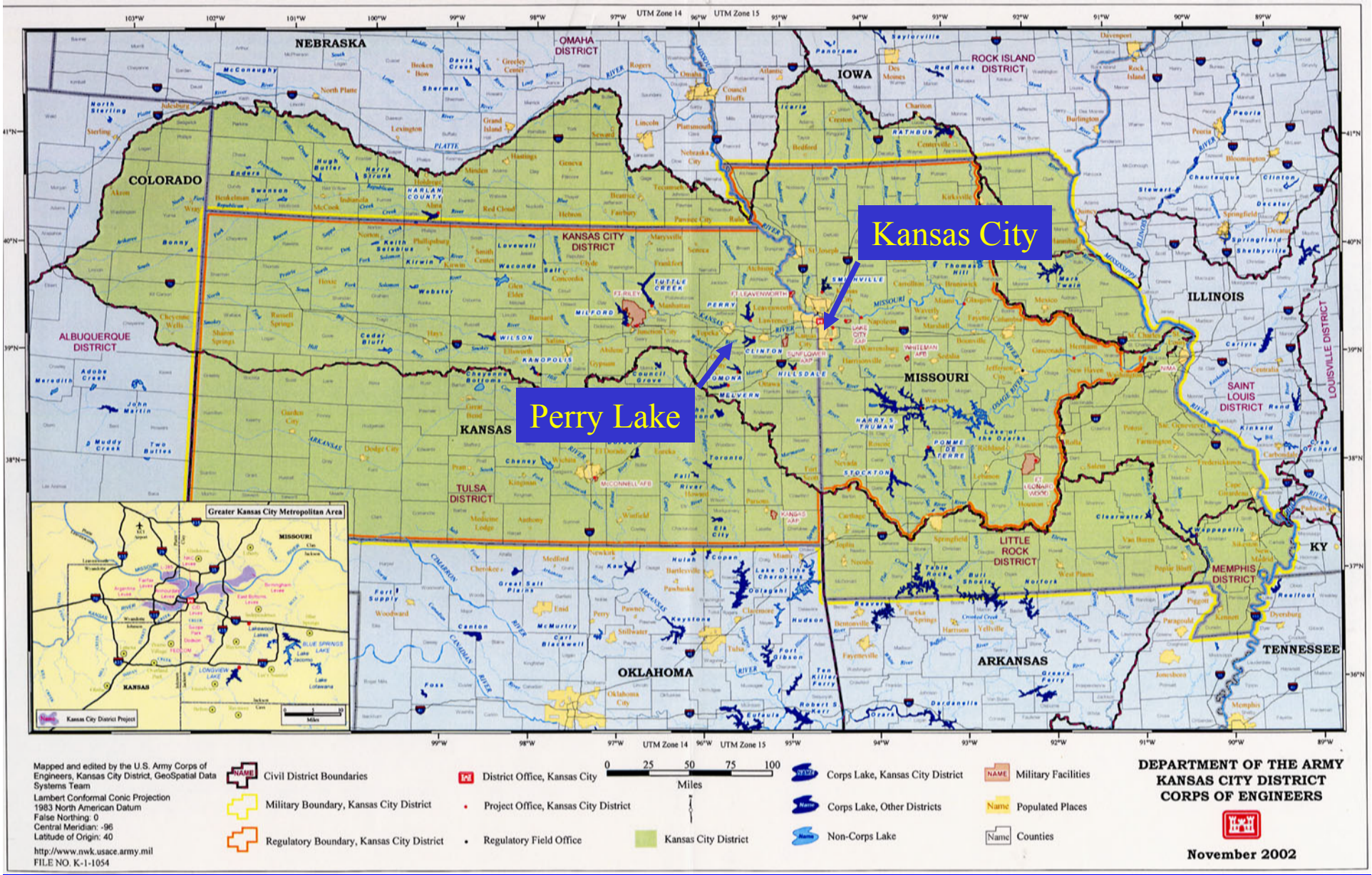
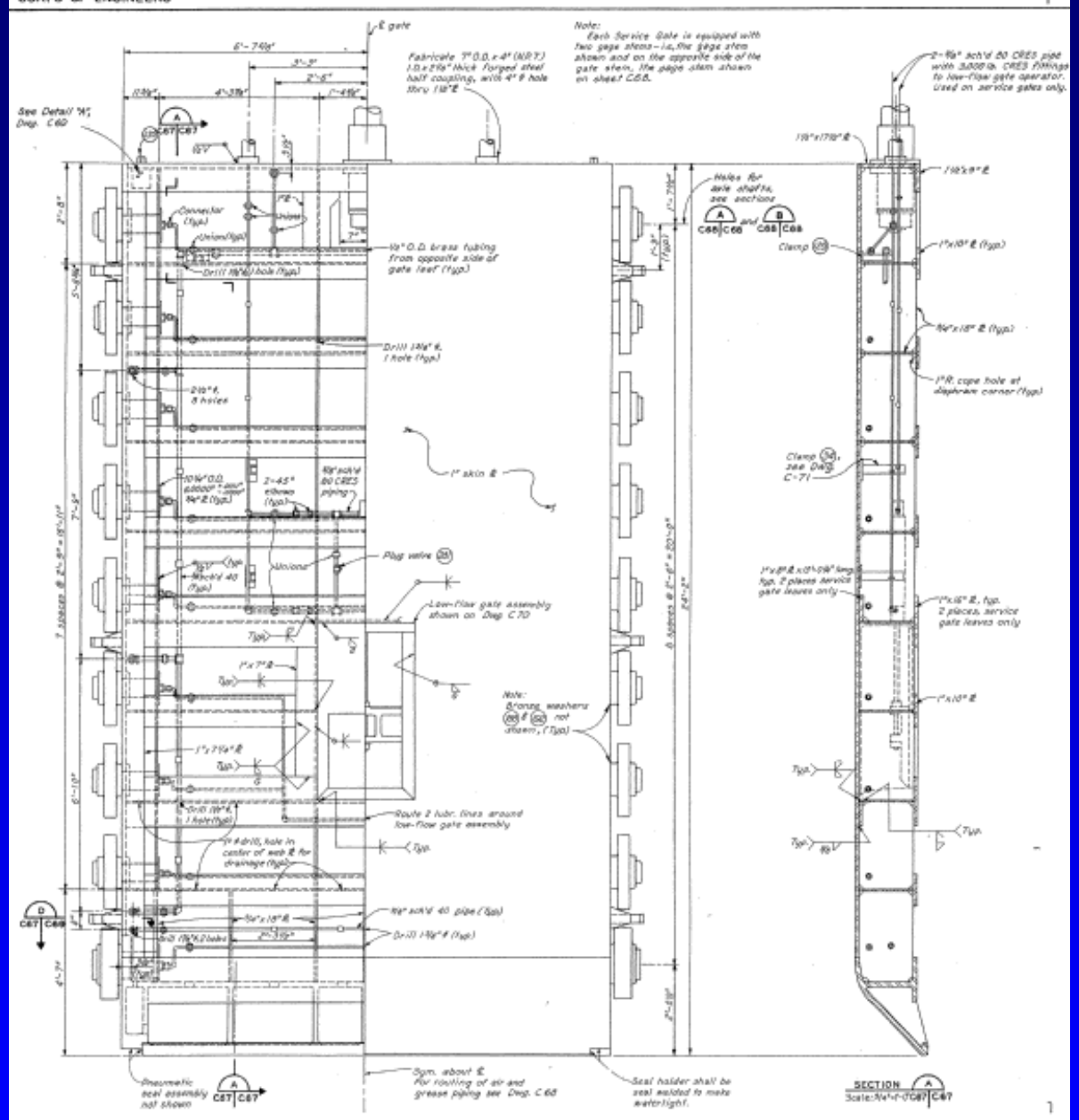
Kansas City District

PERRY LAKE PROJECT GATE REPAIR
3 August 2005
MARVIN PARKS, E.I.T


Kansas City
Perry Lake
NEBRASKA
OMAHA DISTRICT
IOWA
ROCK ISLAND DISTRICT
COLORADO
KANSAS CITY DISTRICT
ALBUQUERQUE DISTRICT
KANSAS
MISSOURI
ILLINOIS
SAINT LOUIS DISTRICT
LOUISVILLE DISTRICT
TULSA DISTRICT
LITTLE ROCK DISTRICT
MEMPHIS DISTRICT
OKLAHOMA
ARKANSAS
TENNESSEE
KY
Greater Kansas City Metropolitan Area
Mapped and edited by the U.S. Army Corps of Engineers, Kansas City District, GeoSpatial Data Systems Team
Lambert Conformal Conic Projection
1983 North American Datum
False Northing: 0
Central Meridian: -96
Latitude of Origin: 40
http://www.nwk.usace.army.mil
FILE NO. K-1054
Civil District Boundaries
Military Boundary, Kansas City District
Regulatory Boundary, Kansas City District
District Office, Kansas City
Project Office, Kansas City District
Regulatory Field Office
Miles
Kansas City District
Corps Lake, Kansas City District
Corps Lake, Other Districts
Non-Corps Lake
Military Facilities
Populated Places
Counties
DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT
CORPS OF ENGINEERS
November 2002

CORPS OF ENGINEERS

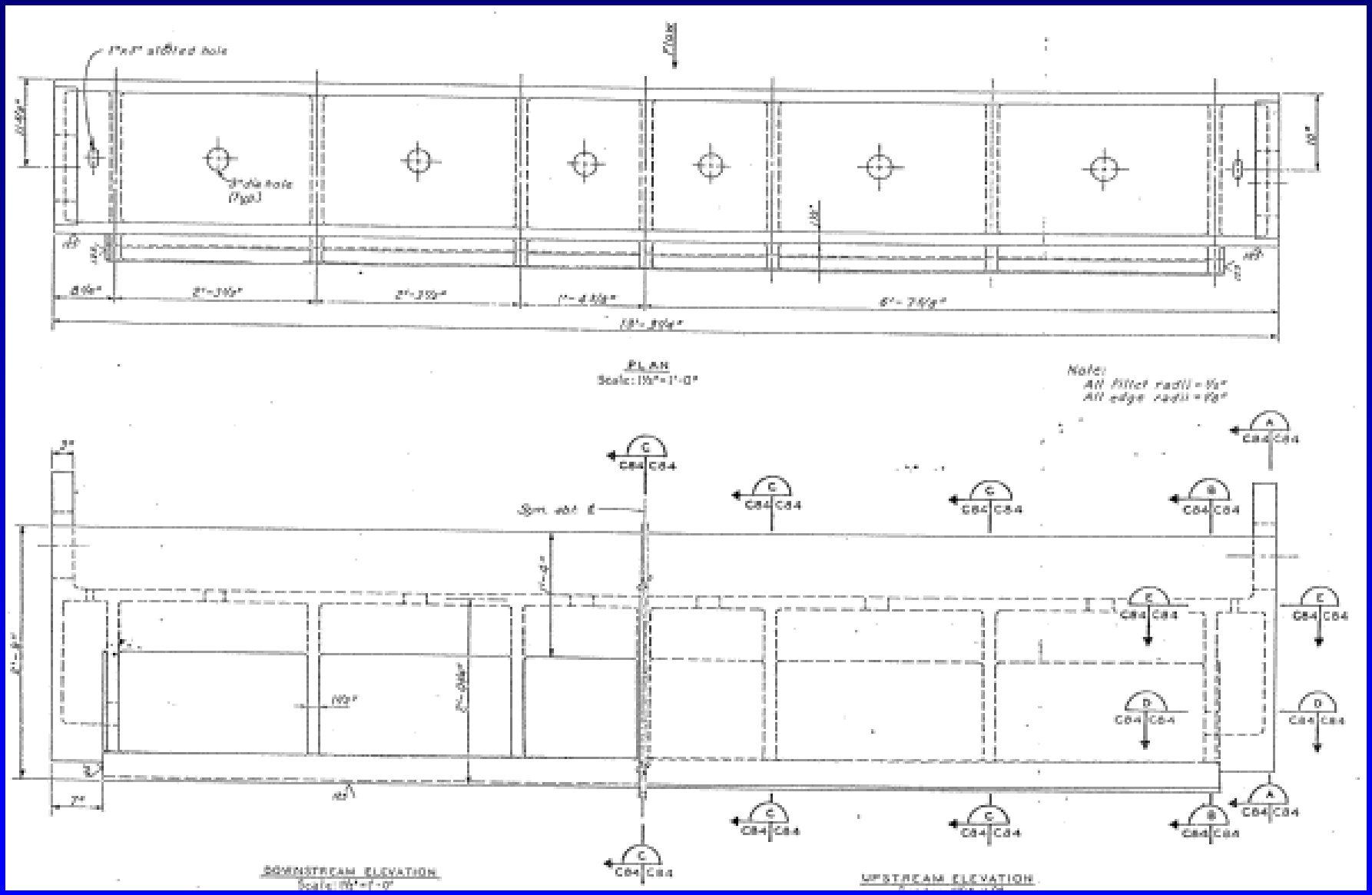


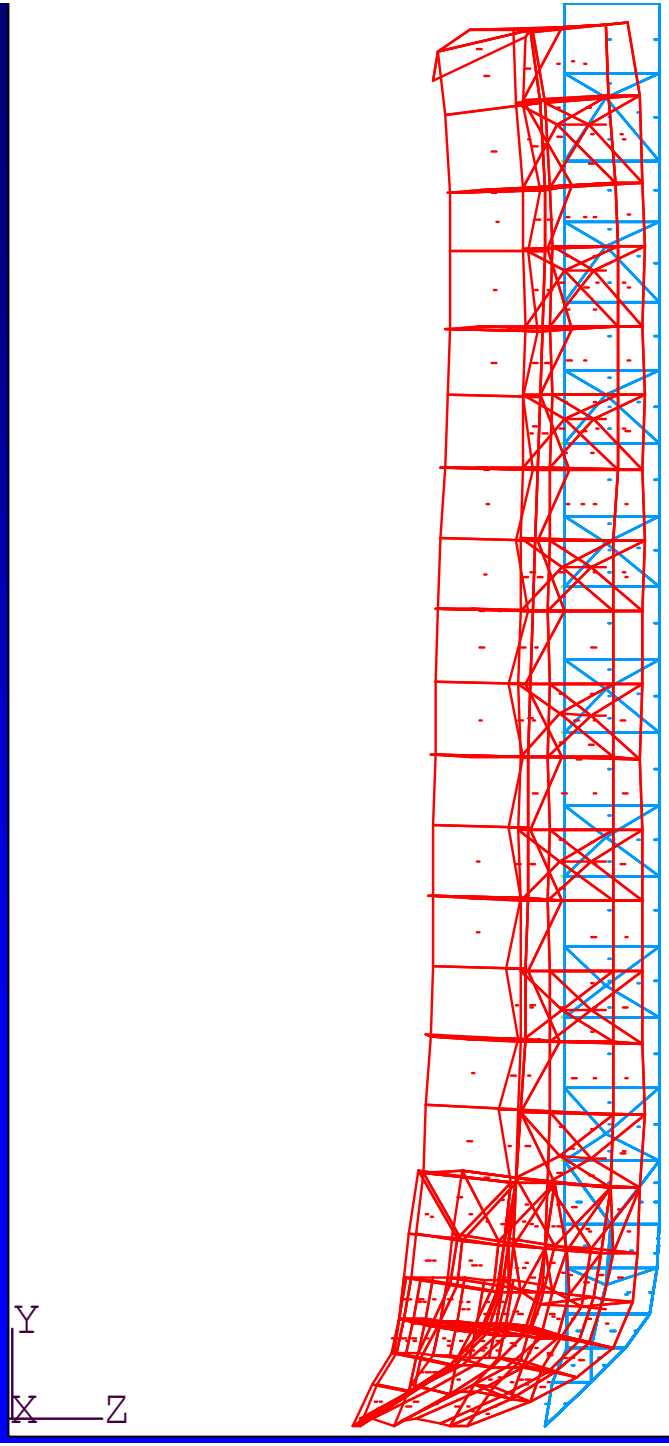
SERVICE GATE LEAF (24)

MAKE 2

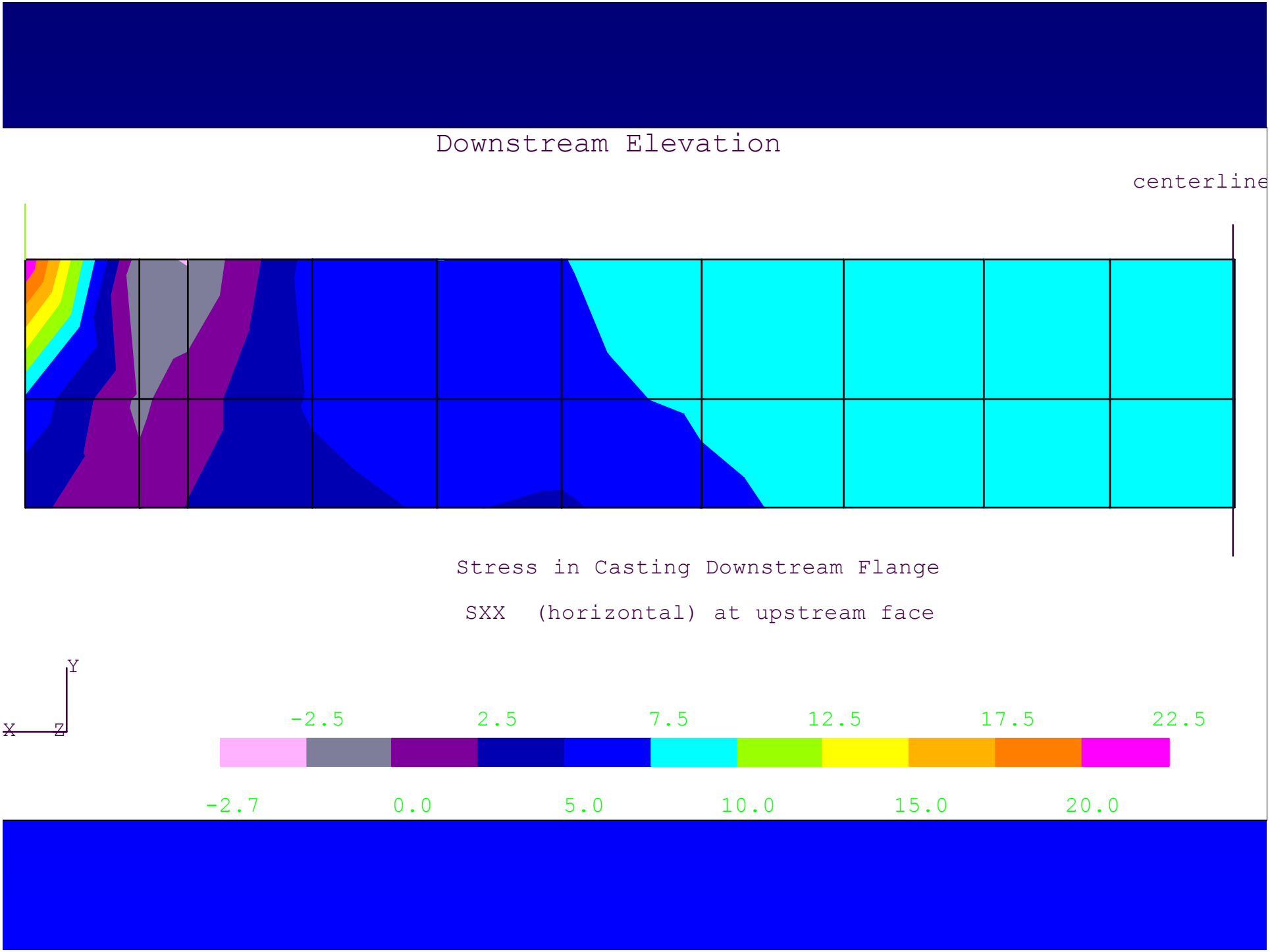
Scale: 1/4"=1'-0"

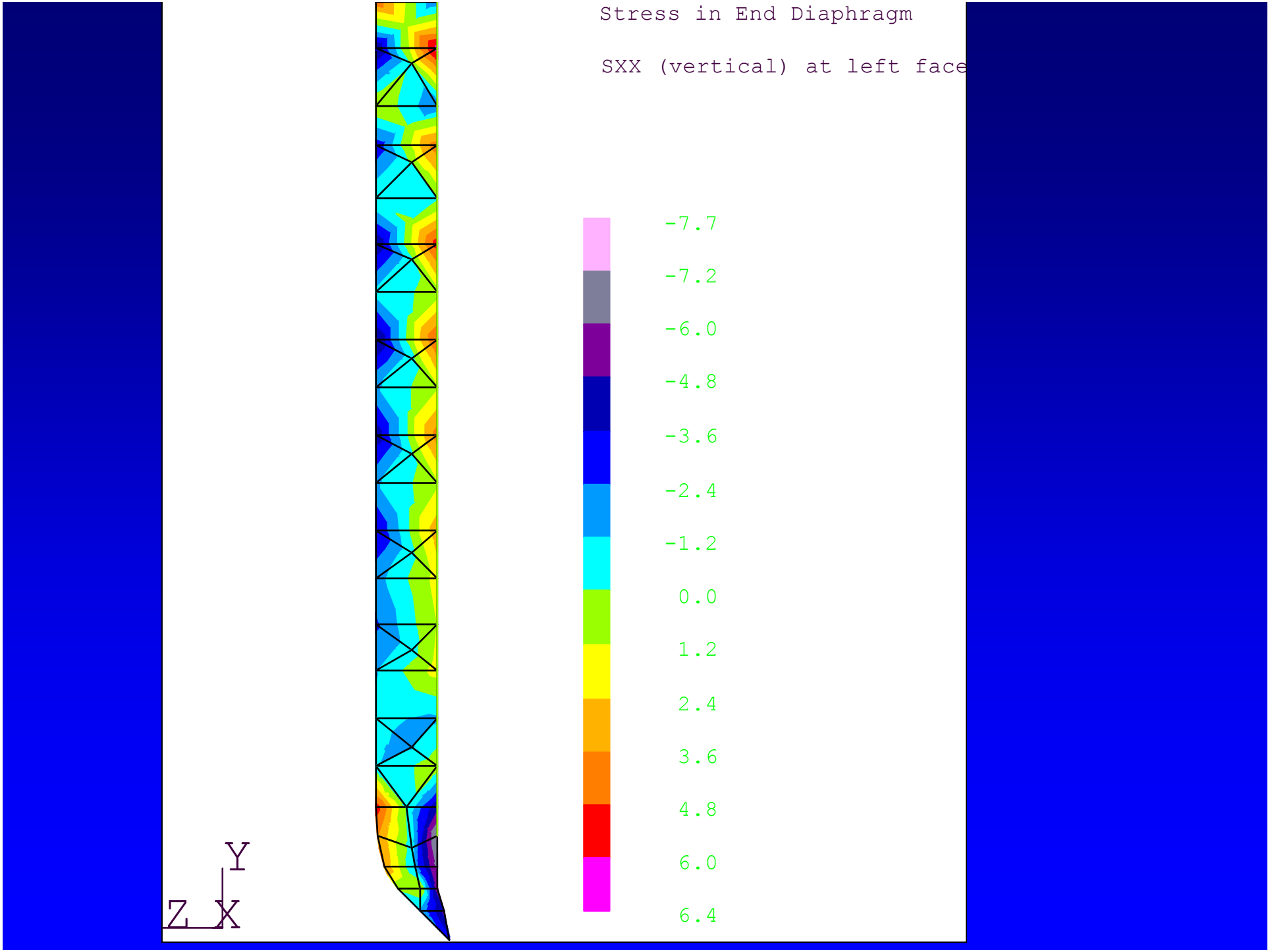
*Service gate leaf for No.2 passage is shown. Service gate leaf for No.1 passage shall have the low-flow gate piping routed thru the opposite gage stem. compr. air and grease piping shall then be routed thru gage stem shown. (Make 1 as shown. Make 1 with routing of piping symmetrically opposite)

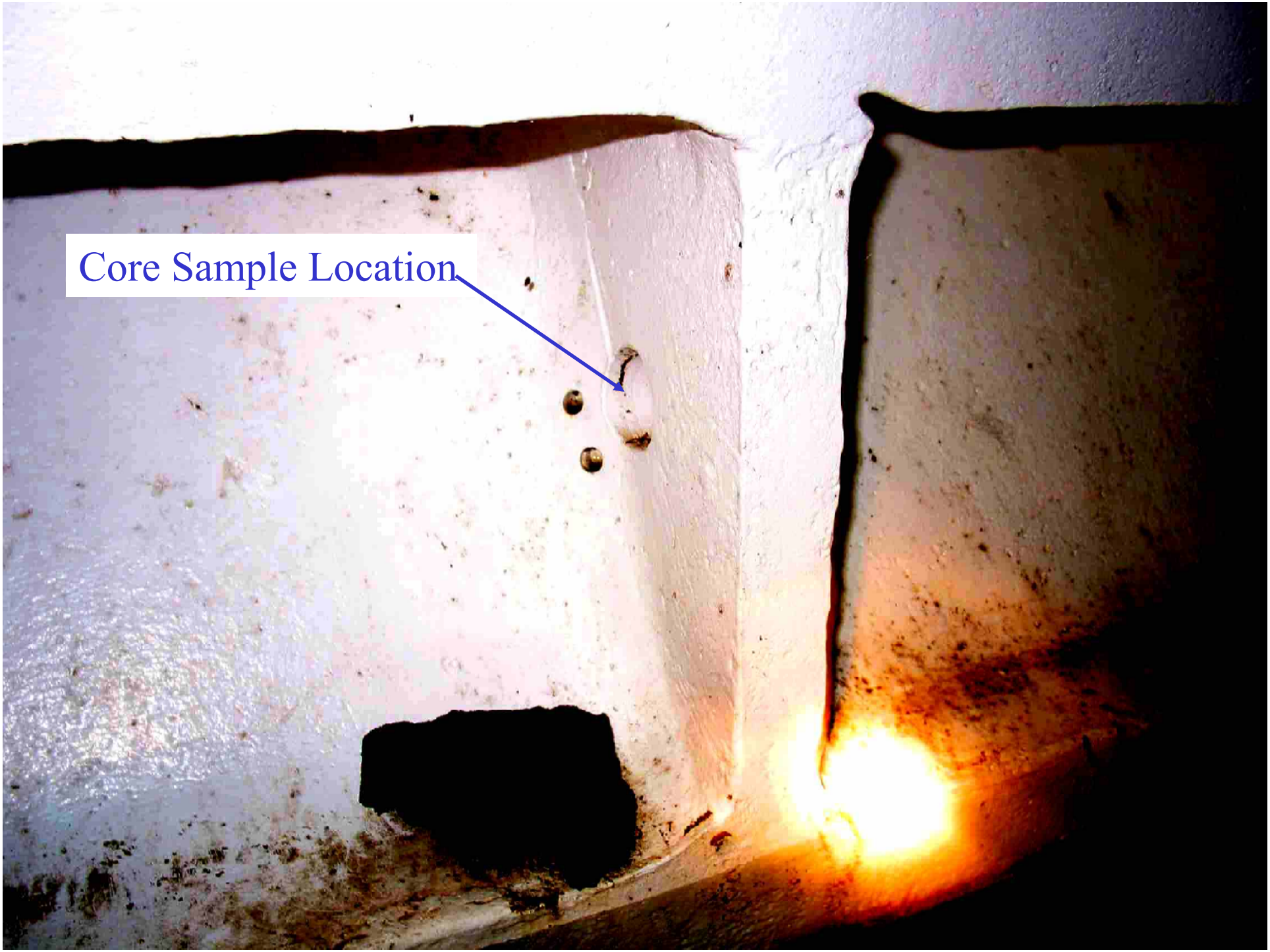

1"x1" slotted hole
Flow
3" dia hole (Typ.)
PLAN
Scale: 1½"=1'-0"
Note:
All fillet radii = ½"
All edge radii = 1/8"
Sym. abt. ℄
DOWNSTREAM ELEVATION
Scale: 1½"=1'-0"
UPSTREAM ELEVATION



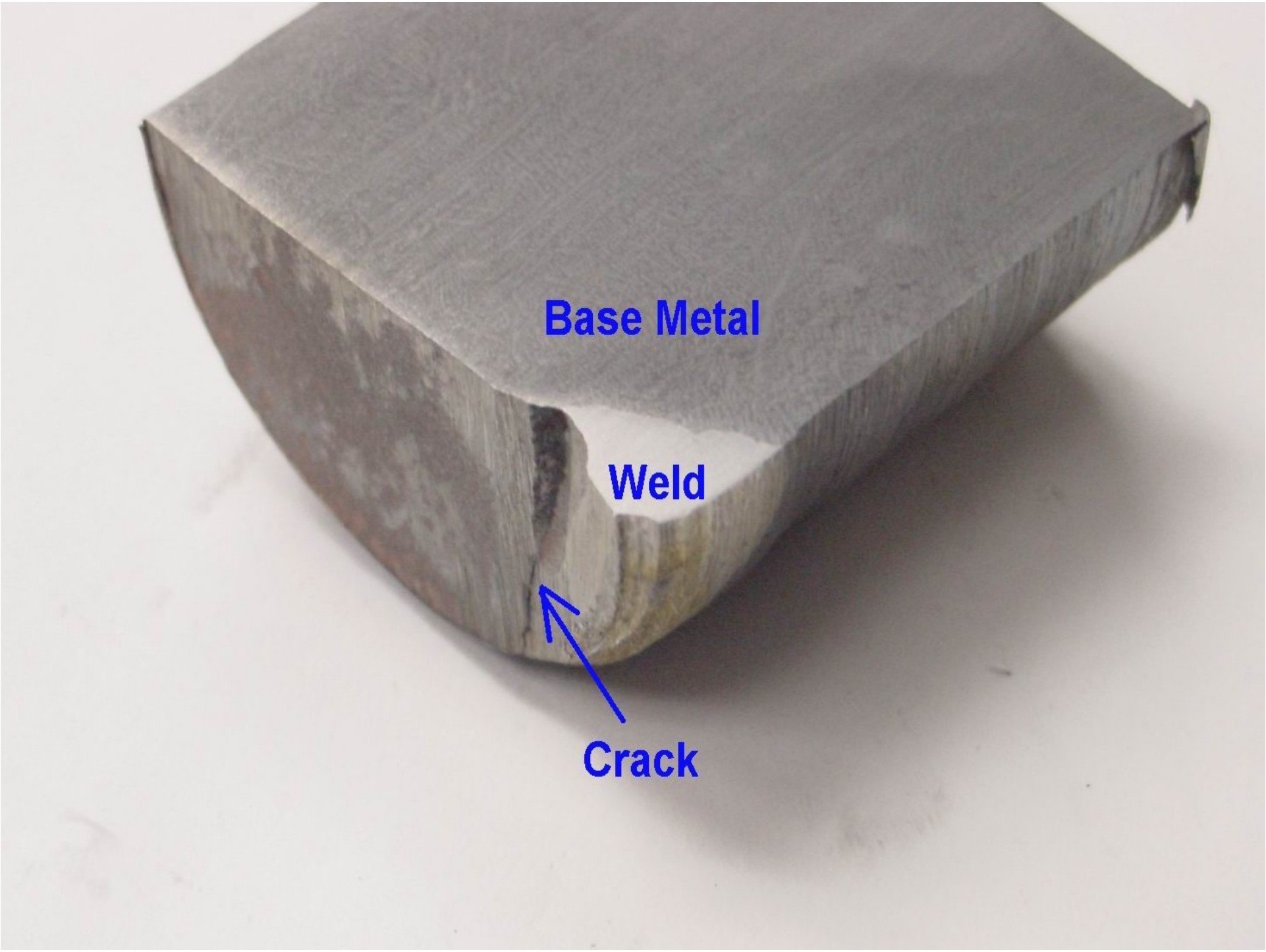
Deformed Shape At Centerline Elevation

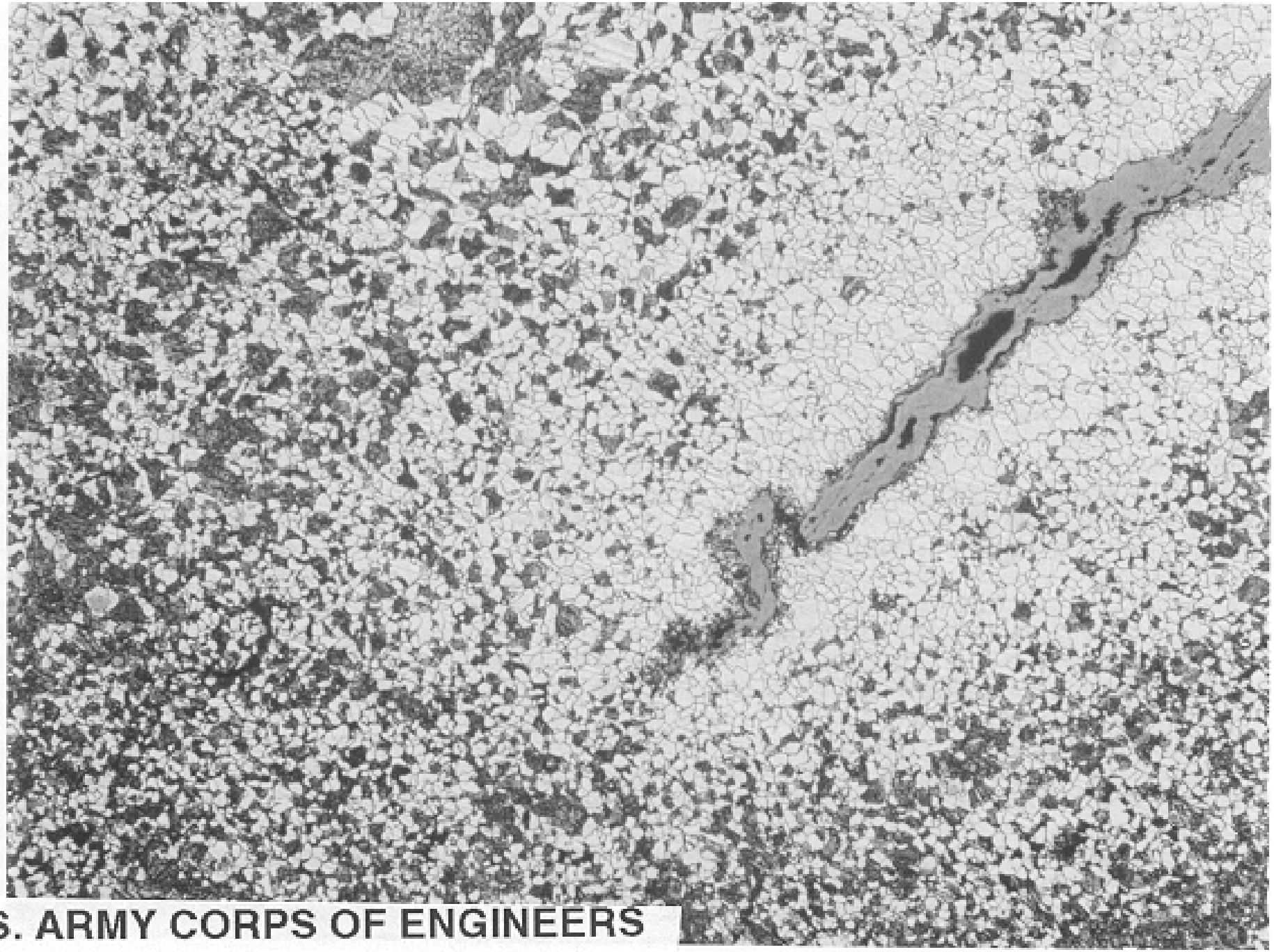

Downstream Elevation
centerline
Stress in Casting Downstream Flange
SXX (horizontal) at upstream face
Y
X
Z
-2.5
2.5
7.5
12.5
17.5
22.5
-2.7
0.0
5.0
10.0
15.0
20.0


Stress in End Diaphragm
SXX (vertical) at left face
-7.7
-7.2
-6.0
-4.8
-3.6
-2.4
-1.2
0.0
1.2
2.4
3.6
4.8
6.0
6.4
Y
Z
X


Core Sample Location

Core Sample, Service Gate No. 1


Base Metal
Weld
Crack



U.S. ARMY CORPS OF ENGINEERS

Lab No. 01M0789, **Fig 4, 50X**

ANALYTE	PLUG
Total Carbon	.34
Silicon	.43
Sulfur	.042
Manganese	.88
Phosphorus	.035
Nickel	.74
Chromium	.88
Molybdenum	.39
Copper	.13
Vanadium	ND
Aluminum	.033

Service Gate No. 1
Casting Core Sample
Chemical Analysis

Repair Alternatives

- Weld repair the existing cracks and return gate to service
- Replace cast gate leaf with another cast steel gate leaf
- Remove (cut) the cast gate leaf and replace with a fabricated steel section

Repair Alternative Chosen

- Remove (cut) the cast gate leaf and replace with a fabricated steel section

Justification

- Long-term cost relative to weld repair
- Cast steel difficult to repair and risky
- Casting a new gate leaf ~ $80k
- NDT and maintenance issues with cast steel

Fabrication

- A572 GR 50 material
- ASTM A 770 requirement for end diaphragms
- Charpy V-Notch requirement for end diaphragms, skin plate and structural tee
- AISC Group 3 structural tee

Welding

- Most important aspect of the work
- Weld Procedure Qualifications
- Stress Relieving
- Preheat and Interpass Temperature
- NDT / CWI

Take-Away Points

- Coal-tar epoxy paint-may protect, but it definitely hides flaws
- Know what you are working with
- Insist on AISC certification fabricators
- Follow AISC provisions on heavy shapes when applicable. Stay away from Group 4 and 5 shapes if possible.

Take-Away Points, con't

- Use AWS D1.5 FCP on HSS, especially for new construction
- "UT" or to not "UT"
- Insist on AISC certified fabricators
- NDT is not a panacea

Comments / Questions

Contact Info

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816-983-3253