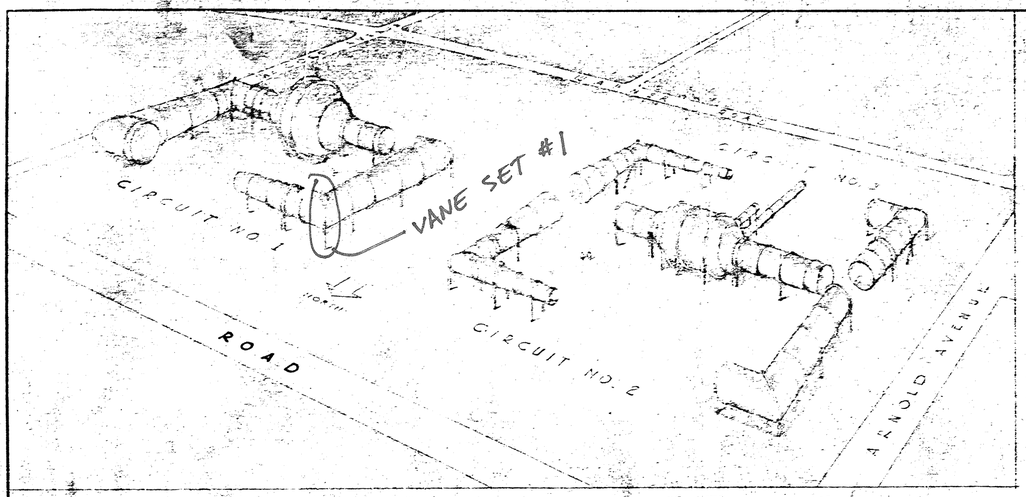
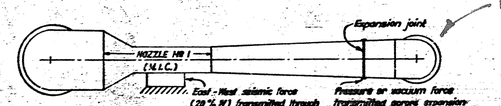
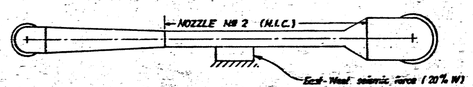


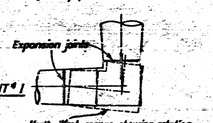
RING GIRDER 7, V.S. #1



NORTH ELEVATION - CIRCUIT # 1



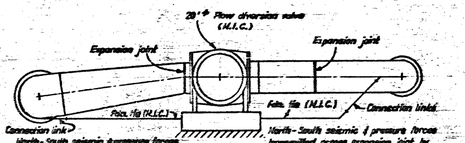
NORTH ELEVATION - CIRCUIT # 2



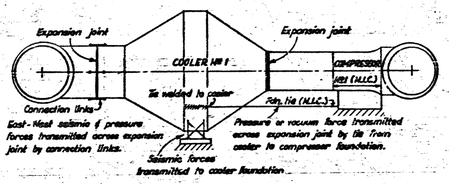
PLAN NORTH-WEST CORNER - CIRCUIT # 1

North-West corner showing rotation of elbow caused by thermal expansion. (Exaggerated)

WEST ELEVATION - CIRCUIT # 1

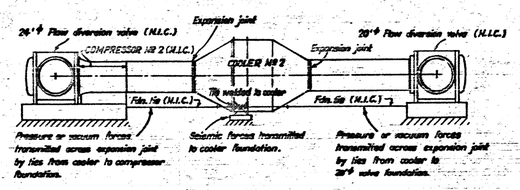


WEST ELEVATION - CIRCUITS # 2 & # 3



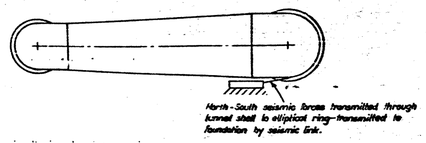
SOUTH ELEVATION - CIRCUIT # 1

LOOKING SOUTH

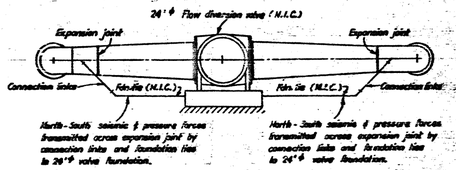


ELEVATION BETWEEN FLOW DIVERSION VALVES

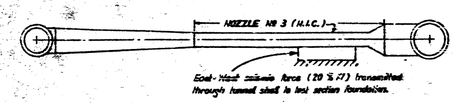
LOOKING SOUTH



EAST ELEVATION - CIRCUIT # 1



EAST ELEVATION - CIRCUITS # 2 & # 3



SOUTH ELEVATION - CIRCUIT # 3

LOOKING SOUTH

DESIGN DATA

I DESIGN LOADS

A PRESSURE AND VACUUM LOADS

The following loads are based on the premise that the tunnels will be either hydrostatically or aerostatically tested to the satisfaction of the Contracting Officer:

1. Circuit No 1 (a) Design pressure = 2½ atmospheres gage (3½ atmospheres absolute) = 3.3 kips per square foot. (b) Design vacuum = 1 atmosphere = 2.1 kips per square foot.
2. Circuits No 2 & 3 (a) Design pressure = 1½ atmospheres gage (2½ atmospheres absolute) = 3.2 kips per square foot. (b) Design vacuum = 1 atmosphere = 2.1 kips per square foot.

If the tunnels are not hydrostatically tested, the following loads apply: (A)

3. Circuit No 1 (a) Design pressure = 1½ atmospheres gage (2½ atmospheres absolute) = 3.2 kips per square foot. (b) Design vacuum = 1 atmosphere = 2.1 kips per square foot.
4. Circuits No 2 & 3 (a) Design pressure = 1 atmosphere gage (2 atmospheres absolute) = 2.1 kips per square foot. (b) Design vacuum = 1 atmosphere = 2.1 kips per square foot.

B LATERAL LOADS

1. Wind - Wind force on tunnel equals 30 pounds per square foot on the projected area, acting in any direction.
2. Seismic - Horizontal seismic force F acting in any direction equals 0.20 W where W = the total dead load.
   All permanent equipment, as well as the tunnel structure is considered dead load.

C EQUIPMENT LOADS

1. Cooler coils, Circuit No 1 (a) Total weight of coils = 211 kips. (b) Total weight of water in coils = 41 kips. (c) Lateral load on coil supports due to pressure drop through coils = 227 kips.
2. Cooler coils, Circuits No 2 & 3 (a) Total weight of coils = 157 kips. (b) Total weight of water in coils = 31 kips. (c) Lateral load on coil supports due to pressure drop through coils = 148 kips.

D THERMAL LOADS

A sufficient number of expansion joints are provided to allow temperature movement in all portions of the tunnel.

II DESIGN STRESSES

A ALLOWABLE STEEL STRESSES FOR PRESSURE LOADS

Tension on net section	12,000 psi
Compression ($\frac{l}{r}$ < 120)	$11,333 - 0.3233\frac{l}{r}$ psi
Bending ($\frac{bd}{t}$ < 600)	12,000 psi
Bending ($\frac{bd}{t}$ > 600)	$7,200,000 \div \frac{bd}{t}$ psi
Bending on pins	27,000 psi
Shear, web of beam, gross section	10,000 psi
Bearing on pins	25,600 psi

B ALLOWABLE WELD METAL STRESSES FOR PRESSURE LOADS

Tension - butt weld - section through throat	12,000 psi
Compression - butt weld - section through throat (crushing)	12,000 psi
Shear - section through throat of fillet weld	10,000 psi
Shear - section through throat of butt weld	9,600 psi

NOTE

The pressure load stresses shown in IA & IB were used in designing Circuit No 1 for 2½ atmospheres gage, and Circuits No 2 & 3 for 1½ atmospheres gage. (A)
If the tunnels are not hydrostatically tested, the pressure and vacuum loads of IA3 & IA4 apply and the stresses of IA3 & IA4 are decreased as follows:
Circuit No 1 ..... 0.60 of the above allowable stresses.
Circuits No 2 & 3 ..... 0.67 of the above allowable stresses.

C ALLOWABLE STEEL STRESSES FOR OTHER THAN PRESSURE LOADS

Tension on net section	20,000 psi
Compression ($\frac{l}{r}$ < 120)	$17,000 - 0.485\frac{l}{r}$ psi
Bending ($\frac{bd}{t}$ < 600)	20,000 psi
Bending ($\frac{bd}{t}$ > 600)	$12,000,000 \div \frac{bd}{t}$ psi
Bending in pins	30,000 psi
Shear, web of beams, gross section	13,000 psi
Bearing on pins	32,000 psi

D ALLOWABLE WELD METAL STRESSES FOR OTHER THAN PRESSURE LOADS

Tension - butt weld - section through throat	20,000 psi
Compression - butt weld - section through throat (crushing)	20,000 psi
Shear - section through throat of fillet weld	13,600 psi
Shear - section through throat of butt weld	13,000 psi

E INCREASE FOR COMBINED LOADS

An increase of 33⅓ % in basic stresses was used for members subject to combined dead load, live load, and wind or seismic stresses except when such an increase resulted in smaller sections than were required for dead and live load only.

A	4-26-54	Deleted "aerostatically" from notes.	RLS

NONE

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS
AMES AERONAUTICAL LABORATORY

8-FT. SUPERSONIC WIND TUNNEL

- DESIGN DATA -

R. Sharpe
EC & ANZ
RLS 5-26-51
5-4-51

A9707-D3 A

SHEET OF

John A. Blume
5-24-51
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STRUCTURAL ENGINEER
45 SECOND STREET
SAN FRANCISCO 5

EAST FILE CORP. COSTA MESA, CA.

327-S106 S-2
8'S.W.T. DESIGN DATA

DH-52