

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program

333 Burma Rd.  
Oakland, CA 94607  
(510) 622-5660, (510) 286-0550 fax



RECEIVED

CC Myers, Inc.  
51 Macalla Road  
San Francisco, CA 94130

APR 20 2005

April 19, 2005

Attn: Mr. Bob Coupe

CC MYERS, INC.  
JOB 215 TEMP. BYPASS STRUCTURE

Contract No. 04-0120R4  
04-SF-80-12.6, 13.2  
South - South Detour

Ref: 215-STL.00110

IC-01788  
215-103  
215-9906

Letter No. 05.03.01-000381

Subject: Response to NOPC 6 - PMC Piping and Routing Design

RC  
AC  
PMC (fax)

Dear Mr. Coupe:

This Office is in receipt of NOPC 6 requesting additional compensation for redesign of the piping and routing plan. This Office takes the opportunity to direct C.C. Myers' attention to their responsibilities in the Contract Special Provisions:

- Section 5-1.14 requires that the Contractor design and provide detailed design plans for the construction of the Temporary Bypass Structure, including all appurtenances required for bridge mounted utilities, at locations shown on the plans and as specified in the Special Provisions.
- Section 10-4 requires the Contractor to submit working drawings for review and approval pertaining to work for (1) NPS 12 US Navy domestic water piping and (2) NPS 4 Caltrans bridge maintenance water line. Materials, construction and payment of the work, are also governed by this section. All incidentals for this work, such as connections to the TBS, shall be in accordance with the requirements specified elsewhere in the Special Provisions.

In their potential claim, the Contractor mentions that the redesign of the piping has changed from the design submitted with the initial bid. A submitted design with the initial bid does not establish any scope of work for the contract, as the Contractor is suggesting. The contract special provisions, as referenced previously, provides for a design submittal process. Designs submitted to the Department are subject to review and approval and would necessitate any changes if appropriate.

As shown by the timeline previously submitted to you, the Office has not provided approval for any of the submitted piping designs. For reasons of safety, the Office has never given any approval for mounting pipe onto barrier rail through various correspondence, meetings and discussions with the Contractor. Reiterating, the design submittal process is established by the Contract Special Provisions and the Department has been administering its review process within these requirements.

The incurred costs that the Contractor is submitting have no merit because of the Contractor's requirement pursuant to the design submittal process. Therefore, the Department has determined NOPC 6 to be without merit.

If you have any questions, please contact me at (510) 286-0511.

Sincerely,



FOR Gary J. Lai  
Structures Representative  
for  
Lourdes David  
Resident Engineer

cc: E. Rufino  
W. Kwan  
D. Adams  
A. Bata

file: 05.03.01, 62.02.06

LET. 164-01

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program

333 Burma Rd.  
Oakland, CA 94607  
(510) 622-5660, (510) 286-0550 fax



RECEIVED

CC Myers, Inc.  
51 Macalla Road  
San Francisco, CA 94130

APR 20 2005

April 19, 2005

Attn: Mr. Bob Coupe

CC MYERS, INC.  
JOB 215 TEMP. BYPASS STRUCTURE

Contract No. 04-0120R4  
04-SF-80-12.6, 13.2  
South - South Detour

Ref: 215-STL.00110

10-01788  
215-103  
215-9906

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AC  
PMC (fax)

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In their potential claim, the Contractor mentions that the redesign of the piping has changed from the design submitted with the initial bid. A submitted design with the initial bid does not establish any scope of work for the contract, as the Contractor is suggesting. The contract special provisions, as referenced previously, provides for a design submittal process. Designs submitted to the Department are subject to review and approval and would necessitate any changes if appropriate.

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If you have any questions, please contact me at (510) 286-0511.

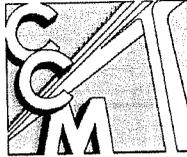
Sincerely,

A handwritten signature in black ink, appearing to read "E. Rufino", with a long horizontal line extending to the right.

FOR Gary J. Lai  
Structures Representative  
for  
Lourdes David  
Resident Engineer

cc: E. Rufino  
W. Kwan  
D. Adams  
A. Bata

file: 05.03.01, 62.02.06



LET. 164-03

C.C. MYERS INC.

51 Macalla Road  
(415) 399-0175

San Francisco, CA 94130  
Fax (415) 399-0587

March 21, 2005

Document No.: 215-STL.00106

State of California  
Department of Transportation  
333 Burma Road  
Oakland, CA 94607

Temporary Bypass Structure  
Contract No. 04-0120R4  
CCM Job # 215

Attn: Mr. Lourdes David  
Resident Engineer

Re: Notice of Potential Claim No.6

Dear Mr. David,

Please find attached State Form CEM-6201A with which we are submitting our Notice of Potential Claim No. 6. We are submitting this notice of potential claim on behalf of our subcontractor, Pacific Mechanical Corporation, in accordance with Section 9-1.04 of the Standard Specifications.

Very Truly Yours,  
C. C. Myers, Inc.

Andy Chan  
Project Engineer

cc: RW.C  
MO

File: 215-101, 215-9906

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**NOTICE OF POTENTIAL CLAIM**  
 CEM-6201A (NEW 9/2002)

FOR STATE USE ONLY	
Received by:	Date:
(For Resident Engineer)	

To <b>Lourdes David</b> (resident engineer)	CONTRACT NUMBER <b>04-0120R4</b>	DATE <b>3/18/05</b>	IDENTIFICATION NUMBER <b>6</b>
---	-------------------------------------	------------------------	-----------------------------------

This is an Initial Notice of Potential Claim for additional compensation submitted as required under the provisions of Section 9-1.04 "Notice of Potential Claim" of the Standard Specifications. The act of the Engineer, or his/her failure to act, or the event, thing, occurrence, or other cause giving rise to the potential claim occurred on:

DATE: 3/18/05

The particular nature and circumstances of this potential claim are described as follows:

Please be advised that we are requesting additional compensation for alternate pipe routing as requested by Caltrans.

This is due to the following:

A different routing than shown on the drawings is requested. The new pipe routing is suspended from structural steel members rather than on top of the guardrail as we originally bid the work and as was shown on the bid drawings. As we discussed, there is no provisions in the bid documents that precluded us from running the pipe on top of the guardrail and our previous design meet the requirements of the Plans Specifications.

This alternate routing causes cost increases of three types:

1. *Additional Design and Detailing Costs-* to revise and resubmit drawings.
2. *Additional Material Costs for Additional Supports Steel Beams and Brackets-* the CALTRANS proposed support scheme requires additional support beams and brackets not part of our original design and original bid.
3. *Additional Labor and equipment costs to erect piping in a more difficult area-* Our original design to piping on the top of the guardrail provided for a relatively easy pipe erection as the piping was ran at grade and with an easy access. The CALTRANS proposed routing is in a area with no access. It is in most cases off the 8 to 10 feet of f the side of deck in mid air. There is no safe access and will require additional labor and equipment to safely access the pipe and to handle and erect it in this difficult area. This will significantly increase our erection costs for the 300 pipe.

Please issue a change order to cover for these additional expenses.

(attach additional sheets as needed)

The undersigned originator (Contractor or Subcontractor as appropriate) certifies that the above statements and attached documents are made in full cognizance of the California False Claims Act, Government Code Sections 12650-12655. The undersigned further understands and agrees that this potential claim to be further considered, unless resolved, must fully conform to the requirements in Section 9-1.04 of the Standard Specifications and must be restated as a claim in the Contractors written statement of claims in accordance with Section 9-1.04 of the Standard Specifications.

**RECEIVED**

MAR 18 2005

CC MYERS, INC.  
 JOB 215 TEMP. BYPASS STRUCTURE

*JMC*  
 \_\_\_\_\_  
 SUBCONTRACTOR or CONTRACTOR  
 (Circle One)

*[Signature]*  
 \_\_\_\_\_  
 (Authorized Representative)

For subcontractor notice of potential claim

This notice of potential claim in knowledge and forwarded by

PMC

*C.C. Myers Inc.*

PRIME CONTRACTOR

*[Signature]* *Andy Chen*  
 \_\_\_\_\_  
 (Authorized Representative)

LET. 164-04

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program

333 Burma Rd.  
Oakland, CA 94607  
(510) 622-5660, (510) 286-0550 fax

RECEIVED



MAR 18 2005

CC Myers, Inc.  
51 Macalla Road  
San Francisco, CA 94130

CC MYERS, INC.  
JOB 215 TEMP. BYPASS STRUCTURE

March 16, 2005

Contract No. 04-0120R4  
04-SF-80-12.6, 13.2  
South - South Detour

Attn: Mr. Bob Coupe

IC-1621  
215-103

Ref: 215-SUB.00016-03, 215-LET.00124

RC  
AC  
✓ PMC (Fax)

Letter No. 05.03.01-000338

Subject: PMC Request for CCO for Piping and Routing Design

Dear Mr. Coupe:

The Department is in receipt of CCM's Letter # 124 regarding PMC's request for CCO. This request cannot be granted for reasons previously explained by State Letter No. 282. Attached, you will find a chronology describing the chain of events of this issue since its inception. As you will note, between August 12 to November 12, 2004, there was no action on the part of CCM/PMC in responding to the Department's comments to Submittal 16-2. No approval had been granted to this submittal during this time frame.

Caltrans has never changed its position concerning the installation and routing of pipe on barrier rail. State Letter #71 had addressed the concern that installing the pipe on top of barrier rail would potentially compromise the intended stability of the barrier rail. In addition to stability concerns, barrier rails are designed and tested to meet safety standards in accordance with the Federal Highway Administration (FHWA). Installing unapproved objects, such as pipeline, on top of barrier rails would compromise their intended safety characteristics.

Please be reminded that Section 10-4 Mechanical of the Special Provisions specifies the requirements for submitting working drawings for review and approval. Work to construct the pipelines cannot proceed until these working drawings have been given approval by the Department. The working drawings should include information such as the routing of the piping. As a reminder, Submittal 16-3 has not been approved by this Office and new revisions are expected to be received.

If you have any questions, please contact me at (510) 286-0511.

Sincerely,

FOR Gary Lai  
Structures Representative  
for  
Lourdes David  
Resident Engineer

cc: E. Rufino, W. Kwan, A. Bata  
file: 05.03.01, 58.16 49.00

# PMC Piping Plan and Routing Design Submittal, Correspondence and Meeting - Chronology of Events

By: Erwin B. Rufino

Date: 2 March 2005

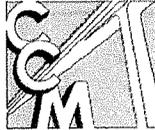
Date of Document	Document Type	Description	Remarks	From	To
6-18-2004	SUBM 16-0, 16-1	Initial Submittal for CT Review	This is the original PMC Piping and Routing Plan. Subm 16-0 and 16-1 are considered the same document.	CCM/PMC	CT
7-09-2004	CT Ltr # 44	Subm 16-0, 16-1 is Not Approved	CT asked CCM to Resubmit	CT	CCM/PMC
7-27-2004	SUBM 16-2	Revised Submittal for CT Review	CCM/PMC submitted this revision in response to CT Letter #44.	CCM/PMC	CT
8-12-2004	CT Ltr # 71	Subm 16-2 is Not Approved	CT asked CCM to address concerns and Resubmit. The submittal is not approved due mainly to concerns of pipe being mounted onto barrier rail.	CT	CCM/PMC
11-10-2004	TELECONFERENCE	Teleconference Meeting between CT and CCM	This teleconference discussed the reasons why Subm. 16-2 cannot be approved. This is mainly due to the pipe being mounted onto the barrier rail. CT addressed traffic safety issues in regards to this. CT mentioned writing a letter to summarize the points of this discussion. Present at teleconference were Andy Chan of CCM, and Erwin Rufino and Wai Kwan of CT. PMC was not present at the meeting.	MEETING/ DISCUSSION	
11-12-2004	CT Ltr # 202	Subm 16-2 is Not Approved	CT addressed its main concerns about mounting pipe onto barrier rail, as a follow up to the phone conference held between CT and CCM on 11-10-04. This letter still references Subm #16-2 and basically reiterates that this submittal is not approved.	CT	CCM/PMC
12-07-2004	MEETING	Meeting among CT, CCM and PMC at YBI contractor trailer, 13.00 h	This meeting focussed on agreeing to a design concept for routing and supporting the 300 mm and 100 mm lines. Summarizing, the 300 mm line would be redesigned to be mounted onto hangers/brackets on the truss members and floor beams. The 100 mm line would be suitable to be tucked behind the barrier rail. CCM/PMC mentioned about submitting a revised plan to address the points in this meeting at the soonest possible. The issue concerning additional compensation or the merits thereof remained unresolved.	MEETING/ DISCUSSION	

## PMC Piping Plan and Routing Design Submittal, Correspondence and Meeting - Chronology of Events

By: Erwin B. Rufino

Date: 2 March 2005

Date of Document	Document Type	Description	Remarks	From	To
12-08-2004	CCM Transm # 142	CCM's Transmittal on PMC's Request for CCO	CCM transmitted to CT PMC's request (PMC letter dated 11-22-04) for additional compensation because they had to redesign. PMC alleges in their letter that they were shocked to discover a change in CT's position on this matter. PMC is referencing Subm #16-2.	CCM/PMC	CT
12-17-2004	SUBM 16-3	Revised Submittal for CT Review	This revised submittal addressed the agreed upon design concept that was reached in the meeting of 12-7-04.	CCM/PMC	CT
12-29-2004	CT Ltr # 256	CT did not Approve Subm #16-3	CT provided comments in reference to Subm 16-3. The submittal was not approved and CT asked CCM to resubmit.	CT	CCM/PMC
1-19-2005	CT Ltr # 282	CT does not grant CCM/PMC's request for CCO	CT responded to CCM Transm #142. CT stated its point that no final approval has been given to the submittal. CT added that no additional compensation would be granted because the review process is still ongoing and pending a final approved design.	CT	CCM/PMC
2-10-2005	CCM Ltr # 124	CCM/PMC continue to request for CCO	CCM and PMC insisted that additional compensation is due to them because they had to redesign a different concept than the original one of Subm 16-0, 16-1. CCM/PMC claim that there has been a change in the scope of the original contract work.	CCM/PMC	CT



C.C. MYERS INC.

51 Macalla Road  
(415) 399-0175

San Francisco, CA 94130  
Fax (415) 399-0587

February 10, 2005

*Document No.: 215-LET.00124*

State of California  
Department of Transportation  
333 Burma Road  
Oakland, CA 94607

Temporary Bypass Structure  
Contract No. 04-0120R4  
CCM Job # 215

Attn: Mr. Lourdes David  
Resident Engineer

Re: Pacific Mechanical Corporation Change Order Request: Cost of Alternate Pipe Routing

Dear Mr. David,

C.C. Myers, Inc. is in response to State Letter 05.03.01-000282. C.C. Myers, Inc. and our subcontractor Pacific Mechanical Corporation (PMC) are requesting the State to continue considering the request for additional compensation associated with the redesign of waterline pipe routing. In the meeting on 12/7/04, PMC received recommendations from the State and redesigned the pipeline routing. As PMC and CCM stated before, the original design was capable to perform quality work and is within the scope of contract. But the redesign will cause additional cost to be incurred in materials, equipment and labors. We are requesting a change order to provide compensation for additional cost due to the redesign. The change order must also provide for a deferred extension to the contract time, as the work will take longer to complete and may be on the critical path when it is performed. Please also see attached PMC letter 292-0004 for your reference.  
Please accept our request.

Very Truly Yours,  
C. C. Myers, Inc.

<<< ORIGINAL SIGNED >>>

Andy Chan  
Project Engineer

cc: RW.C  
JG

File: 215-101, 215-214



RECEIVED

FEB 07 2005

PACIFIC MECHANICAL CORPORATION  
GENERAL ENGINEERING CONTRACTORS  
Calif. State Lic. No. 138920 \* Nevada State Lic. No. 0006244

CC MYERS, INC.

JOB 215 TEMP. BYPASS STRUCTURE

IC - 1449

215-214

February 3, 2005

CC Myers, Inc.  
51 Macalla Road  
San Francisco, CA 94130

Log No: 292-00004

Attention: Bob Coupe  
Reference: Temporary Bypass Structure  
Caltrans Contract #04-0120R4  
Subject: Cost of Alternate Pipe Routing

Fax: 415-399-0587

Dear Mr. Coupe,

We just received a faxed copy of the Letter from Caltrans on the subject topic and we do not concur with the statements made therein. We urge Caltrans to reconsider their position on the request for additional compensation on the request on the basis of the information below.

The alternate routing was recommended by CALTRANS at our last meeting with them. As decided at the meeting, we revised our drawings to show the different routing. The new pipe routing is suspended from structural steel members rather than on top of the guardrail as we originally bid the work. As we discussed, there is no provisions in the bid documents that precluded us from running the pipe on top of the guardrail and our previous design meet the requirements of the Plans Specifications.

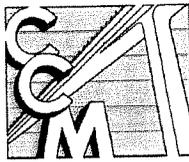
This alternate routing causes cost increases of three types:

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2. *Additional Material Costs for Additional Supports Steel Beams and Brackets-* the CALTRANS proposed support scheme requires additional support beams and brackets not part of our original design and original bid.
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Please issue a change order to cover for these additional expenses.

Very truly yours,

Pierre Bigras  
Project Manager



LET. 164-05

C.C. MYERS INC.

51 Macalla Road  
(415) 399-0175

San Francisco, CA 94130  
Fax (415) 399-0587

February 10, 2005

Document No.: 215-LET.00124

State of California  
Department of Transportation  
333 Burma Road  
Oakland, CA 94607

Temporary Bypass Structure  
Contract No. 04-0120R4  
CCM Job # 215

Attn: Mr. Lourdes David  
Resident Engineer

Re: Pacific Mechanical Corporation Change Order Request: Cost of Alternate Pipe Routing

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Please accept our request.

Very Truly Yours,  
C. C. Myers, Inc.

Andy Chan  
Project Engineer

cc: RW.C  
JG

File: 215-101, 215-214



# RECEIVED

FEB 07 2005

**PACIFIC MECHANICAL CORPORATION**  
GENERAL ENGINEERING CONTRACTORS  
Calif. State Lic. No. 138920 \* Nevada State Lic. No. 0006244

CC MYERS, INC.

JOB 215 TEMP. BYPASS STRUCTURE

IC - 1449

215-214

RC  
AC

Caltrans (after AC Review)

Log No: 292-00004

February 3, 2005

CC Myers, Inc.  
51 Macalla Road  
San Francisco, CA 94130

Fax: 415-399-0587

Attention: Bob Coupe  
Reference: Temporary Bypass Structure  
Caltrans Contract #04-0120R4  
Subject: Cost of Alternate Pipe Routing

Dear Mr. Coupe,

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Please issue a change order to cover for these additional expenses.

Very truly yours,

Pierre Bigras  
Project Manager

LET. 164-06

333 Burma Rd.  
Oakland, CA 94607  
(510) 622-5660, (510) 286-0550 fax

RECEIVED

DEC 30 2004



CC MYERS, INC.  
JOB 215 TEMP. BYPASS STRUCTURE

December 29, 2004

CC Myers  
51 Macalla Road  
San Francisco, CA 94130

IC - 1266  
215-103

Contract No. 04-0120R4  
04-SF-80-12.6, 13.2  
Temporary Bypass Structure

Attn: Mr. Bob Coupe

RC  
AC  
Pacific Mechanical Corp - For

Letter No. 05.03.01-000256 ✓

Ref: 215-SUB.00016-02, 215-SUB.00016-03

Subject: Pacific Mechanical Corporation - Pipe Routing and Design

Dear Mr. Coupe,

This Office has received and reviewed the above referenced project's Preliminary Piping Routing and Design re-submittal. At this time approval cannot be provided for the following reasons:

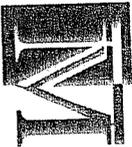
1. Sheet PB-292-102-C – no data provided on the rubber hose. The hose is flexible and may sway during operation and by seismic lateral forces. How is the hose prevented from swaying.
2. Sheet PB-292-104-B – Type 1 Attachment
  - a. Drilled and tapped holes – recommend a minimum engagement thread length to be as thick as bolt diameter. Most of the girder and vertical chords are 20mm and below in thickness.
  - b. Option for welded connection – submit details and support calculations for weld.
  - c. Provisions for supporting future S.D. header – requires additional information.
3. Sheet PB-292-104-B – Type 2 Attachment to truss top chord
  - a. C 200 – need the full designation for this channel section – C depth x weight.
4. Sheet PB-292-106-C –
  - a. Anchor details – what are the plate and gusset sizes? What are the anchorage details – diameter of anchor, length of embedment, anchor type...etc.
  - b. Unistrut Support – what is the type and size of the anchor bolt and their embedment.
  - c. Submit supporting calculations for the anchorages.
5. General – submittal mixes English Imperial and Metric units. Metric units are specified to be used by the Contract Special Provisions.

Please revise and resubmit this package for review and approval.

Sincerely,

Gary Lai  
Structure Representative  
for  
Resident Engineer  
Lourdes David

cc: D. Adams, A. Bata, E. Rufino, W. Kwan  
file: 05.03.01



# C.C. MYERS, INC.

An Equal Opportunity / Affirmative Action Employer

51 MACALLIA ROAD  
SAN FRANCISCO, CA 94130

415-399-0175  
FAX 415-399-0587

LET. 164-07  
SUBMITTAL 2/5 - SUB. 00016-3

<b>Dated:</b> Dec 17 2004	<b>Job No.:</b> 215
<b>Attention:</b> Mr. <del>Kenneth Lanebath</del> Lourdes	David
<b>RE:</b> 04-0120R4	
San Francisco Oakland Bay Bridge	
Temporary Bypass Structure	

To: State of California  
333 Burma Road  
Oakland CA 94607

Item	Date	Copies	Description	Drawing No	Rev	Status	Pages
01	Dec 17 2004	6	PMC: Dwg PB-292-101-C		0	Pending	
02	Dec 17 2004	6	PMC: Dwg PB-292-102-C		0	Pending	
03	Dec 17 2004	6	PMC: Dwg PB-292-103-B		0	Pending	
04	Dec 17 2004	6	PMC: Dwg PB-292-104-B		0	Pending	
05	Dec 17 2004	6	PMC: Dwg PB-292-105-B		0	Pending	
06	Dec 17 2004	6	PMC: Dwg PB-292-106-C		0	Pending	

### Remarks:

Attached are 6 copies of package of PMC design plan for 4" and 12" waterline for review and approval.

Copy To: RC, TG, MO

File: 215-101

Signed:

  
 Robert W. Coupe  
 Project Manager

  
 Andy Chen Jr  
 Project Manager





# Pacific Mechanical Corporation

**SUBMITTAL**  
No. 002.2

2501 Annalisa Drive, Concord, CA 94520  
Phone: 925-827-4940 Fax: 925-827-0519  
CA License No. 138920 \* NV License No. 6244

**Project:** Temporary Bypass Structure

**Date:** 12/15/2004

**To:** CC Myers, Inc.

**Owner Submittal:**

51 Macalla Road

**Reference:** Revised Piping Routing

San Francisco, CA 94130

**Attention:** Bob Coupe

**Job #:** 292

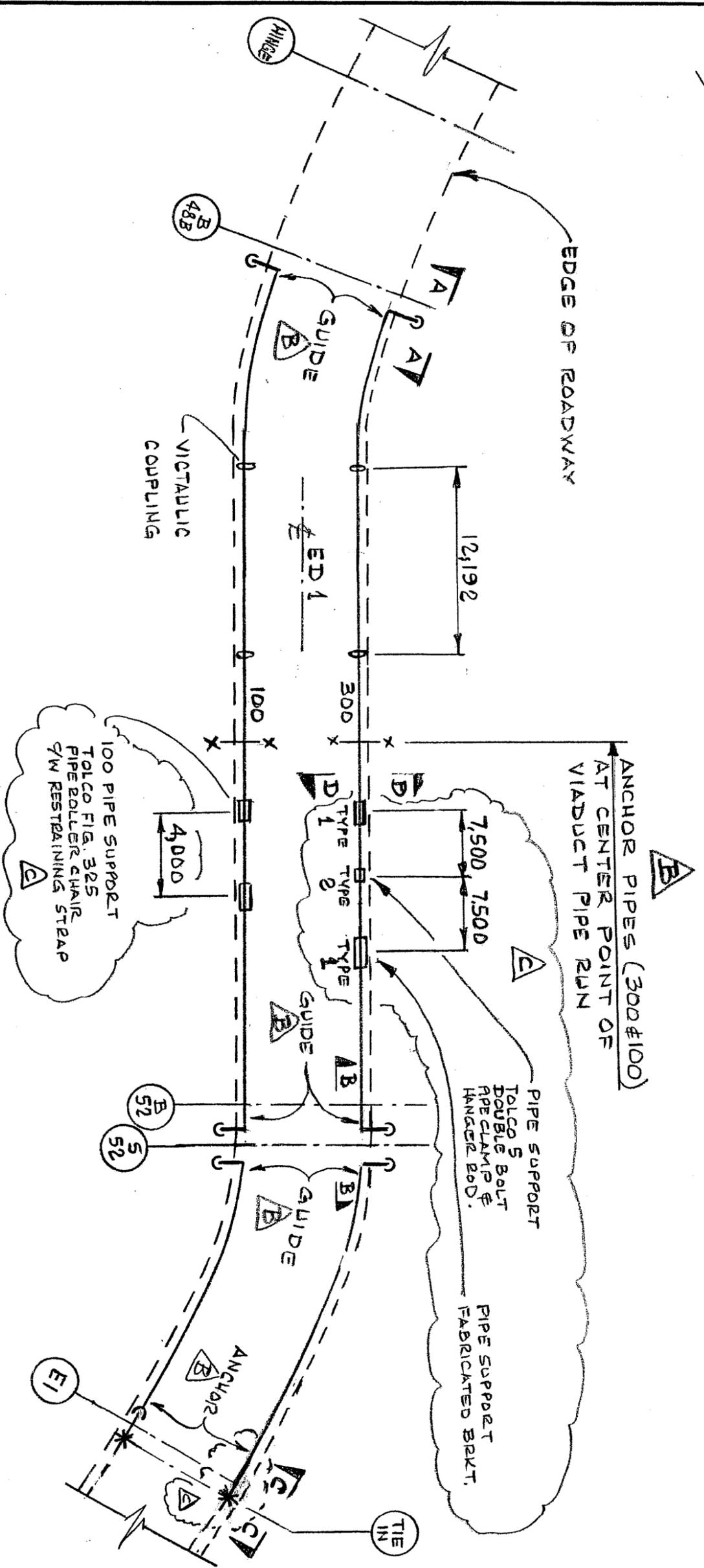
WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
<input type="checkbox"/> Change Order	<input type="checkbox"/> Review and Comment	<input type="checkbox"/> Resubmit
<input type="checkbox"/> Plans		<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	<b>SENT VIA:</b>	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Returned for Corrections
<input checked="" type="checkbox"/> Other: Made from Submittal	<input type="checkbox"/> Separate Cover Via: GSO (292-1100)	<input type="checkbox"/> Due Date:

SPEC SEC	PARAGRAPH	REV.	ITEM NO.	COPIES	DATE	ITEM DESCRIPTION	STATUS
10-4	10-4.02-E	002	8	12/15/2004	SUB	Title: Preliminary Piping Routing & Design Desc: Dwgs: PB-292-101-C, 102-C, 103-B, 104-B, 105-B, 106-C	SIR

**Remarks:** The piping routing has been revised to incorporate all changes that we discussed and agreed to with CALTRANS at our recent meeting. Please expedite review and approval of this submittal.

CC: Submittal No. 292-002

Signed:   
Maria Guadannuz



**PLAN - LOWER DECK**  
SCALE: NONE

MARK	QUAN	DESCRIPTION
C	1/3	PIPE SUPPORT TYPE ARRANGEMENT REVISD.
B	7/8	PIPE ANCHOR/GUIDE LOCATIONS REVISD.

**PACIFIC MECHANICAL CORPORATION**  
General Engineering Contractors  
2501 ANNALISA DR., CONCORD, CA 94520 • (925) 827-4940 • FAX (925) 827-0519 • U.C. NO. 138970

SCALE: ~ APPROVED BY: \_\_\_\_\_  
DATE: 6/10/04 DRAWN BY: **PB**  
REVISED

PLAN ON LOWER DECK (EAST BOUND)  
12" & 4" WATER LINES

CC MYERS / CALTRANS DRAWING NUMBER: **PB-292-101-C**

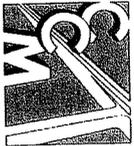












# C.C. MYERS, INC.

An Equal Opportunity / Affirmative Action Employer

51 MACALLA ROAD  
SAN FRANCISCO, CA 94130  
415-399-0175  
FAX 415-399-0587

LET. 164-08

## LETTER OF TRANSMITTAL

Document No:	215-STT.00142		
Dated	Dec 08 2004	Job No.:	215
Attention:	Mr. Lourdes David		
Re:	04-0120R4		
	Temporary Bypass Structure		

To: State of California  
333 Burma Road  
Oakland CA 94607

We are sending you:

- Drawing
- Samples
- Payroll
- Change Order
- Attached
- Via Fax
- Plans
- Certificates of compliance
- Specs
- Schedule
- Prog. Pmt
- Calculations
- Copy of Letter
- Invoice

Copies	Item	Date	Description
1	01	Nov 22 2004	Pacific Mechanicals "Piping Routing and Design"

These are transmitted as checked below:

- For Approval
- For Your Use
- For Review/comment
- As Requested
- Return For Correction
- For Information

Remarks:

Copy To: Andy Chan, Robert Coupe, Main Office

File: 215-101, 215-214

Signed:

Christine M Williams  
Project Engineer





REC'D  
P.M.C. MYERS, INC

**PACIFIC MECHANICAL CORPORATION**  
GENERAL ENGINEERING CONTRACTORS  
Calif. State Lic. No. 138920 \* Nevada State Lic. No. 0006244

**RECEIVED**

November 22, 2004  
DEC 7 2004

CC MYERS, INC. CC MYERS, INC.  
3286 Fitzgerald Road JOB 215 TEMP. BYPASS STRUCTURE  
Rancho Cordova, CA 95742 Log No: 292-00001  
IC-1163  
215-214

Attention: Bob Coupe RC Fax: 916-635-1527  
Reference: Temporary Bypass Structure AC  
Caltrans Contract #04-0120R4 Caltrans (Trans)

Subject: Piping Routing and Design

Dear Mr. Coupe,

We received copy of the Caltrans letter of Nov. 12 the subject project and we offer these comments.

Firstly, we are surprised by the sudden change of position on this subject. As you know we have had some back and forth on this submittal already. Although there was some questions on the routing of the piping on the K-rail portion, there was not any outstanding comments on the portion running on top of the Type 732 barrier rail. We understood that the portion of the work supported by the Type 732 barrier rail had been accepted months ago. We understood that the only portion not accepted was the few meters running on top of the K-rail over the existing bridge.

Secondly, on the comment "Barrier rails are not designed to sustain any additional imposed loads on them without modifications to the design" we do not concur with this statement. The maximum load that will applied to the barrier from the piping is 1043 Kg distributed over a surface area of 464 sq cm. The resulting stress is many orders of magnitude less than the capacity of concrete and the rebar of the barrier. In fact these loads are insignificant compared to the capacity of the barrier. The present design of the K-rail can certainly adequately support the added load of 1043 Kg every 7 meters.

Thirdly, on the comment "also, the center of gravity of the altered pipe-rail system would be higher than normal, thereby creating a potentially unstable condition for the barrier rails." You will note that the Type 732 Barrier is anchored into the structural deck with two #16M @ 400 mm. Lateral or overturning resistance of the barrier is provided mostly by this set of rebars. Not by the dead weight of the concrete. The resistance provided by the dead weight of the barrier concrete is insignificant in comparison. The effect of a higher center of gravity of the barrier created by the additional pipe weight is most certainly negligible. Therefore, we submit that the

November 22, 2004  
Bob Coupe  
CC Myers, Inc.  
Page 2 of 2

design we provided for running and supporting the pipe meets the requirements of good engineering practice and the specifications.

Fourthly, on the subject supporting the pipe of the K-trail, we concur that some eccentric loads applied to the K-rail could contribute to making less stable if it is not anchored to the deck. We believe that pipe supports could be designed to support the piping partly off the deck, behind the K-rail, instead of being attached solely to the K-rail. This would eliminate any eccentric loading to the K-rail. Please refer to the attached sketch showing this proposed method. Please advise if sufficient room exists there and we will redesign these supports accordingly. In conclusion, we firmly believe that our design meets all requirements of good engineering practice, the drawings and the specifications. This is the design we based our proposal on.

We believe that the requirements made in the November 12 Caltrans letter were not part the original specifications and bid package. We believe that these additional constraints and requirements will cause both PMC and CC Myers additional cost. Additional cost to redesign the piping, the pipe supports, and to run and support piping at an alternate location will require additional compensation. At this point, if the submitted support method cannot be approved, we will required a change order to cover for the additional expenses associated with the additional requirements.

Alternately, we are prepared to redesign the supports for the K-trail portion of the routing as shown on the attached sketch at no additional costs. We propose you arrange a meeting with decision makers at Caltrans to discuss the benefits of our design and/or address any of their concerns.

Very truly yours,



Pierre Bigras  
Project Manager

cc:

Enclosures:



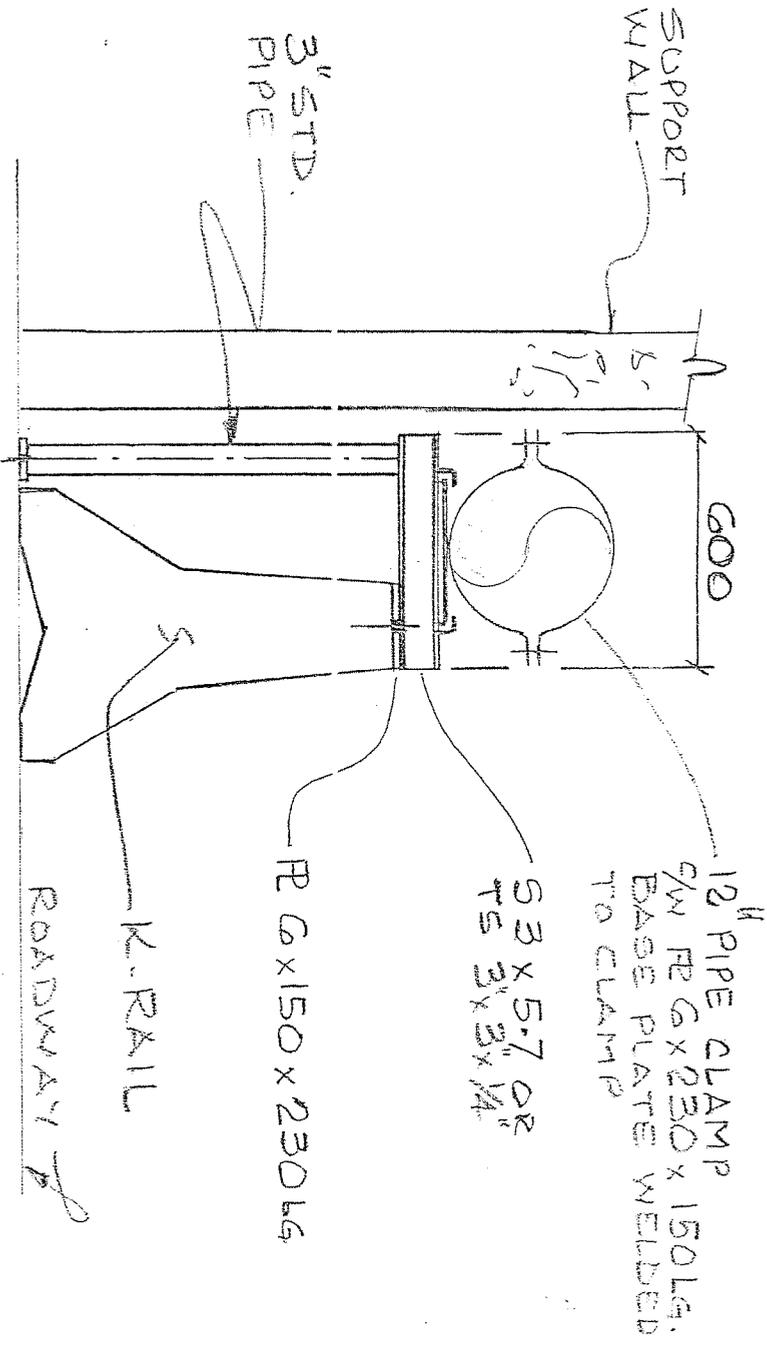
PACIFIC MECHANICAL CORPORATION

P.O. BOX 4041 • CONCORD, CA 94524  
(925) 827-4940 • FAX (925) 827-0519

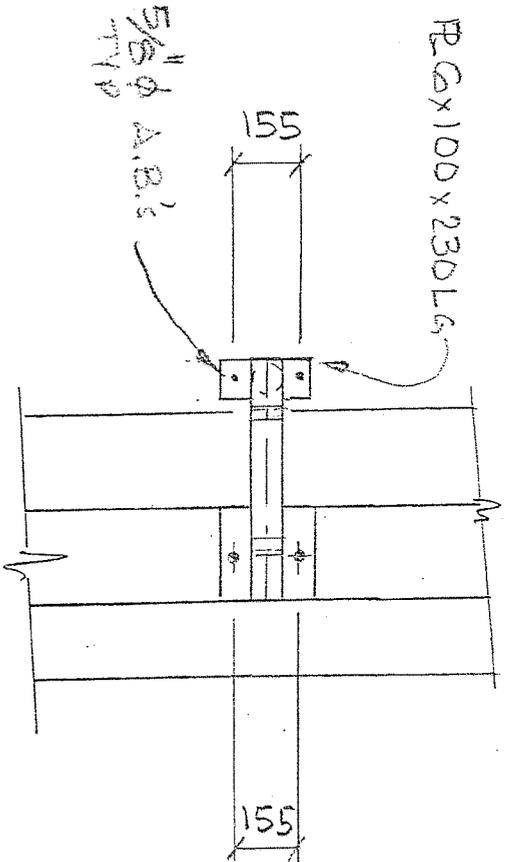
Subject: REVISED PIPE SUPPORT @ K-RAIL

12" #4" WATER LINES

By: BAWM Date: 11/22/04 Sheet 1 / 1



SECTION



PLAN

12" PIPE SHOWN  
4" PIPE SIMILAR

LET. 164-09

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY  
**DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program**

ARNOLD SCHWARZENEGGER, Governor



333 Burma Rd.  
Oakland, CA 94607  
(510) 622-5660, (510) 286-0550 fax

**RECEIVED**

NOV 12 2004

November 12, 2004

CC Myers  
51 Macalla Road  
San Francisco, CA 94130

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE

Contract No. 04-0120R4  
04-SF-80-12.6, 13.2  
Temporary Bypass Structure

Attn: Mr. Bob Coupe

IC-1022

Letter No. 05.03.01-000202

Ref: 215-SUB.00016-02

215-103  
PACIFIC MECHANICAL - TRN  
RC  
MB

Subject: Pacific Mechanical Corporation: Preliminary Piping Routing and Design

Dear Mr. Coupe:

The Department has finished its review of the above referenced submittal. This submittal cannot be approved due to serious concerns regarding the manner in which the pipe is mounted onto both the K-rail barrier and Type 732 barrier rail. Please reference sheets PB-292-104-A and PB-292-106-B of the submittal. It is not acceptable to mount the pipes on these barrier rails, as they compromise the intended safety function of the barrier rails. Barrier rails are not designed to sustain any additional imposed loads on them without modifications to the design. Also, the center of gravity of the altered pipe-rail system would be higher than normal, thereby creating a potentially unstable condition for the barrier rails. Additionally, the sectional drawing on sheet PB-292-106-B shows the centerline of the pipe to be offset with the centerline of the K-rail which would cause an undesired eccentric loading condition.

Please contact me at (510) 286-0511 for any additional questions.

Sincerely,

*SPB Ruffino*  
FOR Gary J. Lai  
Structures Representative  
for

Lourdes David  
Resident Engineer

Post-It™ brand fax transmittal memo 7671		# of pages	
To: Bob coupe	From: E. RUEFIND	2	
Co: CCM	Co: CT		
Dept.	Phone #		
Fax #	Fax #		

cc: 05.03.01  
file:



*Flex your power!  
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LET. 164-10

**DEPARTMENT OF TRANSPORTATION**  
333 BURMA ROAD  
OAKLAND, CA 94607-1015  
PHONE (510) 622-5660  
FAX (510) 286-0550

August 12, 2004  
Contract No. 04-0120R4  
04-SF-80-12.6/13.2  
Temporary Bypass Structure  
SL# 71

**RECEIVED**

Mr. Robert W. Coupe  
C. C. MYERS, INC.  
51 Macalla Road  
San Francisco, CA 94130

AUG 16 2004

RE: 215-SUB.00016-2  
Subject: Preliminary Piping Routing & Design

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE

10-494  
215-103

imBBA  
Pacific Mechanical

Dear Mr. Coupe:

The Department has reviewed the above referenced project's Preliminary Piping Routing and Design Submittal and submit and following comments:

1. Since K-rail (temporary railing) is used in this case, is it anchored to the bridge deck? By supporting pipe on top of the K-Rail, the center of gravity (C.G.) would be much higher, therefore changing the stability characteristics of the K-Rail from what it was intended for. In essence, the K-Rail with pipe can be unstable. Has this been considered? Therefore, the Pipe should be supported behind the K-Rail, away from traffic, if possible. Support details on this would be feasible.
2. K-Rail shown at East Tie-In is not consistent with the Preliminary Design Submittals.
3. Why are two 90-degree elbows needed on the ends of the K-rail support? Only one should be sufficient enough.
4. The units on Plan Sheet PB-292-106-B should be in metric.

Please address these concerns and resubmit. If you have any questions, please contact me at (510) 622-5660.

Sincerely,

Kenneth Loncharich  
Resident Engineer

cc: File 5.03, 58.16



**C.C. MYERS, INC.**

3286 FITZGERALD ROAD  
RANCHO CORDOVA, CA 95742

An Equal Opportunity / Affirmative Action Employer  
916-635-9370  
FAX 916-635-8961

LET. 164-11

**SUBMITTAL**

Document No.:	215-SUB.00016-02		
Dated:	Jul 27 2004	Job No.:	215
Attention:	Mr. Kenneth Loncharich		
RE:	04-0120R4		
San Francisco Oakland Bay Bridge			
Temporary Bypass Structure			

To: State of California  
333 Berma Road  
Oakland CA 94607

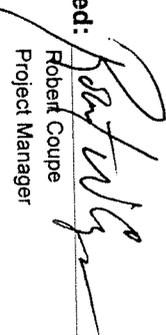
- We are sending you:  Attached  Via Fax
- Drawing  Plans  Prog. Pmt
- Samples  Certificates of compliance  Calculations
- Payroll  Specs  Copy of Letter
- Change Order  Schedule  Invoice

Item	Date	Copies	Description	Drawing No	Rev	Status	Pages
01	Jul 21 2004	4	Pacific Mechanical: Preliminary Piping Routing & Design		1	Pending	

**These Are Transmitted As Checked Below:**

- For Approval  For Review/comment  Return For Correction
- For Your Use  As Requested  For Information

Remarks:

Signed:   
Robert Coupe  
Project Manager

Copy To: WLD

File: 215-101



# Pacific Mechanical Corporation

SUBMITTAL  
No. 002.1

2501 Annalisa Drive, Concord, CA 94520  
Phone: 925-827-4940 Fax: 925-827-0519  
CA License No. 138920 \* NV License No. 6244

**Project:** Temporary Bypass Structure

**Date:** 7/21/2004

**To:** CC Myers, Inc.

**Owner Submittal:** 002.1

3286 Fitzgerald Road  
Rancho Cordova, CA 95742

**Reference:** Preliminary Piping  
Routing & Design  
PMC Submittal No. 002.1

**Attention:** Bob Coupe

**Job #:** 292

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
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<input type="checkbox"/> Plans		<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	<b>SENT VIA:</b>	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Returned for Corrections
<input checked="" type="checkbox"/> Other: Made from Submittal	<input type="checkbox"/> Separate Cover Via: GSO (292-1100)	<input type="checkbox"/> Due Date:

SPEC SEC .	PARAGRAPH	REV.	ITEM NO.	COPIES	DATE	ITEM DESCRIPTION	STATUS
10-4	10-4.02-E	001	1	8	7/21/2004	SUB Preliminary Piping Routing & Design Dwgs: PB-292-101-B, 102-B, 103-B, 104-B, 105-B, 106-B	SIR

**Remarks:**

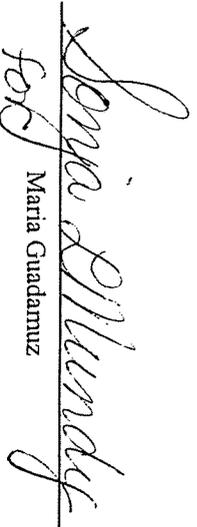
## RECEIVED

JUL 23 2004

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
IC-00461  
215-214  
STATE  
IMBSEN

JUL 23 2004  
JUL 23 2004  
JUL 23 2004

CC: Submittal File 292-002.1

Signed:   
Maria Guadamuz

Contract No. 04-0120R4  
Temporary Bypass Structure

## Resubmittal – Preliminary Pipe Routing

1. Review Comment Responses
2. Fitting & Flange Submittals
3. Revised Piping Drawings:
  - #2539\_1-D
  - #2539\_2-D
  - #2539\_3-D
  - #2539\_44D
  - #PB-292-101B
  - #PB-292-102B
  - #PB-292-103B
  - #PB-292-104B
  - #PB-292-105B
  - #PB-292-106B
4. Pipe Deflection Model
5. Copy of the previously approved piping submittal
  - Not for Review – For Information Only -

Contract No. 04-0120R4  
Temporary Bypass Structure

## Review Comment Responses

**Contract #04-0120R4  
Temporary Bypass Structure**

**Waterlines Piping – Bid Items 81 & 82  
Spec Section 10-4.02 Part 2**

**PMC Preliminary Piping Design Re-submittal  
addressing submittal review comments of July 13 Caltrans letter:**

Please refer to attached July 13 Caltrans letter when reading point below.

- 1) All pipe & Victaulic couplings have already been submitted and approved on a previous submittal. We have attached a copy for your information.  
All Fittings will be ASTM A234 Gr WPB Standard wall - welded - Domestic.  
We have attached a submittal for your review.  
All Flanges will be ASTM A105 standard bore - Domestic. We have attached a submittal for your review.  
Hoses have not been designed, as yet, but will be submitted on a future submittal after the preliminary pipe routing is approved. Please note that this is a preliminary submittal only, to permit Caltrans to review and approve the general routing and support method. All final design and details will be issued in a future submittal once this preliminary pipe routing is approved..
- 2) All pipe is supplied in 40' lengths, except that a few spools will be cut to size at tie-in or change of directions locations. Note that this pipe has been fully fabricated, galvanized, grooved, inspected and accepted by Caltrans. It is currently stored at Kelly Pipe yard in Santa Fee Springs.  
Yes, the 40 foot lengths will be able to match the curves on the bridge. The flex in the Victaulic couplings provides ample movement for the pipe to curve to match the bridge routing. This had been modeled both mathematically and also graphically. We have attached a copies for your review.
- 3) Details of the anchors are attached.
- 4) We have moved the anchor location to the middle of the span to allow free movement at each of the ends following your recommendations.
- 5) No isolation valves are shown on the contract drawings, neither are any used on the existing system currently on the bridge. It does not appear to us that any are required. Should these be required, they will added as part of the final design and all details will be furnished in a future submittal.
- 6) No air relief valves are shown on the contract drawings, neither are any used on the existing system currently on the bridge. It does not appear to us that any are

required. Should these be required, they will added as part of the final design and all details will be furnished in a future submittal.

- 7) Please see 1) above.
- 8) The original submittal provided two alternatives for Caltrans to consider. To simplify matters, we have eliminated the alternative that ran the pipe on the deck level and we will continue to run the pipe on the top of the 'K' Rail barrier the tei-in point.
- 9) We have revised the shoe details to show metric dimensions. All other submittals are in metric.

DEPARTMENT OF TRANSPORTATION

333 BURMA ROAD  
OAKLAND, CA 94607-1015  
PHONE (510) 622-5660  
FAX (510) 286-0550



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JUL 13 2004

July 9, 2004  
Contract No. 04-0120R4  
04-SF-80-12.6/13.2  
Temporary Bypass Structure  
SI# 44

Mr. Robert W. Coupe  
C. C. MYERS, INC.  
3286 Fitzgerald Road  
Rancho Cordova, CA 95742

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
~~22-00359~~  
215-103  
PRELIMINARY MECHANICAL

RE: 215-SUB.00016-00, 215-SUB.00016-01  
Subject: Preliminary Pipe Routing and Design

Dear Mr. Coupe:

The Department has reviewed the above referenced project's Preliminary Pipe Routing and Design, and submits the following comments:

1. Provide specifications for pipe, Victouluc couplings (what type), grooving method, hose and fittings.
  2. Are all the pipes manufactured in 40-foot lengths? Will they be able to match the curves on the bridge with this long of a section?
  3. Provide details for the anchors.
  4. In Section BB either the anchor is on the wrong side of the expansion joint or the detail is drawn backwards.
  5. Are any isolation valves needed to facilitate the future change over?
  6. Are any air relief valves needed (automatic or manual) to facilitate filling the 12-inch pipe?
  7. Provide specifications for the 4-inch and 12-inch rubber reinforced hose and fittings.
  8. Where will the water lines be installed on the temporary bypass structure (behind or on top of the barrier)? Is this consistent with the information provided in the design submittals?
  9. All submittals must be in metric units.
- Please address the above comments and resubmit. If you have any questions, please contact me at (510) 622-5660.

Sincerely,

Kenneth Loncharich  
Resident Engineer  
cc: File 5.03, 58.16

Contract No. 04-0120R4  
Temporary Bypass Structure

## Fitting & Flange Submittals

**Contract #04-0120R4  
Temporary Bypass Structure**

**Waterlines Piping Submittals – Bid Items 81 & 82  
Spec Section 10-4.02 Part 2**

**Fittings:**

All Fittings will be ASTM A234 Gr WPB Standard wall - welded - Domestic. We have attached a submittal for you review.

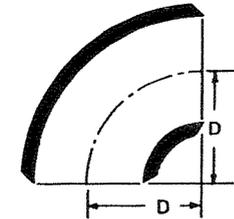
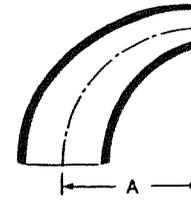
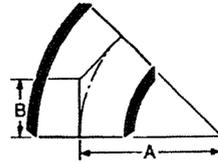
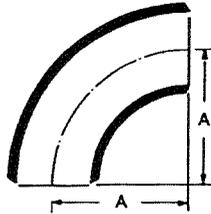
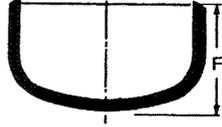
**Flanges:**

All Flanges will be ASTM A105 standard bore - Domestic. We have attached a submittal for you review.

# General Dimensions for

# Welding Fittings

ANSI B16.9  
ANSI B36.10  
ANSI B16.28



Nom. Pipe Size	Outside Diam.	Nominal Wall Thickness				A	B
		STD	XS	160	XXS		
1/2	0.840	.109	.147	.188	.294	1 1/2	5/8
3/4	1.050	.113	.154	.219	.308	◆ 1 1/8	● 7/16
1	1.315	.133	.179	.250	.358	1 1/2	7/8
1 1/4	1.660	.140	.191	.250	.382	1 3/8	1
1 1/2	1.900	.145	.200	.281	.400	2 1/4	1 1/8
2	2.375	.154	.218	.344	.436	3	1 3/8
2 1/2	2.875	.203	.276	.375	.552	3 3/4	1 3/4
3	3.500	.216	.300	.438	.600	4 1/2	2
3 1/2	4.000	.226	.318	.....	.636●	5 1/4	2 1/4
4	4.500	.237	.337	.531	.674	6	2 1/2
5	5.563	.258	.375	.625	.750	7 1/2	3 1/8
6	6.625	.280	.432	.719	.864	9	3 3/4
8	8.625	.322	.500	.906	.875	12	5
10	10.750	.365	.500	1.125	1.000	15	6 1/4
12	12.750	.375	.500	1.312	1.000	18	7 1/2
14	14.000	.375	.500	1.406	.....	21	8 3/4
16	16.000	.375	.500	1.594	.....	24	10
18	18.000	.375	.500	1.781	.....	27	11 1/4
20	20.000	.375	.500	1.969	.....	30	12 1/2
22	22.000	.375	.500	2.125	.....	33	13 1/2
24	24.000	.375	.500	2.344	.....	36	15
26	26.000	.375	.500	.....	.....	39	16
28	28.000	.375	.500	.....	.....	42	17 1/4
30	30.000	.375	.500	.....	.....	45	18 1/2
32	32.000	.375	.500	.....	.....	48	19 3/4
34	34.000	.375	.500	.....	.....	51	21
36	36.000	.375	.500	.....	.....	54	22 1/4
38	38.000	.375	.500	.....	.....	57	23.62
40	40.000	.375	.500	.....	.....	60	24.88
42	42.000	.375	.500	.....	.....	63	26
44	44.000	.375	.500	.....	.....	66	27.38
46	46.000	.375	.500	.....	.....	69	28.62
48	48.000	.375	.500	.....	.....	72	29.88

	D	F†	F‡		Nom. Pipe Size
	.....	1	1		1/2
	.....	1	1		3/4
	1	1 1/2	1 1/2		1
	1 1/4	1 1/2	1 1/2		1 1/4
	1 1/2	1 1/2	1 1/2		1 1/2
	2	1 1/2	1 3/4		2
	2 1/2	1 1/2	2		2 1/2
	3	2	2 1/2		3
	3 1/2	2 1/2	3		3 1/2
	4	2 1/2	3		4
	5	3	3 1/2		5
	6	3 1/2	4		6
	8	4	5		8
	10	5	6		10
	12	6	7		12
	14	6 1/2	7 1/2		14
	16	7	8		16
	18	8	9		18
	20	9	10		20
	22	10	10		22
	24	10 1/2	12		24
	.....	10 1/2	.....		26
	28	10 1/2	.....		28
	30*	10 1/2	.....		30
	32	10 1/2	.....		32
	34	10 1/2	.....		34
	36*	10 1/2	.....		36
	38	12	.....		38
	40	12	.....		40
	.....	12	.....		42
	44	13 1/2	.....		44
	46	13 1/2	.....		46
	48	13 1/2	.....		48

†Applies for "XS" wall thickness and less  
‡Applies for wall thickness greater than "XS"

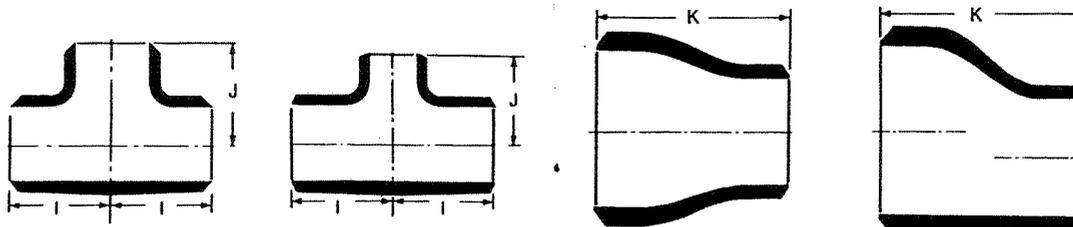
● This size not covered by ANSI B36.10  
◆ 1 1/2" at manufacturer's option

\*This size not covered by ANSI B16.9 ■ 2" at manufacturer's option  
● 3/4" at manufacturer's option

# General Dimensions for

# Welding Fittings (Cont.)

ANSI B16.9  
ANSI B36.10



Nom. Pipe Size	Outlet	Outside Diam.	Nominal Wall Thickness				I	J	K
			STD	XS	160	XXS			
1/2	1/2	.840	.109	.147	.188	.294	1	1	...
	3/8	.675	.091	.126	....	....	1	1	...
3/4	3/4	1.050	.113	.154	.219	.308	1 1/8	1 1/8	...
	1/2	.840	.109	.147	.188	.294	1 1/8	1 1/8	1 1/2
1	1	1.315	.133	.179	.250	.358	1 1/2	1 1/2	...
	3/4	1.050	.113	.154	.219	.308	1 1/2	1 1/2	2
	1/2	.840	.109	.147	.188	.294	1 1/2	1 1/2	2
1 1/4	1 1/4	1.660	.140	.191	.250	.382	1 7/8	1 7/8	...
	1	1.315	.133	.179	.250	.358	1 7/8	1 7/8	2
	3/4	1.050	.113	.154	.219	.308	1 7/8	1 7/8	2
	1/2	.840	.109	.147	.188	.294	1 7/8	1 7/8	2
1 1/2	1 1/2	1.900	.145	.200	.281	.400	2 1/4	2 1/4	...
	1 1/4	1.660	.140	.191	.250	.382	2 1/4	2 1/4	2 1/2
	1	1.315	.133	.179	.250	.358	2 1/4	2 1/4	2 1/2
	3/4	1.050	.113	.154	.219	.308	2 1/4	2 1/4	2 1/2
	1/2	.840	.109	.147	.188	.294	2 1/4	2 1/4	2 1/2
2	2	2.375	.154	.218	.344	.436	2 1/2	2 1/2	...
	1 1/2	1.900	.145	.200	.281	.400	2 1/2	2 3/8	3
	1 1/4	1.660	.140	.191	.250	.382	2 1/2	2 1/4	3
	1	1.315	.133	.179	.250	.358	2 1/2	2	3
	3/4	1.050	.113	.154	.219	.308	2 1/2	1 3/4	3
2 1/2	2 1/2	2.875	.203	.276	.375	.552	3	3	...
	2	2.375	.154	.218	.344	.436	3	2 3/4	3 1/2
	1 1/2	1.900	.145	.200	.281	.400	3	2 5/8	3 1/2
	1 1/4	1.660	.140	.191	.250	.382	3	2 1/2	3 1/2
	1	1.315	.133	.179	.250	.358	3	2 1/4	3 1/2

Nom. Pipe Size	Outlet	Outside Diam.	Nominal Wall Thickness				I	J	K
			STD	XS	160	XXS			
3	3	3.500	.216	.300	.438	.600	3 3/8	3 3/8	...
	2 1/2	2.875	.203	.276	.375	.552	3 3/8	3 1/4	3 1/2
	2	2.375	.154	.218	.344	.436	3 3/8	3	3 1/2
	1 1/2	1.900	.145	.200	.281	.400	3 3/8	2 7/8	3 1/2
	1 1/4	1.660	.140	.191	.250	.382	3 3/8	2 3/4	3 1/2
3 1/2	3 1/2	4.000	.226	.318	....	.636†	3 3/4	3 3/4	...
	3	3.500	.216	.300	.438	.600	3 3/4	3 5/8	4
	2 1/2	2.875	.203	.276	.375	.552	3 3/4	3 1/2	4
	2	2.375	.154	.218	.344	.436	3 3/4	3 1/4	4
	1 1/2	1.900	.145	.200	.281	.400	3 3/4	3 1/8	4
4	4	4.500	.237	.337	.531	.674	4 1/8	4 1/8	...
	3 1/2	4.000	.226	.318	....	.636†	4 1/8	4	4
	3	3.500	.216	.300	.438	.600	4 1/8	3 7/8	4
	2 1/2	2.875	.203	.276	.375	.552	4 1/8	3 3/4	4
	2	2.375	.154	.218	.344	.436	4 1/8	3 1/2	4
5	5	5.563	.258	.375	.625	.750	4 7/8	4 7/8	...
	4	4.500	.237	.337	.531	.674	4 7/8	4 5/8	5
	3 1/2	4.000	.226	.318	....	.636†	4 7/8	4 1/2	5
	3	3.500	.216	.300	.438	.600	4 7/8	4 3/8	5
	2 1/2	2.875	.203	.276	.375	.552	4 7/8	4 1/4	5
6	6	6.625	.280	.432	.719	.864	5 5/8	5 5/8	...
	5	5.563	.258	.375	.625	.750	5 5/8	5 3/8	5 1/2
	4	4.500	.237	.337	.531	.674	5 5/8	5 1/8	5 1/2
	3 1/2	4.000	.226	.318	....	.636†	5 5/8	5	5 1/2
	3	3.500	.216	.300	.438	.600	5 5/8	4 7/8	5 1/2
2 1/2	2.875	.203	.276	.375	.552	5 5/8	4 3/4	5 1/2	

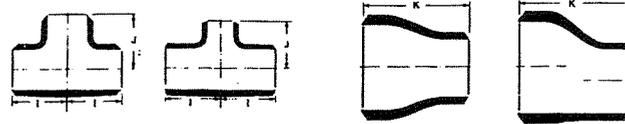
†This size not covered by ANSI B36.10

# General Dimensions for

# Welding Fittings (Cont.)

ANSI B16.9  
ANSI B36.10

## Tees & Reducers (cont.)



Nom. Pipe Size	Outlet	Outside Diam.	Nominal Wall Thickness				I	J	K
			STD	XS	160	XXS			
8	8	8.625	.327	.500	.906	.875	7	7	..
	6	6.625	.280	.432	.719	.864	7	6 5/8	6
	5	5.563	.258	.375	.625	.750	7	6 3/8	6
	4	4.500	.237	.337	.531	.674	7	6 1/8	6
	3 1/2	4.000	.226	.318	..	.636†	7	6	6
10	10	10.750	.365	.500	1.125	1.000	8 1/2	8 1/2	..
	8	8.625	.322	.500	.906	.875	8 1/2	8	7
	6	6.625	.280	.432	.719	.864	8 1/2	7 3/8	7
	5	5.563	.258	.375	.625	.750	8 1/2	7 1/2	7
	4	4.500	.237	.337	.531	.674	8 1/2	7 1/4	7
12	12	12.750	.375	.500	1.312	1.000	10	10	..
	10	10.750	.365	.500	1.125	1.000	10	9 1/2	8
	8	8.625	.322	.500	.906	.875	10	9	8
	6	6.625	.280	.432	.719	.864	10	8 3/8	8
	5	5.563	.258	.375	.625	.750	10	8 1/2	8
14	14	14.000	.375	.500	1.406	..	11	11	..
	12	12.750	.375	.500	1.312	..	11	10 5/8	13
	10	10.750	.365	.500	1.125	..	11	10 1/8	13
	8	8.625	.322	.500	.906	..	11	9 3/4	13
	6	6.625	.280	.432	.719	..	11	9 3/8	13
16	16	16.000	.375	.500	1.594	..	12	12	..
	14	14.000	.375	.500	1.406	..	12	12	14
	12	12.750	.375	.500	1.312	..	12	11 5/8	14
	10	10.750	.365	.500	1.125	..	12	11 1/8	14
	8	8.625	.322	.500	.906	..	12	10 3/4	14
	6	6.625	.280	.432	.719	..	12	10 3/8	14
18	18	18.000	.375	.500	..	..	13 1/2	13 1/2	..
	16	16.000	.375	.500	1.594	..	13 1/2	13	15
	14	14.000	.375	.500	..	..	13 1/2	13	15
	12	12.750	.375	.500	..	..	13 1/2	12 5/8	15
	10	10.750	.365	.500	..	..	13 1/2	12 1/2	15
	8	8.625	.322	.500	..	..	13 1/2	11 3/4	15
20	20	20.000	.375	.500	..	..	15	15	..
	18	18.000	.375	.500	..	..	15	14 1/2	20
	16	16.000	.375	.500	..	..	15	14	20
	14	14.000	.375	.500	..	..	15	14	20
	12	12.750	.375	.500	..	..	15	13 3/8	20
	10	10.750	.365	.500	..	..	15	13 1/8	20
	8	8.625	.322	.500	..	..	15	12 3/4	20
	22	22.000	.375	.500	..	..	16 1/2	16 1/2	..
22	20	20.000	.375	.500	..	..	16 1/2	16	20
	18	18.000	.375	.500	..	..	16 1/2	15 1/2	20
	16	16.000	.375	.500	..	..	16 1/2	15	20

Nom. Pipe Size	Outlet	Outside Diam.	Nominal Wall Thickness				I	J	K
			STD	XS	160	XXS			
22	14	14.000	.375	.500	..	..	16 1/2	15	20
	12	12.750	.375	.500	..	..	16 1/2	14 5/8	..
	10	10.750	.365	.500	..	..	16 1/2	14 1/8	..
24	24	24.000	.375	.500	..	..	17	17	..
	22	22.000	.375	.500	..	..	17	17	20
	20	20.000	.375	.500	..	..	17	17	20
	18	18.000	.375	.500	..	..	17	16 1/2	20
	16	16.000	.375	.500	..	..	17	16	20
	14	14.000	.375	.500	..	..	17	16	20
	12	12.750	.375	.500	..	..	17	15 3/8	20
26	10	10.750	.365	.500	..	..	17	15 1/8	20
	26	26.000	.375	.500	..	..	19.50	19.50	..
	24	24.000	.375	.500	..	..	19.50	19.00	24.00
	22	22.000	.375	.500	..	..	19.50	18.50	24.00
	20	20.000	.375	.500	..	..	19.50	18.00	24.00
	18	18.000	.375	.500	..	..	19.50	17.50	24.00
	16	16.000	.375	.500	..	..	19.50	17.00	..
	14	14.000	.375	.500	..	..	19.50	17.00	..
	12	12.750	.375	.500	..	..	19.50	16.62	..
28	28	28.000	.375	.500	..	..	20.50	20.50	..
	26	26.000	.375	.500	..	..	20.50	20.50	24.00
	24	24.000	.375	.500	..	..	20.50	20.00	24.00
	22	22.000	.375	.500	..	..	20.50	19.50	24.00
	20	20.000	.375	.500	..	..	20.50	19.00	24.00
	18	18.000	.375	.500	..	..	20.50	18.50	..
	16	16.000	.375	.500	..	..	20.50	18.00	..
	14	14.000	.375	.500	..	..	20.50	18.00	..
30	12	12.750	.375	.500	..	..	20.50	17.62	..
	30	30.000	.375	.500	..	..	22	22	..
	24	24.000	.375	.500	..	..	22	21	24
	22	22.000	.375	.500	..	..	22	20 1/2	24
	20	20.000	.375	.500	..	..	22	20	24
	18	18.000	.375	.500	..	..	22	19 1/2	..
32	16	16.000	.375	.500	..	..	22	19	..
	32	32.000	.375	.500	..	..	23.50	23.50	..
	30	30.000	.375	.500	..	..	23.50	23.00	24.00
	28	28.000	.375	.500	..	..	23.50	22.50	24.00
	26	26.000	.375	.500	..	..	23.50	22.50	24.00
	24	24.000	.375	.500	..	..	23.50	22.00	24.00
	22	22.000	.375	.500	..	..	23.50	21.50	..
	20	20.000	.375	.500	..	..	23.50	21.00	..
32	18	18.000	.375	.500	..	..	23.50	20.50	..
	16	16.000	.375	.500	..	..	23.50	20.00	..
	14	14.000	.375	.500	..	..	23.50	20.00	..

# Dimensional Tolerances for Welding Fittings

## BUTT WELDING FITTINGS

The tolerances shown are in accordance with the dimensional tolerances approved by the American National Standards Institute (ANSI B16.9) for all carbon and alloy

fittings except Short Radius Elbows and Returns. These are governed by ANSI B16.28.

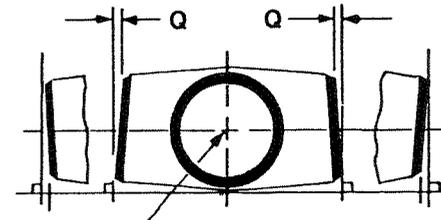
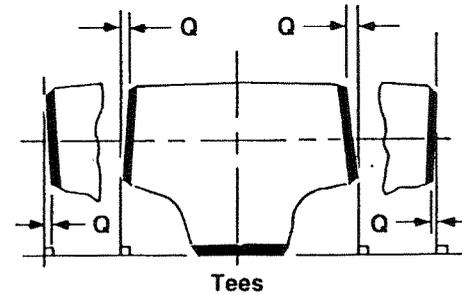
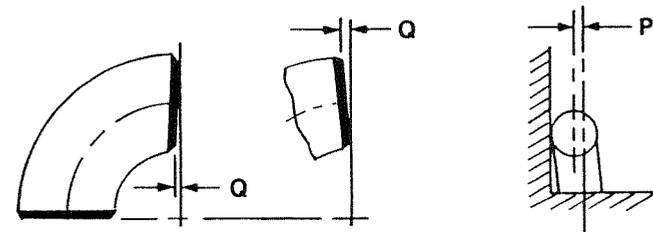
All Fittings				90 Deg. and 45 Deg. Elbows and Tees	Reducers and Lap Joint Stub Ends	Caps
Nominal Pipe Size (NPS)	Outside (1) Diameter at Bevel	Inside (2) Diameter at End	Wall (2) Thickness t	Center-to-End Dimension A, D, J	Overall Length K	Overall Length F
½ to 2½	+0.06 -0.03	±0.03	Not less than 87.5% of nominal thickness	±0.06	±0.06	±0.12
3 to 3½	±0.06	±0.06		±0.06	±0.06	±0.12
4	±0.06	±0.06		±0.06	±0.06	±0.12
5 to 8	+0.09 -0.06	±0.06		±0.06	±0.06	±0.25
10 to 18	+0.16 -0.12	±0.12		±0.09	±0.09	±0.25
20 to 24	+0.25 -0.19	±0.19		±0.09	±0.09	±0.25
26 to 30	+0.25 -0.19	±0.19		±0.12	±0.19	±0.38
32 to 48	+0.25 -0.19	±0.19		±0.19	±0.19	±0.38

Nominal Pipe Size	Angularity Tol.	
	Off Angle Q	Off Plane P
½ to 4	0.03	0.06
5 to 8	0.06	0.12
10 to 12	0.09	0.19
14 to 16	0.09	0.25
18 to 24	0.12	0.38
26 to 30	0.19	0.38
32 to 42	0.19	0.50
44 to 48	0.19	0.75

All dimensions are in inches.

(1) Out-of-round is the sum of absolute values of plus and minus tolerance.

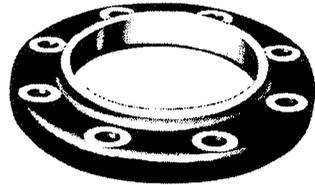
(2) The inside diameter at ends and the nominal wall thicknesses are to be specified by the purchaser.



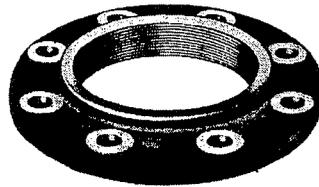
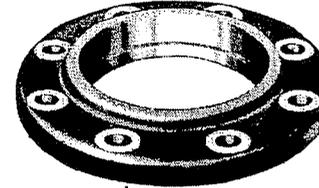
This End Flush Against Square

# Types of Flanges

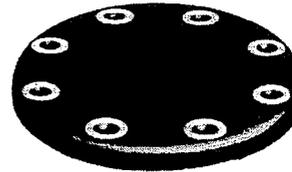
Lap Joint Flange



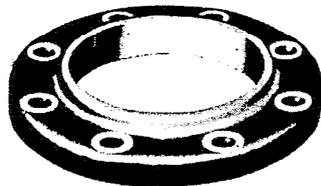
Socket Type Flange



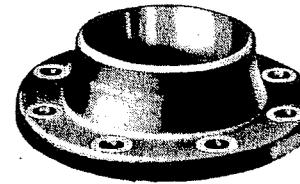
Threaded Flange



Blind Flange



Slip-on Flange



Welding Neck Flange

**Manufacturing  
and Material  
Standards\***

material: ASTM A-105

dimensions: ANSI B16.5

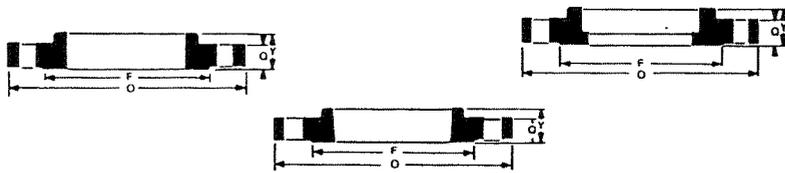
Flanges covered in this booklet are only the most commonly used types and sizes.

\*These standards apply only to carbon steel.

# General Dimensions for Forged Steel Flanges

ANSI B16.5

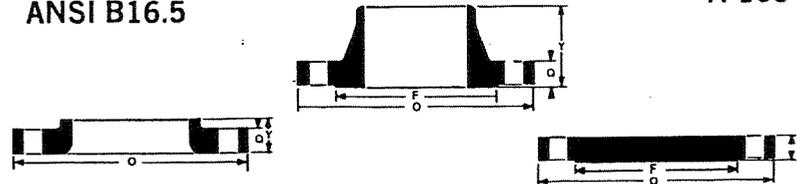
A-105



Class 150

ANSI B16.5

A-105



Class 300

Nom. Pipe Size	Out-side Diam. O	Flange Thick-ness Q†	Diam. of Raised Face F	Length Thru Hub Y†			Drilling		Bores*		
				Welding Neck	Thrd., Slip-on and Socket	Lap Joint	No. & Sizes of Holes	Bolt Circle	Slip-on	Lap Joint	
1/2	3 1/2	7/16	1 3/8	1 1/8	5/8	5/8	4- 5/8	2 3/8	.88	.90	
3/4	3 7/8	1/2	1 11/16	2 1/16	5/8	5/8	4- 5/8	2 3/4	1.09	1.11	
1	4 1/4	9/16	2	2 3/16	1 1/16	1 1/16	4- 5/8	3 1/8	1.36	1.38	
1 1/4	4 5/8	5/8	2 1/2	2 1/4	1 3/16	1 3/16	4- 5/8	3 1/2	1.70	1.72	
1 1/2	5	1 1/16	2 7/8	2 7/16	7/8	7/8	4- 5/8	3 3/8	1.95	1.97	
2	6	3/4	3 5/8	2 1/2	1	1	4- 3/4	4 3/4	2.44	2.46	
2 1/2	7	7/8	4 1/8	2 3/4	1 1/8	1 1/8	4- 3/4	5 1/2	2.94	2.97	
3	7 1/2	1 5/16	5	2 3/4	1 3/16	1 3/16	4- 3/4	6	3.57	3.60	
◆ 3 1/2	8 1/2	1 5/16	5 1/2	2 13/16	1 1/4	1 1/4	8- 3/4	7	4.07	4.10	
4	9	1 5/16	6 3/16	3	1 5/16	1 5/16	8- 3/4	7 1/2	4.57	4.60	
5	10	1 5/16	7 5/16	3 1/2	1 7/16	1 7/16	8- 7/8	8 1/2	5.66	5.69	
6	11	1	8 1/2	3 1/2	1 9/16	1 9/16	8- 7/8	9 1/2	6.72	6.75	
8	13 1/2	1 1/8	10 5/8	4	1 3/4	1 3/4	8- 7/8	11 3/4	8.72	8.75	
10	16	1 3/16	12 3/4	4	1 15/16	1 15/16	12-1	14 1/4	10.88	10.92	
12	19	1 1/4	15	4 1/2	2 3/16	2 3/16	12-1	17	12.88	12.92	
14	21	1 3/8	16 1/4	5	2 1/4	3 3/8	12-1 1/8	18 3/4	14.14	14.18	
16	23 1/2	1 7/16	18 1/2	5	2 1/2	3 7/16	16-1 1/8	21 1/4	16.16	16.19	
18	25	1 9/16	21	5 1/2	2 11/16	3 3/16	16-1 1/4	22 3/4	18.18	18.20	
20	27 1/2	1 11/16	23	5 11/16	2 7/8	4 1/16	20-1 1/4	25	20.20	20.25	
24	32	1 7/8	27 1/4	6	3 1/4	4 3/8	20-1 3/8	29 1/2	24.25	24.25	
26											
28	These spaces have been provided so that										
30	new flange sizes through 36" can be										
32	included as they become available										
34	from ANSI.										
36											

\*Welding neck and socket type flange bores are same as I.D. of pipe to which they are welded. See table on pages 4 and 5. Socket diameter of socket type flange is the same as bore of slip-on flange.

†Where applicable, includes 1/16" raised face.

◆ For information only

Nom. Pipe Size	Out-side Diam. O	Flange Thick-ness Q†	Diam. of Raised Face F	Length Thru Hub Y†			Drilling		Bores*		
				Welding Neck	Thrd., Slip-on and Socket	Lap Joint	No. & Size of Holes	Bolt Circle	Slip-on	Lap Joint	
1/2	3 3/4	9/16	1 3/8	2 1/16	7/8	7/8	4- 5/8	2 5/8	.88	.90	
3/4	4 5/8	5/8	1 11/16	2 1/4	1	1	4- 3/4	3 1/4	1.09	1.11	
1	4 7/8	1 1/16	2	2 7/16	1 1/16	1 1/16	4- 3/4	3 1/2	1.36	1.38	
1 1/4	5 1/4	3/4	2 1/2	2 9/16	1 1/16	1 1/16	4- 3/4	3 3/8	1.70	1.72	
1 1/2	6 1/8	1 3/16	2 7/8	2 11/16	1 3/16	1 3/16	4- 7/8	4 1/2	1.95	1.97	
2	6 1/2	7/8	3 5/8	2 3/4	1 5/16	1 5/16	8- 3/4	5	2.44	2.46	
2 1/2	7 1/2	1	4 1/8	3	1 1/2	1 1/2	8- 7/8	5 7/8	2.94	2.97	
3	8 1/4	1 1/8	5	3 3/8	1 11/16	1 11/16	8- 7/8	6 5/8	3.57	3.60	
◆ 3 1/2	9	1 3/16	5 1/2	3 3/16	1 3/4	1 3/4	8- 7/8	7 1/4	4.07	4.10	
4	10	1 1/4	6 3/16	3 3/8	1 7/8	1 7/8	8- 7/8	7 7/8	4.57	4.60	
5	11	1 3/8	7 5/16	3 3/8	2	2	8- 7/8	9 1/4	5.66	5.69	
6	12 1/2	1 7/16	8 1/2	3 3/8	2 1/16	2 1/16	12- 7/8	10 5/8	6.72	6.75	
8	15	1 5/8	10 5/8	4 3/8	2 7/16	2 7/16	12-1	13	8.72	8.75	
10	17 1/2	1 7/8	12 3/4	4 5/8	2 5/8	3 3/4	16-1 1/8	15 1/4	10.88	10.92	
12	20 1/2	2	15	5 1/8	2 7/8	4	16-1 1/4	17 3/4	12.88	12.92	
14	23	2 1/8	16 1/4	5 5/8	3	4 3/8	20-1 1/4	20 1/4	14.14	14.18	
16	25 1/2	2 1/4	18 1/2	5 3/4	3 1/4	4 3/4	20-1 3/8	22 1/2	16.16	16.19	
18	28	2 3/8	21	6 1/4	3 1/2	5 5/8	24-1 3/8	24 3/4	18.18	18.20	
20	30 1/2	2 1/2	23	6 3/8	3 3/4	5 1/2	24-1 3/8	27	20.20	20.25	
24	36	2 3/4	27 1/4	6 5/8	4 3/16	6	24-1 5/8	32	24.25	24.25	
26											
28	These spaces have been provided so that										
30	new flange sizes through 36" can be										
32	included as they become available										
34	from ANSI.										
36											

\*Welding neck and socket type flange bores are same as I.D. of pipe to which they are welded. See table on pages 4-7. Socket diameter of socket type flange is the same as bore of slip-on flange.

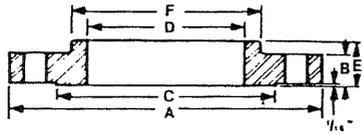
†Where applicable, includes 1/16" raised face

◆ For information only

# Dimensional Tolerances

# for Forged Steel Flanges

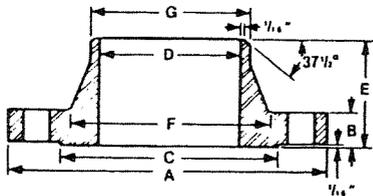
threaded, lap joint,  
slip-on and  
blind flanges  
ANSI B16.5



Outside Diameter (A)	When O. D. is 24" or less
	When O. D. is over 24"
Inside Diameter (D)	Threaded
	Slip-on and Lap Joint
Diameter of Contact Face (C)	1/16" Raised Face
	1/4" Raised Face, Tongue and Groove, or Male and Female
Diameter of Counterbore	Same as for Inside Diameter

$\pm 1/16$ "	Outside Dia. of Hub (F)	12" and Smaller	$+3/32$ " $-1/16$ "
		Over 12"	$\pm 1/8$ "
$\pm 1/8$ "	Drilling	Bolt Circle	$\pm 1/16$ "
		Bolt hole spacing	$\pm 1/32$ "
		Eccentricity between bolt circle diameter and machined facing diameter	2 1/2" and smaller 1/32" Max. 3" and larger 1/16" Max.
$\pm 1/32$ "	Overall Height (E)	On flanges 18" and smaller	$+1/8$ " $-1/32$ "
		On flanges larger than 18"	$+3/16$ " $-1/16$ "
$\pm 1/64$ "	Thickness (B)	18" and smaller	$+1/8$ " $-0$ "
		Over 18"	$+3/16$ " $-0$ "
		Where allowance has been left on face for finish: All sizes	$+1/8$ " $-1/16$ "

welding neck  
flanges  
ANSI B16.5



Outside Diameter (A)	When O. D. is 24" or less
	When O. D. is over 24"
Inside Diameter (D)	10" and smaller
	12" to 18"
	Over 18"
Diameter of Contact Face (C)	1/16" Raised Face
	1/4" Raised Face, Tongue and Groove, or Male and Female
Diameter of Hub at Point of Welding (G)	5" and smaller
	6" and larger
Diameter of Hub at Base (F)	When "F" is 24" and smaller
	When "F" is over 24"

$\pm 1/16$ "	Drilling	Bolt Circle	$\pm 1/16$ "
		Bolt hole spacing	$\pm 1/32$ "
$\pm 1/8$ "	Drilling	Eccentricity between bolt circle diameter and machined facing diameter	2 1/2" and smaller 1/32" Max. 3" and larger 1/16" Max.
$\pm 1/32$ "	Width of Land	All sizes	$\pm 1/32$ "
$\pm 1/16$ "			
$+1/8$ " $-1/16$ "	Angle of Hub Bevel	All sizes	$\pm 2 1/2$ °
$\pm 1/32$ "			
$\pm 1/64$ "	Overall Height (E)	10" and smaller	$\pm 1/16$ "
		12" and larger	$\pm 1/8$ "
$+3/32$ " $-1/32$ "	Thickness (B)	18" and smaller	$+1/8$ " $-0$ "
		Over 18"	$+3/16$ " $-0$ "
$+5/32$ " $-1/32$ "		Where allowance has been left on face for finish: All sizes	$+1/8$ " $-1/16$ "
$\pm 1/16$ "			
$\pm 1/8$ "			

\* This tolerance not covered by ANSI B16.5. Dimensions are approximate.

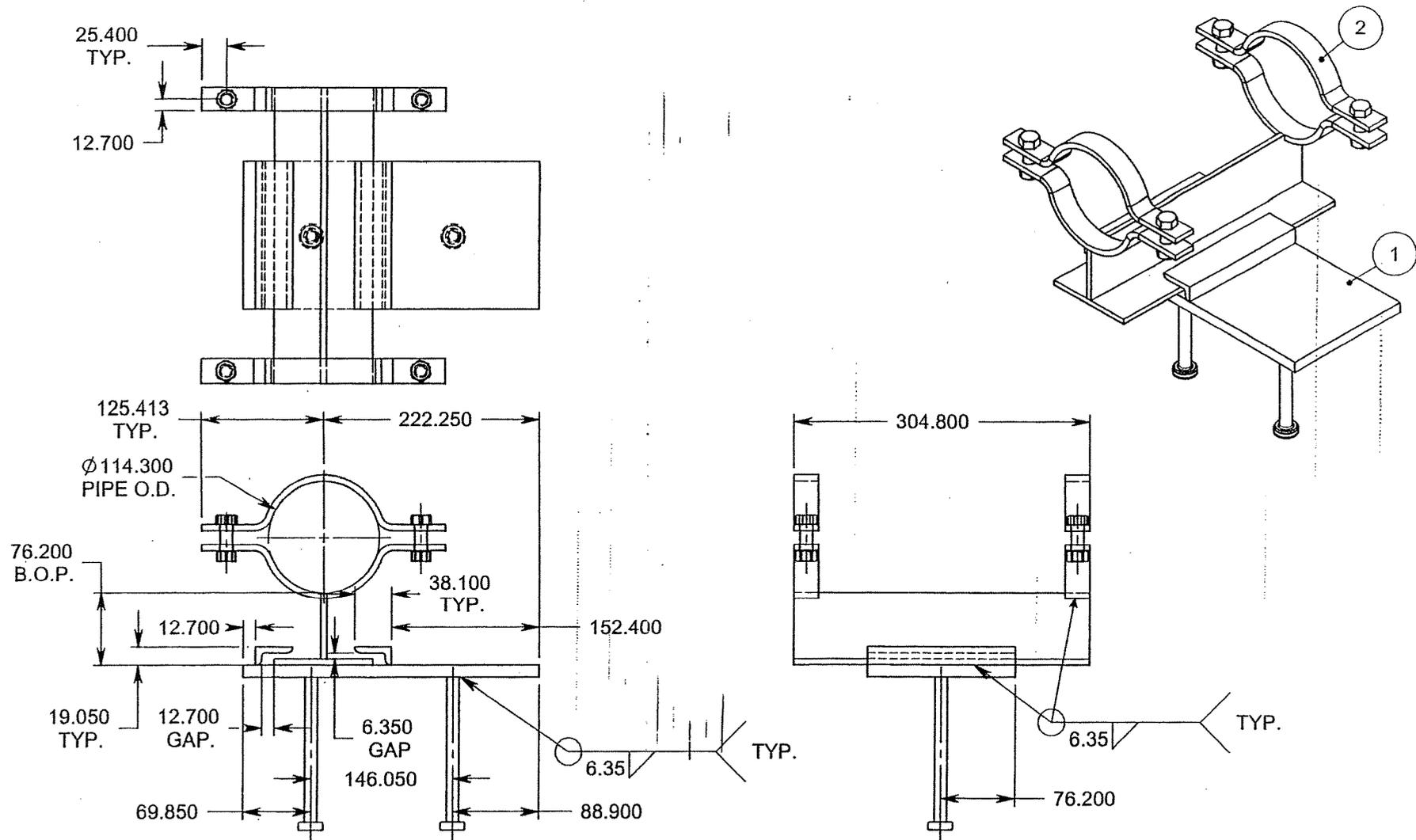
# Decimal Equivalents of One Inch

---

$\frac{1}{64}$	.015625	$\frac{33}{64}$	.515625
$\frac{1}{32}$	.03125	$\frac{17}{32}$	.53125
$\frac{3}{64}$	.046875	$\frac{35}{64}$	.546875
$\frac{1}{16}$	.0625	$\frac{9}{16}$	.5625
$\frac{5}{64}$	.078125	$\frac{37}{64}$	.578125
$\frac{3}{32}$	.09375	$\frac{19}{32}$	.59375
$\frac{7}{64}$	.109375	$\frac{39}{64}$	.609375
$\frac{1}{8}$	.125	$\frac{5}{8}$	.625
$\frac{9}{64}$	.140625	$\frac{41}{64}$	.640625
$\frac{5}{32}$	.15625	$\frac{21}{32}$	.65625
$\frac{11}{64}$	.171875	$\frac{43}{64}$	.671875
$\frac{3}{16}$	.1875	$\frac{11}{16}$	.6875
$\frac{13}{64}$	.203125	$\frac{45}{64}$	.703125
$\frac{7}{32}$	.21875	$\frac{23}{32}$	.71875
$\frac{15}{64}$	.234375	$\frac{47}{64}$	.734375
$\frac{1}{4}$	.25	$\frac{3}{4}$	.75
$\frac{17}{64}$	.265625	$\frac{49}{64}$	.765625
$\frac{9}{32}$	.28125	$\frac{25}{32}$	.78125
$\frac{19}{64}$	.296875	$\frac{51}{64}$	.796875
$\frac{5}{16}$	.3125	$\frac{13}{16}$	.8125
$\frac{21}{64}$	.328125	$\frac{53}{64}$	.828125
$\frac{11}{32}$	.34375	$\frac{27}{32}$	.84375
$\frac{23}{64}$	.359375	$\frac{55}{64}$	.859375
$\frac{3}{8}$	.375	$\frac{7}{8}$	.875
$\frac{25}{64}$	.390625	$\frac{57}{64}$	.890625
$\frac{13}{32}$	.40625	$\frac{29}{32}$	.90625
$\frac{27}{64}$	.421875	$\frac{59}{64}$	.921875
$\frac{7}{16}$	.4375	$\frac{15}{16}$	.9375
$\frac{29}{64}$	.453125	$\frac{61}{64}$	.953125
$\frac{15}{32}$	.46875	$\frac{31}{32}$	.96875
$\frac{31}{64}$	.484375	$\frac{63}{64}$	.984375
$\frac{1}{2}$	.5	$1$	1

Contract No. 04-0120R4  
Temporary Bypass Structure

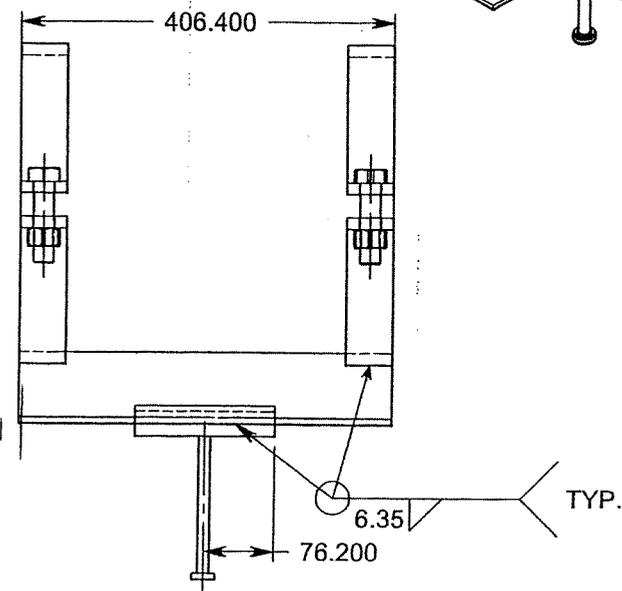
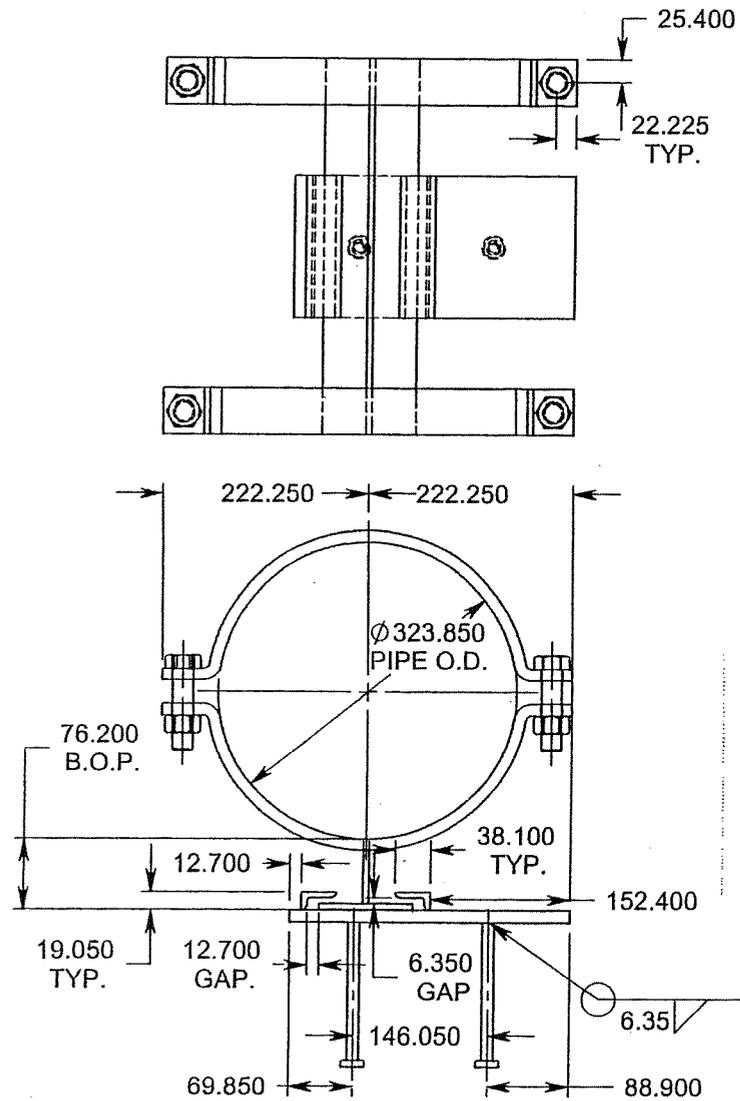
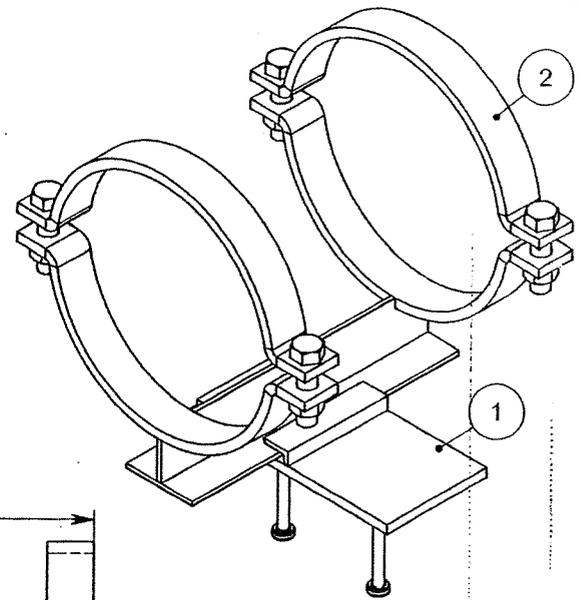
## Revised Piping Drawings



NO.	QTY.	THK.	WIDTH	LENGTH	DESCRIPTION	FINISH	WT.
1	1				EMBED PLATE	OSC	12.633
	1	12.700	152.400	304.800	PLATE	OSC	10.224
	2	.500Ø		6.000	NELSON STUD	OSC	0.392
	2	.250		152.400	L1.500 x 1.500 TRMD.	OSC	0.812
2	1				FIG.426 - 4.000 SPEC.	OSC	9.565
	1	6.350	101.600	304.800	BASE PLATE	OSC	3.408
	1	6.350	69.850	304.800	VERTICAL PLATE	OSC	2.307
	4	6.350	25.400	11.560	PIPE CLAMP	OSC	0.785
	4	.500		1.500	STD. HHMB	EG	0.1334
	4	.500			HEX NUT	EG	0.043



REV.	DATE	COMMENTS	DETAIL TYPE:	PART #:	ITEM:	APPROVED BY:	QTY. REQ'D
					1		100
			PROJECT:	BAY BRIDGE		REF:	SKETCH
			P.O. OR REF#:	2539		TOLCO CAD NO.:	1
			TITLE:	4.000 (STL) SLIDE SUPPORT		DRAWN BY:	OF
			FOR:	CLEMENT / PMC CORP.		mendozaj	1
						APPROVED:	WEIGHT:
						SCALE:	22.197
						DATE:	6-3-04
						1:6	



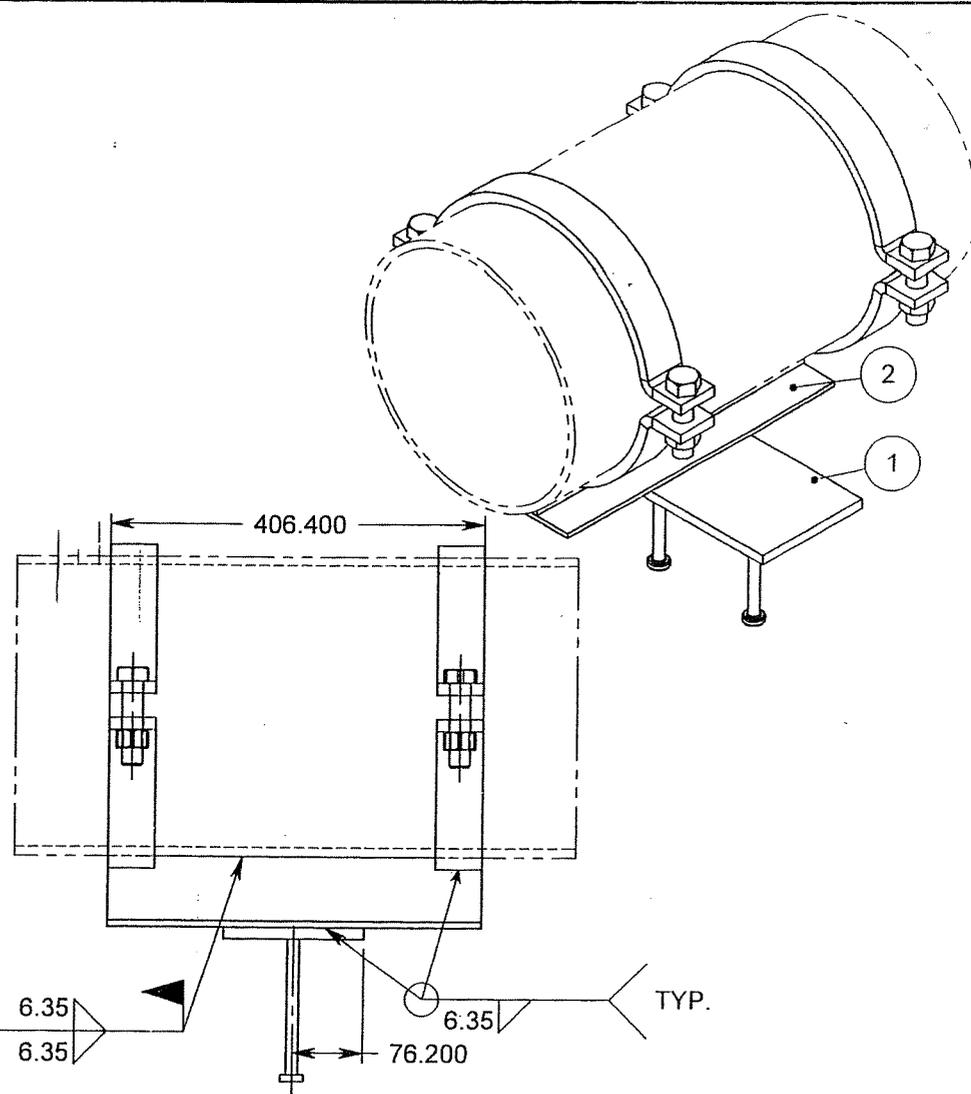
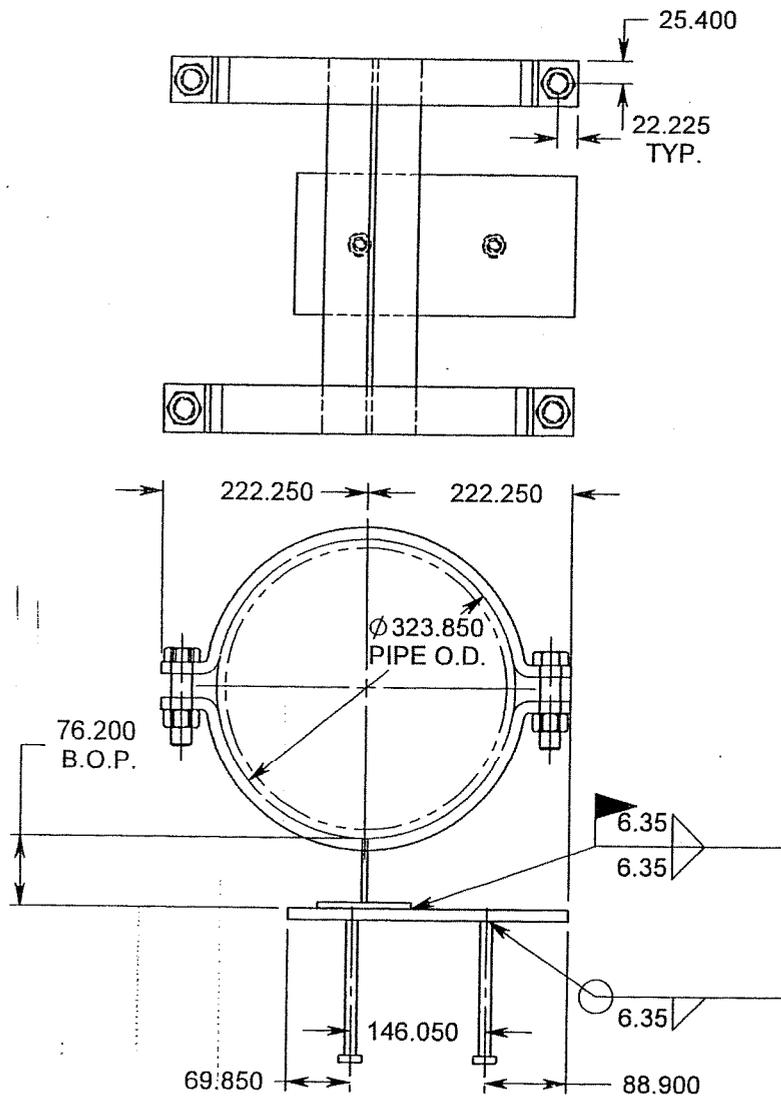
NO.	QTY.	THK.	WIDTH	LENGTH	DESCRIPTION	FINISH	WT.
1	1				EMBED PLATE	OSC	12.633
	1	12.700	152.400	304.800	PLATE	OSC	10.224
	2	.500Ø		6.000	NELSON STUD	OSC	0.392
	2	.250		152.400	L1.500 x 1.500 TRMD.	OSC	0.812
2	1				FIG.426 - 4.000 SPEC.	OSC	37.556
	1	6.350	101.600	406.400	BASE PLATE	OSC	4.544
	1	6.350	69.850	406.400	VERTICAL PLATE	OSC	2.982
	4	12.700	50.800	23.342	PIPE CLAMP	OSC	6.433
	4	.875		3.500	STD. HHMB	EG	0.8511
	4	.875			HEX NUT	EG	0.223



REV.	DATE	COMMENTS	DETAIL TYPE:	PART #:	ITEM: 2	APPROVED BY:	QTY. REQ'D
							60
				PROJECT: BAY BRIDGE		REF: SKETCH	SHEET: 1
				P.O. OR REF#: 2539		TOLCO CAD NO.: 2539 2-D	OF 1
				TITLE: 12.000 (STL) SLIDE SUPPORT		DRAWN BY: mendozaj	WEIGHT: 50.189
				FOR: CLEMENT / PMC CORP.		APPROVED:	SCALE: 1:8
							DATE: 6-3-04

Wednesday, July 21, 2004 11:20:38 AM





NO.	QTY.	THK.	WIDTH	LENGTH	DESCRIPTION	FINISH	WT.
1	1				EMBED PLATE	OSC	11.009
	1	12.700	152.400	304.800	PLATE	OSC	10.224
	2	.500Ø		6.000	NELSON STUD	OSC	0.392
2	1				FIG.426 - 4.000 SPEC.	OSC	37.556
	1	6.350	101.600	406.400	BASE PLATE	OSC	4.544
	1	6.350	69.850	406.400	VERTICAL PLATE	OSC	2.982
	4	12.700	50.800	23.342	PIPE CLAMP	OSC	6.433
	4	.875		3.500	STD. HHMB	EG	0.8511
	4	.875			HEX NUT	EG	0.223

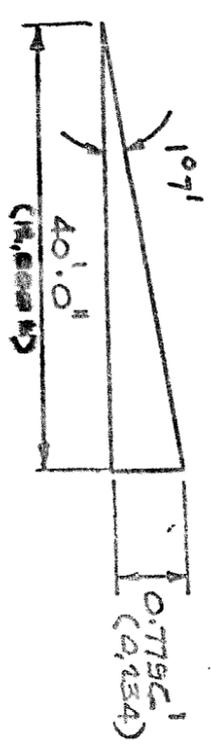
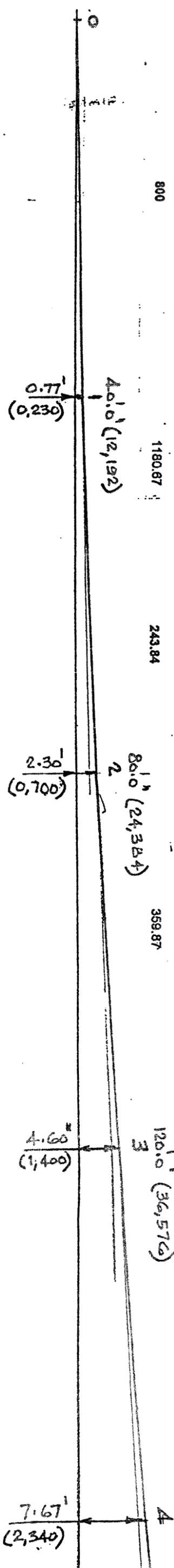


REV.	DATE	COMMENTS	DETAIL TYPE:	PART #:	ITEM:	APPROVED BY:	QTY. REQ'D
					4		2
			PROJECT:	BAY BRIDGE		REF:	SKETCH
			P.O. OR REF#:	2539		TOLCO CAD NO.:	2539_4-D
			TITLE:	12.000 (STL) ANCHOR SUPPORT		DRAWN BY:	WEIGHT:
			FOR:	CLEMENT / PMC CORP.		mendoza	48.565
					APPROVED:	SCALE:	DATE:
						1:8	7-21-04

Total Horizontal displacement per 40 foot length  
allowing a standard displacement of 0.766666667 foot per 40' length

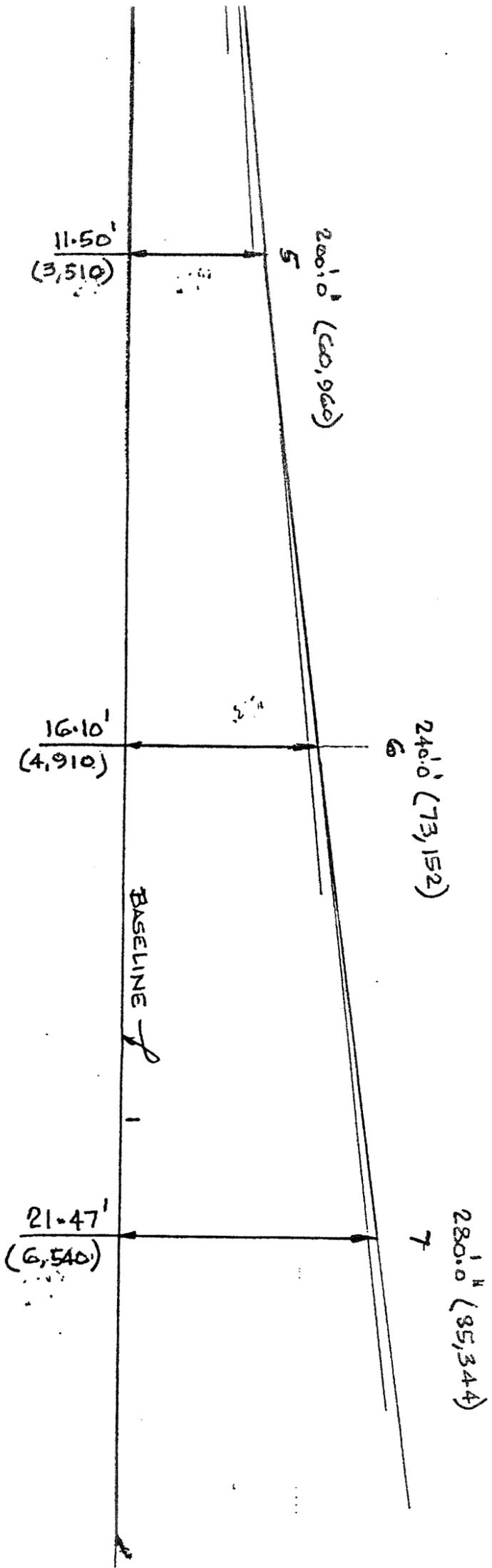
Total Horizontal displacement per 12 M length  
allowing a standard displacement of 0.23368 M per 12 M length

# of 40' pipe lengths	Total X Distance	Y displacm. per length	Y displacement for individual interval	Cummul. Y displacement	# of 12 M pipe lengths	Total X Distance (M)	Y displacm. per length (M)	Y displacement for individual interval (M)	Cummul. Y displacement (M)
20	800	0.766666667	15.33	161.00	20	243.84	0.23368	4.67	49.07
19		0.766666667	14.57	145.67	19		0.23368	4.44	44.40
18		0.766666667	13.80	131.10	18		0.23368	4.21	39.96
17		0.766666667	13.03	117.30	17		0.23368	3.97	35.75
16		0.766666667	12.27	104.87	16		0.23368	3.74	31.78
15		0.766666667	11.50	92.00	15		0.23368	3.51	28.04
14		0.766666667	10.73	80.50	14		0.23368	3.27	24.54
13		0.766666667	9.97	69.77	13		0.23368	3.04	21.26
12		0.766666667	9.20	59.80	12		0.23368	2.80	18.23
11		0.766666667	8.43	50.60	11		0.23368	2.57	15.42
10		0.766666667	7.67	42.17	10		0.23368	2.34	12.85
9		0.766666667	6.90	34.50	9		0.23368	2.10	10.52
8		0.766666667	6.13	27.80	8		0.23368	1.87	8.41
7		0.766666667	5.37	21.47	7		0.23368	1.64	6.54
6		0.766666667	4.60	16.10	6		0.23368	1.40	4.91
5		0.766666667	3.83	11.50	5		0.23368	1.17	3.51
4		0.766666667	3.07	7.67	4		0.23368	0.93	2.34
3		0.766666667	2.30	4.60	3		0.23368	0.70	1.40
2		0.766666667	1.53	2.30	2		0.23368	0.47	0.70
1		0.766666667	0.77	0.77	1		0.23368	0.23	0.23



12M x Tan 1.07' = ± 0.234M  
40 FT x Tan 1.07' = ± 0.7666 FT

STYLE 77 VICTAULIC CPG.			
DEFLECTION FROM $\phi$			
PER CPG DEG	PIPE IN/FT	PIPE MM/M	
121	1.07'	0.23'	20



12" #4' PIPE DEFLECTION ON CURVE  
USING VICTAULIC COUPLINGS.

BY BRIDGE TEMPORARY BRIDGE  
PIPE REROUTING

Job # 292

Contract No. 04-0120R4  
Temporary Bypass Structure

## Pipe Deflection Model













Contract No. 04-0120R4  
Temporary Bypass Structure

Previously Approved Piping Submittal

[Faint, illegible text, likely a list of items or specifications]



# Pacific Mechanical Corporation

2501 Annalisa Drive, Concord, CA 94520  
Phone: 925-827-4940 Fax: 925-827-0519  
CA License No. 138920 \* NV License No. 6244

**SUBMITTAL**  
No. 001.0

**Project:** Temporary Bypass Structure

Date: 4/20/2004

**To:** CC Myers, Inc.

Owner Submittal: 001.0

3286 Fitzgerald Road  
Rancho Cordova, CA 95742

Reference: Washline Piping

Bid Items 81 & 82  
Section 10-4.02 Part 2

**Attention:** Bob Coupe

Job #: 292

*FOR REVIEW*  
*FOR REVIEW*  
*FOR REVIEW*

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
<input type="checkbox"/> Change Order	<input type="checkbox"/> Re-Worked	<input type="checkbox"/> Resubmit
<input type="checkbox"/> Plans	<input type="checkbox"/> Re-Worked	<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	<input type="checkbox"/> Attached	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Returned for Corrections
<input checked="" type="checkbox"/> Other: Made from Submittal	<input type="checkbox"/> Separate Cover Via: GSO (292-1100)	<input type="checkbox"/> Due Date:

SPEC SEC	PARAGRAPH	REV.	QTY	UNIT	NO.	COPIES	DATE	ITEM	DESCRIPTION	STATUS
10-4	10-4.02-A	000	12			4/20/2004	SUB		Title: Pipe Class Description Desc: 4" & 12" Pipe Grade A53B / A53F Galvanized	SIR
10-4	10-4.02-B	000	12			4/20/2004	SUB		Title: Galvanized Coating Desc: Galvanized Coating	SIR
10-4	10-4.02-C	000	12			4/20/2004	SUB		Title: Pipe Grooving Desc: Pipe Grooving	SIR
10-4	10-4.02-D	000	12			4/20/2004	SUB		Title: Grooved Mechanical Coupling Desc: Grooved Mechanical Coupling	SIR

Remarks:

*COPY OF PREVIOUS SUBMITTAL.*  
*ALREADY REVIEWED & APPROVED FOR REFORMATORY*

CC: Submittal No. 292-001

Signed: Maria Guadamuz

**PACIFIC MECHANICAL CORPORATION**

GENERAL ENGINEERING CONTRACTORS

Calif. State Lic. No. 134620

April 20, 2004

C C Myers, Inc.  
3286 Fitzgerald Road  
Rancho Cordova, CA 95742

Attention: Bob Coupe

Ref: Caltrans Contract #04-0120R4  
Temporary Bypass Structure  
Waterlines Piping Submittals – Bid Items 81 & 82

Subject: Bulk Piping Submittal - & Request for Prompt Review

Gentlemen:

We are in the process of purchasing a bulk order of pipe and Vic couplings to protect the project from the risk of further cost increases on steel. As you know, the price of steel has escalated approx 20% per months for the last few months. We have already incurred significant cost increases from the time we bid the job. When those costs are know, we expect to work with your firm and seek compensation for this unforeseeable cost increase.

At the present, the steel mills are no longer quoting any pricing on future mill runs. They are quoting "pricing in effect at time of production". Therefore, it is essential to buy material currently in stock. We have secured the items below from stock and we will be able to lock in pricing when we receive an approved submittal. Please request expedient review of the attached submittal to allow us to conclude the purchase as soon as possible.

1340 LF	Std 12" Pipe A53B	Std wall – Galvanized- Domestic
1340 LF	Std 4" Pipe A53F	Std wall - Galvanized – Domestic
40 EA	4" Vic Coupling	
40 EA	12" Vic Coupling	

We need to buy this material as soon as possible this to protect the project and ultimately the client from exposure to more steel cost increases. Thank you for your help on this.

Sincerely,

Pierre Bigras  
Project Manager

Z:\Users\Projects\292 CC Myers\CC Myers - Request for prompt review.doc

Contract #04-0120R4  
Temporary Bypass Structure

Waterlines Piping Submittals – Bid Items 81 & 82  
Spec Section 10-4.02 Part 2

**Pipe Class Description:**

12" Pipe Grade A53B ERW Std wall - Galvanized –Domestic  
4" Pipe Grade A53F Std wall - Galvanized –Domestic

**Galvanized Coating:**

The galvanized zinc coating will be as defined in ASTM A53 article 19.2

**Pipe Grooving:**

Pipe Grooving will be as per attached "Standard Cut Groove Specifications/steel".  
Pipe will be shop grooved after galvanization. The groove area will be coated with ZRC  
cold galvanizing. Note that rolled grooving not feasible on galvanized pipe as it damages  
the internal surface of the galvanizing

**Grooved Mechanical Coupling:**

Will be Vicatolic Style 77 as per attached cut sheet with the Shop standard coating.

# Pipe Class Description:

## PIPE SPECIFICATIONS

### Scope

<b>A53</b> 1/8" - 26 STD, XS AND XXS ANSI B36.10	Covers BLACK and hot-dipped GALVANIZED WELDED and SEAMLESS nominal size and wall pipe suitable for welding and for coiling, bending, flanging, and other forming operations.  Continuous weld pipe is not intended for flanging (using pipe wall to form flange).  Seamless and electric-resistance weld pipe may be specified in grades A or B.
Other sizes and dimensions may be furnished	Order should specify when pipe is required for close coiling.

### Hydrostatic Testing

Prescribes hydrostatic test pressures for continuous weld pipe and for seamless and electric resistance weld pipe. Provision is made for test pressures not to exceed 2500 psi for pipe 3 inch and under or 2800 psi for pipe over 3 inch.  
  
Each length of pipe must be tested at the producing mill. Welded pipe 2 inch and larger is jarred near one end while under test pressure.

Refer to ASTM A53 Table X 2.2

### Permissible Variations in Weights Per Foot

#### For XS and lighter wall thicknesses

Pipe shall not vary more than plus or minus 5 percent from weights shown in tables and included in ANSI B36.10.

#### For walls heavier than XS

Pipe shall not vary more than plus or minus 10 percent from weights shown in tables and included in ANSI B36.10.

Sizes 4 inch and smaller weighted in customary mill lifts. On larger sizes, weight tolerance is applicable to individual lengths.

## PIPE SPECIFICATIONS

### Permissible Variations in OD

<b>A53</b> 1/8" - 26" STD, XS and XXS	<b>OUTSIDE DIAMETER</b> at any point shall not vary more than:			
	<table border="0"> <tr> <td><b>Nominal Pipe Size</b></td> <td><b>Over</b></td> <td><b>Under</b></td> </tr> </table>	<b>Nominal Pipe Size</b>	<b>Over</b>	<b>Under</b>
<b>Nominal Pipe Size</b>	<b>Over</b>	<b>Under</b>		

ANSI B36.10	1-1/2" and smaller	1/64"	1/64"
Other sizes and dimensions may be furnished	2 and larger	1%	1%

**Permissible Variations in Wall Thickness**

Minimum wall thickness at any point shall not be more than 12.5 percent under nominal wall thickness specified.  
 Specification contains a table of minimum wall thicknesses on inspection calculated as 0.875 x nominal wall.

**Chemical Requirements**

Composition, max. percent	C			Mn	P	S
Types S and E						
Grade A	0.25	0.95	0.05		0.06	
Grade B	0.30	1.20	0.05		0.06	
Type F	—	—	0.06		0.045	

**Tensile Requirements**

	Tensile Strength min, psi	Yield Point min, psi
Types S and E		
Grade A	48,000	30,000
Grade B	60,000	35,000
Type F	45,000	25,000

Table lists minimum elongation values calculated by the equation:  
 $e=625,000 A0.2 / U0.9$

**PIPE SPECIFICATIONS**

**Mechanical Tests Specified**

A53	TENSILE TEST
1/8" - 26	Required on all sizes. Tests on welded pipe 8 inch and larger shall be from transverse specimen.

STD, XS AND XXS ANSI B36.10	BEND TEST
	Required on sizes 2 inch and smaller, except XXS over 1-1/4 inch. Pipe shall stand cold bending through 90 degrees around a mandrel with a diameter twelve times the nominal diameter of the pipe without cracking. If for close coiling bend shall be 180 degrees around diameter eight times the nominal diameter of pipe.

Other sizes and dimensions may be furnished	FLATTENING TEST
	Required on sizes over 2 inch in nominal diameter in wall thickness, XS and lighter

less than 22 ft (6.71 m), with a minimum average for the order of 35 ft (10.67 m).

17.1.4 When lengths longer than single random are required for wall thicknesses heavier than extra-strong, the length shall be subject to negotiation.

17.1.5 When pipe is furnished with threads and couplings, the length shall be measured to the outer face of the coupling.

## 18. End Finish

18.1 When ordered with plain ends, the pipe shall be furnished to the following practice, unless otherwise specified.

18.1.1 NPS 1 1/2 and Smaller—Unless otherwise specified on the purchase order, end finish shall be at the option of the manufacturer.

### 18.1.2 NPS 2 and Larger:

18.1.2.1 Pipe of standard or extra strong weights, or in wall thickness less than 0.500 in. (12.7 mm), other than double extra strong pipe, shall be plain-end beveled with ends beveled to an angle of 30°, +5°, -0°, measured from a line drawn perpendicular to the axis of the pipe, and with a root face of 1/16 in. ± 1/32 in. (1.6 mm ± 0.79 mm).

18.1.2.2 Pipe with wall thicknesses over 0.500 in. (12.7 mm), and all double extra strong, shall be plain-end square cut.

18.2 When ordered with threaded ends, the pipe ends shall be provided with a thread in accordance with the gaging practice and tolerances of ANSI B1.20.1. For standard-weight pipe in sizes 6 in. and smaller, refer to Table X3.1 for threading data. For standard-weight pipe 8 in. and larger and all sizes of extra-strong weight and double extra-strong weight, refer to Table X3.2 for threading data. Threaded pipe sizes 4 in. and larger shall have thread protectors on the ends not protected by a coupling.

18.3 When ordered with couplings, one end of each length of pipe shall be provided with a coupling manufactured in accordance with Specification A 865. The coupling threads shall be in accordance with the gaging practice of ANSI B1.20.1. The coupling shall be applied hand-tight, unless power-tight is specified on the order. Couplings are to be made of steel. Taper-tapped couplings shall be furnished on all weights of threaded pipe 2 1/2 in. and larger. For sizes 2 in. and smaller, it is regular practice to furnish straight-tapped couplings for standard-weight pipe and taper-tapped couplings for extra-strong and double extra-strong pipe. If taper-tapped couplings are required for sizes 2 in. and under on standard-weight pipe, line pipe in accordance with API Specification 5L should be ordered. The taper-tapped couplings provided on line pipe in these sizes may be used on mill-threaded standard-weight pipe of the same size.

## 19. Galvanized Pipe

19.1 Galvanized pipe ordered under this specification shall be coated with zinc inside and outside by the hot-dip process. The zinc used for the coating shall be any grade of zinc conforming to Specification B 6.

19.2 *Weight of Coating*—The weight of zinc coating shall be not less than 1.3 oz/ft<sup>2</sup> (0.55 kg/m<sup>2</sup>) as determined from the average results of the two specimens taken for test in the manner prescribed in 19.5 and not less than 1.6 oz/ft<sup>2</sup> (0.49

kg/m<sup>2</sup>) for either of these specimens. The weight of coating expressed in ounces per square foot shall be calculated dividing the total weight of zinc, inside plus outside, by the total area, inside plus outside, of the surface coated. Each specimen shall have not less than 1.3 oz/ft<sup>2</sup> (0.40 kg/m<sup>2</sup>) zinc coating on each surface, calculated by dividing the weight of zinc on the given surface (outside or inside) by the area of the surface coated (outside or inside).

19.3 *Weight of Coating Test*—The weight of zinc coating shall be determined by a stripping test in accordance with Test Method A 90. The total zinc on each specimen shall be determined in a single stripping operation.

19.4 *Test Specimens*—Test specimens for determination of weight of coating shall be cut approximately 4 in. (101 mm) in length.

19.5 *Number of Tests*—Two test specimens for the determination of weight of coating shall be taken, one from each end of one length of galvanized pipe selected at random from each lot of 500 lengths or fraction thereof, of each size.

19.6 *Retests*—If the weight of coating of any lot does not conform to the requirements specified in 19.2, retests of two additional pipes from the same lot shall be made, each which shall conform to the requirements specified.

19.7 When pipe ordered under this specification is to be galvanized, the tension, flattening, and bend tests shall be made on the base material before galvanizing. When specified, results of the mechanical tests on the base material shall be reported to the purchaser. If impracticable to make the mechanical tests on the base material before galvanizing such tests may be made on galvanized samples, and an flaking or cracking of the zinc coating shall not be considered cause for rejection. When galvanized pipe is bent or otherwise fabricated to a degree which causes the zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.

## 20. Workmanship, Finish and Appearance

20.1 The pipe manufacturer shall explore a sufficient number of visual surface imperfections to provide reasonable assurance that they have been properly evaluated with respect to depth. Exploration of all surface imperfections not required, but may be necessary to ensure compliance with 20.2.

20.2 Surface imperfections that penetrate more than 12 1/4 % of the nominal wall thickness or encroach on the minimum wall thickness shall be considered defects. Pitting with defects shall be given one of the following disposition:

20.2.1 The defect may be removed by grinding provided that the remaining wall thickness is within specified limits.

20.2.2 Type S pipe and the parent metal of Type E pipe, except within 1/2 in. (12.7 mm) of the fusion line of the electric resistance seam, may be repaired in accordance with the welding provisions of 20.5. Repair welding of Type pipe and the weld seam of Type E is prohibited.

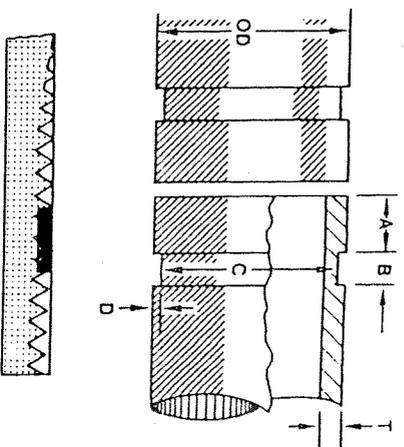
20.2.3 The section of pipe containing the defect may be cut off within the limits of requirement on length, or

20.2.4 Rejected.

20.3 At the purchaser's discretion, pipe shall be subjected to rejection if surface defects repaired in accordance with 20.2 are not scattered, but appear over a large area in excess of what is considered a workmanlike finish. Disposition of

# STANDARD CUI GROOVE SPECIFICATIONS/STEEL and OTHER METALLIC IPS PIPE

## Pipe Grooving:



Cut grooving standard steel pipe removes less metal, to less depth, than threading, maintaining the designed integrity of the pipe.

**COLUMN 1**—Nominal IPS pipe size. Nominal metric (ISO) pipe size. IPS outside diameter. Metric (ISO) outside diameter. The outside diameter of cut grooved pipe shall not vary more than the tolerance listed. For IPS pipe, the maximum allowable tolerance from square cut ends is 0.030" for ¾" through 3½", 0.045" for 4" through 6", and 0.060" for sizes 8" O.D. and above measured from true square line. For (ISO) metric pipe, the maximum allowable tolerance from square cut ends is 0.76 mm for sizes 20 mm-80 mm; 1.14 mm for sizes 100 mm-150 mm; and 1.52 mm for sizes 200 mm and above, measured from the true square line.

**COLUMN 2**—IPS outside diameter. Metric (ISO) outside diameter. The outside diameter of cut grooved pipe shall not vary more than the tolerance listed. For IPS pipe, the maximum allowable tolerance from square cut ends is 0.030" for ¾" through 3½", 0.045" for 4" through 6", and 0.060" for sizes 8" O.D. and above measured from true square line. For (ISO) metric pipe, the maximum allowable tolerance from square cut ends is 0.76 mm for sizes 20 mm-80 mm; 1.14 mm for sizes 100 mm-150 mm; and 1.52 mm for sizes 200 mm and above, measured from the true square line.

**COLUMN 3**—Gasket seat: the pipe surface shall be free from indentations, roll marks, and projections from the end of the pipe to the groove, to provide a headdress seal for the gasket. All loose paint, scale, dirt, chips, grease and rust must be removed. It continues to be Vicraulic's first recommendation that pipe be square cut. When using beveled pipe contact Vicraulic for details. Square cut pipe must be used with FlusSeal® and EndSeal® gaskets. Gasket seat "A" is measured from the end of the pipe.

**COLUMN 4**—Groove width: bottom of groove to be free of loose dirt, chips, rust and scale that may interfere with proper coupling assembly. Maximum permissible radius at bottom corner of groove is 0.015" (0.381mm).

**COLUMN 5**—Groove outside diameter: the groove must be uniform depth for the entire pipe circumference. The "C" diameter must be maintained within the "C" diameter tolerance listed. Groove depth: for reference only. Groove must conform to the groove diameter "C" listed.

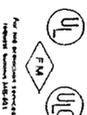
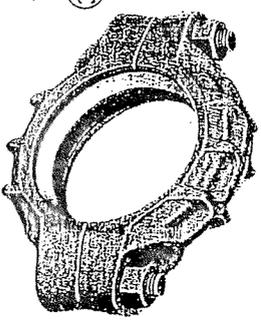
**COLUMN 7**—Minimum allowable wall thickness: this is the minimum wall thickness which may be cut grooved.

Nominal Size Inches	2		3 Gasket Seat A ±0.03 ±0.76	4 Groove Width B ±0.03 ±0.76	5		6 Groove Depth D (rel.)	7 Min. Allow Wall Thicnk. T
	Basic	Tolerance			Basic	Toler. ±0.03 ±0.03		
1	1.050 28.9	+0.010 +0.25	0.625 15.88	0.313 7.95	0.938 23.93	-0.015 -0.38	0.056 1.42	0.113 2.87
1	1.315 33.4	+0.013 +0.33	0.625 15.88	0.313 7.95	1.190 30.23	-0.015 -0.38	0.063 1.60	0.133 3.38
1¼	1.660 42.2	+0.016 +0.41	0.625 15.88	0.313 7.95	1.535 38.99	-0.015 -0.38	0.063 1.60	0.140 3.56
1½	1.900 48.3	+0.019 +0.48	0.625 15.88	0.313 7.95	1.775 45.09	-0.015 -0.38	0.063 1.60	0.145 3.68
2	2.375 60.3	+0.024 +0.61	0.625 15.88	0.313 7.95	2.250 57.15	-0.015 -0.38	0.063 1.60	0.154 3.91
2½	2.875 73.0	+0.029 +0.74	0.625 15.88	0.313 7.95	2.720 68.09	-0.018 -0.46	0.078 1.98	0.188 4.78
3 O.D.	3.000 76.1	+0.030 +0.76	0.625 15.88	0.313 7.95	2.845 72.26	-0.018 -0.46	0.078 1.98	0.188 4.78
3	3.500 88.9	+0.035 +0.89	0.625 15.88	0.313 7.95	3.344 84.94	-0.018 -0.46	0.078 1.98	0.188 4.78
3½	4.000 101.6	+0.040 +1.02	0.625 15.88	0.313 7.95	3.834 97.38	-0.020 -0.51	0.083 2.11	0.188 4.78
4	4.500 114.3	+0.045 +1.14	0.625 15.88	0.313 7.95	4.334 110.08	-0.020 -0.51	0.083 2.11	0.203 5.16
4¼ O.D.	4.250 109.0	+0.043 +1.04	0.625 15.88	0.344 8.77	4.084 102.73	-0.020 -0.51	0.083 2.11	0.203 5.16
4½	5.000 127.0	+0.050 +1.27	0.625 15.88	0.375 9.53	4.834 122.78	-0.020 -0.51	0.083 2.11	0.203 5.16
5¼ O.D.	5.250 133.0	+0.053 +1.70	0.625 15.88	0.344 8.77	5.084 129.13	-0.020 -0.51	0.083 2.11	0.203 5.16
5½ O.D.	5.500 139.7	+0.056 +1.42	0.625 15.88	0.375 9.53	5.334 135.48	-0.020 -0.51	0.083 2.11	0.203 5.16
5	5.363 141.2	+0.056 +1.42	0.625 15.88	0.375 9.53	5.395 137.03	-0.022 -0.56	0.084 2.13	0.203 5.16
6 O.D.	6.000 152.4	+0.056 +1.42	0.625 15.88	0.375 9.53	5.830 148.08	-0.022 -0.56	0.085 2.16	0.219 5.56
6¼ O.D.	6.250 159.0	+0.063 +1.35	0.625 15.88	0.344 8.77	6.032 153.21	-0.022 -0.56	0.109 2.77	0.219 5.56
6½ O.D.	6.500 165.1	+0.063 +1.60	0.625 15.88	0.375 9.53	6.330 160.78	-0.022 -0.56	0.085 2.16	0.219 5.56
6	6.625 168.3	+0.063 +1.60	0.625 15.88	0.375 9.53	6.455 163.96	-0.022 -0.56	0.085 2.16	0.219 5.56
8 O.D.	8.000 203.2	+0.063 +1.60	0.625 15.88	0.438 11.13	7.816 198.51	-0.025 -0.64	0.092 2.34	0.236 6.03
8	8.625 219.1	+0.063 +1.60	0.750 19.05	0.438 11.13	8.441 214.40	-0.025 -0.64	0.092 2.34	0.236 6.03
10 O.D.	10.000 254.0	+0.063 +1.60	0.750 19.05	0.500 12.70	9.812 249.22	-0.027 -0.69	0.094 2.39	0.250 6.35
10	10.750 273.0	+0.063 +1.60	0.750 19.05	0.500 12.70	10.582 269.28	-0.027 -0.69	0.094 2.39	0.250 6.35
12 O.D.	12.000 304.8	+0.063 +1.60	0.750 19.05	0.500 12.70	11.781 299.24	-0.030 -0.76	0.109 2.77	0.279 7.09
12	12.750 323.8	+0.063 +1.60	0.750 19.05	0.500 12.70	12.531 318.23	-0.030 -0.76	0.109 2.77	0.279 7.09
14 O.D.	14.000 355.6	+0.063 +1.60	0.938 23.93	0.500 12.70	13.781 350.04	-0.030 -0.76	0.109 2.77	0.281 7.14
15 O.D.	15.000 381.0	+0.063 +1.60	0.938 23.93	0.500 12.70	14.781 375.44	-0.030 -0.76	0.109 2.77	0.312 7.92
16 O.D.	16.000 406.4	+0.063 +1.60	0.938 23.93	0.500 12.70	15.781 400.84	-0.030 -0.76	0.109 2.77	0.312 7.92
18 O.D.	18.000 457.2	+0.063 +1.60	1.000 25.40	0.500 12.70	17.781 451.04	-0.030 -0.76	0.109 2.77	0.312 7.92
20 O.D.	20.000 508.0	+0.063 +1.60	1.000 25.40	0.500 12.70	19.781 502.44	-0.030 -0.76	0.109 2.77	0.312 7.92
22 O.D.	22.000 559.0	+0.063 +1.60	1.000 25.40	0.563* 14.30	21.656 550.06	-0.030 -0.76	0.172 4.37	0.375 9.53
24 O.D.	24.000 610.0	+0.063 +1.60	1.000 25.40	0.563* 14.30	23.656 600.86	-0.030 -0.76	0.172 4.37	0.375 9.53
28 I.D.	28.875 733.4	+0.063 +1.60	1.000 25.40	0.563* 14.30	28.531 724.69	-0.030 -0.76	0.172 4.37	0.437 11.10
30 I.D.	31.000 787.4	+0.063 +1.60	1.250 31.75	0.625 15.88	30.594 777.09	-0.030 -0.76	0.203 5.16	0.500 12.70

\*¾" (14 mm) wide groove is required in sizes 22"-24" (559-610.0 mm) in order to obtain the maximum allowable pipe end movement listed in Performance Data Charts. ¼" (12 mm) wide groove will give ½ the maximum allowance shown for 22"-24" (559-610.0 mm). For double groove tool bit information, contact Vicraulic.

# STYLE 77 STANDARD FLEXIBLE COUPLING

1000 PSI VICITAULIC COUPLING



The standard of the line, Style 77 is available in a broad range of IPS sizes for varied services. See 1 and 2. The housing has ribbed construction to provide maximum strength without unnecessary weight. The coupling is capable of working pressures up to 1000 PSI (6900 kPa) depending on size and is suitable for buried or exposed services. Housings may be ordered hot dip galvanized or specially coated. Request VS-077 for submittal.

## ALTERNATE MATERIALS

**Stainless Steel**  
Style 77-S couplings are available in Type 304 or Type 316 stainless steel, with matching bolts and standard or special gaskets in sizes from 3/4" through 24" (26,9-610,0 mm). Contact Victaulic for details. Request VS-SSP for submittal.

**Aluminum**  
Style 77-A couplings are available in aluminum alloy 356-T6, ASTM B-26, with plated steel bolts and standard or special gaskets, in sizes from 1" through 8" (33,7-219,1 mm). Contact Victaulic for details. Request VS-AP for submittal.

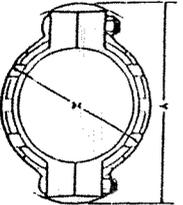
<sup>1</sup> NOTE: Independent testing has shown the Style 77 coupling to be an effective stress relief and vibration attenuation device providing performance superior to braided steel and elastomeric arch-type connectors when used in close proximity to the source of vibration. Request Technical Sheet TS-5000.

<sup>2</sup> NOTE: Independent testing has shown that Victaulic Style 77 and 75 flexible couplings and Style 07 Zero-Flex<sup>®</sup> rigid couplings provide exceptional functionality during and after earthquake conditions. Request Technical Sheet TS-4000.

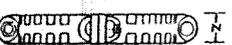
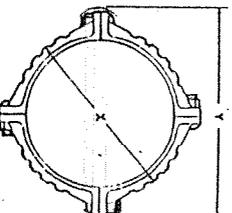
Nominal Size Inches	Pipe O.D. Inches	Max. Work Press. PSI*	Max. End Load Lbs.*	Allow. Pipe End t Sep. In. (min)	Deflect. Per Culp. Degree	Pipe Fr. Coeff. In./Ft.	Bolt/Nut No.-Size Inches	Coupling Dimensions			Approx. Weight Each Lbs.
								X	Y	Z	
3/4	1.050	1,000	865	0-0.13	6°-47'	1.43	2-3/4×2	2.13	3.63	1.75	1.1
	26.8	3500	3930	0-3.2		1.13		3.4	52	4.4	0.3
1	1.315	1,000	1,360	0-0.13	5°-26'	1.14	2-3/4×2	2.38	3.88	1.75	1.3
	33.7	3500	3050	0-3.2		0.92		60	95	4.4	0.6
1 1/4	1.660	1,000	2,160	0-0.13	4°-19'	0.90	2-1/2×2 1/2	2.63	4.63	1.75	2.0
	42.4	3500	3610	0-3.2		0.75		57	113	4.4	0.8
1 1/2	1.900	1,000	2,835	0-0.13	3°-46'	0.79	2-1/2×2 1/2	3.00	5.00	1.75	2.1
	46.3	3500	4251	0-3.2		0.66		72	127	4.4	1.0
2	2.375	1,000	4,430	0-0.13	3°-11'	0.63	2-1/2×2 1/2	3.63	5.63	1.75	2.6
	60.3	3500	4971	0-3.2		0.52		82	143	4.4	1.2
2 1/2	2.875	1,000	6,490	0-0.13	2°-29'	0.52	2-1/2×2 1/2	4.25	6.25	1.75	3.1
	73.0	3500	7090	0-3.2		0.43		103	159	4.4	1.4
3 0 D.	3,000	1,000	7,070	0-0.13	2°-23'	0.50	2-1/2×2 1/2	4.31	6.31	1.75	3.6
	76.1	3500	31460	0-3.2		0.42		110	160	4.4	1.6
3	3,500	1,000	9,620	0-0.13	2°-3'	0.43	2-1/2×2 1/2	5.00	7.00	1.75	3.5
	89.9	3500	46810	0-3.2		0.36		127	178	4.4	1.6
3 1/2	4,000	1,000	12,565	0-0.13	1°-48'	0.38	2-5/8×3 1/4	5.63	8.00	1.75	5.6
	101.6	3500	55915	0-3.2		0.32		143	203	4.4	2.5
4	4,500	1,000	15,900	0-0.25	3°-11'	0.67	2-5/8×3 1/4	6.38	8.50	2.00	6.6
	114.3	3500	70755	0-6.4		0.56		162	216	5.1	3.0
4 1/4 O.D.	4,250	1,000	14,180	0-0.25	3°-21'	0.70	2-16×82.5	5.88	8.06	2.06	7.0
	108.0	3500	63100	0-6.4		0.56		149	205	5.2	3.2
5	5,563	1,000	24,300	0-0.25	2°-35'	0.54	2-3/4×4 1/4	7.63	10.25	2.00	10.6
	141.3	3500	106135	0-6.4		0.45		194	260	5.1	4.8
5 1/4 O.D.	5,250	1,000	21,635	0-0.25	2°-42'	0.56	2-20×108	7.34	9.20	2.06	10.0
	133.0	3500	96275	0-6.4		0.47		186	234	5.2	4.5
5 1/2 O.D.	5,500	1,000	23,745	0-0.25	2°-36'	0.55	2-20×108	7.60	9.44	2.06	11.0
	139.7	3500	105655	0-6.4		0.46		193	240	5.2	5.0
6	6,625	1,000	34,470	0-0.25	2°-10'	0.45	2-3/4×4 1/4	9.00	11.50	2.00	11.8
	168.3	3500	153390	0-6.4		0.48		225	292	5.1	5.4
6 1/4 O.D.	6,250	1,000	30,665	0-0.25	2°-17'	0.48	2-20×108	8.50	10.38	2.06	13.2
	159.0	3500	136460	0-6.4		0.40		216	264	5.2	6.0
6 1/2 O.D.	6,500	1,000	33,185	0-0.25	2°-12'	0.46	2-3/4×4 1/4	9.19	11.50	2.06	13.2
	165.1	3500	147660	0-6.4		0.38		223	292	5.2	6.0
8	8,625	800	46,740	0-0.25	1°-40'	0.35	2-7/8×5	11.38	14.50	2.38	20.1
	219.1	5500	207935	0-6.4		0.29		265	365	6.0	9.1
10	10,750	800	73,280	0-0.25	1°-20'	0.28	2-1×6	13.50	16.75	2.50	28.3
	273.0	5500	328100	0-6.4		0.23		343	425	6.4	12.8
12	12,750	800	102,000	0-0.25	1°-7'	0.23	2-1×6 1/2	15.50	19.00	2.50	34.2
	323.9	5500	453900	0-6.4		0.20		394	483	6.4	15.5
14	14,000	300	46,180	0-0.25	1°-2'	0.22	4-1×3 1/2	16.63	20.00	2.88	35.6
	355.6	2065	205500	0-6.4		0.18		423	508	7.3	16.1
15	15,000	300	53,000	0-0.25	0°-57'	0.20	4-1×5 1/2	17.88	21.25	2.88	48.8
	381.0	2065	235650	0-6.4		0.17		454	540	7.3	22.1
16	16,000	300	66,320	0-0.25	0°-54'	0.19	4-1×3 3/4	19.00	22.38	2.88	51.1
	405.4	2065	258425	0-6.4		0.16		460	538	7.3	23.2
18	18,000	300	76,340	0-0.25	0°-48'	0.17	4-1×3 3/4	21.25	24.38	3.13	64.4
	457.0	2065	339710	0-6.4		0.14		540	619	7.9	29.2
20	20,000	300	94,000	0-0.25	0°-43'	0.15	4-1 1/8×4	23.50	27.50	3.13	91.2
	503.0	2065	416300	0-6.4		0.12		557	699	7.9	41.4
22	22,000	300	114,000	0-0.25	0°-38'	0.13	4-1 1/8×4	25.63	30.00	3.13	92.0
	559.0	2065	507300	0-6.4		0.11		631	762	7.9	41.7
24	24,000	250	113,000	0-0.25	0°-36'	0.13	6-1 1/8×4	27.63	31.38	3.13	94.0
	610.0	1725	502050	0-6.4		0.11		702	797	7.9	42.6
28 I.D.	28,875	150	98,250	0-0.25	0°-30'	0.10	6-1×5 1/2	32.00	35.50	3.13	95.0
	733.4	1035	437210	0-6.4		0.09		813	902	7.9	43.1
30 I.D.	31,000	150	113,250	0-0.25	0°-28'	0.10	6-1×5 1/2	34.38	37.75	3.63	127.2
	787.4	1035	503960	0-6.4		0.09		872	959	8.2	57.7

\* Refer to Notes page 28.

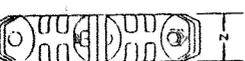
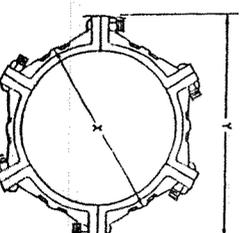
① Number of bolts equals number of housing segments.  
② Metric thread size bolts (plated) are available (color coded gold) for all coupling sizes upon request.  
Contact Victaulic for details.



¾"-1 1/2" Sizes



1 4"-2" Sizes



2 1/2"-3 0" I.D. Sizes



Flex your power!  
Be energy efficient!

**DEPARTMENT OF TRANSPORTATION**

333 BURMA ROAD  
OAKLAND, CA 94607-1015  
PHONE (510) 622-5660  
FAX (510) 286-0550

LET. 164-12

**RECEIVED**

JUL 13 2004

July 9, 2004  
Contract No. 04-0120R4  
04-SF-80-12.6/13.2  
Temporary Bypass Structure  
SL# 44

Mr. Robert W. Coupe  
C. C. MYERS, INC.  
3286 Fitzgerald Road  
Rancho Cordova, CA 95742

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
TEL-00359  
248-103  
Pacific Mechanical

RE: 215-SUB.00016-00, 215-SUB.00016-01  
Subject: Preliminary Pipe Routing and Design

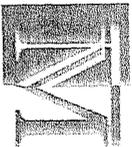
Dear Mr. Coupe:

The Department has reviewed the above referenced project's Preliminary Pipe Routing and Design, and submits the following comments:

1. Provide specifications for pipe, Victouluc couplings (what type), grooving method, hose and fittings.
  2. Are all the pipes manufactured in 40-foot lengths? Will they be able to match the curves on the bridge with this long of a section?
  3. Provide details for the anchors.
  4. In Section BB either the anchor is on the wrong side of the expansion joint or the detail is drawn backwards.
  5. Are any isolation valves needed to facilitate the future change over?
  6. Are any air relief valves needed (automatic or manual) to facilitate filling the 12-inch pipe?
  7. Provide specifications for the 4-inch and 12-inch rubber reinforced hose and fittings.
  8. Where will the water lines be installed on the temporary bypass structure (behind or on top of the barrier)? Is this consistent with the information provided in the design submittals?
  9. All submittals must be in metric units.
- Please address the above comments and resubmit. If you have any questions, please contact me at (510) 622-5660.

Sincerely,

Kenneth Loncharich  
Resident Engineer  
cc: File 5.03, 58.16



**C.C. MYERS, INC.**

3286 FITZGERALD ROAD  
RANCHO CORDOVA, CA 95742

An Equal Opportunity / Affirmative Action Employer  
916-635-9370  
FAX 916-635-8961

LET. 164-13

**SUBMITTAL**

Document No.:	215-SUB.00016-01		
Dated:	Jun 23 2004	Job No.:	215
Attention:	Mr. Kenneth Loncharic		
RE:	04-0120R4		
	San Francisco Oakland Bay Bridge		
	SFOBB South Detour		

To: State of California  
333 Berma Road  
Oakland CA 94607

We are sending you:  Attached  Via Fax

- Drawing  Plans  Prog. Prnt
- Samples  Certificates of compliance  Calculations
- Payroll  Specs  Copy of Letter
- Change Order  Schedule  Invoice

Item	Date	Copies	Description	Drawing No	Rev	Status	Pages
01		0	PMC Submittal: Preliminary Piping Routing & Design			Pending	
02	Jun 17 2004	1	PMC Submittal: Preliminary Piping Routing & Design - Revised	PB-292-106-A		Pending	

**These Are Transmitted As Checked Below:**

- For Approval  For Review/comment  Return For Correction
- For Your Use  As Requested  For Information

Remarks:

Signed:   
 Robert Coupe  
 Project Manager

Copy To:

File: 215-101



# Pacific Mechanical Corporation

**SUBMITTAL**  
**No. 002.R**

2501 Annalisa Drive, Concord, CA 94520  
Phone: 925-827-4940 Fax: 925-827-0519  
CA License No. 138920 \* NV License No. 6244

**Project:** Temporary Bypass Structure

**Date:** 6/17/2004

**To:** CC Myers, Inc.

**RECEIVED** Owner Submittal: 002.0

3286 Fitzgerald Road  
Rancho Cordova, CA 95742

**JUN 22 2004**

**Reference:** Preliminary Piping  
Routing & Design  
PMC Submittal No. 002.0

**Attention:** Bob Coupe

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
*IT-215-285*  
*215-214*  
*5 PART*

**Job #:** 292

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
<input type="checkbox"/> Change Order	<input type="checkbox"/> Review and Comment	<input type="checkbox"/> Resubmit
<input type="checkbox"/> Plans		<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	<b>SENT VIA:</b>	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Returned for Corrections
<input checked="" type="checkbox"/> Other: Made from Submittal	<input type="checkbox"/> Separate Cover Via: GSO (292-1100)	<input type="checkbox"/> Due Date:

SPEC SEC	PARAGRAPH	REV.	ITEM NO.	COPIES	DATE	ITEM DESCRIPTION	STATUS
10-4	10-4.02-E	000	12	6/11/2004	SUB	Title: Preliminary Piping Routing & Design Desc: Dwgs: PB-292-101-A, 102-A, 103-A, 104-A, 105-A; 106-A	SIR

**Remarks:** THESE DRAWINGS SUPERCEDE THE SET FORWARDED TO YOU ON JUNE 17, 2004. PLEASE DISCARD SHEETS PB-292-106-A AND RE-IMAGE WITH THE ATTACHED, AS OUR SUBMITTAL.

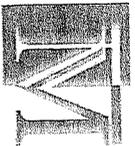
REC'D  
G. C. MYERS, INC.  
2004 JUN 21 A 7:21

CC: Submittal No. 292-002

Signed:

Maria Guadamuz





**C.C. MYERS, INC.**

3286 FITZGERALD ROAD  
RANCHO CORDOVA, CA 95742

An Equal Opportunity / Affirmative Action Employer  
916-635-9370  
FAX 916-635-8961

**SUBMITTAL**

*LET. 164-14*

Document No.:	215-SUB.00016-00		
Dated:	Jun 18 2004	Job No.:	215
Attention:	Mr. Kenneth Loncharich		
RE:	04-0120R4		
San Francisco Oakland Bay Bridge			
SFOB South Detour			

To: State of California  
333 Berma Road  
Oakland CA 94607

- We are sending you:  Attached  Via Fax
- Drawing  Plans  Prog. Pmt
  - Samples  Certificates of compliance  Calculations
  - Payroll  Specs  Copy of Letter
  - Change Order  Schedule  Invoice

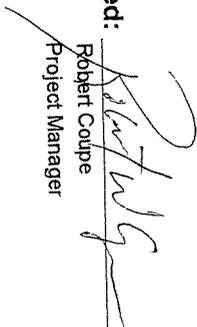
Item	Date	Copies	Description	Drawing No	Rev	Status	Pages
01	Jun 11 2004	6	PMC Submittal: Preliminary Piping Routing & Design		0	Pending	

**These Are Transmitted As Checked Below:**

- For Approval  For Review/comment  Return For Correction
- For Your Use  As Requested  For Information

**Remarks:**

Please review the attached plans and approve the concept/routing of the 4" and 12" waterlines on the Temporary Bypass Structure. We will then incorporate these details into the design drawings.

Signed:   
 Robert Coupe  
 Project Manager

Copy To: M12  
File: 215-101



# Pacific Mechanical Corporation

**SUBMITTAL**  
No. 002.R

2501 Annalisa Drive, Concord, CA 94520  
Phone: 925-827-4940 Fax: 925-827-0519  
CA License No. 138920 \* NV License No. 6244

**Project:** Temporary Bypass Structure

**Date:** 6/17/2004

**To:** CC Myers, Inc.

**Owner Submittal:** 002.0

3286 Fitzgerald Road  
Rancho Cordova, CA 95742

**Reference:** Preliminary Piping  
Routing & Design  
PMC Submittal No. 002.0

**Attention:** Bob Coupe

**Job #:** 292

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
<input type="checkbox"/> Change Order	<input type="checkbox"/> Review and Comment	<input type="checkbox"/> Resubmit
<input type="checkbox"/> Plans		<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	<b>SENT VIA:</b>	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> Returned for Corrections
<input checked="" type="checkbox"/> Other: Made from Submittal	<input type="checkbox"/> Separate Cover Via: GSO (292-1100)	<input type="checkbox"/> Due Date:

SPEC SEC	PARAGRAPH	REV.	ITEM NO.	COPIES	DATE	ITEM DESCRIPTION	STATUS
10-4	10-4.02-E	000	12	6/11/2004	SUB	Title: Preliminary Piping Routing & Design Desc: Dwgs: PB-292-101-A, 102-A, 103-A, 104-A, 105-A; 106-A	SIR

**Remarks:** THESE DRAWINGS SUPERCEDE THE SET FORWARDED TO YOU ON JUNE 11, 2004. PLEASE DISCARD THOSE SHEETS AND REPLACE WITH THE ATTACHED, AS OUR SUBMITTAL.

# RECEIVED

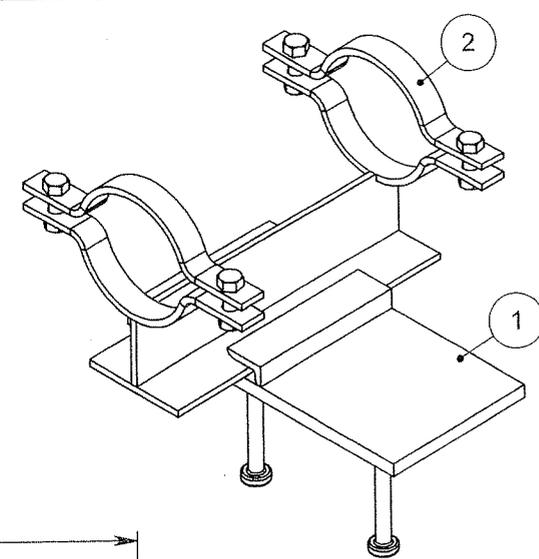
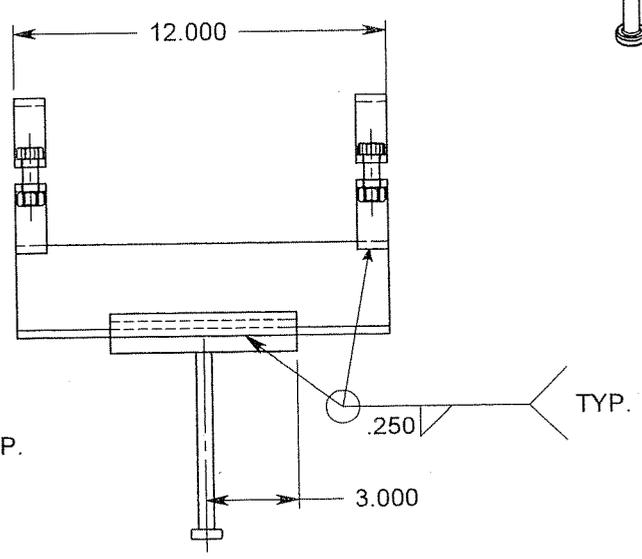
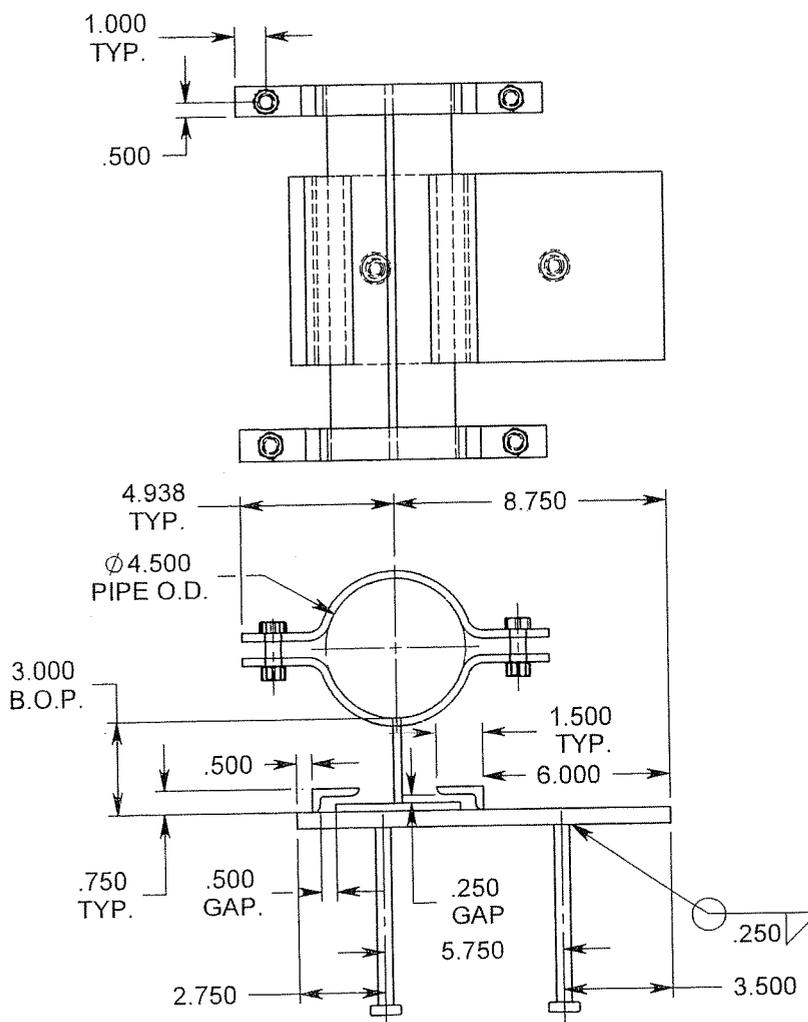
JUN 18 2004

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
PC-00253  
215-214

CC: Submittal No. 292-002

Signed:

Maria Guadamuz

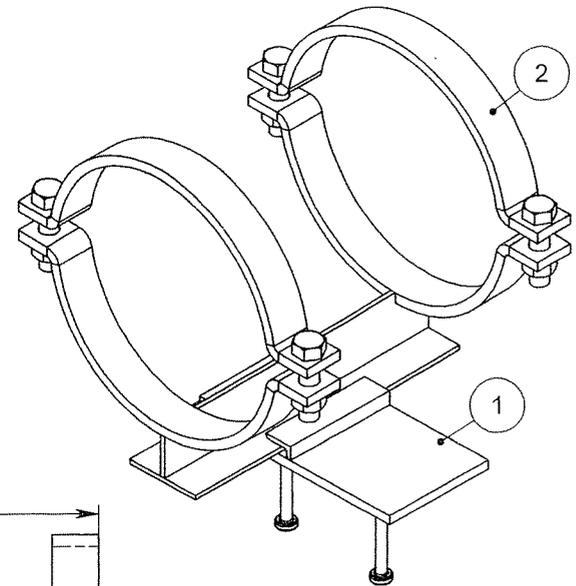
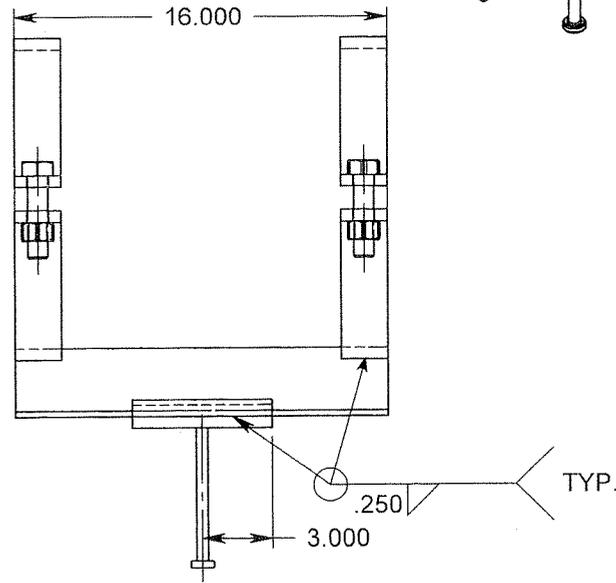
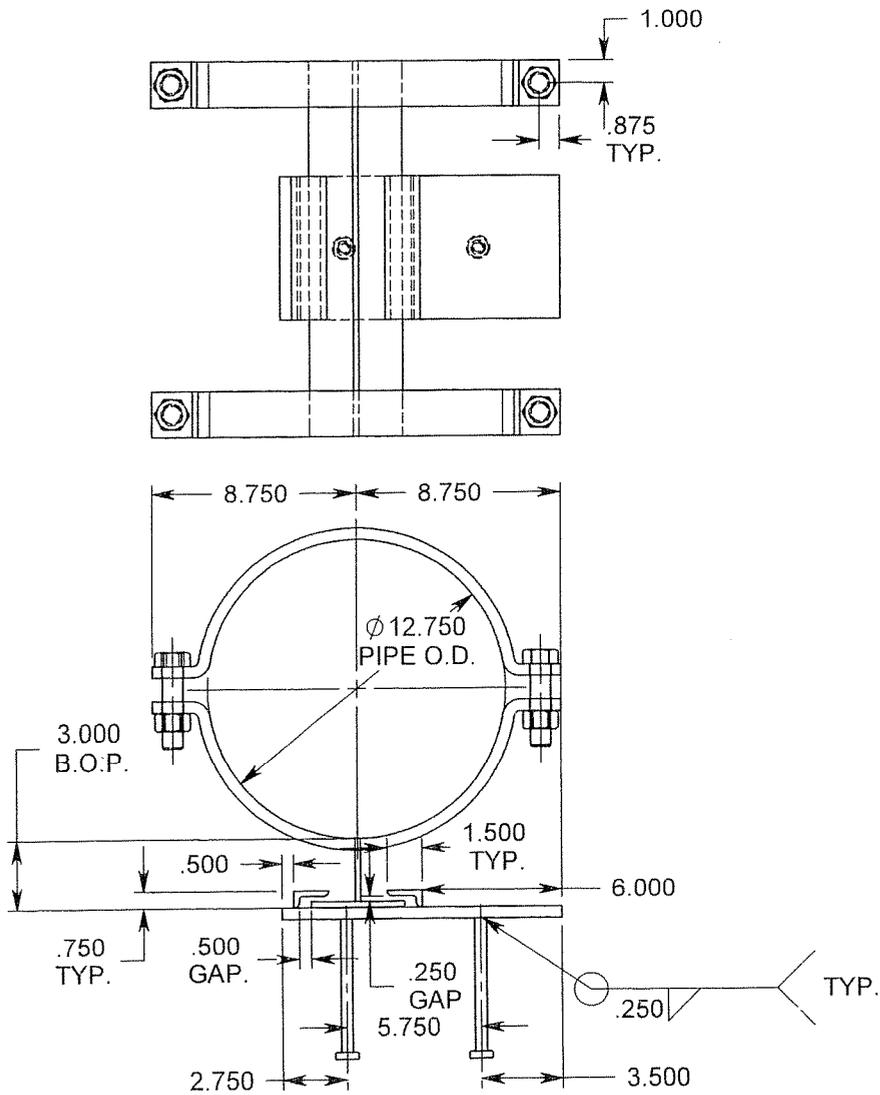


NO.	QTY.	THK.	WIDTH	LENGTH	DESCRIPTION	FINISH	WT.
1	1				EMBED PLATE	OSC	12.633
	1	.500	6.000	12.000	PLATE	OSC	10.224
	2	.500Ø		6.000	NELSON STUD	OSC	0.392
	2	.250		6.000	L1.500 x 1.500 TRMD.	OSC	0.812
2	1				FIG.426 - 4.000 SPEC.	OSC	9.565
	1	.250	4.000	12.000	BASE PLATE	OSC	3.408
	1	.250	2.750	12.000	VERTICAL PLATE	OSC	2.307
	4	.250	1.000	11.560	PIPE CLAMP	OSC	0.785
	4	.500		1.500	STD. HHMB	EG	0.1334
	4	.500			HEX NUT	EG	0.043



REV.	DATE	COMMENTS	DETAIL TYPE:	PART #:	ITEM:	APPROVED BY:	QTY. REQ'D
					1		100
			PROJECT:	BAY BRIDGE		REF:	SKETCH
			P.O. OR REF#:	2539		TOLCO CAD NO.:	2539 1-D
			TITLE:	4.000 (STL) SLIDE SUPPORT		DRAWN BY:	mendozaj
			FOR:	CLEMMENT / PMC CORP.		WEIGHT:	22.197
						APPROVED:	SCALE:
							1:6
							DATE:
							6-3-04

Friday, June 11, 2004 9:22:45 AM



NO.	QTY.	THK.	WIDTH	LENGTH	DESCRIPTION	FINISH	WT.
1	1				EMBED PLATE	OSC	12.633
	1	.500	6.000	12.000	PLATE	OSC	10.224
	2	.500Ø		6.000	NELSON STUD	OSC	0.392
	2	.250		6.000	L1.500 x 1.500 TRMD.	OSC	0.812
2	1				FIG.426 - 4.000 SPEC.	OSC	37.556
	1	.250	4.000	16.000	BASE PLATE	OSC	4.544
	1	.250	2.750	16.000	VERTICAL PLATE	OSC	2.982
	4	.500	2.000	23.342	PIPE CLAMP	OSC	6.433
	4	.875		3.500	STD. HHMB	EG	0.8511
	4	.875			HEX NUT	EG	0.223



REV.	DATE	COMMENTS	DETAIL TYPE:	PART #:	ITEM:	APPROVED BY:	QTY. REQ'D
					2		60
			PROJECT:	BAY BRIDGE		REF:	SKETCH
			P.O. OR REF#:	2539		TOLCO CAD NO.:	2539_2-D
			TITLE:	12.000 (STL) SLIDE SUPPORT		DRAWN BY:	WEIGHT:
			FOR:	CLEMMENT / PMC CORP.		mendozaj	50.189
			APPROVED:	SCALE:	DATE:		
				1:8	6-3-04		
							SHEET: 1 OF 1















LET. 164-15

*Flex your power!  
Be energy efficient!*

**DEPARTMENT OF TRANSPORTATION**

333 BURMA ROAD  
OAKLAND, CA 94607-1015  
PHONE (510) 622-5660  
FAX (510) 286-0550

April 28, 2004  
Contract No. 04-0120R4  
04-SF-80-12.6/13.2  
South/South Detour  
SL# 15

**RECEIVED**

APR 28 2004

Mr. Robert W. Coupe  
C. C. MYERS, INC.  
3286 Fitzgerald Road  
Rancho Cordova, CA 95742

RE: 215-STUB.00012-0  
Subject: Bulk Piping Submittal

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
FC-02172  
215-103  
Pacific Mechanical

Dear Mr. Coupe:

The Department has reviewed the Bulk Piping Submittal, and determined that it meets the contract requirements per Section 10-4.02 of the Special Provisions, and is approved.

If you have any questions regarding this review, please contact me at (510) 622-5660.

Sincerely,

Kenneth Loncharich  
Resident Engineer

cc: File 5.03, 58.12, 37.81, 37.82



C.C. MYERS, INC.

SUBMITTAL

LET. 164-16

P. O. Box 2948  
Rancho Cordova, CA 95741

An Equal Opportunity / Affirmative Action Employer  
(916) 635-9370  
FAX (916) 635-1527

Document No.:	215-SUB.00012 - 0
Date:	4/22/2004
Job No.:	215
Attention:	Mr. Kenneth Loncharich
RE:	04-0120R4
	San Francisco Oakland Bay Bridge
	Temporary Bypass Structure

To: State of California  
Department of Transportation  
333 Berrina Road  
Oakland CA 94607

We are sending you:  Attached  Under Separate Cover Via \_\_\_\_\_ The Followings Items:

Shop Drawings  Change Orders  Specs

Copy of Letter  Progress Payment Bills  Letter

Prints  Plans  Samples

Other

Copies	Item	Description	Drwg. No.	Rev.	Status	Date
5	1	Pacific Mechanical Corporation TBS Waterline Data			Pending	4/22/2004

These Are Transmitted As Checked Below:

For Approval  As Requested  Signed as Requested

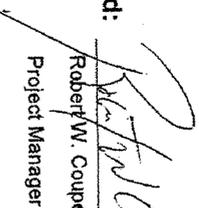
For Your Use  For Your Review and Comment  Approved as Noted

For Your Signature  Returned for Corrections  See Remarks Below

Remarks:

Please review/approve this material as soon as possible so it may be purchased to protect from additional price escalations.

Signed:

  
Robert W. Coupe  
Project Manager

Copy To: MO

File: 215-101



# Pacific Mechanical Corporation

2501 Annalisa Drive, Concord, CA 94520  
Phone: 925-827-4940 Fax: 925-827-0519  
CA License No. 138920 \* NV License No. 6244

**SUBMITTAL**  
**No. 001.0**

**Project:** Temporary Bypass Structure

**Date:** 4/20/2004

**To:** CC Myers, Inc.

**Owner Submittal:** 001.0

3286 Fitzgerald Road  
Rancho Cordova, CA 95742

**Reference:** Waterline Piping

Bid Items 81 & 82  
Section 10-4.02 Part 2

**Attention:** Bob Coupe

**Job #:** 292

WE ARE SENDING:		SUBMITTED FOR:		ACTION TAKEN:	
<input checked="" type="checkbox"/>	Shop Drawings	<input checked="" type="checkbox"/>	Approval	<input type="checkbox"/>	Approved as Submitted
<input type="checkbox"/>	Letter	<input type="checkbox"/>	Your Use	<input type="checkbox"/>	Approved as Noted
<input type="checkbox"/>	Prints	<input checked="" type="checkbox"/>	As Requested	<input type="checkbox"/>	Returned After Loan
<input type="checkbox"/>	Change Order	<input type="checkbox"/>	Review and Comment	<input type="checkbox"/>	Resubmit
<input type="checkbox"/>	Plans	<b>SENT VIA:</b>		<input type="checkbox"/>	Returned
<input type="checkbox"/>	Samples	<input checked="" type="checkbox"/>	Attached	<input type="checkbox"/>	Returned for Corrections
<input checked="" type="checkbox"/>	Other: Made from Submittal	<input type="checkbox"/>	Separate Cover Via: GSO (292-1100)	<input type="checkbox"/>	Due Date:

SPCC SEC	PARAGRAPH	REV.	ITEM NO.	COPIES	DATE	ITEM DESCRIPTION	STATUS
10-4	10-4.02-A	000		12	4/20/2004	SUB Title: Pipe Class Description Desc: 4" & 12" Pipe Grade A53B / A53F Galvanized	SIR
10-4	10-4.02-B	000		12	4/20/2004	SUB Title: Galvanized Coating Desc: Galvanized Coating	SIR
10-4	10-4.02-C	000		12	4/20/2004	SUB Title: Pipe Grooving Desc: Pipe Grooving	SIR
10-4	10-4.02-D	000		12	4/20/2004	SUB Title: Grooved Mechanical Coupling Desc: Grooved Mechanical Coupling	SIR

**Remarks:**

# RECEIVED

APR 21 2004

CC MYERS, INC.  
JOB 215 TEMP BYPASS STRUCTURE  
FC-00103  
215-214  
SMATE

CC: Submittal No. 292-001

Signed:

Maria Guadamuz



## PACIFIC MECHANICAL CORPORATION

GENERAL ENGINEERING CONTRACTORS

Calif. State Lic. No. 136920

April 20, 2004

C C Myers, Inc.  
3286 Fitzgerald Road  
Rancho Cordova, CA 95742

Attention: Bob Coupe

Ref: Caltrans Contract #04-0120R4  
Temporary Bypass Structure  
Waterlines Piping Submittals – Bid Items 81 & 82

Subject: Bulk Piping Submittal - & Request for Prompt Review

Gentlemen:

We are in the process of purchasing a bulk order of pipe and Vic couplings to protect the project from the risk of further cost increases on steel. As you know, the price of steel has escalated approx 20% per months for the last few months. We have already incurred significant cost increases from the time we bid the job. When those costs are known, we expect to work with your firm and seek compensation for this unforeseeable cost increase.

At the present, the steel mills are no longer quoting any pricing on future mill runs. They are quoting "*pricing in effect at time of production*". Therefore, it is essential to buy material currently in stock. We have secured the items below from stock and we will be able to lock in pricing when we receive an approved submittal. Please request expedient review of the attached submittal to allow us to conclude the purchase as soon as possible.

1340 LF	Std 12" Pipe A53B Std wall – Galvanized- Domestic
1340 LF	Std 4" Pipe A53F Std wall - Galvanized – Domestic
40 EA	4" Vic Coupling
40 EA	12" Vic Coupling

We need to buy this material as soon as possible this to protect the project and ultimately the client from exposure to more steel cost increases. Thank you for your help on this.

Sincerely,

Pierre Bigras  
Project Manager

Z:\Users\Projects\292 CC Myers\CC Myers - Request for prompt review.doc

**Contract #04-0120R4  
Temporary Bypass Structure**

**Waterlines Piping Submittals – Bid Items 81 & 82  
Spec Section 10-4.02 Part 2**

**Pipe Class Description:**

12” Pipe Grade A53B ERW Std wall - Galvanized –Domestic  
4” Pipe Grade A53F Std wall - Galvanized –Domestic

**Galvanized Coating:**

The galvanized zinc coating will be as defined in ASTM A53 article 19.2

**Pipe Grooving:**

Pipe Grooving will be as per attached “Standard Cut Groove Specifications/steel”.  
Pipe will be shop grooved after galvanization. The groove area will be coated with ZRC  
cold galvanizing. Note that rolled grooving not feasible on galvanized pipe as it damages  
the internal surface of the galvanizing

**Grooved Mechanical Coupling:**

Will be Vicatulle Style 77 as per attached cut sheet with the Shop standard coating.

# Pipe Class Description:

## PIPE SPECIFICATIONS

### Scope

<b>A53</b>	Covers BLACK and hot-dipped GALVANIZED WELDED and SEAMLESS nominal size and wall pipe suitable for welding and for coiling, bending, flanging, and other forming operations.
1/8" - 26	
STD, XS AND XXS	
ANSI B36.10	Continuous weld pipe is not intended for flanging (using pipe wall to form flange).
Other sizes and dimensions may be furnished	Seamless and electric-resistance weld pipe may be specified in grades A or B.
Order should specify when pipe is required for close coiling.	

### Hydrostatic Testing

Prescribes hydrostatic test pressures for continuous weld pipe and for seamless and electric resistance weld pipe. Provision is made for test pressures not to exceed 2500 psi for pipe 3 inch and under or 2800 psi for pipe over 3 inch.

Each length of pipe must be tested at the producing mill. Welded pipe 2 inch and larger is jarred near one end while under test pressure.

Refer to ASTM A53 Table X 2.2

### Permissible Variations in Weights Per Foot

#### For XS and lighter wall thicknesses

Pipe shall not vary more than plus or minus 5 percent from weights shown in tables and included in ANSI B36.10.

#### For walls heavier than XS

Pipe shall not vary more than plus or minus 10 percent from weights shown in tables and included in ANSI B36.10.

Sizes 4 inch and smaller weighted in customary mill lifts. On larger sizes, weight tolerance is applicable to individual lengths.

## PIPE SPECIFICATIONS

### Permissible Variations in OD

<b>A53</b>	OUTSIDE DIAMETER at any point shall not vary more than:			
1/8" - 26" STD, XS and XXS	<table border="0"> <tr> <td data-bbox="196 576 236 820">Nominal Pipe Size</td> <td data-bbox="196 895 236 979">Over</td> <td data-bbox="196 1102 236 1209">Under</td> </tr> </table>	Nominal Pipe Size	Over	Under
Nominal Pipe Size	Over	Under		

ANSI B36.10	1-1/2" and smaller	1/64"	1/64"
	2 and larger	1%	1%

Other sizes and dimensions may be furnished

#### Permissible Variations in Wall Thickness

Minimum wall thickness at any point shall not be more than 12.5 percent under nominal wall thickness specified.  
Specification contains a table of minimum wall thicknesses on inspection calculated as 0.875 x nominal wall.

#### Chemical Requirements

Composition, max. percent	C			P	S
	Min	Max	Max		
Types S and E					
Grade A	0.25	0.95	0.05	0.06	0.06
Grade B	0.30	1.20	0.05	0.06	0.06
Type F	—	—	0.06	0.045	0.045

#### Tensile Requirements

	Tensile Strength min, psi	Yield Point min, psi
Types S and E		
Grade A	48,000	30,000
Grade B	60,000	35,000
Type F	45,000	25,000

Table lists minimum elongation values calculated by the equation:  
 $e=625,000 A0.2 /U0.9$

#### PIPE SPECIFICATIONS

##### Mechanical Tests Specified

#### A53 TENSILE TEST

Required on all sizes. Tests on welded pipe 8 inch and larger shall be from transverse specimen.

#### STD, XS AND XXS BEND TEST

Required on sizes 2 inch and smaller, except XXS over 1-1/4 inch. Pipe shall stand cold bending through 90 degrees around a mandrel with a diameter twelve times the nominal diameter of the pipe without cracking. If for close coiling bend shall be 180 degrees around diameter eight times the nominal diameter of pipe.

#### Other sizes and dimensions may be furnished

#### FLATTENING TEST

Required on sizes over 2 inch in nominal diameter in wall thickness, XS and lighter

less than 22 ft (6.71 m), with a minimum average for the order of 35 ft (10.67 m).

17.1.4 When lengths longer than single random are required for wall thicknesses heavier than extra-strong, the length shall be subject to negotiation.

17.1.5 When pipe is furnished with threads and couplings, the length shall be measured to the outer face of the coupling.

## 18. End Finish

18.1 When ordered with plain ends, the pipe shall be furnished to the following practice, unless otherwise specified.

18.1.1 NPS 1 1/2 and Smaller—Unless otherwise specified on the purchase order, end finish shall be at the option of the manufacturer.

18.1.2 NPS 2 and Larger:

18.1.2.1 Pipe of standard or extra strong weights, or in wall thickness less than 0.500 in. (12.7 mm), other than double extra strong pipe, shall be plain-end beveled with ends beveled to an angle of 30°, +5°, -0°, measured from a line drawn perpendicular to the axis of the pipe, and with a root face of 1/16 in. ± 1/32 in. (1.6 mm ± 0.79 mm).

18.1.2.2 Pipe with wall thicknesses over 0.500 in. (12.7 mm), and all double extra strong, shall be plain-end square cut.

18.2 When ordered with threaded ends, the pipe ends shall be provided with a thread in accordance with the gaging practice and tolerances of ANSI B1.20.1. For standard-weight pipe in sizes 6 in. and smaller, refer to Table X3.1 for threading data. For standard-weight pipe 8 in. and larger and all sizes of extra-strong weight and double extra-strong weight, refer to Table X3.2 for threading data. Threaded pipe sizes 4 in. and larger shall have thread protectors on the ends not protected by a coupling.

18.3 When ordered with couplings, one end of each length of pipe shall be provided with a coupling manufactured in accordance with Specification A 865. The coupling threads shall be in accordance with the gaging practice of ANSI B1.20.1. The coupling shall be applied handling-tight, unless power-tight is specified on the order. Couplings are to be made of steel. Taper-tapped couplings shall be furnished on all weights of threaded pipe 2 1/2 in. and larger. For sizes 2 in. and smaller, it is regular practice to furnish straight-tapped couplings for standard-weight pipe and taper-tapped couplings for extra-strong and double extra-strong pipe. If taper-tapped couplings are required for sizes 2 in. and under on standard-weight pipe, line pipe in accordance with API Specification 5L should be ordered. The taper-tapped couplings provided on line pipe in these sizes may be used on mill-threaded standard-weight pipe of the same size.

## 19. Galvanized Pipe

19.1 Galvanized pipe ordered under this specification shall be coated with zinc inside and outside by the hot-dip process. The zinc used for the coating shall be any grade of zinc conforming to Specification B.6.

19.2 *Weight of Coating*—The weight of zinc coating shall be not less than 1.8 oz/ft<sup>2</sup> (0.55 kg/m<sup>2</sup>) as determined from the average results of the two specimens taken for test in the manner prescribed in 19.5 and not less than 1.6 oz/ft<sup>2</sup> (0.49

kg/m<sup>2</sup>) for either of these specimens. The weight of coating expressed in ounces per square foot shall be calculated by dividing the total weight of zinc, inside plus outside, by the total area, inside plus outside, of the surface coated. Each specimen shall have not less than 1.3 oz/ft<sup>2</sup> (0.40 kg/m<sup>2</sup>) of zinc coating on each surface, calculated by dividing the total weight of zinc on the given surface (outside or inside) by the area of the surface coated (outside or inside).

19.3 *Weight of Coating Test*—The weight of zinc coating shall be determined by a stripping test in accordance with Test Method A 90. The total zinc on each specimen shall be determined in a single stripping operation.

19.4 *Test Specimens*—Test specimens for determination of weight of coating shall be cut approximately 4 in. (101.6 mm) in length.

19.5 *Number of Tests*—Two test specimens for the determination of weight of coating shall be taken, one from each end of one length of galvanized pipe selected at random from each lot of 500 lengths or fraction thereof, of each size.

19.6 *Retests*—If the weight of coating of any lot does not conform to the requirements specified in 19.2, retests of two additional pipes from the same lot shall be made, each of which shall conform to the requirements specified.

19.7 When pipe ordered under this specification is to be galvanized, the tension, flattening, and bend tests shall be made on the base material before galvanizing. When specified, results of the mechanical tests on the base material shall be reported to the purchaser. If impracticable to make the mechanical tests on the base material before galvanizing, such tests may be made on galvanized samples, and any flaking or cracking of the zinc coating shall not be considered cause for rejection. When galvanized pipe is bent or otherwise fabricated to a degree which causes the zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.

## 20. Workmanship, Finish and Appearance

20.1 The pipe manufacturer shall explore a sufficient number of visual surface imperfections to provide reasonable assurance that they have been properly evaluated with respect to depth. Exploration of all surface imperfections is not required, but may be necessary to ensure compliance with 20.2.

20.2 Surface imperfections that penetrate more than 12 1/2% of the nominal wall thickness or encroach on the minimum wall thickness shall be considered defects. Pipe with defects shall be given one of the following dispositions:

20.2.1 The defect may be removed by grinding provided that the remaining wall thickness is within specified limits.

20.2.2 Type S pipe and the parent metal of Type E pipe, except within 1/2 in. (12.7 mm) of the fusion line of the electric resistance seam, may be repaired in accordance with the welding provisions of 20.5. Repair welding of Type F pipe and the weld seam of Type E is prohibited.

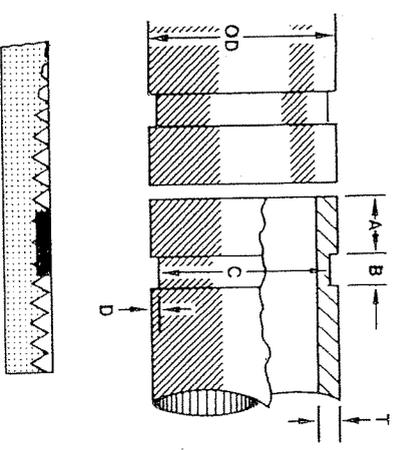
20.2.3 The section of pipe containing the defect may be cut off within the limits of requirement on length, or

20.2.4 Rejected.

20.3 At the purchaser's discretion, pipe shall be subjected to rejection if surface defects repaired in accordance with 20.2 are not scattered, but appear over a large area in excess of what is considered a workmanlike finish. Disposition of

# STANDARD CUT GROOVE SPECIFICATIONS/STEEL and OTHER METALLIC IPS PIPE

## Pipe Grooving:



Cut grooving standard steel pipe removes less metal, to less depth, than threading, maintaining the designed integrity of the pipe.

**COLUMN 1**—Nominal IPS pipe size. Nominal metric (ISO) pipe size.

**COLUMN 2**—IPS outside diameter. Metric (ISO) outside diameter.

The outside diameter of cut grooved pipe shall not vary more than the tolerance listed. For IPS pipe, the maximum allowable tolerance from square cut ends is 0.030" for ¾" through 3½", 0.045" for 4" through 6", and 0.060" for sizes 8" O.D. and above measured from true square line. For (ISO) metric pipe, the maximum allowable tolerance from square cut ends is 0.76 mm for sizes 20 mm-50 mm; 1.14 mm for sizes 100 mm-150 mm; and 1.52 mm for sizes 200 mm and above, measured from the true square line.

**COLUMN 3**—Gasket seat: the pipe surface shall be free from indentations, roll marks, and projections from the end of the pipe to the groove, to provide a leaktight seal for the gasket. All loose paint, scale, dirt, chips, grease and rust must be removed. It continues to be Victaulic's first recommendation that pipe be square cut. When using beveled pipe contact Victaulic for details. Square cut pipe must be used with PipeSeal® and EndSeal® FlushSeal®. Gasket seat "A" is measured from the end of the pipe.

**COLUMN 4**—Groove width: bottom of groove to be free of loose dirt, chips, rust and scale that may interfere with proper coupling assembly. Maximum permissible radius at bottom corner of groove is 0.015" (0.381mm).

**COLUMN 5**—Groove outside diameter: the groove must be uniform depth for the entire pipe circumference. Groove must be maintained within the "C" diameter tolerance listed.

**COLUMN 6**—Groove depth: for reference only. Groove must conform to the groove diameter "C" listed.

**COLUMN 7**—Minimum allowable wall thickness: this is the minimum wall thickness which may be cut grooved.

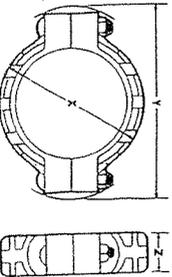
1 Nominal Size Inches	2 Pipe Outside Diameter O.D. - Inches/millimeters		3 Gasket Seat A ±0.03 ±0.76	4 Groove Width B ±0.03 ±0.76	5 Groove Diameter C		6 Groove Depth (vel.) 0.056 1.42	7 Min. Allow Wall Thick. T
	Basic	Tolerance			Basic	Toler. +0.000 +0.008		
¾	1.050	+0.010	0.625	0.313	0.938	-0.015	0.056	0.113
	26.9	+0.25	16.88	7.95	23.83	-0.38	1.42	2.87
1	1.315	+0.013	0.625	0.313	1.190	-0.015	0.063	0.133
	33.4	+0.33	16.88	7.95	30.23	-0.38	1.60	3.38
1¼	1.660	+0.016	0.625	0.313	1.535	-0.015	0.063	0.140
	42.2	+0.41	15.88	7.95	38.99	-0.38	1.60	3.56
1½	1.900	+0.019	0.625	0.313	1.775	-0.015	0.063	0.145
	48.3	+0.48	15.88	7.95	45.09	-0.38	1.60	3.68
2	2.375	+0.024	0.625	0.313	2.250	-0.015	0.063	0.154
	60.3	+0.61	15.88	7.95	57.15	-0.38	1.60	3.91
2½	2.875	+0.029	0.625	0.313	2.720	-0.018	0.078	0.188
	73.0	+0.74	15.88	7.95	69.09	-0.46	1.98	4.78
3 O.D.	3.000	+0.030	0.625	0.313	2.945	-0.018	0.078	0.188
	76.1	+0.76	15.88	7.95	72.26	-0.46	1.98	4.78
3	3.500	+0.035	0.625	0.313	3.344	-0.018	0.078	0.188
	88.9	+0.88	15.88	7.95	84.94	-0.46	1.98	4.78
3½	4.000	+0.040	0.625	0.313	3.834	-0.020	0.083	0.188
	101.6	+1.02	15.88	7.95	97.38	-0.51	2.11	4.78
4	4.500	+0.045	0.625	0.375	4.334	-0.020	0.083	0.203
	114.3	+1.14	15.88	9.53	116.08	-0.51	2.11	5.16
4¼ O.D.	4.250	+0.043	0.625	0.344	4.084	-0.020	0.083	0.203
	108.0	+1.04	16.88	8.77	102.73	-0.51	2.11	5.16
4½	5.000	+0.050	0.625	0.375	4.834	-0.020	0.083	0.203
	127.0	+1.27	16.88	9.53	122.78	-0.51	2.11	5.16
5¼ O.D.	5.250	+0.053	0.625	0.344	5.084	-0.020	0.083	0.203
	133.0	+1.70	16.88	8.77	129.13	-0.51	2.11	5.16
5½ O.D.	5.500	+0.056	0.625	0.375	5.334	-0.020	0.083	0.203
	139.7	+1.42	16.88	9.53	135.48	-0.51	2.11	5.16
5	5.963	+0.056	0.625	0.375	5.935	-0.022	0.084	0.203
	141.3	+1.42	16.88	9.53	137.03	-0.56	2.18	5.16
6 O.D.	6.000	+0.056	0.625	0.375	6.830	-0.022	0.085	0.219
	152.4	+1.42	16.88	9.53	146.08	-0.56	2.18	5.36
6¼ O.D.	6.250	+0.063	0.625	0.344	6.032	-0.022	0.109	0.219
	158.0	+1.35	15.88	8.77	153.21	-0.56	2.18	5.36
6½ O.D.	6.500	+0.063	0.625	0.375	6.390	-0.022	0.085	0.219
	165.1	+1.60	15.88	9.53	160.78	-0.56	2.18	5.36
6	6.625	+0.063	0.625	0.375	6.455	-0.022	0.085	0.219
	169.3	+1.60	16.88	9.53	163.96	-0.56	2.18	5.36
8 O.D.	8.000	+0.063	0.750	0.438	7.816	-0.025	0.092	0.238
	203.2	+1.60	19.05	11.13	192.53	-0.64	2.34	6.06
8	8.625	+0.063	0.750	0.438	8.441	-0.025	0.092	0.238
	219.1	+1.60	19.05	11.13	214.40	-0.64	2.34	6.36
10 O.D.	10.000	+0.063	0.750	0.500	9.812	-0.027	0.094	0.250
	254.0	+1.60	19.05	12.70	246.23	-0.68	2.38	6.36
10	10.750	+0.063	0.750	0.500	10.562	-0.027	0.094	0.250
	273.0	+1.60	19.05	12.70	260.28	-0.68	2.38	6.36
12 O.D.	12.000	+0.063	0.750	0.500	11.781	-0.030	0.109	0.279
	304.8	+1.60	19.05	12.70	289.24	-0.76	2.77	7.09
12	12.750	+0.063	0.750	0.500	12.531	-0.030	0.109	0.279
	323.9	+1.60	19.05	12.70	310.28	-0.76	2.77	7.09
14 O.D.	14.000	+0.063	0.938	0.500	13.781	-0.030	0.109	0.281
	353.6	+1.60	23.83	12.70	360.04	-0.76	2.77	7.14
15 O.D.	15.000	+0.063	0.938	0.500	14.781	-0.030	0.109	0.312
	381.0	+1.60	23.83	12.70	375.44	-0.76	2.77	7.32
16 O.D.	16.000	+0.063	0.938	0.500	15.781	-0.030	0.109	0.312
	406.4	+1.60	23.83	12.70	400.84	-0.76	2.77	7.92
18 O.D.	18.000	+0.063	1.000	0.500	17.781	-0.030	0.109	0.312
	457.2	+1.60	25.40	12.70	451.64	-0.76	2.77	7.92
20 O.D.	20.000	+0.063	1.000	0.500	19.781	-0.030	0.109	0.312
	500.0	+1.60	25.40	12.70	502.44	-0.76	2.77	7.92
22 O.D.	22.000	+0.063	1.000	0.563*	21.656	-0.030	0.172	0.375
	558.0	+1.60	25.40	14.30	550.06	-0.76	4.37	9.53
24 O.D.	24.000	+0.063	1.000	0.563*	23.656	-0.030	0.172	0.375
	610.0	+1.60	25.40	14.30	600.86	-0.76	4.37	9.53
28 I.D.	28.875	+0.063	1.000	0.563	28.531	-0.030	0.172	0.437
	733.4	+1.60	25.40	14.30	724.69	-0.76	4.37	11.10
30 I.D.	31.000	+0.063	1.250	0.625	30.594	-0.030	0.203	0.500
	787.4	+1.60	31.75	15.88	777.09	-0.76	5.16	12.70

\*¾" (14 mm) width groove is required in sizes 22"-24" (559-610.0 mm) in order to obtain the maximum allowable pipe end moment listed in Performance Data Charts. ½" (12 mm) width groove will give ½ the maximum allowance shown for 22"-24" (559-610.0 mm). For double groove tool bit information, contact Victaulic.

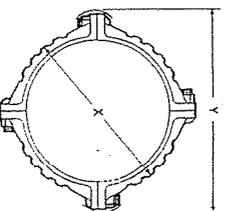
## STYLE 77 STANDARD FLEXIBLE COUPLING

Nominal Size Inches	Pipe O.D. Inches	Max. Work Press. PSI*	Max. End Load Lbs. #	Allow. Pipe End T Sep. In.	Deflect. Fr. Q <sub>1</sub> Per Cplg. Degree	Pipe In./Fl.	@ # Bolt/Nut Inches	Coupling Dimensions			Approx. Weight Each Lbs.
								X	Y	Z	
3/4	1.050 26.5	1,000 6900	865 3830	0-0.13 0-3.2	6°-47'	1.43 1 1/8	2-3/8×2	2.13 5 1/4	3.63 52	1.75 44	1.1 0.5
1	1.315 33.7	1,000 6900	1,360 6030	0-0.13 0-3.2	5°-26'	1.14 9/8	2-3/8×2	2.38 6 1/8	3.88 90	1.75 44	1.3 0.6
1 1/4	1.660 42.4	1,000 6900	2,160 9510	0-0.13 0-3.2	4°-19'	0.90 7/8	2-1/2×2 1/4	2.63 67	4.63 116	1.75 44	2.0 0.9
1 1/2	1.900 40.3	1,000 6900	2,835 12915	0-0.13 0-3.2	3°-46'	0.79 6/8	2-1/2×2 1/2	3.00 76	5.00 127	1.75 44	2.1 1.0
2	2.375 60.3	1,000 6900	4,430 16715	0-0.13 0-3.2	3°-11'	0.63 5/8	2-1/2×2 1/2	3.63 92	5.63 143	1.75 44	2.6 1.2
2 1/2	2.875 73.0	1,000 6900	6,490 28990	0-0.13 0-3.2	2°-29'	0.52 4/8	2-1/2×2 3/4	4.25 100	6.25 139	1.75 44	3.1 1.4
3 O.D.	3.000 76.1	1,000 6900	7,070 31460	0-0.13 0-3.2	2°-23'	0.50 4/2	2-1/2×2 3/4	4.31 110	6.31 160	1.75 44	3.6 1.6
3	3.500 88.9	1,000 6900	9,620 46810	0-0.13 0-3.2	2°-3'	0.43 3/8	2-1/2×2 3/4	5.00 127	7.00 173	1.75 44	3.5 1.6
3 1/2	4.000 101.6	1,000 6900	12,565 55915	0-0.13 0-3.2	1°-48'	0.38 3/2	2-5/8×3/4	5.63 143	8.00 203	1.75 44	5.6 2.5
4	4.500 114.3	1,000 6900	15,990 70755	0-0.25 0-6.4	3°-11'	0.67 5/8	2-5/8×3/4	6.38 162	8.50 216	2.00 51	6.6 3.0
4 1/4 O.D.	4.250 108.0	1,000 6900	14,180 63100	0-0.25 0-6.4	3°-21'	0.70 5/8	2-16×82.5	7.63 194	10.25 260	2.00 51	10.6 4.8
5	5.563 141.3	1,000 6900	24,300 109135	0-0.25 0-6.4	2°-35'	0.54 4/5	2-3/4×4/4	7.63 194	10.25 260	2.00 51	10.6 4.8
5 1/4 O.D.	5.250 133.0	1,000 6900	21,635 96275	0-0.25 0-6.4	2°-42'	0.56 4/7	2-20×108	7.34 186	9.20 234	2.06 52	10.0 4.5
5 1/2 O.D.	5.500 139.7	1,000 6900	23,745 105665	0-0.25 0-6.4	2°-36'	0.55 4/6	2-20×108	7.60 192	9.44 240	2.06 52	11.0 5.0
6	6.625 168.3	1,000 6900	34,470 153990	0-0.25 0-6.4	2°-10'	0.45 3/6	2-3/4×4/4	9.00 222	11.50 292	2.00 51	11.8 5.4
6 1/4 O.D.	6.250 159.0	1,000 6900	30,665 136460	0-0.25 0-6.4	2°-17'	0.48 4/0	2-20×108	8.50 216	10.38 264	2.06 52	13.2 6.0
6 1/2 O.D.	6.500 165.1	1,000 6900	33,185 147690	0-0.25 0-6.4	2°-12'	0.46 3/8	2-3/4×4/4	9.19 232	11.50 292	2.06 52	13.2 6.0
8	8.625 219.1	800 5500	46,740 207995	0-0.25 0-6.4	1°-40'	0.35 2/9	2-7/8×5	11.38 289	14.50 368	2.38 60	20.1 9.1
10	10.750 273.0	800 5500	73,280 326100	0-0.25 0-6.4	1°-20'	0.28 2/8	2-1×6	13.50 343	16.75 423	2.50 64	28.3 12.9
12	12.750 323.9	800 5500	102,000 459900	0-0.25 0-6.4	1°-7'	0.23 2/20	2-1×6 1/2	15.50 394	19.00 483	2.50 64	34.2 15.5
14	14.000 355.6	300 205500	46,180 205500	0-0.25 0-6.4	1°-2'	0.22 1/8	4-1×3 1/2	16.63 423	20.00 503	2.88 73	35.6 16.1
15	15.000 381.0	300 2055	53,000 235850	0-0.25 0-6.4	0°-57'	0.20 1/7	4-1×5 1/2	17.88 454	21.25 540	2.88 73	48.8 22.1
16	16.000 406.4	300 2065	60,320 269425	0-0.25 0-6.4	0°-54'	0.19 1/6	4-1×3 1/2	19.00 493	22.38 563	2.88 73	51.1 23.2
18	18.000 457.0	300 2065	76,340 339710	0-0.25 0-6.4	0°-48'	0.17 1/4	4-1×3 1/2	21.25 540	24.38 610	3.13 79	64.4 29.2
20	20.000 508.0	300 2065	94,000 419300	0-0.25 0-6.4	0°-43'	0.15 1/2	4-1 1/4×4	23.50 597	27.50 693	3.13 79	91.2 41.4
22	22.000 559.0	300 2065	114,000 507300	0-0.25 0-6.4	0°-38'	0.13 1/3	4-1 1/4×4	25.63 661	30.00 702	3.13 79	92.0 41.7
24	24.000 610.0	250 1725	113,000 502850	0-0.25 0-6.4	0°-36'	0.13 1/3	6-1 1/4×4	27.63 702	31.38 757	3.13 79	94.0 42.6
28 I.D.	28.875 733.4	150 1035	98,250 437210	0-0.25 0-6.4	0°-30'	0.10 5/8	6-1×5 1/2	32.00 813	35.50 902	3.13 78	95.0 43.1
30 I.D.	31.000 787.4	150 1035	113,250 505950	0-0.25 0-6.4	0°-28'	0.10 5/8	6-1×5 1/2	34.38 873	37.75 959	3.63 92	127.2 57.7

\* Refer to Notes page 28.  
 @ Number of bolts equals number of housing segments.  
 †Metric thread size bolts (plated) are available (color coded gold) for all coupling sizes upon request.  
 Contact Victaulic for details.



3/4"-1 1/2" Sizes



1 1/4"-2 1/2" Sizes



GROOVED  
IPS CPLG

The standard of the line, Style 77 is available in a broad range of IPS sizes for varied services. See 1 and 2. The housing has ribbed construction to provide maximum strength without unnecessary weight. The coupling is capable of working pressures up to 1000 PSI (6900 kPa) depending on size and is suitable for buried or exposed services. Housings may be ordered hot dip galvanized or specially coated. Request VS-077 for submittal.

### ALTERNATE MATERIALS

#### Stainless Steel

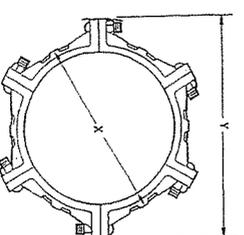
Style 77-S couplings are available in Type 304 or Type 316 stainless steel, with matching bolts and standard or special gaskets in sizes from 3/4" through 24" (26.9-610.0 mm). Contact Victaulic for details. Request VS-SSP for submittal.

#### Aluminum

Style 77-A couplings are available in aluminum alloy 356-T6, ASTM B-26, with plated steel bolts and standard or special gaskets, in sizes from 1" through 8" (33.7-219.1 mm). Contact Victaulic for details. Request VS-AP for submittal.

1 NOTE: Independent testing has shown the Style 77 coupling to be an effective stress relief and vibration attenuation device providing performance superior to braided steel and elastomeric arch-type connectors when used in close proximity to the source of vibration. Request Technical Sheet TS-5000.

2 NOTE: Independent testing has shown that Victaulic Style 77 and 75 flexible couplings and Style 07 Zero-Flex® rigid couplings provide exceptional functionality during and after earthquake conditions. Request Technical Sheet TS-4000.



2 1/2"-3 1/2" I.D. Sizes

