"	1	B-P2.08	Box Tier	Children's	None	None	None			1	Pipe found to be solid and well braced. 90 elbow picks-up RD above, not a base 90 under tall riser. Has short vertical drop from RD and not subjected to thrust loads, no JR needed.
13.1	90 Elbow	6"	1	B-P2.09	Box Tier	Mechanical Room	None	None	None			1	Pipe found to be solid and well braced. 90 elbow picks-up small RD above with short vertical drop from RD and not subjected to thrust loads, no JR needed.
14	90 Elbow	6"	2	B-P2.09	Box Tier	Mechanical Room	None	None	None			2	Pipe found to be solid and well braced. One elbow picks-up RD above with short vertical drop from RD - no JR needed. Second 90 is at the top of riser (turned down). These are not subjected to thrust loads, no JR needed.
14.1	45 Elbow	6"	2	B-P2.09	Box Tier	Mechanical Room	None	None	None			2	Pipe found to be solid and well braced. 45 elbow is horizontal pipe with no thrust load, no JR needed.
17	90 Elbow	6"	3	B-P2.09	Box Tier	Studio Storage	None	None	None			3	Pipe found to be solid and well braced. One 90 elbow picks-up RD above with short vertical drop from RD - no JR needed. Other 90s are at the top of riser (turned down). These are not subjected to thrust loads, no JR needed.
17.1	45 Elbow	6"	11	B-P2.09	Box Tier	Studio Storage	None	None	None			11	Pipe found to be solid and well braced. 45 elbows are horizontal pipe with no thrust load, no JR needed.
17.3	Wye	6"	1	B-P2.09	Box Tier	Studio Storage	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
18	90 Elbow	6"	3	B-P2.12	Second Tier	West MER	None	None	None			3	Pipe found to be solid and well braced. One 90 elbow picks-up RD above with short vertical drop from RD - no JR needed. Second 90 is at the top of riser (turned down). Third 90 is horizontal with no thrust load. These are not subjected to thrust loads, no JR needed.
19.2	90 Elbow	6"	3	B-P2.14	Second Tier	Chiller Plant	None	None	None			3	Pipe found to be solid and well braced. 90 elbows pick-up RD above with short vertical drop from RD - no JR needed.
19.3	45 Elbow	6"	2	B-P2.14	Second Tier	Chiller Plant	None	None	None			2	Pipe found to be solid and well braced. 45 elbows are horizontal pipe with no thrust load, no JR needed.
19.5	Wye	6"	1	B-P2.14	Second Tier	Chiller Plant	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
22.1	90 Elbow	6"	1	B-P2.15	Third Tier	West MER	None	None	None		1		Piping found solid and well braced. 90 elbow is a base 90 at bottom of riser and should have JR specified.

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers

**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
22.2	45 Elbow	6"	3	B-P2.15	Third Tier	West MER	None	None	None			3	Pipe found to be solid and well braced. 45 elbows are horizontal pipe with no thrust load, no JR needed.
22.4	Wye	6"	1	B-P2.15	Third Tier	West MER	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
23	90 Elbow	6"	1	B-P2.16	Third Tier	Ken's Office	None	None	None			1	Piping found solid and well braced. 90 elbow is at the top of a riser (turned down) and not subjected to thrust loads - no JR.
23.1	Wye	6"	1	B-P2.16	Third Tier	Ken's Office	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
24.2	90 Elbow	6"	1	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None		1		Piping appeared to be solid and well braced. 90 elbow is a base 90 at bottom of riser and should have JR specified.
24.6	Wye	6"	1	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None			1	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.
25.4	90 Elbow	6"	2	B-P2.16	Third Tier	Mech Duct Space	None	None	None			2	Pipe found to be solid and well braced. 90 elbows pick-up RD above with short vertical drop from RD. No thrust loads - no JR needed.
25.8	Wye	6"	1	B-P2.16	Third Tier	Mech Duct Space	None	None	None			1	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.
26	90 Elbow	6"	2	B-P2.17	Intermediate	East MER	None	None	None			2	Pipe found to be solid and well braced and tight to the slab. One 90 elbow picks-up RD above with short vertical drop from RD - no JR needed. Second 90 is horizontal with no thrust load. These are not subjected to thrust loads, no JR needed.
29	45 Elbow	6"	2	B-P2.17	Intermediate	West MER	None	None	None			2	Pipe found to be solid and well braced. 45 elbows are vertical with no thrust load, no JR needed.
30	90 Elbow	6"	2	B-P2.18	Intermediate	West MER	None	None	None			2	Pipe found to be solid and well braced. One 90 elbow picks-up RD above with short vertical drop from RD - no JR needed. Second 90 is horizontal with no thrust load. These are not subjected to thrust loads, no JR needed.
30.1	45 Elbow	6"	3	B-P2.18	Intermediate	West MER	None	None	None			3	Pipe found to be solid and well braced. 45 elbow is horizontal pipe with no thrust load, no JR needed.
32	90 Elbow	6"	2	B-P2.18	Intermediate	North MER	None	None	None			2	Piping found solid and well braced. 90 elbow is at the top of a riser (turned down) and second 90 elbow is horizontal - not subjected to thrust loads - no JR.
32.1	Wye	6"	2	B-P2.18	Intermediate	North MER	None	None	None			2	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.
33.1	90 Elbow	6"	1	B-P2.18	Intermediate	East Duct Space	None	None	None			1	Pipe found to be solid and well braced tight to structure. 90 elbow picks-up RD above with short vertical drop from RD - no JR needed.

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PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers
**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
36.3	90 Elbow	6"	4	B-P2.21	Attic	Lower Attic	None	None	None			4	Pipe found to be well supported and braced. These 90 elbows pick-up RD/trench above with short vertical drop from RD - no JR needed.
37.3	90 Elbow	6"	1	B-P2.22	Attic	North Attic Above IT Area	None	None	None			1	Pipe found to be well supported and braced tight to structure. These 90 elbows are horizontal and not subjected to thrust loads - no JR needed.
37.9	Wye	6"	3	B-P2.22	Attic	North Attic Above IT Area	None	None	None			3	Pipe found to be well supported and braced tight to structure. Wye is horizontal and not subjected to thrust loads - no JR needed.
38.4	90 Elbow	6"	2	B-P2.24	Attic	Upper Attic	None	None	None			2	Pipe found to be well supported and braced. These 90 elbows pick-up RD above with short vertical drop from RD - no JR needed.
38.6	45 Elbow	6"	3	B-P2.24	Attic	Upper Attic	None	None	None			3	Pipe found to be well supported and braced tight to structure. These 45 elbows are horizontal and not subjected to thrust loads - no JR needed.
38.8	Wye	6"	1	B-P2.24	Attic	Upper Attic	None	None	None			1	Pipe found to be well supported and braced tight to structure. Wye is horizontal and not subjected to thrust loads - no JR needed.
4	90 Elbow	8"	2	B-P2.04	Orchestra	Main Lobby	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow which may be subjected to thrust loads - JR to be specified. 2nd 90 is at the top of a riser and JR not needed.
4.1	45 Elbow	8"	1	B-P2.04	Orchestra	Main Lobby	None	None	None			1	Pipe found to be solid and well braced. Horizontal 45 elbow has no load, no thrust and no JR needed.
4.2	Wye	8"	1	B-P2.04	Orchestra	Main Lobby	None	None	None			1	Pipe found to be solid and well braced. Horizontal wye has no load, no thrust and no JR needed.
9	90 Elbow	8"	1	B-P2.07	Box Tier	Chorus Restroom	None	None	None			1	Pipe found to be solid and well braced. 90 elbow is vertical (turned down) fitting with no thrust load, no JR needed.
13.4	Wye	8"	1	B-P2.09	Box Tier	Mechanical Room	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
15	90 Elbow	8"	1	B-P2.09	Box Tier	Mechanical Room	None	None	None		1		Piping found solid and well braced. 90 elbow is a base 90 at bottom of riser and should have JR specified.
15.1	45 Elbow	8"	3	B-P2.09	Box Tier	Mechanical Room	None	None	None			3	Pipe found to be solid and well braced. 45 elbows are horizontal pipe with no thrust load, no JR needed.
16	90 Elbow	8"	3	B-P2.09	Box Tier	Studio Theater	None	None	None			3	Pipe found to be solid and well braced to the CMU wall. Not base 90s subjected to thrust loads - no JR needed.
16.1	45 Elbow	8"	1	B-P2.09	Box Tier	Studio Theater	None	None	None			1	Pipe found to be solid and well braced to the CMU wall. Not base fitting subjected to thrust loads - no JR needed.

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PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers

**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
17.2	Wye	8"	1	B-P2.09	Box Tier	Studio Storage	None	None	None			1	Pipe found to be solid and well braced. This wye is a vertical (turned down) fitting with no thrust load, no JR needed.
19	Pipe	8"	1	B-P2.14	Second Tier	Chiller Plant	None	1	None				Adjust Riser Clamp to slab.
19.1	90 Elbow	8"	2	B-P2.14	Second Tier	Chiller Plant	None	None	None			2	Pipe found to be solid and well braced. One 90 elbow is at the top of riser (turned down). Second is a fitting on a well supported horizontal run. These are not subjected to thrust loads, no JR needed.
19.4	Wye	8"	1	B-P2.14	Second Tier	Chiller Plant	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
20	90 Elbow	8"	4	B-P2.14	Second Tier	East Storage	None	None	None			4	This is an OFD that spills on a lower roof. 90 elbows pick-up RD above with short vertical drop from RD and spills onto a lower roof. These are well supported and braced and are not subjected to thrust loads, no JR needed.
22	90 Elbow	8"	1	B-P2.15	Third Tier	West MER	None	None	None			1	Piping found solid and well braced. 90 elbow is at the top of a riser (turned down) and not subjected to thrust loads - no JR.
22.3	Wye	8"	1	B-P2.15	Third Tier	West MER	None	None	None		1		Piping found solid and well braced. Wye is a 8" diameter wye at the end of a pipe run which may be subjected to thrust load - should have JR specified.
24.1	90 Elbow	8"	1	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None			1	Piping found solid and well braced. 90 elbow is horizontal and not subjected to thrust loads - no JR.
24.5	Wye	8"	1	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None			1	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.
25.3	90 Elbow	8"	3	B-P2.16	Third Tier	Mech Duct Space	None	None	None		3		Piping appeared to be solid and well braced. 90 elbows are base 90s at the bottom of risers and should have JRs specified.
25.5	45 Elbow	8"	1	B-P2.16	Third Tier	Mech Duct Space	None	None	None			1	Pipe found to be solid and well braced. 45 elbow is horizontal pipe with no thrust load, no JR needed.
25.7	Wye	8"	2	B-P2.16	Third Tier	Mech Duct Space	None	None	None			2	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.
30.2	Wye	8"	1	B-P2.18	Intermediate	West MER	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
31.1	Pipe	8"	1	B-P2.18	Intermediate	West MER	None	None	1				Pipe found not sufficiently braced. Install a brace on OFD to column
33	90 Elbow	8"	1	B-P2.18	Intermediate	East Duct Space	None	None	None			1	Piping found solid and well braced tight to structure. 90 elbow is at the top of a riser (turned down) - not subjected to thrust loads - no JR.
33.2	45 Elbow	8"	1	B-P2.18	Intermediate	East Duct Space	None	None	None			1	Pipe found to be solid and well braced tight to structure. 45 elbow is horizontal pipe with no thrust load, no JR needed.

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers

**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
33.3	Wye	8"	1	B-P2.18	Intermediate	East Duct Space	None	None	None			1	Pipe found to be solid and well braced tight to structure. Wye is horizontal pipe with no thrust load, no JR needed.
34.1	90 Elbow	8"	2	B-P2.19	Fourth Tier	Main Lobby	None	None	None			2	Pipe appeared to be solid and well supported. Both 90 degree elbows are horizontal and are not subjected to thrust loads - no JR.
34.4	45 Elbow	8"	3	B-P2.19	Fourth Tier	Main Lobby	None	None	None			3	Pipe appeared to be solid and well supported. Elbows are horizontal and are not subjected to thrust loads - no JR.
34.6	Wye	8"	4	B-P2.19	Fourth Tier	Main Lobby	None	None	None			4	Pipe appeared to be solid and well supported tight to structure. Wyes are horizontal to pick up roof drains and are not subjected to thrust loads - no JR.
35	90 Elbow	8"	3	B-P2.20	Fourth Tier	Above Dimmer & IT East	None	None	None			3	Piping found solid and well braced. Two 90 elbows are horizontal and subjected to no thrust loads - no JR. One 90 elbow is at the top of a riser (turned down) - not subjected to thrust loads - no JR.
35.1	45 Elbow	8"	2	B-P2.20	Fourth Tier	Above Dimmer & IT East	None	None	None			2	Pipe appeared to be solid and well supported. Elbows are horizontal and are not subjected to thrust loads - no JR.
35.2	Wye	8"	1	B-P2.20	Fourth Tier	Above Dimmer & IT East	None	None	None			1	Pipe appeared to be solid and well supported. Wye is horizontal and are not subjected to thrust loads - no JR.
36.2	90 Elbow	8"	4	B-P2.21	Attic	Lower Attic	None	None	None			4	Pipe found to be well supported and braced. These 90 elbows are horizontal and not subjected to thrust loads - no JR.
36.5	45 Elbow	8"	2	B-P2.21	Attic	Lower Attic	None	None	None			2	Pipe found to be well supported and braced. These 45 elbows are horizontal and not subjected to thrust loads - no JR needed.
36.7	Wye	8"	1	B-P2.21	Attic	Lower Attic	None	None	None			1	Pipe found to be well supported and braced. Wye is horizontal and not subjected to thrust loads - no JR needed.
37.5	45 Elbow	8"	5	B-P2.22	Attic	North Attic Above IT Area	None	None	None			5	Pipe found to be well supported and braced tight to structure. These 45 elbows are horizontal and not subjected to thrust loads - no JR needed.
37.8	Wye	8"	2	B-P2.22	Attic	North Attic Above IT Area	None	None	None			2	Pipe found to be well supported and braced tight to structure. Wye is horizontal and not subjected to thrust loads - no JR needed.
38.1	Pipe	8"	1	B-P2.24	Attic	Upper Attic	1	None	None				Provide hanger at 8" wye for added support.
38.3	90 Elbow	8"	1	B-P2.24	Attic	Upper Attic	None	None	None			1	Pipe found to be well supported and braced tight to structure. 90 elbow is horizontal and not subjected to thrust loads - no JR needed.
38.5	45 Elbow	8"	3	B-P2.24	Attic	Upper Attic	None	None	None			3	Pipe found to be well supported and braced tight to structure. These 45 elbows are horizontal and not subjected to thrust loads - no JR needed.

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

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**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
38.7	Wye	8"	4	B-P2.24	Attic	Upper Attic	None	None	None			4	Pipe found to be well supported and braced tight to structure. Wye is horizontal and not subjected to thrust loads - no JR needed.
1	90 Elbow	10"	2	B-P2.03	Orchestra	Main Lobby	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow which may be subjected to thrust loads - JR to be specified. 2nd 90 is at the top of a riser and JR not needed.
3	90 Elbow	10"	2	B-P2.03	Orchestra	Main Lobby	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow which may be subjected to thrust loads - JR to be specified. 2nd 90 is at the top of a riser and JR not needed.
3.1	45 Elbow	10"	2	B-P2.03	Orchestra	Main Lobby	None	None	None			2	Pipe found to be solid and well braced. Horizontal 45 elbow has no load, no thrust and no JR needed.
6	90 Elbow	10"	3	B-P2.05	Orchestra	Loading Dock	None	None	None			3	Was able to confirm a portion of the pipe was solid and well braced. A portion was above loading dock stucco ceiling and could not be seen. The entire pipe run is primarily horizontal and not subjected to thrust loads with no JR needed. Could access elbow near column line HK by cutting in a new AP if needed.
6.1	Wye	10"	1	B-P2.05	Orchestra	Loading Dock	None	None	None			1	Was able to confirm the pipe was solid and well braced. The pipe run is primarily horizontal and not subjected to thrust loads with no JR needed.
8.3	Wye	10"	1	B-P2.07	Box Tier	Donor's Lounge	None	None	None			1	Pipe found to be solid and well braced. Wye fitting is vertical (turned-down) no thrust load, no JR needed.
13	90 Elbow	10"	2	B-P2.09	Box Tier	Mechanical Room	None	None	None		1	1	Piping found solid and well braced. One 90 elbow is a base 90 at bottom of riser and should have JR specified. Second base 90 elbow is top of riser (turned down) and not subjected to thrust load - no JR needed.
13.2	45 Elbow	10"	1	B-P2.09	Box Tier	Mechanical Room	None	None	None			1	Pipe found to be solid and well braced. 45 elbow is horizontal pipe with no thrust load, no JR needed.
13.3	Wye	10"	1	B-P2.09	Box Tier	Mechanical Room	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
24	90 Elbow	10"	1	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None			1	Piping found solid and well braced. 90 elbow is at the top of a riser (turned down) and not subjected to thrust loads - no JR.
24.3	45 Elbow	10"	3	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None			3	Pipe found to be solid and well braced. 45 elbows are horizontal pipe with no thrust load, no JR needed.
24.4	Wye	10"	2	B-P2.16	Third Tier	Chiller Plant & CEO	None	None	None			2	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

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**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
34	90 Elbow	10"	2	B-P2.19	Fourth Tier	Main Lobby	None	None	None			2	Pipe appeared to be solid and well braced tight to concrete shear wall. Both 90 degree elbows are horizontal and are not subjected to thrust loads - no JR.
34.3	45 Elbow	10"	4	B-P2.19	Fourth Tier	Main Lobby	None	None	None			4	Pipe appeared to be solid and well supported. Elbows are horizontal and are not subjected to thrust loads - no JR.
34.5	45 Elbow	10"	4	B-P2.19	Fourth Tier	Main Lobby	None	None	None			4	Pipe appeared to be solid and well supported. Elbows are horizontal and are not subjected to thrust loads - no JR.
34.6	Wye	10"	6	B-P2.19	Fourth Tier	Main Lobby	None	None	None			6	Pipe appeared to be solid and well supported. Wyes are horizontal and are not subjected to thrust loads - no JR.
37	Pipe	10"	1	B-P2.22	Attic	North Attic Above IT Area	None	None	1				Pipe found not to be sufficiently braced. Pipe to be braced to beams/columns.
37.2	90 Elbow	10"	3	B-P2.22	Attic	North Attic Above IT Area	None	None	None		3		Piping appeared to be solid and well braced. 90 elbows are base 90s at the bottom of tall risers and should have JRs specified.
37.4	45 Elbow	10"	2	B-P2.22	Attic	North Attic Above IT Area	None	None	None			2	Pipe found to be well supported and braced tight to structure. These 45 elbows are horizontal and not subjected to thrust loads - no JR needed.
37.7	Wye	10"	1	B-P2.22	Attic	North Attic Above IT Area	None	None	None			1	Pipe found to be well supported and braced tight to structure. Wye is horizontal and not subjected to thrust loads - no JR needed.
38	Pipe	10"	1	B-P2.24	Attic	Upper Attic	None	None	1				Need sway brace to structure to brace pipe.
38.2	90 Elbow	10"	1	B-P2.24	Attic	Upper Attic	None	None	None			1	Pipe found to be solid and well braced. 90 elbow is at the top of a riser (turned down) - not subjected to thrust loads - no JR.
38.7	Wye	10"	1	B-P2.24	Attic	Upper Attic	None	None	None			1	Pipe found to be well supported and braced tight to structure. Wye is horizontal and not subjected to thrust loads - no JR needed.
2	90 Elbow	12"	2	B-P2.03	Orchestra	Main Lobby	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow which may be subjected to thrust loads - JR to be specified. 2nd 90 is at the top of a riser and JR not needed.
7.2	Wye	12"	1	B-P2.07	Box Tier	Restaurant	None	None	None			1	Pipe found to be solid and well braced. Vertical (turned down) wye has no load, no thrust and no JR needed.
21	Pipe	12"	1	B-P2.15	Third Tier	East MER	1	None	None				Support for 12" wye fitting with unistrut.
21.1	90 Elbow	12"	2	B-P2.15	Third Tier	East MER	None	None	None		1	1	Piping found solid and well braced. First 90 elbow is a base 90 at bottom of riser and should have JR specified. Second 90 elbow is at the top of a riser (turned down) and not subjected to thrust loads - no JR.

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

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**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
21.2	Wye	12"	2	B-P2.15	Third Tier	East MER	None	None	None		1	1	Piping found solid and well braced. First wye is a large diameter 12" to 12" wye at the end of a pipe run which may be subjected to thrust load - should have JR specified. Second wye is a horizontal 6" to 12" wye not subjected to thrust loads - no JR.
25	Pipe	12"	1	B-P2.16	Third Tier	Mech Duct Space	1	None	None				Piping was supported by temporary scaffolding. Agreed to provide additional support under 12" wye.
25.1	NH Coupling	12"	1	B-P2.16	Third Tier	Mech Duct Space	None	None	None	1			Replace existing NH Coupling.
25.2	90 Elbow	12"	2	B-P2.16	Third Tier	Mech Duct Space	None	None	None		1	1	Piping found solid and well braced. One 90 elbow already has JR, but must replace the coupling. Second 90 elbow is at the top of a riser (turned down) and not subjected to thrust load - no JR needed.
25.6	Wye	12"	2	B-P2.16	Third Tier	Mech Duct Space	None	None	None			2	Pipe found to be solid and well braced. Wyes are horizontal with no thrust load, no JR needed.
27	90 Elbow	12"		B-P2.17	Intermediate	East Public Restroom	None	None	None				This line was repaired prior to closing GWB ceilings.
28	90 Elbow	12"		B-P2.17	Intermediate	Elev #8 Lobby	None	None	None				This line does not show offset in as-built. Was a straight vertical pipe in the field. No JR needed.
36	Pipe	12"	3	B-P2.21	Attic	Lower Attic	None	None	3				Pipe to be braced to trusses.
36.1	90 Elbow	12"	2	B-P2.21	Attic	Lower Attic	None	None	None			2	One 90 elbow is horizontal and not subjected to thrust loads - no JR. One 90 elbow is at the top of a riser (turned down) - not subjected to thrust loads - no JR.
36.4	45 Elbow	12"	3	B-P2.21	Attic	Lower Attic	None	None	None			3	Pipe found to be well supported and braced. These 45 elbows are horizontal and not subjected to thrust loads - no JR needed.
36.6	Wye	12"	1	B-P2.21	Attic	Lower Attic	None	None	None			1	Pipe found to be well supported and braced. Wye is horizontal and not subjected to thrust loads - no JR needed.
37.1	90 Elbow	12"	2	B-P2.22	Attic	North Attic Above IT Area	None	None	None		2		Piping appeared to be solid and well braced. 90 elbows are base 90s at the bottom of tall risers and should have JRs specified.
37.6	Wye	12"	2	B-P2.22	Attic	North Attic Above IT Area	None	None	None		2		Piping appeared to be solid and well braced. Wyes are at the end of long pipe runs and may be subjected to thrust loads. Should have JRs specified.
11	Pipe	15"	1	B-P2.08	Box Tier	Toilet	1	None	None				Pipe not found to be well braced. Will provide bridging hanger above restroom.
11.1	90 Elbow	15"	3	B-P2.08	Box Tier	Chorus & Toilet	None	None	None		1	2	Piping found solid and well braced. One 90 elbow above toilet room should have JR specified. Second base 90 elbow is fixed within CMU shaft wall - no JR needed. Third 90 elbow is top of riser (turned down) without thrust load - no JR needed.
11.3	45 Elbow	15"	2	B-P2.08	Box Tier	Chorus & Toilet	None	None	None			2	Pipe found to be solid and well braced. 45 elbows are horizontal pipe with no thrust load, no JR needed.

PAC Ballet Opera House Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

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**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
11.4	Wye	15"	1	B-P2.08	Box Tier	Chorus & Toilet	None	None	None			1	Pipe found to be solid and well braced. Wye is horizontal with no thrust load, no JR needed.
	TOTALS		258				4	1	8	1	25	219	

PAC Concert Hall Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

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**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Jointly Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
1	Additional bracket	4"	1	C-P2.01	Orchestra	Orch Lobby above elect rm	1	None	None				
14.2	Pipe	4"	1	C-P2.06	Box Tier	Women Dressing	None	None	1				4" pipe may need to be braced. Will confirm and install if needed.
2	90 Elbow	6"	2	C-P2.02	Orchestra	Conductors Office	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow should have JR specified. 2nd 90 is at the top of a riser and not subjected to thrust loads.
4	90 Elbow	6"	3	C-P2.02	Orchestra	Soloist Dressing	None	None	None		1	2	Pipe found to be solid and well braced. Base 90 JR difficult but can be done. Other horizontal 90s above ductwork have no thrust loads and no JR needed.
6	22.5 Elbow	6"	2	C-P2.03	Orchestra	Laundry Room	None	None	None			2	Pipe found to be solid and well braced. These are offset fittings on vertical riser. No thrust. Need to relocate laundry furniture to access.
9.1	90 Elbow	6"	1	C-P2.03	Orchestra	Workshop Classroom	None	None	None			1	Pipe found to be solid and well braced. Elbow picks-up RD above. Not a base 90, short vertical drop, no thrust load, no JR needed.
9.2	45 Elbow	6"	2	C-P2.03	Orchestra	Workshop Classroom	None	None	None			2	Horizontal 45 elbow. Pipe found to be solid and well braced. No thrust load, no JR needed.
11	90 Elbow	6"	1	C-P2.05	Box Tier	Choral Assembly	None	None	None			1	Pipe found to be solid and well braced. Fittings are either horizontal or are turning down, i.e. subjected to no thrust load; no JR needed.
11.1	45 Elbow	6"	2	C-P2.05	Box Tier	Choral Assembly	None	None	None			2	Fittings are either horizontal or are turning down, i.e. subjected to no thrust load; no JR needed. Pipe found to be solid and well braced.
11.2	Wye	6"	1	C-P2.05	Box Tier	Choral Assembly	None	None	None			1	Fittings are either horizontal or are turning down, i.e. subjected to no thrust load; no JR needed. Pipe found to be solid and well braced.
14	90 Elbow	6"	2	C-P2.06	Box Tier	Women Dressing	None	None	None			2	Pipe found to be solid and well braced. Fittings are either horizontal or are turning down, i.e. subjected to no thrust load; no JR needed.
14.1	Wye	6"	1	C-P2.06	Box Tier	Women Dressing	None	None	None			1	Fitting is horizontal, i.e. subjected to no thrust load; no JR needed. Pipe found to be solid and well braced.
20	90 Elbow	6"	3	C-P2.11	Third Tier	Lobby & Restroom East	None	None	None		1	2	Pipe found to be solid and well braced. Base 90 elbow under riser - JR to be specified. Horizontal 90 elbow and 90 degree elbow that turns down (top of riser) has no thrust load and no JR needed.
20.1	45 Elbow	6"	5	C-P2.11	Third Tier	Lobby & Restroom East	None	None	None			5	Pipe found to be solid and well braced. Fittings are horizontal, i.e. subjected to no thrust loads; no JR needed.

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							Jointly Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
20.2	Wye	6"	1	C-P2.11	Third Tier	Lobby & Restroom East	None	None	None			1	Pipe found to be solid and well braced. Fitting is horizontal, i.e. subjected to no thrust load; no JR needed.
21	Wye	6"	1	C-P2.11	Third Tier	Mechanical Room East	None	None	None			1	Pipe found to be solid and well braced. Fitting is horizontal, i.e. subjected to no thrust load; no JR needed.
22	90 Elbow	6"	2	C-P2.11	Third Tier	Lobby & Restroom West	None	None	None		1	1	Pipe found to be solid and well braced. Base 90 elbow under riser - JR to be specified. Horizontal 90 elbow in toilet room chase has no thrust load and no JR needed.
22.1	45 Elbow	6"	3	C-P2.11	Third Tier	Lobby & Restroom West	None	None	None			3	Pipe found to be solid and well braced. Fittings are horizontal, i.e. subjected to no thrust loads; no JR needed.
27	90 Elbow	6"	2	C-P2.14	Catwalk	East Chase above Side Circulation	None	None	None		2		Pipe is solid and well braced. Fittings may be subjected to thrust loads from risers above - JR to be specified.
28	90 Elbow	6"	2	C-P2.14	Catwalk	West Chase above Side Circulation	None	None	None		2		Pipe is solid and well braced. Fittings may be subjected to thrust loads from risers above - JR to be specified.
29	90 Elbow	6"	3	C-P2.17	Attic	Attic Level East Side	None	None	None			3	Pipe found solid and well braced to attic floor slab. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
30.4	Wye	6"	2	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			2	Pipe appeared to be solid and well braced. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
31	90 Elbow	6"	4	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			4	Pipe found solid and well braced to attic floor slab. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
31.1	45 Elbow	6"	2	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			2	Pipe found solid and well braced to attic floor slab. Primarily horizontal pipe runs not subjected to thrust loads, no JR needed.
31.2	Wye	6"	1	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			1	Pipe found solid and well braced. Primarily horizontal pipe runs not subjected to thrust loads, no JR needed.
32	Wye	6"	1	C-P2.18	Attic	Attic Level Southeast MER	None	None	None			1	Pipe found solid and well braced. Primarily horizontal pipe runs not subjected to thrust loads, no JR needed.
23.2	45 Elbow	6"	2	C-P2.12	Third Tier	Mechanical Room East	None	None	None			2	Pipe found to be solid and well braced. Fitting is either horizontal or turned-down (top of riser) subjected to no thrust load; no JR needed.
29.1	45 Elbow	6"	1	C-P2.17	Attic	Attic Level East Side	None	None	None			1	Pipe found solid and well braced to attic floor slab. Primarily horizontal pipe runs not subjected to thrust loads, no JR needed.

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Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers
**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Jointly Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
30.2	45 Elbow	6"	2	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			2	Pipe appeared to be solid and well braced. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
5.2	Coupling "Rusted"	8"	3	C-P2.02	Orchestra	Production Office	None	None	None	3			Rusted NH Coupling to be replaced
3	90 Elbow	8"	3	C-P2.02	Orchestra	Restroom	None	None	None		1	2	Pipe found to be solid and well braced. Will require access panels. Base 90 should have JR specified. Other 90 degree fittings not subjected to thrust loads and no JR needed.
5	90 Elbow	8"	2	C-P2.02	Orchestra	Production Office	None	None	None		1	1	Pipe found to be solid and well braced. Base 90 difficult but can be done - JR should be specified. Other horizontal 90s above ductwork have no thrust load and no JR needed.
5.1	45 Elbow	8"	2	C-P2.02	Orchestra	Production Office	None	None	None			2	Pipe found to be solid and well braced. Horizontal 45 elbow above ductwork has no load, no thrust and no JR needed.
9	90 Elbow	8"	2	C-P2.03	Orchestra	Workshop Classroom	None	None	None		1	1	One 90 degree fitting to have JR specified. Second 90 elbow is in the chase and partially set into CMU chase wall. Is solid, no movement, no JR needed.
10	90 Elbow	8"	2	C-P2.05	Box Tier	Men's Restroom	None	None	None		1	1	Base elbow to have unistrut to support bottom of elbow as a JR. Pipe found to be solid and well braced. Other 90 elbow turns down (is a top of riser) and has no load, no thrust and no JR necessary.
12	90 Elbow	8"	2	C-P2.05	Box Tier	Corridor	None	None	None		1	1	Pipe found to be solid and well braced. Base elbow to have JR specified. Second 90 elbow is horizontal with no thrust load, no JR needed.
13	90 Elbow	8"	1	C-P2.05	Box Tier	Chase Between Women's & Stair	None	None	None			1	Piping well secured, solid to CMU chase wall between tiled men's and women's toilet. Not a base 90 and no thrust load - No JR needed.
13.1	Wye	8"	1	C-P2.05	Box Tier	Chase Between Women's & Stair	None	None	None			1	Piping well secured, solid to CMU chase wall between tiled men's and women's toilet. No JR needed.
15.2	90 Elbow	8"	1	C-P2.06	Box Tier	Men's Dressing	None	None	None		1		Base elbow at the bottom of riser. Pipe found to be solid and well braced. JR to be specified.
15.3	45 Elbow	8"	2	C-P2.06	Box Tier	Men's Dressing	None	None	None		2		Base elbow at the bottom of riser. Pipe found to be solid and well braced. JR to be specified.
16	Pipe	8"	1	C-P2.06	Box Tier	Mechanical Room West	None	None	1				Will install sway brace to column.
16.1	90 Elbow	8"	2	C-P2.06	Box Tier	Mechanical Room West	None	None	None		1	1	Base 90 elbow under riser - JR to be specified. Horizontal 90 elbow has no thrust load and no JR needed.
16.2	45 Elbow	8"	2	C-P2.06	Box Tier	Mechanical Room West	None	None	None			2	Pipe found to be solid and well braced. Fitting is horizontal, i.e. subjected to no thrust load; no JR needed.

PAC Concert Hall Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

Rev: 21 March 2013

*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers
**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Jointly Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
17	90 Elbow	8"	2	C-P2.06	Box Tier	Donor's Lounge	None	None	None			2	Primarily horizontal pipe runs picking up drains from the roof above - approx 3'. Not subjected to thrust load, no JR needed. Pipe found to be solid and well braced.
17.1	45 Elbow	8"	1	C-P2.06	Box Tier	Donor's Lounge	None	None	None			1	Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'. Not subjected to thrust loads, no JR needed. Pipe found to be solid and well braced.
17.2	Wye	8"	2	C-P2.06	Box Tier	Donor's Lounge	None	None	None			2	Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'. Not subjected to thrust loads, no JR needed. Pipe found to be solid and well braced.
18	90 Elbow	8"	2	C-P2.08	Second Tier	Handicapped Restroom	None	None	None		1	1	Base 90 elbow under riser - JR to be specified. Second 90 elbow turns down (top of riser) has no thrust load and no JR needed. Pipe found to be solid and well braced.
19	90 Elbow	8"	2	C-P2.09	Second Tier	Mechanical Room East	None	None	None		2		Back-to-back base 90 elbows under riser - JR to be specified. Pipe found to be solid and well braced.
19.1	NH Coupling	8"	4	C-P2.09	Second Tier	Mechanical Room East	None	None	None	4			Stripped NH Coupling to be replaced.
22.2	Wye	8"	1	C-P2.11	Third Tier	Lobby & Restroom West	None	None	None			1	Pipe found to be solid and well braced. Fitting is a turned-down wye (top of riser) in the toilet chase and subjected to no thrust load; no JR needed.
23	90 Elbow	8"	1	C-P2.12	Third Tier	Mechanical Room East	None	None	None			1	Pipe found to be solid and well braced. Fitting is either horizontal or turned-down (top of riser) subjected to no thrust load; no JR needed.
23.1	45 Elbow	8"	1	C-P2.12	Third Tier	Mechanical Room East	None	None	None			1	Pipe found to be solid and well braced. Fitting is either horizontal or turned-down (top of riser) subjected to no thrust load; no JR needed.
23.3	Wye	8"	1	C-P2.12	Third Tier	Mechanical Room East	None	None	None			1	Pipe found to be solid and well braced. Fitting is either horizontal or turned-down (top of riser) subjected to no thrust load; no JR needed.
24	90 Elbow	8"	4	C-P2.12	Third Tier	Mechanical Room West	None	None	None		4		Pipe is solid and well braced. Fittings may be subjected to thrust loads from risers above - JR to be specified. Access on top of ductwork.
24.1	45 Elbow	8"	1	C-P2.12	Third Tier	Mechanical Room West	None	None	None			1	Pipe found to be solid and well braced. Fitting is either horizontal or turned-down (top of riser) subjected to no thrust load; no JR needed.
24.2	Wye	8"	1	C-P2.12	Third Tier	Mechanical Room West	None	None	None			1	Pipe found to be solid and well braced. Fitting is either horizontal or turned-down (top of riser) subjected to no thrust load; no JR needed.

PAC Concert Hall Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

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*Type 1 Joint Restraints (JR) - This type of fitting should have joint restraints specified because they may be subjected to a significant thrust load such as 90 degree bends at the bottom of tall risers

**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Jointly Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
25.1	90 Elbow	8"	2	C-P2.13	Catwalk	Main Lobby	None	None	None			2	Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3' drop. Not subjected to thrust loads, no JR needed.
26.1	90 Elbow	8"	2	C-P2.13	Catwalk	Main Lobby	None	None	None			2	Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
30	90 Elbow	8"	2	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			2	Pipe appeared to be solid and well braced. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
30.3	Wye	8"	1	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			1	Pipe appeared to be solid and well braced. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
33	90 Elbow	8"	6	C-P2.18	Attic	Attic Level Southwest MER	None	None	None		3	3	Pipe appeared to be solid and well braced. Three 90 elbows at bottom of risers may be subjected to thrust loads - JRs to be specified. Three 90 elbows are horizontal or turned-down (top of riser) and not subjected to thrust loads - no JR needed.
33.1	45 Elbow	8"	4	C-P2.18	Attic	Attic Level Southwest MER	None	None	None			4	Piping appeared to be well supported and braced. Fitting not at the bottom of risers with no thrust loads. No JR needed.
33.2	Wye	8"	1	C-P2.18	Attic	Attic Level Southwest MER	None	None	None			1	Piping appeared to be well supported and braced. Fitting not at the bottom of risers with no thrust loads. No JR needed.
26.3	45 Elbow	8"	2	C-P2.13	Catwalk	Main Lobby	None	None	None			2	Pipe found to be solid and well braced. Fitting is horizontal subjected to no thrust load; no JR needed.
30.1	45 Elbow	8"	2	C-P2.17	Attic	Attic Level Smoke Well	None	None	None			2	Pipe appeared to be solid and well braced. Primarily horizontal pipe runs picking up drains from the roof a short distance above - approx 3'-4'. Not subjected to thrust loads, no JR needed.
8	22.5 Elbow	10"	2	C-P2.03	Orchestra	Loading Dock	None	None	None			2	Pipe behind ductwork is solid, vertical offsets, no thrust load, no JR needed.
9.3	Wye	10"	1	C-P2.03	Orchestra	Workshop Classroom	None	None	None			1	Horizontal wye. Pipe found to be solid and well braced. No thrust load, no JR needed.
16.3	Wye	10"	1	C-P2.06	Box Tier	Mechanical Room West	None	None	None			1	Pipe found to be solid and well braced. Fitting is horizontal, i.e. subjected to no thrust load; no JR needed.

PAC Concert Hall Scope of Work for Sway Bracing, Riser Clamp, Hangers and Joint Restraint on CI Rain Water Leaders (RWL)

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**Type 2 Joint Restraints (JR) - This type of fitting should not have joint restraints specified because they are not subjected to a significant thrust load such as elbows at the top of risers, at horizontal elbows, or elbows at short vertical drops.

							Jointly Agreed Scope				Fitting Joint Restraints		
Item #	Description	Size	Quantity	Drawing	Level	Location	Hanger / Bracket	Riser Clamp	Sway Brace	Misc Scope	Quantity Type #1 JR *	Quantity Type #2 JR **	Notes
25	90 Elbow	10"	2	C-P2.13	Catwalk	Main Lobby	None	None	None			2	Pipe appeared to be well anchored to the shear wall. 90 elbows at the bottom of approx. 12' riser. Should not be subjected to unresisted thrust loads. Access maybe available from Upper Third Tier slab (New AP). May need further evaluation.
25.2	Wye	10"	1	C-P2.13	Catwalk	Main Lobby	None	None	None			1	Pipe appeared to be solid and well braced. Fitting is a turned-down (top of riser) wye subjected to no thrust load; no JR needed.
1A	90 Elbow	12"	1	C-P2.01	Orchestra	Concrete Shear Wall	None	None	None			1	Pipe appeared to be solid and well braced. 90 base elbow is in encased concrete shear wall.
7	45 Elbow	12"	2	C-P2.03	Orchestra	General Storage	None	None	None			2	Pipe solidly anchored to wall. Vertical 45 offset. No thrust. No JR needed.
15	45 Elbow	12"	1	C-P2.06	Box Tier	Men's Dressing	None	None	None		1		Base elbow at the bottom of riser. Pipe found to be solid and well braced. JR to be specified.
15.1	Wye	12"	2	C-P2.06	Box Tier	Men's Dressing	None	None	None		2		Base wye at the bottom of riser. Pipe found to be solid and well braced. JR to be specified.
26	90 Elbow	12"	2	C-P2.13	Catwalk	Main Lobby	None	None	None			2	Pipe found to be solid and well braced. 1 Fitting is a turned-down (top of riser) 90 and the other was a horizontal 90 subjected to no thrust load; no JR needed.
26.2	45 Elbow	12"	3	C-P2.13	Catwalk	Main Lobby	None	None	None			3	Pipe found to be solid and well braced. Fitting is horizontal subjected to no thrust load; no JR needed.
26.4	Wye	12"	1	C-P2.13	Catwalk	Main Lobby	None	None	None			1	Pipe found to be solid and well braced. Fitting is horizontal subjected to no thrust load; no JR needed.
	TOTALS		146				1	0	2	7	30	106	

Attachment C
INSURANCE

PACB shall furnish to the Miami Dade County, 111 NW 1st Street 24th Floor, Miami, Florida 33128, Certificate(s) of Insurance which indicate that insurance coverage has been obtained which meets the requirements as outlined below:

A. Worker's Compensation Insurance for all employees of PACB as required by Florida Statute 440.

B. Commercial General Liability Insurance including Products and Completed Operations, on a comprehensive basis in an amount not less than $5,000,000 combined single limit per occurrence for bodily injury and property damage. **Miami-Dade County must be shown as an additional insured with respect to this coverage.**

C. Automobile Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the work, in an amount not less than $1,000,000 combined single limit per occurrence for bodily injury and property damage.

D. Professional Liability Insurance in an amount not less than $5,000,000. Coverage must be maintained for a minimum of ten years after project completion.

All insurance policies required above shall be issued by companies authorized to do business under the laws of the State of Florida, with the following qualifications:

The company must be rated no less than "A-" as to management, and no less than "Class VII" as to financial strength, by the latest edition of Best's Insurance Guide, published by A.M. Best Company, Oldwick, New Jersey, or its equivalent, subject to the approval of the County Risk Management Division.

or

The company must hold a valid Florida Certificate of Authority as shown in the latest "List of All Insurance Companies Authorized or Approved to Do Business in Florida" issued by the State of Florida Department of Insurance and are members of the Florida Guaranty Fund.

Compliance with the foregoing requirements shall not relieve the PACB of liability and obligation under this section or under any other section of this agreement.

BHR