

Table 12.2-1
 REACTOR BUILDING CONCRETE STRUCTURE
 BASE SLAB DESIGN DATA

Principal Design Cases	Allowable Stresses
DL + External Water Load El. 556.0 + Differential Settlement + Operating Basis Earthquake	Normal concrete stresses $f_s = 0.5f_y$
DL + External Water Load El. 556.0 + Differential Settlement + Design Basis Earthquake	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

Normal concrete stresses are as given for working stress design in ACI Code 318.63

Material Properties

Concrete - $f_c' = 3000$ psi
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Rock (elastic modulus) - 8,200,000 psi (Subsection 2.5)

Table 12.2-2
 REACTOR BUILDING CONCRETE STRUCTURE
 STAGE I WALL DESIGN DATA
 (Construction Condition)

Principal Design Case	Allowable Stresses
DL + External Water Load El. 547.0 + Earth Load El. 547.0	Normal concrete stresses $f_s = 0.5 f_y$

Normal concrete stresses are as given for working stress design in ACI Code 318.63.

Material Properties

Concrete - $f_c = 3,000$ psi
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Earth - $w = 120$ pcf

Table 12.2-3
 REACTOR BUILDING CONCRETE STRUCTURE
 STAGE II SLAB OVER TORUS DESIGN DATA

Principal Design Cases	Allowable Stresses
I DL + External Water Load El.547.0 + Earth Load El.547.0	Normal concrete stresses $f_s = 0.5 f_y$
II Case I + LL	$f_s = 0.5 f_y$
III DL + LL	$f_s = 0.5 f_y$

LL as given above is wet weight of concrete from El. 559.83 to El. 565.0

Normal concrete stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete - $f_c' = 3,000$ psi (4,000 psi inside wall El.536.92-557.5)
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Earth - $w = 120$ pcf

Table 12.2-4
 REACTOR BUILDING CONCRETE STRUCTURE
 EL. 565.0 SLAB OVER TORUS DESIGN DATA

Principal Design Cases		Allowable Stresses
I	DL + LL + Operating Basis Earthquake (0.1g)	Normal concrete stresses fs = 0.5 fy
II	DL + LL + Column Load + Operating Basis Earthquake (0.1g)	Normal concrete stresses fs = 0.5 fy
III	DL + Earth Load + Water Load + Operating Basis Earthquake (0.1g)	Normal concrete stresses fs = 0.5fy
IV	DL + LL + Column Load + Earth Load + Waterload + Operating Basis Earthquake (0.1g)	Normal concrete stresses fs = 0.5 fy
V	DL + LL + Design Basis Earthquake (0.2g)	fc = 0.85 fc' fs = 0.90 fy
VI	DL + LL + Column Load + Design Basis Earthquake (0.2g)	fc = 0.85 fc' fs = 0.90 fy
VII	DL + Earth Load + Water Load + Design Basis Earthquake (0.2g)	fc = 0.85 fc' fs = 0.90 fy
VIII	DL + LL + Column Load + Earth Load + Water Load + Design Basis Earthquake (0.2g)	fc = 0.85 fc' fs = 0.90 fy

LL as listed above includes uniform live load of 400 psf and machine loads where they exceed the uniform live load.

Normal concrete stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete - fc' = 3,000 psi(4,000 psi inside wall El. 536.92 - 557.5)
 w = 145 pcf

Reinforcing steel - fy = 60,000 psi (ASTM A432)

Earth - w = 120 pcf

Table 12.2-5
 REACTOR BUILDING CONCRETE STRUCTURE
 CORNER WALL DESIGN DATA

Principal Design Cases	Allowable Stresses
I Earth Load + Water Load + Operating Basis Earthquake (0.1g)	Normal concrete stresses $f_s = 0.5 f_y$
II Earth Load + Water Load + Design Basis Earthquake (0.2g)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

Normal concrete stresses are as given for working stress design in ACI Code 318.63.

Material Properties

Concrete - $f_c' = 3,000$ psi
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Earth - $w = 120$ pcf

Table 12.2-6
 REACTOR BUILDING CONCRETE STRUCTURE
 HPCI SYSTEM ROOMS DESIGN DATA

Principal Design Cases	Allowable Stresses
DL + Earth Load + Water Load + Operating Basis Earthquake (0.1g)	Normal concrete stresses $f_s = 0.5 f_y$
DL + Earth Load + Water Load + Design Basis Earthquake (0.2g)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

Normal concrete stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete - $f_c' = 3,000$ psi
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Earth - $w = 120$ pcf

Table 12.2-7

REACTOR BUILDING CONCRETE STRUCTURE
EXTERIOR WALLS

Principal Design Cases		Allowable Stresses
I	Earth Pressure*	Normal stresses
II	Earth Pressure* + Operating Basis Earthquake (0.1g)	Normal concrete stresses $f_s = 0.5 f_y$
III	Earth Pressure* + Design Basis Earthquake (0.2g)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$
IV	Earth Pressure* + Internal Pressure of Ruptured Pipe (36 lbs per sq ft)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$
V	Earth Pressure* + 100-mph Wind	Normal Stresses increased 33-1/3%
VI	Earth Pressure* + 300-mph Wind	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$
VII	Earth Pressure* + Rapid Tornado Depressurization	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$
VIII	Probable Maximum Flood** (Water Level El.572.5)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

*or pressure from diesel-generator building or radwaste building

**applicable only to wall adjacent to Turbine Building

Normal stresses are as given for working stress design in ACI Code 318-63. Concrete shear stress is as described in this subsection.

Material Properties

Concrete- $f_c' = 3000$ psi
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A-432)

Earth- $w = 120$ pcf

Table 12.2-8

REACTOR BUILDING CONCRETE STRUCTURE
EXTERIOR WALLS AT ADJACENT UNITS

Principal Design Cases	Allowable Stresses
I Expansion Joint Loads	Normal stresses
II Expansion Joint Loads + Operating Basis Earthquake (0.1g)	Normal concrete stresses $f_s = 0.5 f_y$
III Expansion Joint Loads + Design Basis Earthquake (0.2g)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$
IV Expansion Joint Loads + Rapid Tornado Depressurization	$f_c = 0.85 f_c'$ $f_y = 0.90 f_y$

Normal stresses are as given for working stress design in ACI Code 318-63. Concrete shear stress is as described in this subsection.

Material Properties - As given in Table 12.2-7

Table 12.2-9

REACTOR BUILDING CONCRETE STRUCTURE
FLOOR SLABS, BEAMS, AND COLUMNS

Principal Design Cases	Allowable Stresses
I DL + LL	Normal stresses
II DL + LL + Operating Basis Earthquake (0.1g)	Normal concrete stresses $f_s = 0.5 f_y$
III DL + LL + Design Basis Earthquake (0.2g)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$
IV DL + LL + 300-mph Wind	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

Normal stresses are as given for working stress design in ACI Code 318-63.

Uniform Floor Live Loads

Slab El. 593, 606, 617, 621.25	400 lbs per sq ft
Slab El. 639 (exception noted below)	400 lbs per sq ft
Slab El. 639 between columns R2, R5 and t, u; R10, R13, and t, u; and R17, R20, and t, u	250 lbs per sq ft
Slab El. 664	1000 lbs per sq ft
Roof El. 635	50 lbs per sq ft

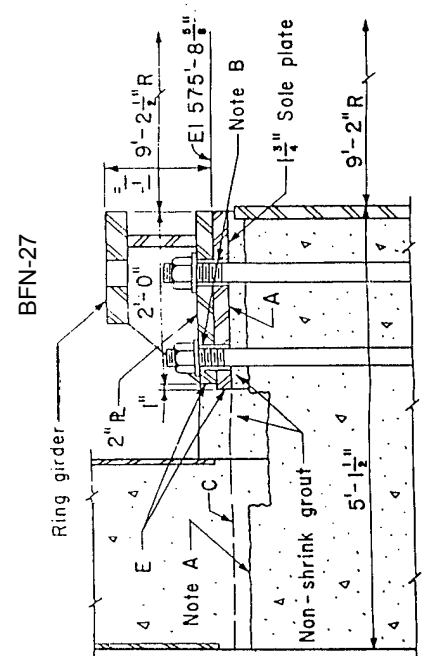
Main Properties
Concrete

Beams and slabs El. 593, 621.25	$f_c' = 3000$ psi
Beams and slabs El. 639, 664	$f_c' = 4000$ psi
Slabs El. 606, 617	$f_c' = 3000$ psi
Roof El. 635	$f_c' = 3000$ psi
Columns	$f_c' = 4000$ psi
w - 145 pcf	

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Table 12.2.10
 REACTOR SUPPORT PEDESTAL—ALLOWABLE AND
 ACTUAL STRESSES FOR PRINCIPAL DESIGN CASES

Note A:
 Concrete poured to EI 575.47 and chipped back to
 EI 575.33 or lower to insure sound concrete.
 Note B:
 Fill gap with Sika Colma Dur.



DETAIL A
 Scale $\frac{3}{4}'' = 1'-0''$

PRINCIPAL DESIGN CASES

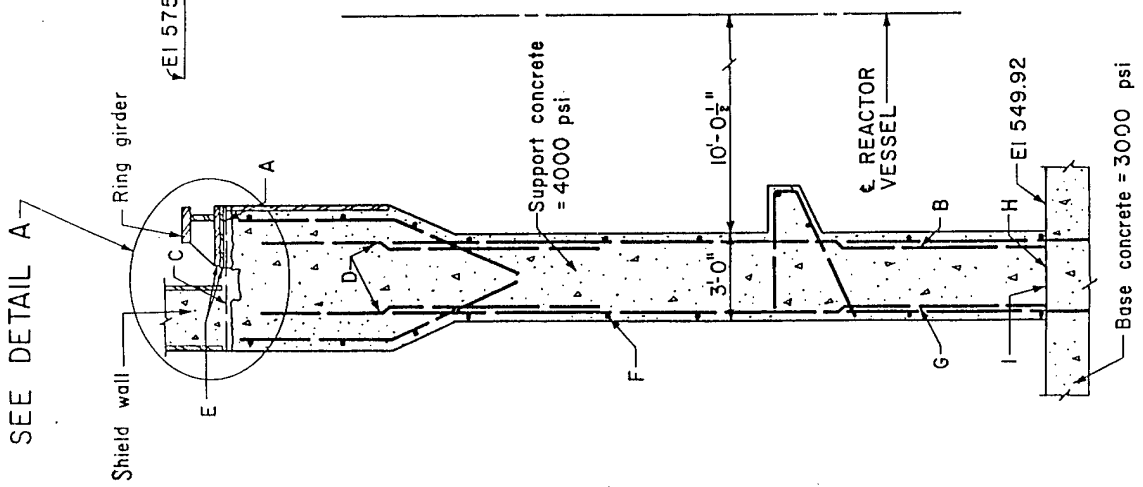
- Case I Normal Operating Loads + Operating Basis
 Earthquake (0.1g) + Temperature Effects
 Case II Normal Operating Loads + Design Basis
 Earthquake (0.2g) + Temperature Effects
 + Jet Load (Accident)

Material Properties
 Concrete $f_c = 4000$ psi (pedestal & shieldwall)
 4000 psi (non-shrink grout)
 3000 psi (pedestal base)
 $w = 145$ pcf
 Reinforcing steel $f_y = 60,000$ psi (ASTM A432)

POINT OF STRESS	DESCRIPTION	CASE I		CASE II	
		ALLOWABLE STRESS (psi)	ACTUAL STRESS (psi)	ALLOWABLE STRESS (psi)	ACTUAL STRESS (psi)
A	Conc Bearing-Base Pl.	1500(1)	166	3000(2)	398
B	Reinforcing Tension	3000(5)	Negligible	54000(6)	9410
C	Conc Shear	126(4)	35	215(3)	109
D	Reinforcing Tension	30000(5)	Negligible	54000(6)	645
E	Conc Bearing	1500(1)	495	3000(2)	1225
F	Reinforcing Tension	30000(5)	27200	54000(6)	47500
G	Reinforcing Tension	30000(5)	Negligible	54000(6)	5790
H	Conc Bearing	750(1)	274	2250(2)	476
la	Conc Shear	70(1)	38	109(7)	68
lb	Conc Shear	145(8)	65	290(9)	158

(1) Normal concrete stress as given for working stress design in ACI Code 318-63.
 (2) $0.75 f_c$
 (3) $4 \phi \sqrt{f_c}$
 (4) $2 \sqrt{f_c}$
 (5) $0.5 f_y$
 (6) $0.9 f_y$
 (7) $2 \phi \sqrt{f_c}$
 (8) $\frac{1}{2} (5.4 \phi \sqrt{f_c})$
 (9) $5.4 \phi \sqrt{f_c}$ (SEAOC Code)

Note C:
 la - shear is radial and considered as diagonal tension shear
 lb - shear is longitudinal and distributed over annular cross section



SECTION THRU PEDESTAL

Table 12.2-11

REACTOR BUILDING CONCRETE STRUCTURE
P-LINE WALL DESIGN DATA

Principal Design Cases	Allowable Stresses
DL + LL	Normal Stresses
DL + LL + Operating Basis Earthquake (0.1g)	Normal concrete stresses $f_s = 0.5f_y$
DL + LL + Design Basis Earthquake (0.2g)	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

Normal stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete - $f_c' = 3000$ psi (4000 psi at steam line compartment)
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

Table 12.2-12

REACTOR BUILDING CONCRETE STRUCTURE
FUEL STORAGE POOL AND DRYER AND SEPARATOR STORAGE POOL

Principal Design Case	Allowable Stresses
I DL + LL + Water Load	Normal stresses
II DL + LL + Water Load + Operating Basis Earthquake(0.1g)	Normal concrete stresses $f_s = 0.5 f_y$
III DL + LL + Water Load + Operating Basis Earthquake (0.1g) + Drywell thermal rise	Normal concrete stresses $f_s = 0.75f_y$
IV DL + LL + Water Load + Design Basis Earthquake (0.2g) + Drywell thermal rise	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$

LL as listed above includes uniform live load, equipment load, and fuel load. Drywell thermal rise includes the effect of the upward movement of the pools due to thermal growth of the drywell shield wall at operating temperature.

Normal stresses are given for working stress design in ACI Code 318-63.

Material Properties

Concrete - $f_c' = 3000$ psi
 $w = 145$ pcf

Reinforcing steel - $f_y = 60,000$ psi (ASTM A432)

BFN-27

Table 12.2-13
(Deleted by Amendment 22)

BFN-27

Table 12.2-14

(Deleted by Amendment 21)

BFN-27

Table 12.2-15
(Deleted by Amendment 21)

Table 12.2-16

ALLOWABLE STRESSES FOR DRYWELL ACCESS PLATFORMS

Loading Condition	Tension on the Net Section	Shear on Gross Section	Compression on Gross Section	Bending
D.L. + L.L. + Seismic Loads (0.1g)	(1) S	(1) S	(1) S-Varies with Slenderness ratio	(1) S
D.L. + L.L. + Seismic Loads(0.2g) + Jet	(2) 0.90 Fy or 1.5 x S	(2) 0.52 Fy or 1.5 x S	(2) 0.9 x Critical Buckling Stress Varies with slenderness ratio or 1.5 x S	(2) 0.9 FY or 1.5 x S

1. S = Allowable Stress Based on the AISC 8th Edition

2. Upper Limit on Allowable Stresses is the lesser of the two values computed

BFN-27

Table 12.2-16.1

(Deleted by Amendment 10)

BFN-27

Table 12.2-16.2

(Deleted by Amendment 10)

BFN-27

Table 12.2-16.3

(Deleted by Amendment 10)

BFN-27

Table 12.2-16.4

REACTOR BUILDING OUTSIDE DRYWELL CONTAINMENT MODAL MASS PROPERTIES

MODE NO.	FREQUENCY CPS	N-S MODAL MASS K-SEC ² /FT	E-W MODAL MASS K-SEC ² /FT	VERTICAL MODAL MASS K-SEC ² /FT
1	1.46	77.4		
2	3.50		235.5	
3	5.83	2198.4		
4	6.01		2937.7	
5	6.28	890.1		
6	6.91			136.7
7	10.94		214.0	
8	14.04			3221.6
9	16.90	1350.6		
10	16.98		1349.0	
11	20.08			7.2
12	36.24			1200.4
	SUMMATION	4516.5	4526.3	4585.9
	TOTAL MASS	5020.5	5020.5	5020.5

Table 12.2-17

DAMPING VALUES FOR THE RPV, RPV INTERNALS,
INTERNAL STRUCTURES, AND REACTOR BUILDING

<u>Component/Structure</u>	<u>Damping Ratio (%) of Critical</u>	
	<u>Horizontal</u>	<u>Vertical</u>
R/B Enclosure Structure	5	5
Drywell Steel	1	1
Shield Wall	5	5
Pedestal	5	5
Star Truss	2	-
Stabilizer	2	-
Refueling Bellows	2	-
Reactor Vessel	1	1
Vessel Support Skirt	1	1
Shroud and Supports	1	1
Fuel	7	7
CRD Guide Tubes	1	1
CRD Housings	3.5	1
Spring K ₁	2	-
Spring K ₂	2	-
Spring K ₃	1	-
Spring K ₄	1	-

Table 12.2-17.1A

REACTOR BUILDING INSIDE DRYWELL CONTAINMENT MODAL PROPERTIES
NS DIRECTION

MODE NO.	FREQUENCY (CDS)	MODAL MASS (K-SEC ² /FT)	COMPOSITE MODAL DAMPING RATIO (% OF CRITICAL)
1	1.45	77.2	5.00
2	4.27	72.7	6.34
3	5.80	2002.0	4.95
4	6.22	968.5	4.95
5	7.37	36.7	1.83
6	9.85	0.3	2.13
7	11.68	0.6	2.83
8	14.35	115.9	2.76
9	17.16	1240.9	4.95
10	17.59	3.75	6.84
11	18.69	0.50	2.23
		<hr/>	
	SUMMATION:	4519.1	
	TOTAL MASS:	5020.5	

Table 12.2-17.1B

REACTOR BUILDING INSIDE DRYWELL CONTAINMENT MODAL PROPERTIES
EW DIRECTION

<u>MODE NO.</u>	<u>FREQUENCY (CDS)</u>	<u>MODAL MASS (K-SEC²/FT)</u>	<u>COMPOSITE MODAL DAMPING RATIO (% OF CRITICAL)</u>
1	3.43	224.1	5.00
2	4.27	64.0	6.34
3	5.99	2841.0	4.90
4	7.37	35.9	1.82
5	9.86	0.3	2.14
6	10.70	2.1	4.99
7	11.68	0.6	2.83
8	14.35	114.1	2.76
9	17.24	1238.8	4.96
10	17.59	5.9	6.84
11	18.69	0.6	2.23
		<hr/>	
	SUMMATION:	4527.4	
	TOTAL MASS:	5020.5	

Table 12.2-17.1C

REACTOR BUILDING INSIDE DRYWELL CONTAINMENT MODAL PROPERTIES
V DIRECTION

<u>MODE NO.</u>	<u>FREQUENCY (CDS)</u>	<u>MODAL MASS (K-SEC²/FT)</u>	<u>COMPOSITE MODAL DAMPING RATIO (% OF CRITICAL)</u>
1	7.73	156.3	5.00
2	14.56	3249.0	4.87
3	16.84	7.3	3.64
	SUMMATION:	3412.6	
4	22.31	5.7	5.00
5	27.21	0.3	3.65
6	36.73	39.0	1.41
7	37.42	1130.3	4.86
8	44.26	0.8	2.32
	SUMMATION:	4588.7	
	TOTAL MASS:	5020.5	

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Table 12.2-18

(Deleted by Amendment 8)

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Table 12.2-19

(Deleted by Amendment 8)

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Table 12.2-20

(Deleted by Amendment 8)

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Table 12.2-21

(Deleted by Amendment 8)

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Table 12.2-22

(Deleted by Amendment 8)

Table 12.2-23
TURBINE BUILDING
CONCRETE FRAME DESIGN DATA

<u>Principal Design Cases</u>	<u>Allowable Stresses</u>
DL + LL + Earth Pressure	Normal stresses
DL + LL + Earth Pressure + Wind (100 mph)	Normal stresses + 33-1/3%
DL + LL + Earth Pressure + Earthquake (Area cols. m-j only)	Normal stresses + 33-1/3%
LL as listed above includes uniform live load as shown in Figures 12.2-47, 12.2-48, and 12.2-49 and machine loads where they exceed the uniform live load.	
Normal stresses are as given for working stress design in ACI Code 318.63.	
Material Properties	
Concrete	$f_c' = 4000$ psi for columns $f_c' = 3000$ psi for all other members including columns placed with walls (pilasters) w (conventional conc.) = 145 pcf w (heavy conc.) = 280 pcf
Reinforcing Steel	$f_y = 80,000$ psi (ASTM A432)

Table 12.2-24

TURBINE FOUNDATION DESIGN DATA

Principal Design Cases	Allowable Stresses
DL + LL	$f'_c = 400$ psi $f_s = 10,000$ psi
DL + LL + Thermal	$f'_c = 1,350$ psi $f_s = 24,000$ psi
Material Properties	
Concrete	$f'_c = 3,000$ psi $w = 145$ pcf
Reinforcing Steel	$f_y = 60,000$ psi (ASTM A432)

Table 12.2-25

REINFORCED CONCRETE CHIMNEY
DESIGN DATA

Design Case	Allowable Stresses, psi		Load Factor
	Concrete	Steel	Ultimate Strength
1. DL + 100-Mph Wind	1075	15,000*	
2. DL + Tornado-Lower 280 feet -Upper 320 feet			1.10 0.55
3. DL + Operating Basis Earthquake - 0.1g	1605	30,000	
DL + Design Basis Earthquake - 0.2g	3655	54,000	
DL + Design Basis Earthquake - 0.2g			1.25
4. Resonant Wind	1605	30,000	
5. DL + 100-Mph Wind + Thermal (due to Unit 3 HWWV)	3655	54,000	

*ACI 307-69

Material Properties

Concrete	
Shell	$f'_c = 4,300$ psi
Foundation and Internal Structures	$f'_c = 3,000$ psi
Reinforcing Steel	$f_y = 60,000$ psi (ASTM A432)

Table 12.2-26

RADWASTE BUILDING
DESIGN DATA

Principal Design Cases	Allowable Stresses
1. DL + Dry Earth Loads + Floor Live Loads or Equipment Loads	Normal stresses
II. DL + Earth Saturated to E1.556 + Floor Live Loads or Equipment Loads	Normal stresses
III. DL + Earth Saturated to E1.556 + Floor Live Loads or Equipment Loads + 100 MPH Wind (30#/ft ²)	Normal stresses increased 33-1/3%
IV. DL + Floor Live Loads or Equipment Loads + Probable Maximum Flood (Water Level E1.572.5) + Wave Forces	fc = 0.85 fc' fs = 0.90 fy

Normal stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete	f 'c = 3000 psi w = 145 pcf
Reinforcing Steel	fy = 60,000 psi (ASTM A432)
Bearing Piles	fy = 36,000 psi (ASTM A36)

Table 12.2-27

INTAKE BUILDING - DESIGN DATA

Principal Design Cases	Allowable Stresses	Calculated Safety Factors		
		Overturning	Floating	Sliding
Ia Reservoir level at elevation 556, two pump bays unwatered. Operating loads including fill and surcharge.	Normal	3.7	3.4	1.3
Ib Same as Ia without surcharge with 0.1g earthquake loads.	Normal concrete $f_s = 0.5 f_y$	2.2	2.9	2.7
II Reservoir level at elevation 562, one pump bay unwatered. Operating loads including fill and surcharge.	Normal increased by 33%	2.1	2.3	6.7
III Reservoir level at elevation 529, (breach at Wheeler Dam) two pump bays unwatered. Operating dead loads including fill and 0.2g earthquake.	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$	4.7	13.2	3.8
IV. Construction condition (stability only). No machinery. Backfill in place - dry condition.		15.3	-	4.1
V. The high walls forming the four compartments around the RHRSW pumps shall be designed to provide protection against natural phenomena such as DBE, tornadoes, and wind waves from 45 mph winds associated with PMF.	$f_c = 0.85 f_c'$ $f_s = 0.90 f_y$			

Normal stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete

 $f_c' = 3000 \text{ psi}$
 $w = 145 \text{ pcf}$

Reinforcing Steel

 $f_y = 60,000 \text{ psi (ASTM A432)}$

Table 12.2-28

INTAKE AND DISCHARGE CONDUITS - DESIGN DATA

Principal Design Cases	Allowable Stresses
I. Normal Operation - Conduit Full DL + Hydraulic Gradient El.597.0 + Earth Pressure (w = 105 pcf)	Normal stresses
II. Exposed Condition - Conduit Full DL + Hydraulic Gradient El.597.0	Normal stresses + 35%
III. Shutoff Condition - Conduit Full Intake Conduit only DL + Hydraulic Gradient El.622.0 + Earth Pressure (w = 105 pcf)	Normal stresses + 65%
IV. External Pressure - Conduit Empty DL + External Water Pressure El.556.0 + Earth Pressure (w = 120 pcf) + Surcharge (300 psf)	Normal stresses
V. Construction Condition - Conduit Empty DL + External Water Pressure El.556.0 + Earth Pressure (w = 120 pcf) + Surcharge (100-Ton Crane)	Normal stresses + 50%

Normal stresses are 20,000 psi for reinforcing steel and for concrete are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete	- fc = 3000 psi w = 145 pcf
Reinforcing steel	- fy = 60,000 psi (ASTM A432)

Table 12.2-29

DIESEL GENERATOR BUILDING

Principal Design Cases		Allowable Stresses
I.	DL + Earth Loads + Expansion Joint Loads	Normal stresses
II.	Case I + Floor Live Loads	Normal stresses
III.	(1±0.067) DL + Expansion Joint Loads + Operating Basis Earthquake Loads(0.1g)	Normal concrete fs = 0.5 fy
IV.	(1±0.133) DL + Expansion Joint Loads + Design Basis Earthquake (0.2g)	fc = 0.85 f 'c fs = 0.90 fy
V.	Case I + Tornado Depressurization	fc = 0.85 f 'c fs = 0.90 fy
VI.	Case I + 300 MPH Tornado Wind (230#/Sq. Ft.)	fc = 0.85 f 'c fs = 0.90 fy
VII.	Case I + Probable Maximum Flood (Water Level El.572.5) + Wave Forces	fc = 0.85 f 'c fs = 0.90 fy

DL includes weight of diesel generators

Normal stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete

f 'c = 3000 psi
w = 145 pcf

Reinforcing Steel

fy = 60,000 psi (ASTM A432)

Earth

w = 120 pcf

Table 12.2-30
(Sheet 1)

DIESEL GENERATOR BUILDING
ACCESS DOORS
DESIGN DATA

Door and Frame Assemblies of A36 Steel

<u>No.</u>	<u>Load Combination</u>	<u>Allowable Stresses (psi)</u>	
		<u>Tension & Compression</u>	<u>Shear</u>
I	Dead Wind at 10 psf	18,000 (0.50 Fy)	12,000 (0.33 Fy)
II	Dead Wind at 300 mph	32,400 (0.9 Fy)	21,600 (0.6 Fy)
III	Dead Tornado differential pressure at 40 psf acting outward	32,400 (0.9 Fy)	21,600 (0.6 Fy)
IV	Dead Earthquake at 0.1g OBE (0.1g)	18,000 (0.5 Fy)	12,000 (0.33 Fy)
V	Dead Earthquake at 0.2g OBE (0.2g)	32,400 (0.9 Fy)	21,600 (0.6 Fy)
VI	Dead 300 mph wind with 100 mph impact from one of the following missiles a. 100 pounds with circular impact area of 4-inch-diameter b. 10-foot length of 2-inch std pipe impacting endwise c. 10-foot length of 1/2-inch std pipe impacting endwise	Plastic design - Doors deform but stop missile	
VII	Dead Static water head to elevation 578	32,400 (0.9 Fy)	21,600 (0.6 Fy)
VIII	Dead Wind Static water head Broken waves to elevation 578.0 Wave height varies with flood level and wind from 10 feet maximum to 5 feet at probable maximum flood but does not exceed El. 578.0	32,400 (0.9 Fy)	21,600 (0.6 Fy)

Table 12.2-30
(Sheet 2)

DIESEL GENERATOR BUILDING
ACCESS DOORS
DESIGN DATA

Other Parts

No.	Load Combination	Allowable Stresses (psi)	
		Tension & Compression	Shear
I	Dead Wind at 10 psf	ULT/5	2xULT/15
II	Dead Wind at 300 mph	0.9 Fy	0.6 Fy
III	Dead Tornado differential pressure at 40 psf acting outward	0.9 Fy	0.6 Fy
IV	Dead OBE (0.1g)	ULT/5	2xULT/15
V	Dead DBE (0.2g)	0.9 Fy	0.6 Fy
VI	Dead 300 mph wind with 100 mph impact from one of the following missiles a. 100 pounds with circular impact area of 4-inch-diameter b. 10-foot length of 2-inch std pipe impacting endwise c. 10-foot length of 1/2-inch std pipe impacting endwise	Plastic design - Doors deform but stop missile	
VII.	Dead Static water head to elevation 578	0.9 Fy	0.6 Fy
VIII.	Dead Wind Static water head Broken waves to elevation 578.0 Wave height varies with flood level and wind from 10 feet maximum to 5 feet at probable maximum flood but does not exceed EI.578.0	0.9 Fy	0.6 Fy

Doors open or closed for combinations 1, IV, and V and closed for all other combinations.

BFN-27

Table 12.2-31

(Deleted by Amendment 8)

BFN-27

Table 12.2-32
(Deleted by Amendment 22)

Table 12.2-33

EQUIPMENT ACCESS LOCK DOORS
DESIGN DATA

No.	Load Combinations	Allowable Stresses (psi)	
		Tension & Compression	Shear
I	Dead	14,000	9,300
II	Dead Wind (10 psf)	22,000	14,500
III	Dead Wind (30 psf)	32,400	21,600
IV	Dead OBE (0.1g)	14,000	9,300
V	Dead DBE (0.2g)	32,400	21,600

Table 12.2-34

STANDBY GAS TREATMENT BUILDING
DESIGN DATA

Principal Design Cases		Allowable Stresses
I	DL + Earth Loads	Normal stresses
II	DL + Earth Loads + Floor Live Loads	Normal stresses
III	(1 ± 0.067) DL + Earth Loads (w = 120 pcf) + Operating Basis Earthquake Loads (NC)	Normal concrete fs = 0.5 fy
IV	(1 + 0.133) DL + Earth Loads (w = 120 pcf) + Design Basis Earthquake Loads (NC)	fc = 0.85 f 'c fs = 0.90 fy

Normal stresses are as given for working stress design in ACI Code 318-63.

Material Properties

Concrete	f 'c = 3000 psi w = 145 pcf
Reinforcing steel	fy = 60,000 psi (ASTM A432)
Earth	w = 120 pcf

TABLE 12.2-35

VALUES USED IN DYNAMIC EARTHQUAKE ANALYSIS
OF STANDBY GAS TREATMENT BUILDINGS

<u>ITEM</u>	<u>N-S DIRECTION</u>	<u>E-W DIRECTION</u>	<u>VERTICAL DIRECTION</u>
Mass of Roof	150 K sec ² /Ft	150 K sec ² /Ft	150 k sec ² /Ft
Mass of Base	58.4 K sec ² /Ft	58.4 K sec ² /Ft	58.4 K sec ² /Ft
BUILDING NO. 1			
K _T	1.20 X 10 ⁶ K/Ft	1.06 X 10 ⁶ K/Ft	-----
K _R	5.49 X 10 ⁸ Ft-K/RAD	1.97 X 10 ⁹ Ft-K/RAD	-----
K _V	-----	-----	3.47 X 10 ⁶ K/Ft
BUILDING NO. 2			
K _T	1.25 X 10 ⁶ K/Ft	1.10 X 10 ⁶ K/Ft	-----
K _R	5.81 X 10 ⁸ Ft-K/RAD	2.15 X 10 ⁹ Ft-K/RAD	-----
K _V	-----	-----	3.60 X 10 ⁶ K/Ft

Table 12.2-36

RESULTS OF DYNAMIC EARTHQUAKE ANALYSIS OF STANDBY GAS
TREATMENT BUILDING FOR OPERATING BASIS EARTHQUAKE (0.10g)

N-S Direction

Period = 0.0845 seconds

Item	Value
Roof Acceleration	0.268g
Base Acceleration	0.179g
Roof Displacement	0.0163 in.
Base Displacement	0.0112 in.

E-W Direction

Period = 0.071 seconds

Item	Value
Roof Acceleration	0.216g
Base Acceleration	0.176g
Roof Displacement	0.0099 in.
Base Displacement	0.00844 in.

Table 12.2-37

INTAKE CHANNEL GATE STRUCTURE DESIGN LOADS

Items and Design Cases

34/Gate Guide Cells

Case 1. $W_c + F_H + P_{H20} + P_{SOIL} + P_{SOILA} + P_{SOILP} + F_{fA} + F_{fp}$ (Initial Condition)

Case 2. Same as Case 1 + $W_g + G + G_{H20}$ (Final Condition)

34/Closure Cells

Case 1. $W_c + F_H + P_{H20} + P_{SOIL} + P_{SOILA} + P_{SOILP} + F_{fA} + F_{fp}$

W_c = Weight of cell minus vertical DBE seismic load

W_g = Weight of gate minus vertical DBE seismic load

G = Total weight of gate time horizontal DBE acceleration

F_H = Total weight of cell times horizontal DBE acceleration

G_{H20} = Increased water pressure on gate due to DBE seismic loading*

P_{H20} = Increased water pressure on cell due to DBE seismic loading*

P_{SOIL} = Increased earth pressure on cell due to DBE seismic loading

P_{SOILA} = Static active earth pressure on cell

P_{SOILP} = Static passive earth pressure on cell

F_{fA} = Active friction force between cell and earth

F_{fp} = Passive friction force between cell and earth

*(Design Maximum Water Level at Elevation 556.0)

Table 12.2-38

REACTOR BUILDING - PERSONNEL AND EQUIPMENT ACCESS LOCKS -
WATERTIGHT DOORS
DESIGN DATA

Door and Frame Assemblies

<u>No.</u>	<u>Load Combination</u>	<u>Allowable Stresses (psi)</u>		
		<u>Tension</u>	<u>Compression</u>	<u>Shear</u>
I	Door Open or closed and dogged Dead + 0.1g earthquake (OBE)	0.5 Fy	0.48 Fy	0.33 Fy
II	Door Open or closed and dogged Dead + 0.2g earthquake (DBE)	0.9 Fy	0.9 Fy	0.6 Fy
III	Door closed and dogged Dead + 7.5 feet static head	0.9 Fy	0.9 Fy	0.6 Fy

Other Parts

I	Door open or closed and dogged Dead + 0.1g earthquake (OBE)	ULT/5	ULT/5	2xULT/5
II	Door open or closed and dogged Dead + 0.2g earthquake (DBE)	0.9 Fy	0.9 Fy	0.6 Fy
III	Door closed and dogged Dead + 7.5 feet static head	0.9 Fy	0.9 Fy	0.6 Fy

A276-304 Stainless Steel
Fy = 30 ksi

A-36 Steel
Fy = 36ksi

Table 12.2-39
(Sheet 1)RADWASTE BUILDING - DOUBLE DOORS FOR EXTERIOR OPENINGS
DESIGN DATADoor and Frame Assemblies of A36 Steel

No.	Load Combination	Allowable Stresses (psi)		
		Tension	Compression	Shear
I	Door open or closed and not dogged Dead load + 0.1g earthquake (OBE)	18,000 (0.5 Fy)	17,000 (0.48 Fy)	12,000 (0.33 Fy)
II	Door closed and dogged Dead + 100 mph wind	32,400 (0.9 Fy)	32,400 (0.9 Fy)	21,600 (0.6 Fy)
III	Door open Dead + 30 mph wind	18,000 (0.5 Fy)	17,000 (0.48 Fy)	12,000 (0.33 Fy)
IV	Door closed and dogged Dead + 10-foot wave with water level at elevation 561.0 + 60 mph wind +0.1g earthquake (OBE)	32,400 (0.9 Fy)	32,400 (0.9 Fy)	21,600 (0.6 Fy)
V	Door open (door 183 only) Dead load + 30 mph wind + earthquake at 0.2g	32,400 (0.9 Fy)	32,400 (0.9 Fy)	21,600 (0.6 Fy)
VI	Door open Dead + 30 mph wind + 0.1g earthquake	32,400 (0.9 Fy)	32,400 (0.9 Fy)	21,600 (0.6 Fy)
VII	Door closed and dogged Dead + 13 feet static head	32,400 (0.9 Fy)	32,400 (0.9 Fy)	21,600 (0.9 Fy)

Other Parts

I	Door open or closed and not dogged Dead + 0.1g earthquake (OBE)	ULT/5	ULT/5	2xULT/15
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Table 12.2-39 (Continued)
 Sheet 2
 RADWASTE BUILDING - DOUBLE DOORS FOR EXTERIOR OPENINGS
 DESIGN DATA

Other Parts (Continued)

<u>No.</u>	<u>Load Combination</u>	<u>Allowable Stresses (psi)</u>		
		<u>Tension</u>	<u>Compression</u>	<u>Shear</u>
II	Door closed and dogged Dead + 100 mph wind	0.9 Fy	0.9 Fy	0.6 Fy
III	Door open Dead + 30 mph wind	ULT/5	ULT/5	2xULT/15
IV	Door closed and dogged Dead + 10-foot wave with water at elevation 561.0 + 60 mph wind + 0.1g earthquake (OBE)	0.9 Fy	0.9 Fy	0.6 Fy
V	Door open (door 183 only) Dead + 30 mph wind + 0.2g earthquake (DBE)	0.9 Fy	0.9 Fy	0.6 Fy
VI	Door open Dead + 30 mph wind + 0.1g earthquake (OBE)	0.9 Fy	0.9 Fy	0.6 Fy
VII	Door closed and dogged Dead + 13 feet static head	0.9 Fy	0.9 Fy	0.6 Fy

Table 12.2-40

RADWASTE BUILDING - PERSONNEL ACCESS DOORS
DESIGN DATA

Door and Frame Assemblies of A36 Steel

<u>No.</u>	<u>Load Combination</u>	<u>Allowable Stresses (psi)</u>		
		<u>Tension</u>	<u>Compression</u>	<u>Shear</u>
I	Door open or closed and dogged Dead	18,000 (0.5 Fy)	17,000 (0.48 Fy)	12,000 (0.33 Fy)
II	Door closed and dogged Dead + 7.5 feet static head (18.3 feet static head for pipe and cable tunnel door)	32,400 (0.9 Fy)	32,400 (0.9 Fy)	21,600 (0.6 Fy)

Other Parts

I	Door open or closed and dogged Dead	ULT/5	ULT/5	2xULT/15
II	Door closed and dogged Dead + 7.5 static head (18.3 feet static head for pipe and cable tunnel door)	0.9 Fy	0.9 Fy	0.6 Fy

Table 12.2-41

INTAKE STRUCTURE AND EQUIPMENT ACCESS LOCK
PERSONNEL ACCESS DOORS
DESIGN DATA

Door and Frame Assemblies

No.	Load Combination	Allowable Stresses (psi)			
		Tension	Compression	Shear	
I	Doors closed and dogged Dead + 300 mph wind	(0.9 Fy)	(0.9 Fy)	(0.6 Fy)	*
II	Door open or closed and dogged Dead + 0.1g earthquake (OBE)	(0.5 Fy)	(0.48 Fy)	(0.33 Fy)	*
III	Door open or closed and dogged Dead + 0.2g earthquake (DBE)	(0.9 Fy)	(0.9 Fy)	(0.6 Fy)	*
IV	Door closed and dogged Dead + 13 feet static head	(0.9 Fy)	(0.9 Fy)	(0.6 Fy)	*

Other Parts

I	Doors open or closed and dogged Dead + 0.1g earthquake (OBE)	ULT/5	ULT/5	2xULT/15	
II	Door open or closed and dogged Dead + 0.2g earthquake (DBE)	0.9 Fy	0.9 Fy	0.6 Fy	
III	Door closed and dogged Dead + 300 mph wind	0.9 Fy	0.9 Fy	0.6 Fy	
IV	Door closed and dogged Dead + 13 feet static head	0.9 Fy	0.9 Fy	0.6 Fy	
ASTM A276-304 Stainless Steel ASTM A240-304 Stainless Steel Fy = 30 ksi		ASTM A-36 Steel Fy = 36 ksi	* For new design, the Allowable Shear stress = 0.52 Fy		

BFN-27

Table 12.2-42

DIESEL GENERATOR BUILDING
PORTABLE BULKHEAD
DESIGN DATA

Bulkhead Bolted in Place

<u>No.</u>	<u>Load Combination</u>	<u>Allowable Stresses (psi)</u>	
		<u>Tension & Compression</u>	<u>Shear</u>
I	Dead OBE (0.1g)	18,000 (0.5 Fy)	12,000 (0.33 Fy)
II	Dead Static water head to elevation 578	32,400 (0.9 Fy)	21,600 (0.6 Fy)

Table 12.2-43

EQUIPMENT ACCESS LOCK
FLOOD GATE
DESIGN DATA

Gate Structural Members of A36 Steel

<u>No.</u>	<u>Load Combination</u>	<u>Allowable Stresses (psi)</u>	
		<u>Tension & Compression</u>	<u>Shear</u>
I	Dead Wind at 10 psf	18,000 (0.5 Fy)	12,000 (0.33 Fy)
II	Dead Wind at 30 psf	32,400 (0.9 Fy)	21,600 (0.6 Fy)
III	Dead OBE (0.1g)	18,000 (0.5 Fy)	12,000 (0.33 Fy)
IV	Dead DBE (0.2g)	32,400 (0.9 Fy)	21,600 (0.6 Fy)
V	Dead Static water head to elevation 578	32,400 (0.9 Fy)	21,600 (0.6 Fy)
VI	Dead Wind Static water head Broken waves to elevation 578.0 Wave height varies with flood level and wind from 10 feet maximum to 5 feet at probable maximum flood but does not exceed El.578.0	32,400 (0.9 Fy)	21,600 (0.6 Fy)

Gate in lowered or raised position for above combination numbers I through IV and in lowered position only for V and VI.

Other Parts

I	Dead Wind at 10 psf	ULT/5	2xULT/15
II	Dead Wind at 30 psf	0.9 Fy	0.6 Fy
III	Dead OBE (0.1g)	ULT/5	2xULT/15
IV	Dead DBE (0.2g)	0.9 Fy	0.6 FY

Gate in raised position only for above combination numbers I through IV. No load on other parts in lowered position.

Table 12.2-44

OFFGAS TREATMENT BUILDING - DESIGN DATA

Loads

- D = Dead load of structure.
- H_V = Vertical earth pressure, including 200-pound-per-square-foot surcharge.
- H_L = Lateral earth pressure, including 200-pound-per-square-foot surcharge.
- H'_L = Lateral earth pressure, including worst effects of water at elevation 556, 561, or 568.75; 200-pound-per-square-foot surcharge.
- E = Design basis earthquake, earth dry.
- S = Earth pressures including 4,700-pound-per-square-foot surcharge along any one wall at a time. This surcharge is caused by chimney dropping outside of building boundary.
- B = Effect on walls only of 13,000-pound-per-square-foot load on the roof. This load represents approximately 3 times the load that would be required to collapse the roof.
- V = Negative pressure of 240 pounds per square foot inside building due to tornado.
- C = Earth pressure against the exterior walls acting as cantilever wall with an applied moment at the top equal to the moment capacity of the connection between the walls and roof. Structure is designed according to the ACI Building Code 318.71.

No. Load Combinations and Load Factor

- 1 $U = 1.7H_L + 1.4 \text{ or } 0.9 (D + H_V)$
- 2 $U = 1.7H_L + 1.4 \text{ or } 0.9 (D + H_V)$
- 3 $U = 1.7E + 1.4 \text{ or } 0.9 (D + H_V)$
- 4 $U = 1.1S + 1.4 \text{ or } 0.9 (D + H_V)$
- 5 $U = 1.7H_L + 1.1V + 1.4(D + H_V)$
- 6 $U = 1.1 C$
- 7 $U + B + H_L + D$

Material Properties - As given in Table 12.2-7

Table 12.2-45

RADWASTE EVAPORATOR BUILDING-DESIGN DATA

Loads

D = Dead load of structure

L = Floor live loads (100 pounds per square foot or equipment loads, whichever was greater)

H = Maximum possible flood (water to elevation 572.5) plus wave forces

W = Wind load (100 MPH)

1. D + L Normal stresses
2. D + L + W Normal stresses, increased by 1.33
3. D + H $f_c=0.85 f_c$
 $f_s=0.90 f_y$

Normal stresses are given for working stress design in the ACI Code 318-71, alternate design method Section 8.10.

Material Properties - As given in Table 12.2-7.

Table 12.2-46
 GATE STRUCTURE NO. 2 DESIGN DATA
 Sheet 1

<u>Loads</u>	
D =	Dead load of the structure and equipment, plus a portion of the live load is added when it includes items such as piping, cable trays, etc.
S =	Active soil pressure.
H =	Hydrostatic pressure from the water surface elevations as shown below.
U _H =	Hydrostatic uplift from the water surface elevations as shown below.
L =	Live load - 200 psf on the machinery deck and/or mobile crane loading on the cellular cofferdam.
C =	Construction condition - cellular cofferdam in place with excavation for concrete gravity section completed.
E =	Earthquake (DBE) - 0.20g horizontal and 0.13g vertical accelerations (at bedrock).

<u>Load Case</u>	<u>Load Combination</u>	<u>Overturning</u>	<u>Factor of Safety Sliding</u>	<u>Pullout**</u>
I	D + S + H ₁ + U _{H1}	1.5*	1.5	1.5
II	D + S + H ₃ + U _{H3}	1.05	1.05	1.05
III	Construction Condition	1.25	1.25	1.25
IV	D + S + H + U _H + E	1.0	1.0	1.0

* or 100% of base in compression for the concrete gravity section
 ** applies only to steel sheet pile structures

Table 12.2-46
 GATE STRUCTURE NO. 2 DESIGN DATA
 Sheet 2

	<u>Upstream</u>	<u>Downstream</u>	<u>Corresponding Rainfall</u>
H & U _H	El. 562.67	El. 556.0	None
H ₁ & U _{H1}	El. 563.44	El. 556.01	4" / hour
H ₃ & U _{H3}	El. 564.93	El. 556.03	Max. Possible

Required Ultimate Concrete Strength (U) for the Reinforced Concrete Components

$$U = 1.4D + 1.7(S + H_1 + U_{H1} + L)$$

$$U = 1.05(D + S + H_3 + U_{H3})$$

$$U = 0.75[1.4D + 1.7(S + H + U_H + L) + 1.87E]$$