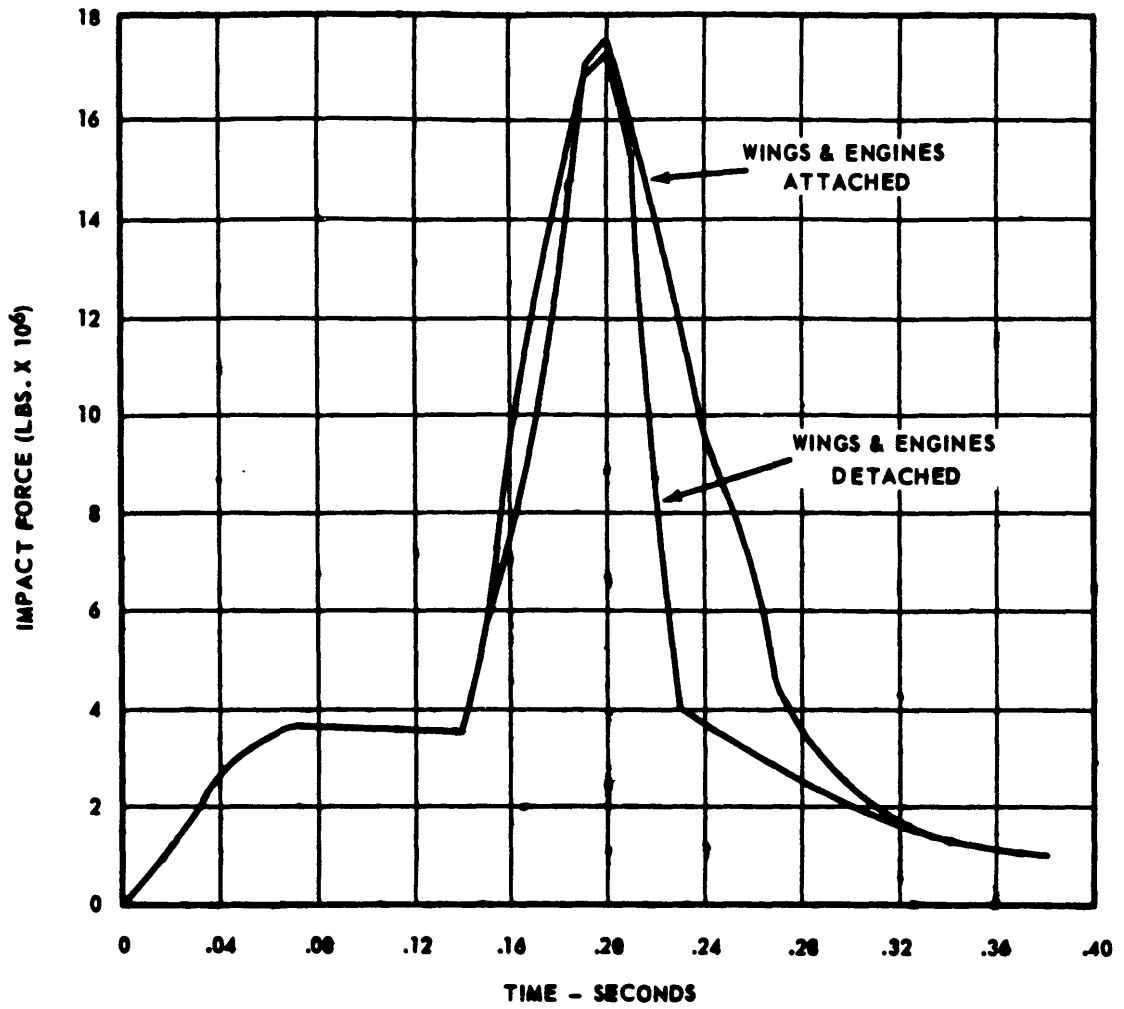


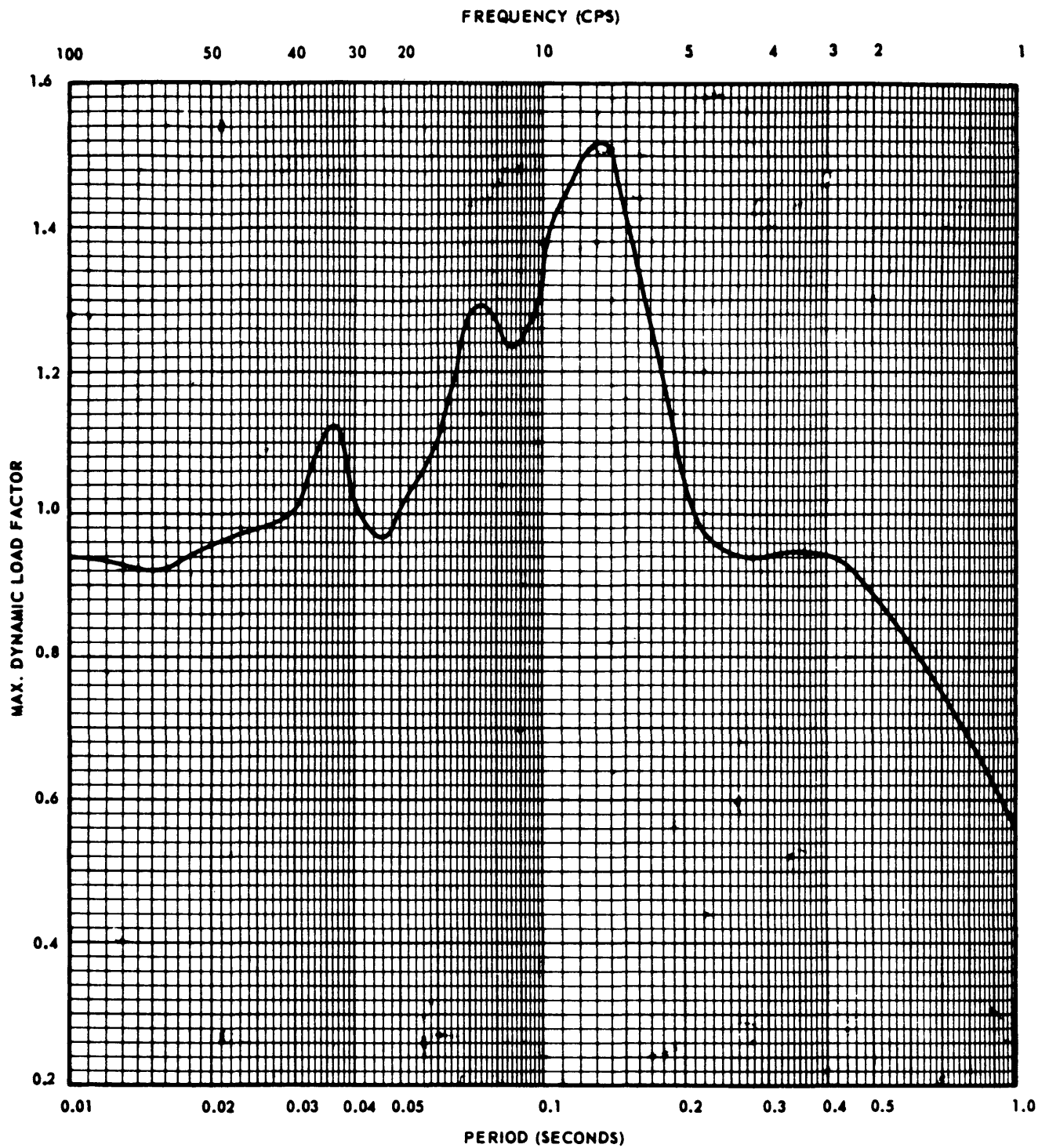
p. 5A.FIG-1

|   |            |
|---|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b> | Update - 1 |
|   | 7/82       |
| <b>Total Reaction vs Time Curve</b>     |            |
| <b>Fig. 5A-1</b>                        |            |



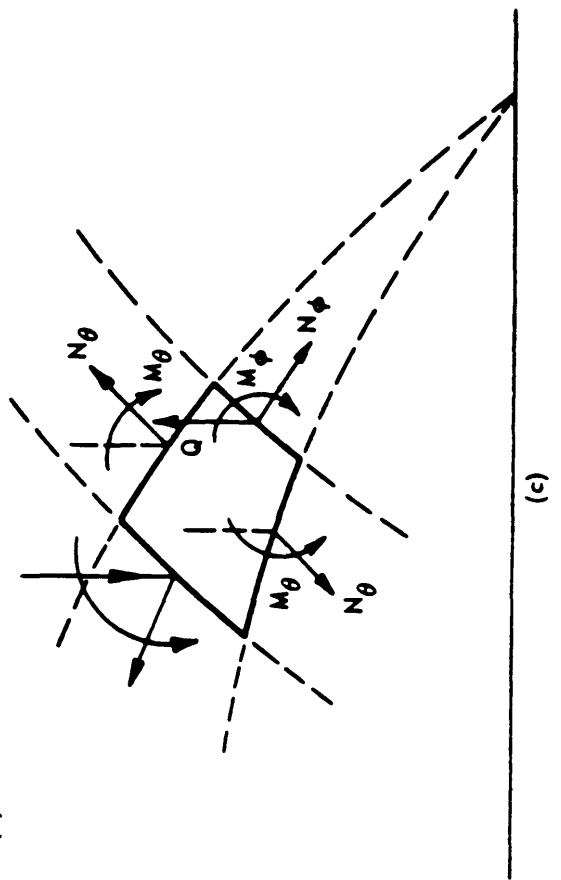
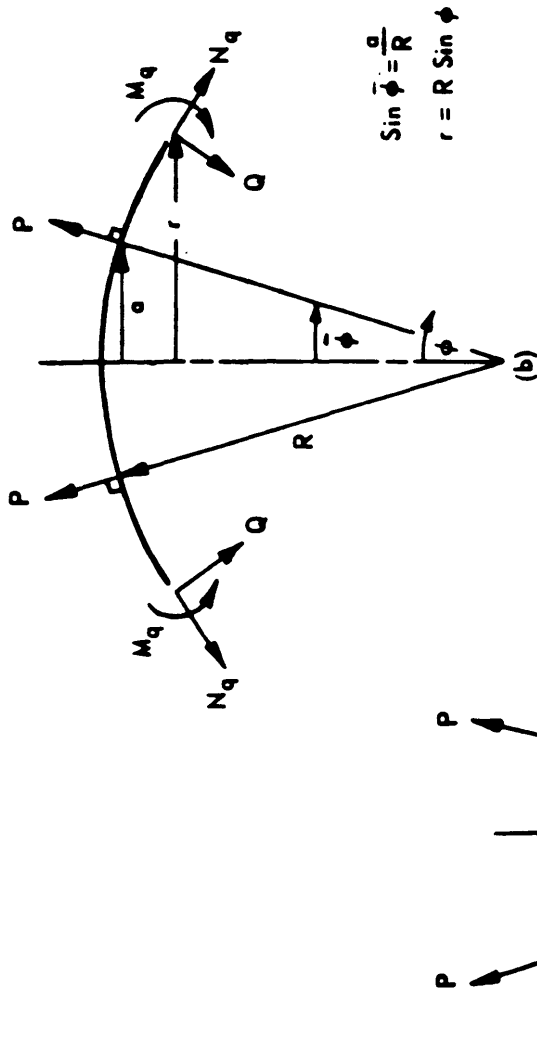
p. 5A.FIG-2

|  |            |
|--|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b>              | Update - 1 |
|  | 7/82       |
| <b>Load Time Curve for 720 Aircraft at 200 Knots</b> |            |
| <b>Fig. 5A-2</b>                                     |            |



p. 5A.FIG-3

**GP Nuclear** Update - 1  
**TMI Unit-1** 7/82  
 Maximum Dynamic Load Factor vs Period or  
 Frequency of a One-Degree-Freedom System under  
 the Impact of Boeing 720  
 Fig. 5A-3

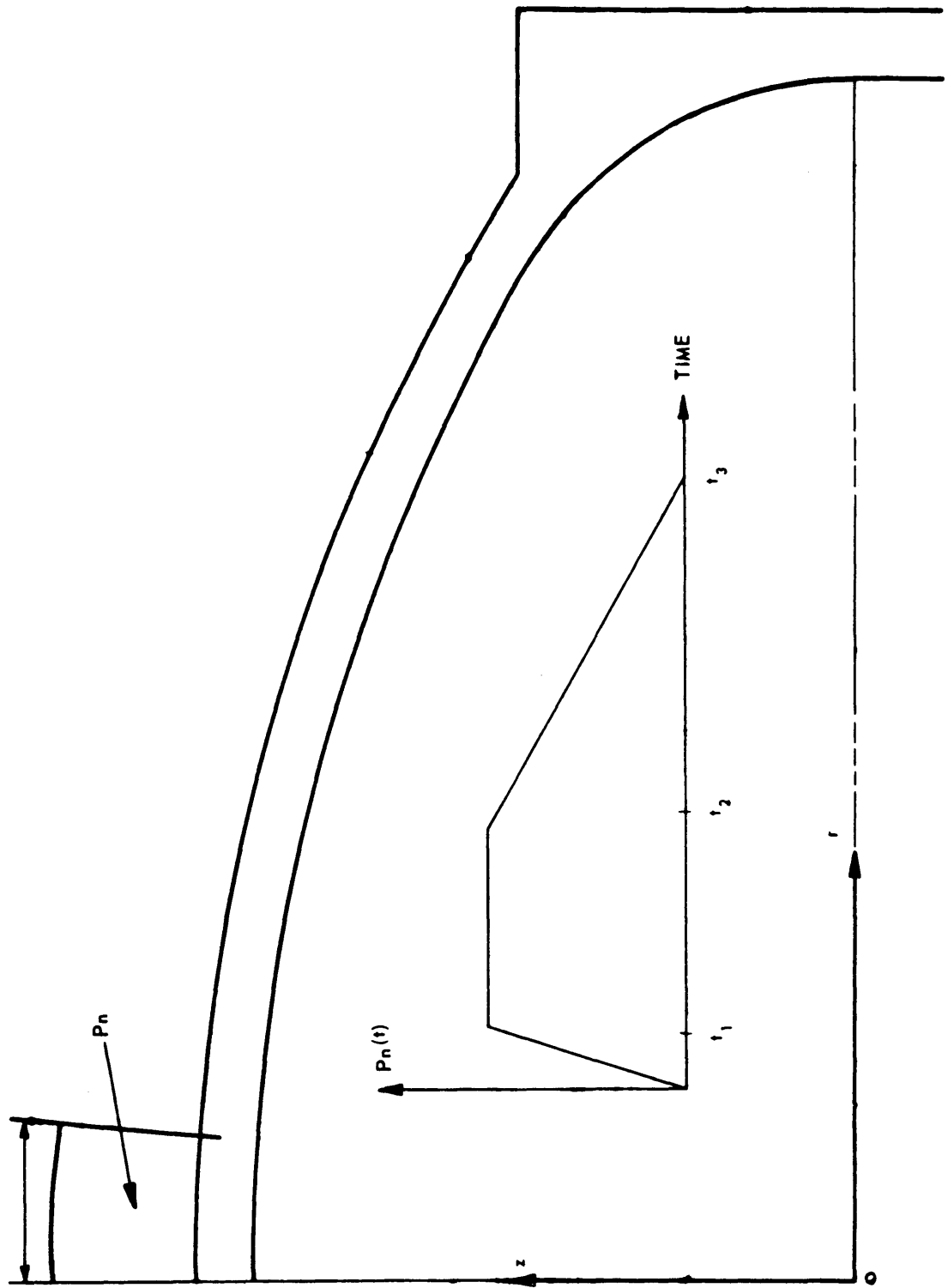


$R = 111'-6"$   
 $r_o = 57'$   
 $\phi = 30.7^\circ$

|  |            |
|--|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b><br>Spherical Cap under a Ring Load | Update - 1 |
|  | 7/82       |
|  | Fig. 5A-4  |

NORMAL PRESSURE DISTRIBUTION

AREA OF IMPACT FOR LARGE AIRCRAFT



p. 5A.FIG-5

**GP Nuclear**

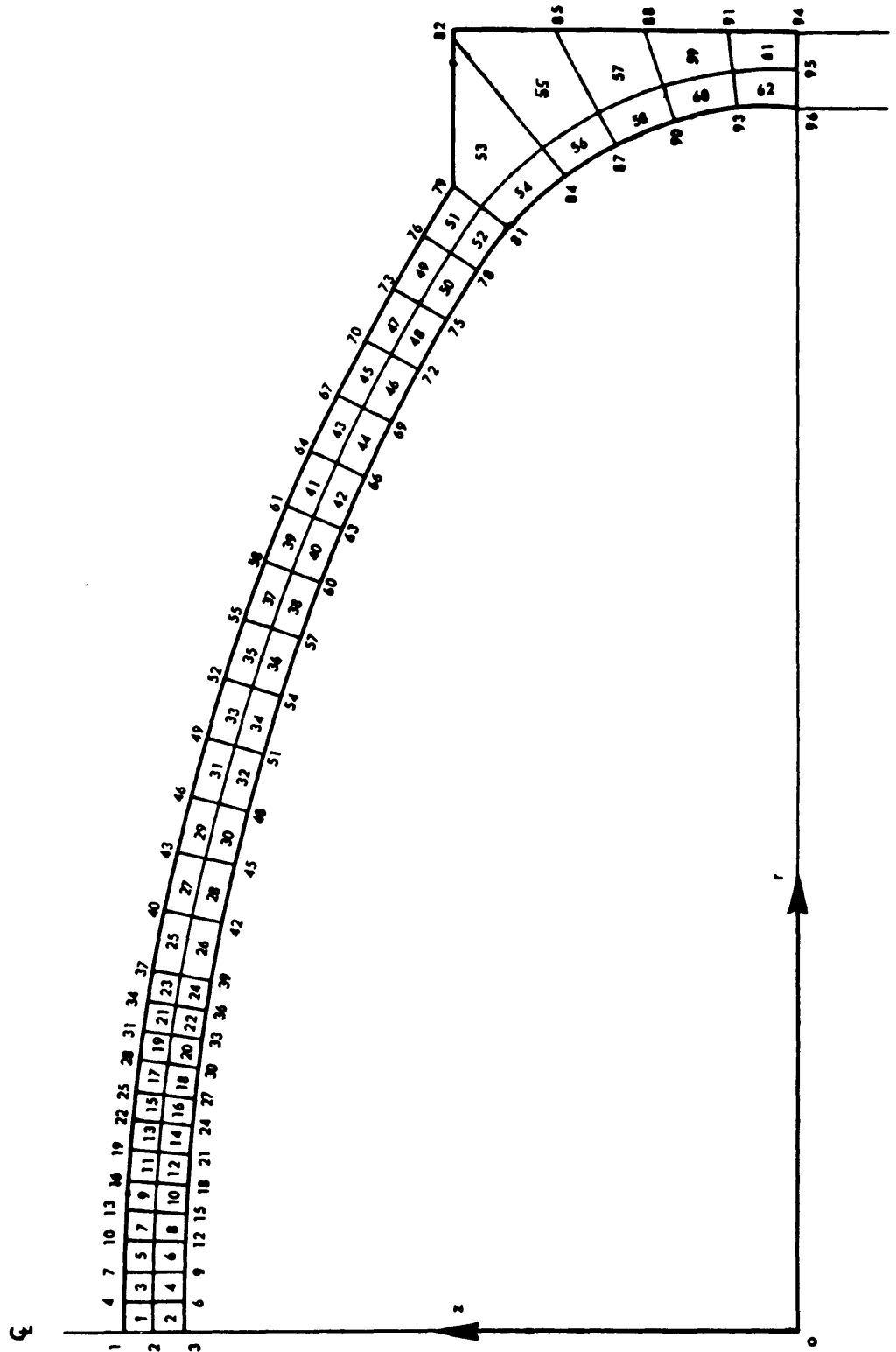
**TMI Unit-1**

**Update - 1**

**7/82**

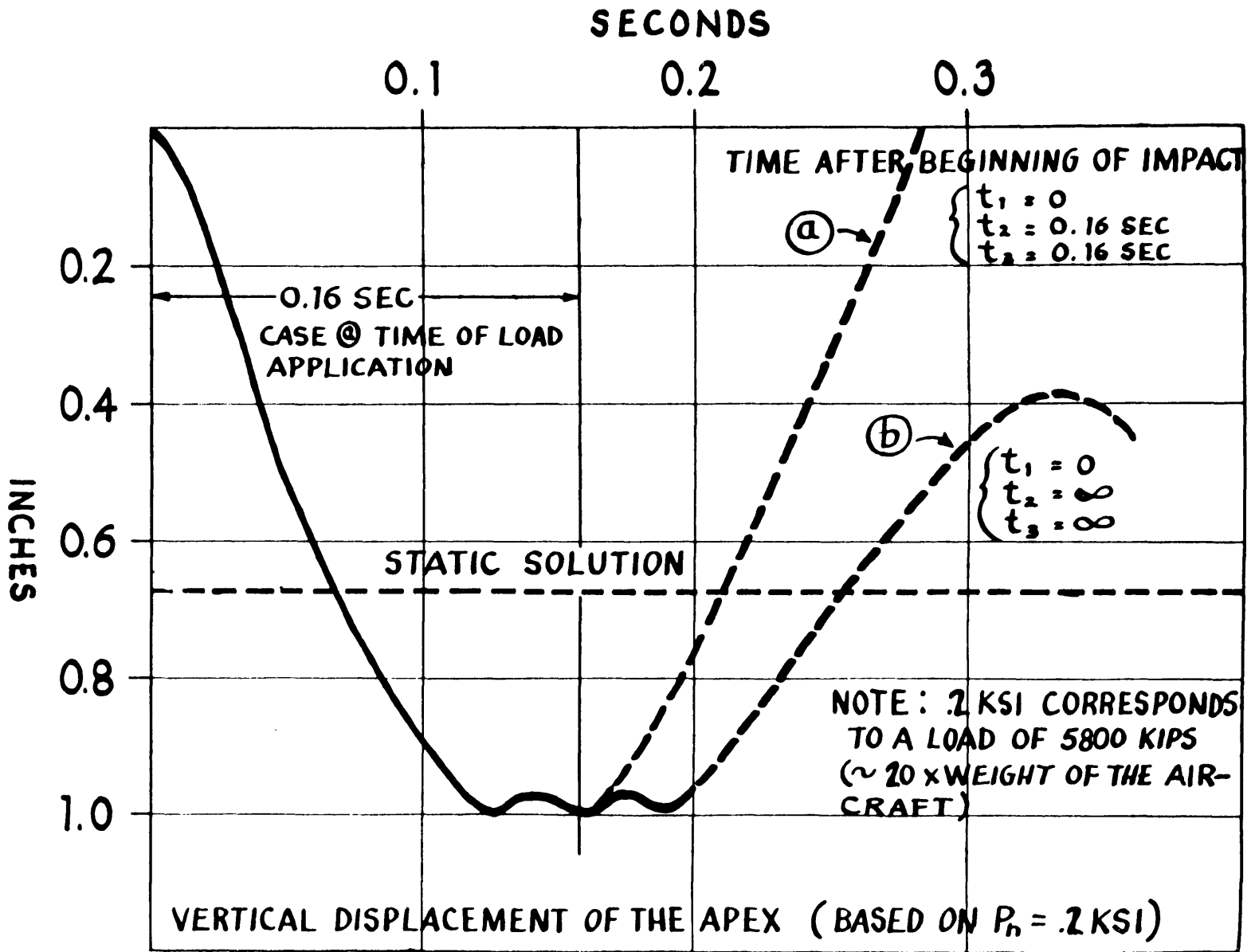
**Spacial and Time Distribution of Load on Shell**

**Fig. 5A-5**



p. 5A.FIG-6

|   |            |
|---|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b><br>Grid for Dynamic Finite Element Analysis of Aircraft Impingement on Dome | Update - 1 |
|   | 7/82       |
|   | Fig. 5A-6  |



P. 5A.FIG-7

**777 Nuclear**

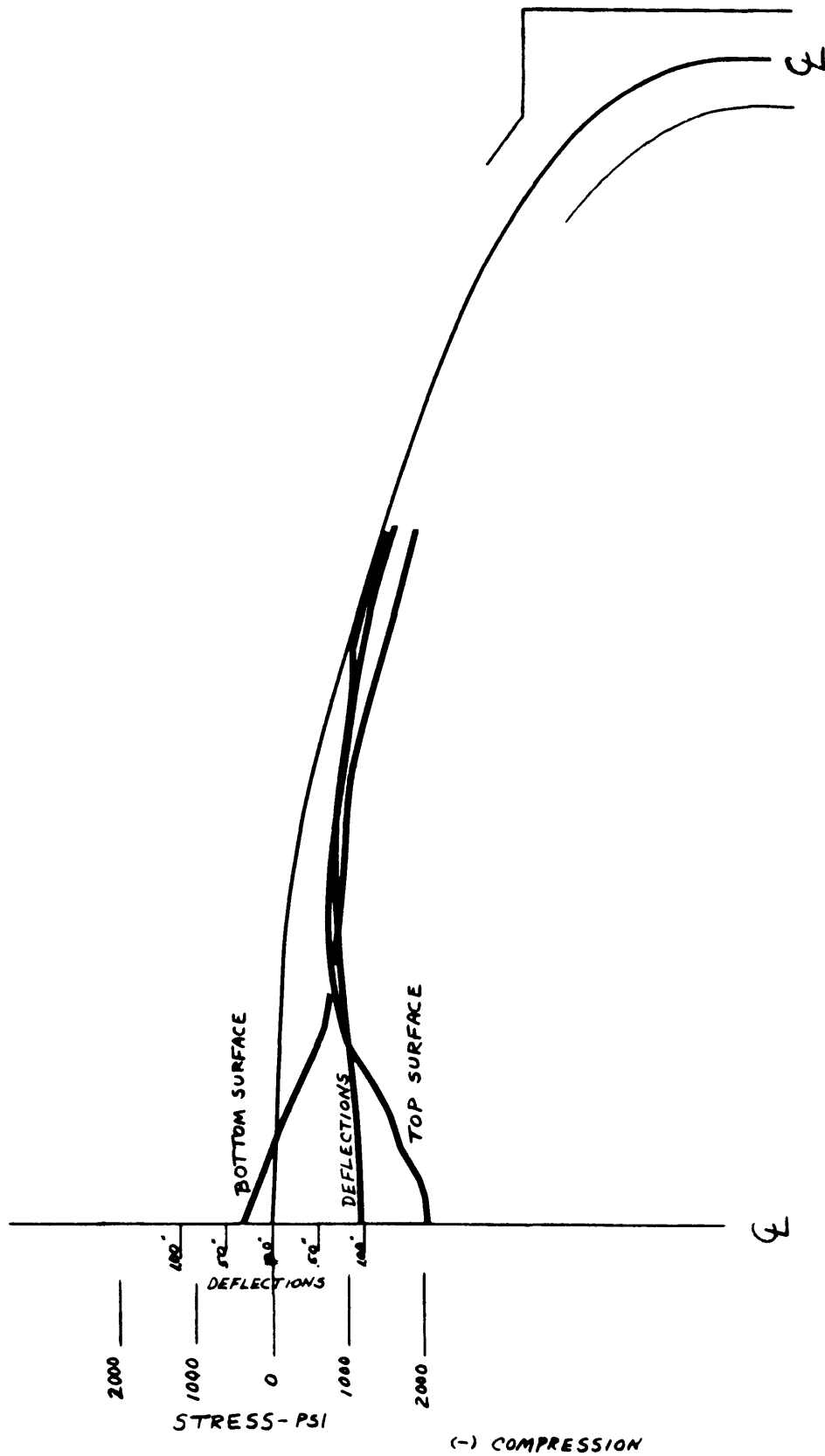
TMI Unit-1

Update - 1

7/82

Effect of Aircraft Impingement on Dome of Containment Structure-Constant Deceleration

Fig. 5A-7



p. 5A.FIG-8

**GPU Nuclear**

Update - 1

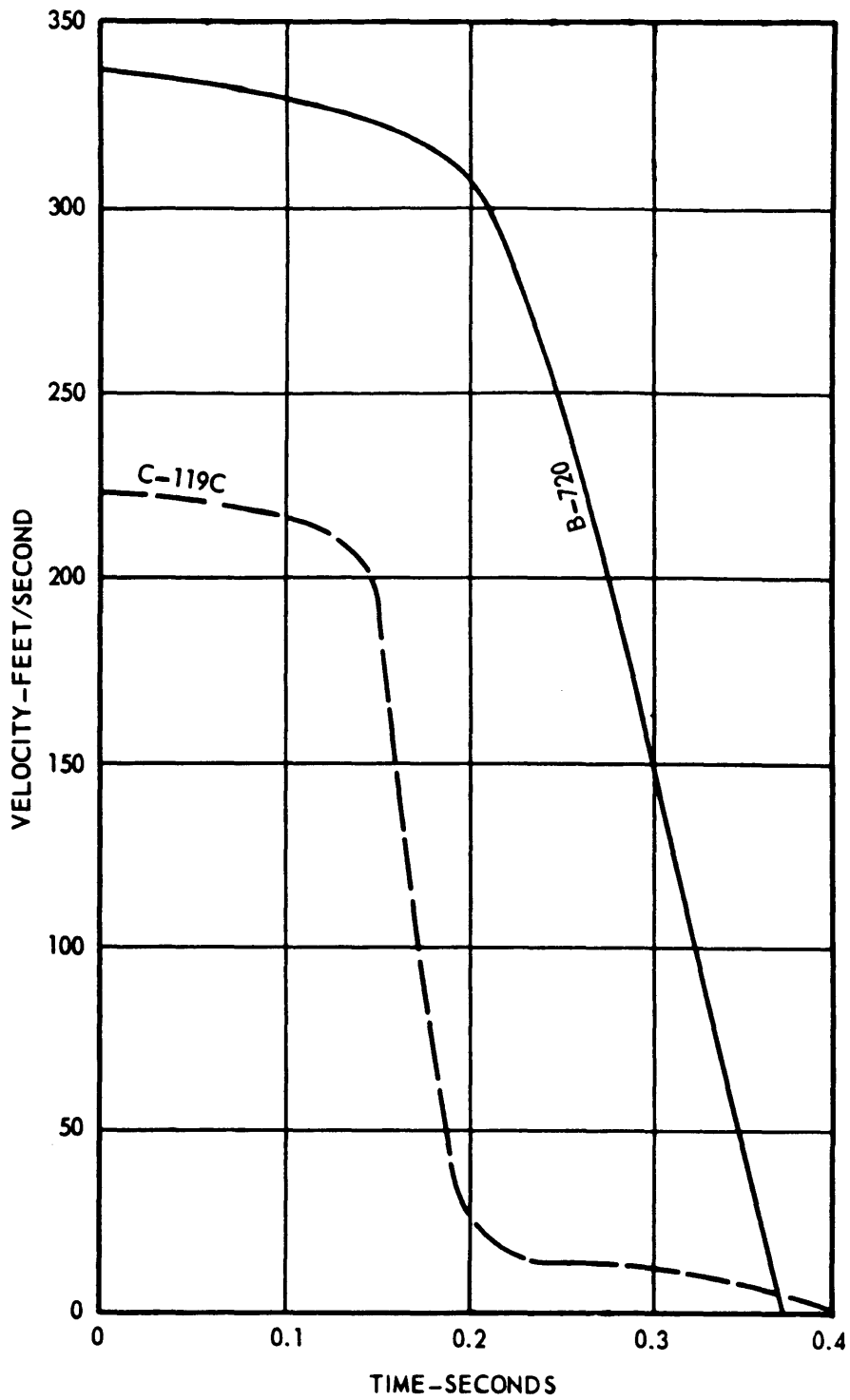
TMI Unit-1

7/82

Deflections and Stresses for Aircraft Impingement  
for Time = 0.16 Seconds - Constant Deceleration

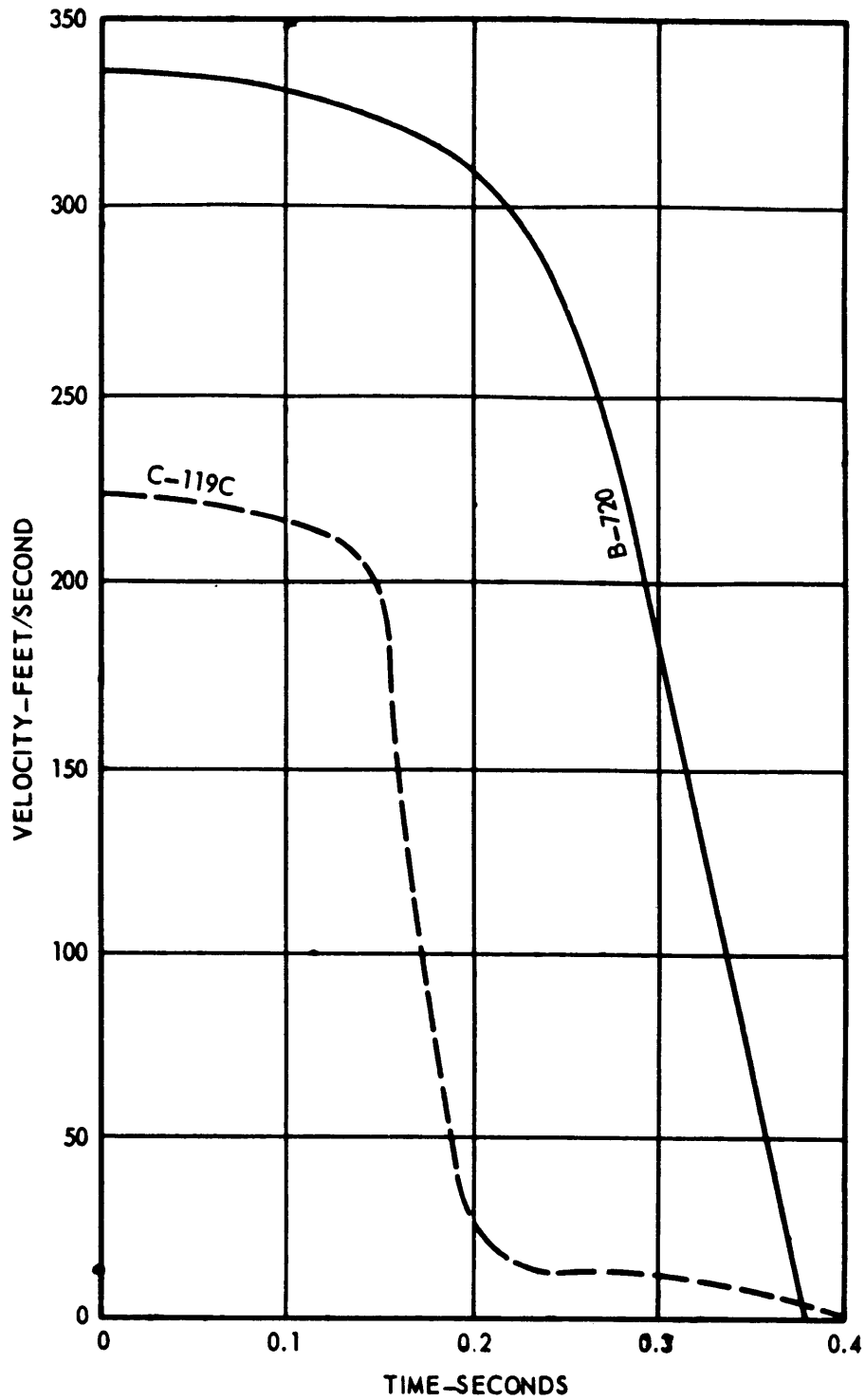
Fig. 5A-8





p. 5A.FIG-9

|   |            |
|---|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b>   | Update - 1 |
|   | 7/82       |
| <b>Velocity Diagram for 720 Aircraft at 200 Knots<br/>         Impact Speed with Wings and Engines Detached</b> |            |
| <b>Fig. 5A-9</b>  |            |

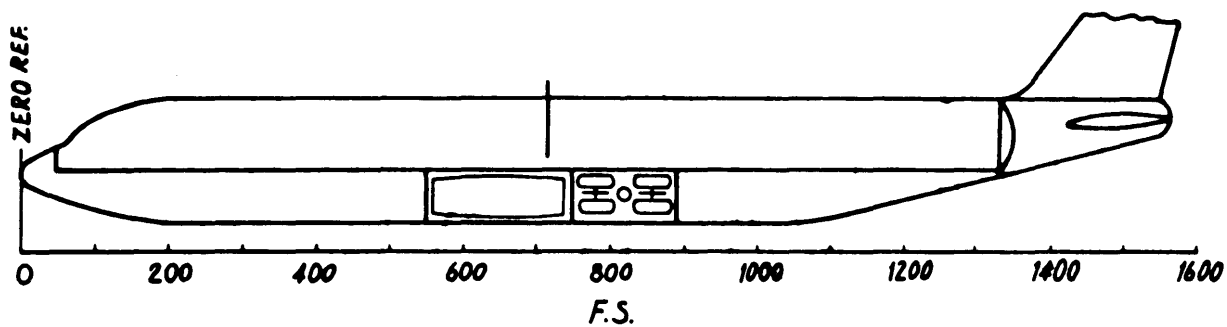
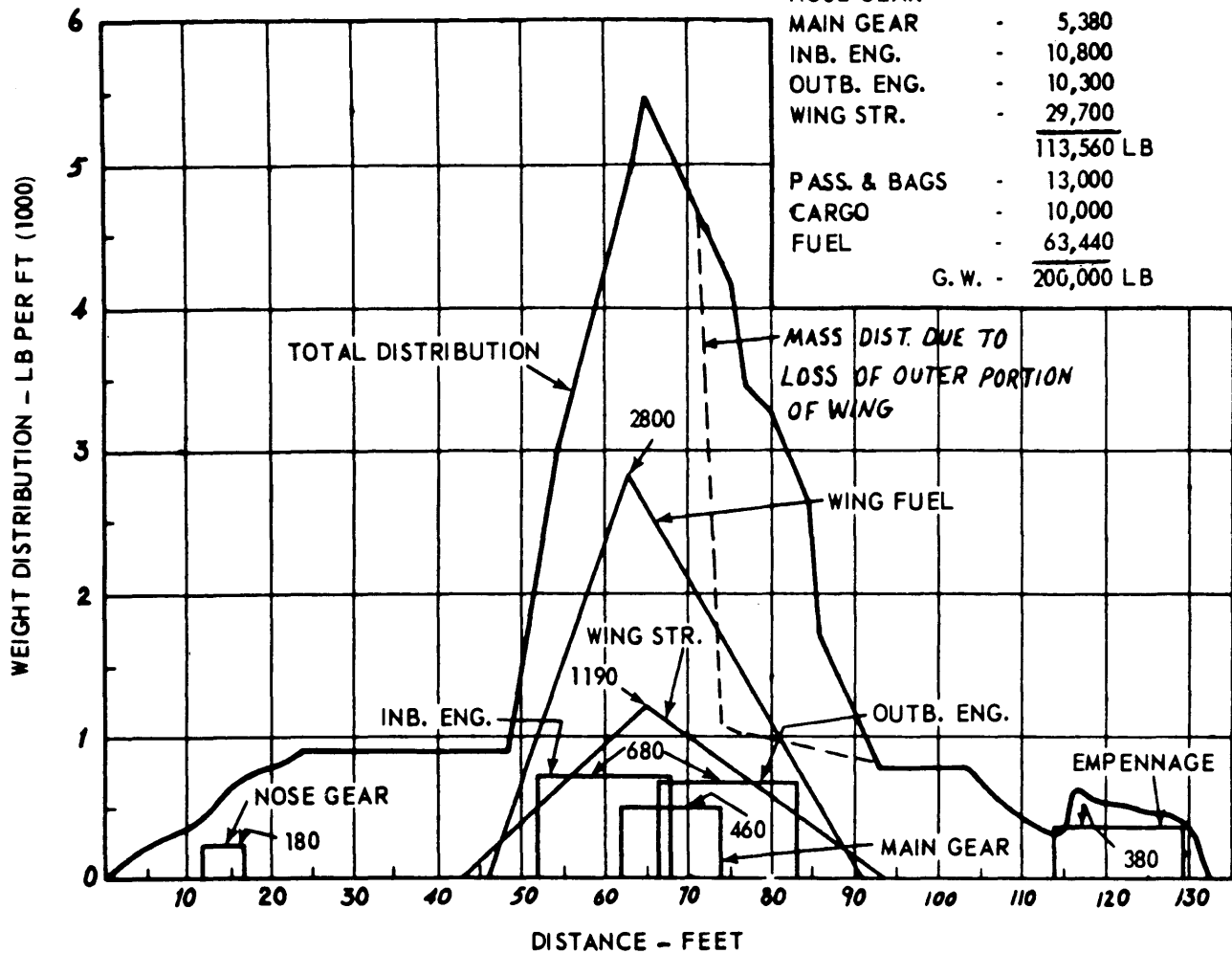


p. 5A.FIG-10

|  |            |
|--|------------|
| <b>GPU Nuclear</b>   | Update - 1 |
| <b>TMI Unit-1</b>  | 7/82       |
| Velocity Diagram for 720 Aircraft at 200 Knots<br>Impact Speed with Wings and Engines Attached |            |
| Fig. 5A-10   |            |

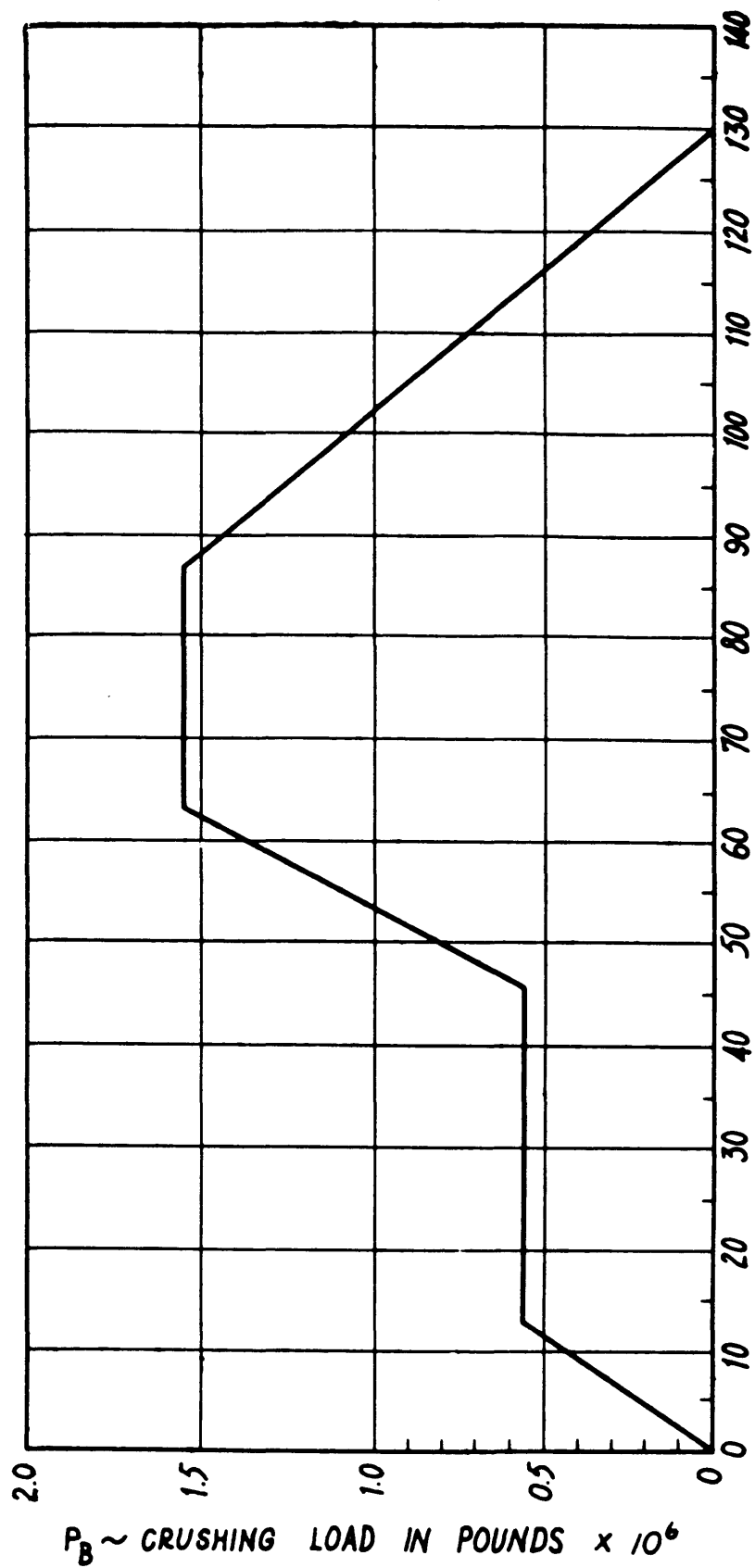
**AIRCRAFT WEIGHT BREAKDOWN**

|              |   |                           |
|--------------|---|---------------------------|
| FUSELAGE     | - | 51,000 LB                 |
| EMPENNAGE    | - | 5,680                     |
| NOSE GEAR    | - | 700                       |
| MAIN GEAR    | - | 5,380                     |
| INB. ENG.    | - | 10,800                    |
| OUTB. ENG.   | - | 10,300                    |
| WING STR.    | - | 29,700                    |
|              |   | <u>113,560 LB</u>         |
| PASS. & BAGS | - | 13,000                    |
| CARGO        | - | 10,000                    |
| FUEL         | - | 63,440                    |
|              |   | <u>G. W. - 200,000 LB</u> |



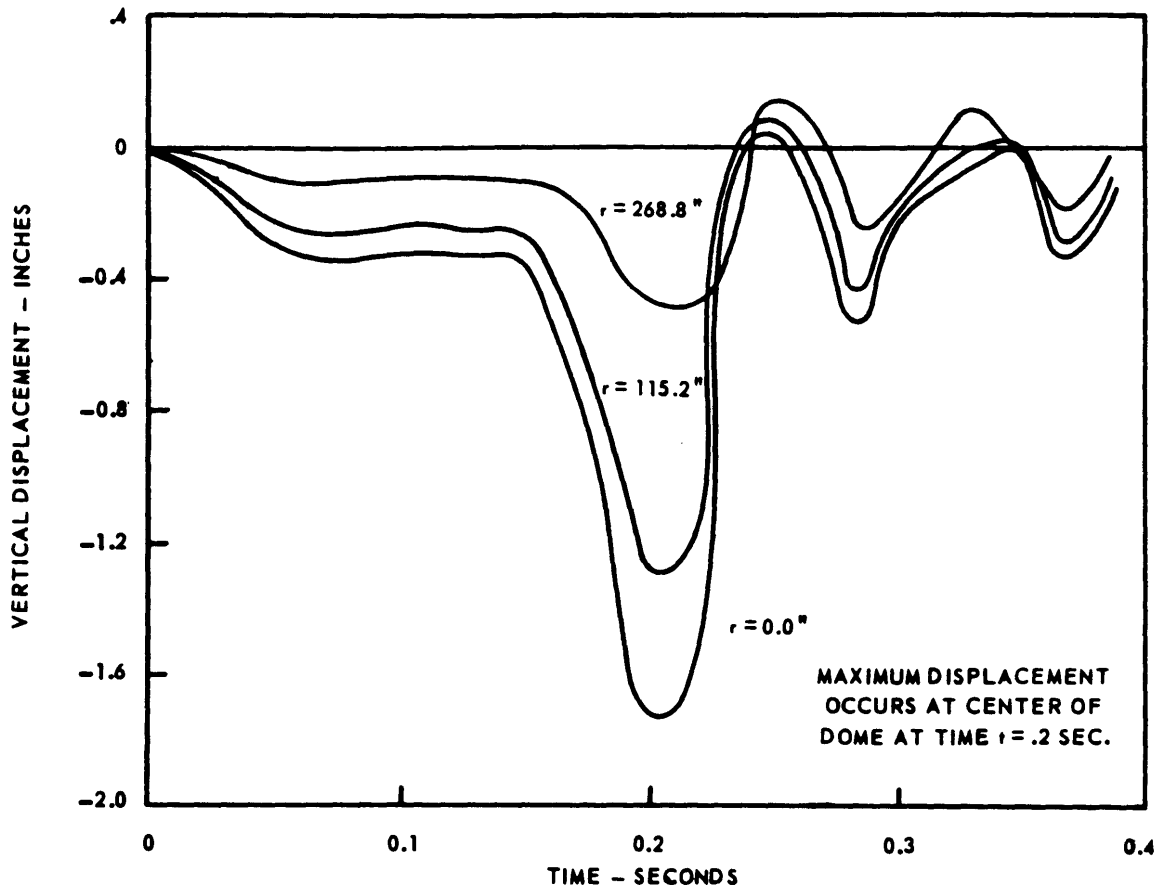
p. 5A.FIG-11

|  |   |                               |
|--|---|-------------------------------|
|  | <p><b>Nuclear</b></p> <p>TMI Unit-1</p> | <p>Update - 1</p> <p>7/82</p> |
|  | <p>720 Aircraft Mass Distribution</p>   | <p>Fig. 5A-11</p>             |



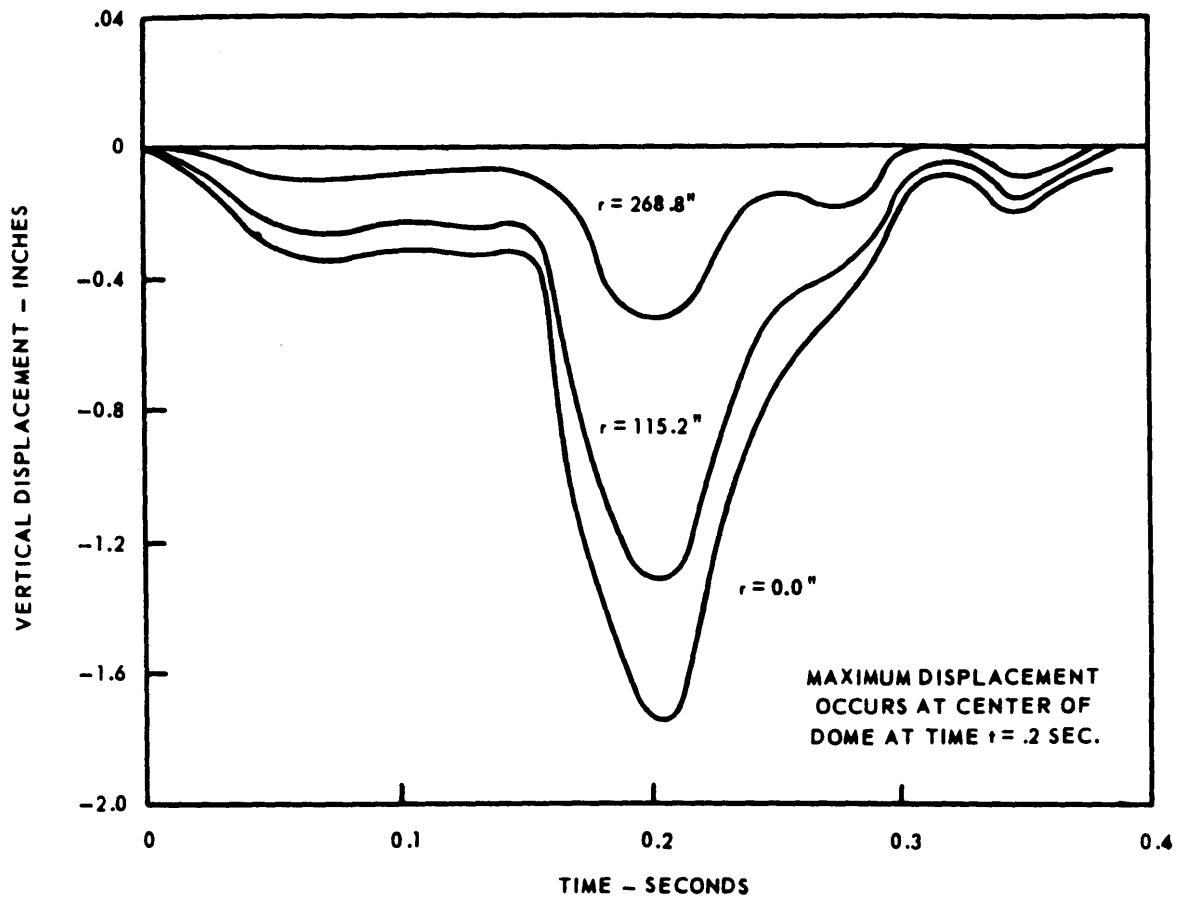
p. 5A.FIG-12

|  |            |
|--|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b>      | Update - 1 |
|  | 7/82       |
| Boeing 720 Fuselage Buckling (Crushing) Load |            |
| Fig. 5A-12                                   |            |



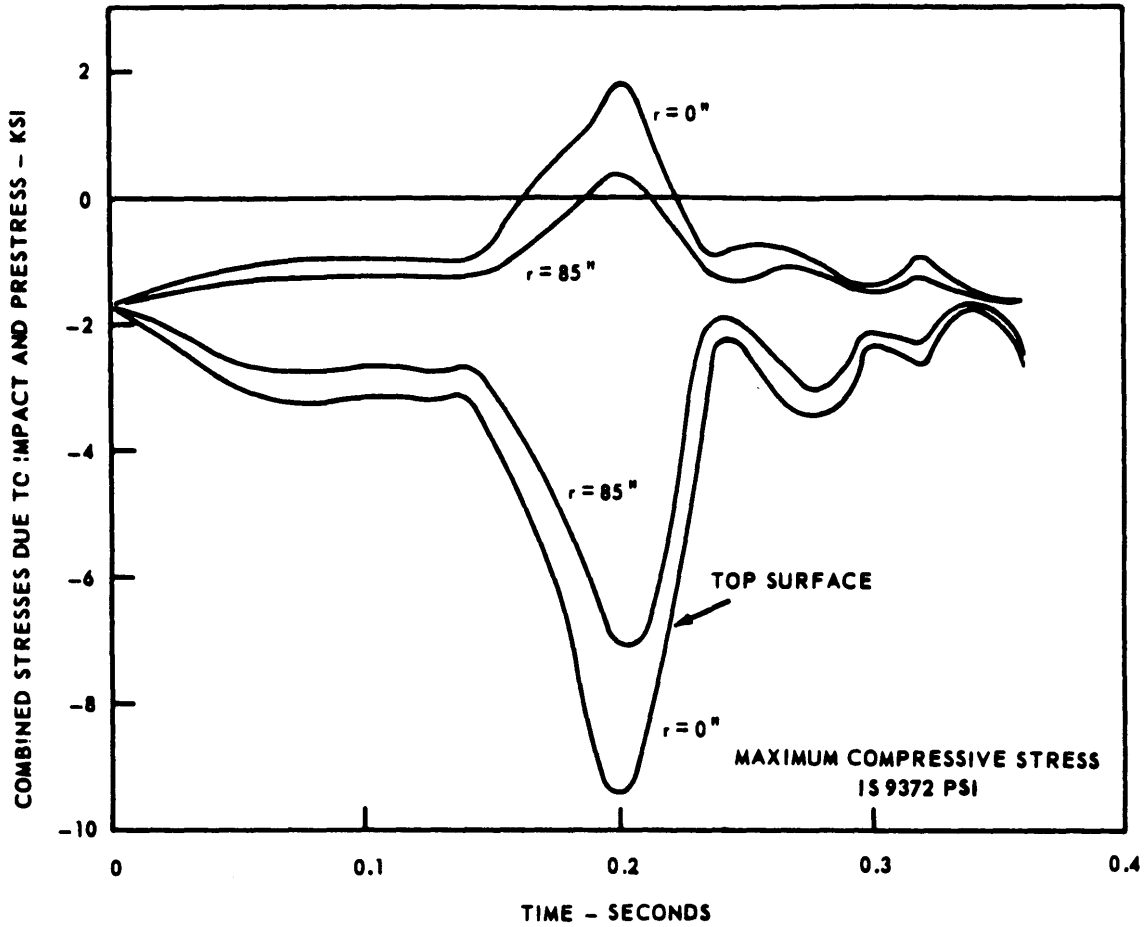
p. 5A.FIG-13

|  |            |
|--|------------|
| <b>GPU Nuclear</b>   | Update - 1 |
|  | 7/82       |
| <b>TMI Unit-1</b>  |            |
| Time Variation of Shell Vertical Displacements with Wings and Engines Detached |            |
| Fig. 5A-13   |            |



MAXIMUM AND MINIMUM  
PRINCIPAL STRESSES  
AT THE TOP AND BOTTOM  
SURFACES OF THE DOME

WINGS & ENGINES ASSUMED  
TO BE DETACHED FROM  
FUSELAGE



p. 5A.FIG-15

**GPU Nuclear**

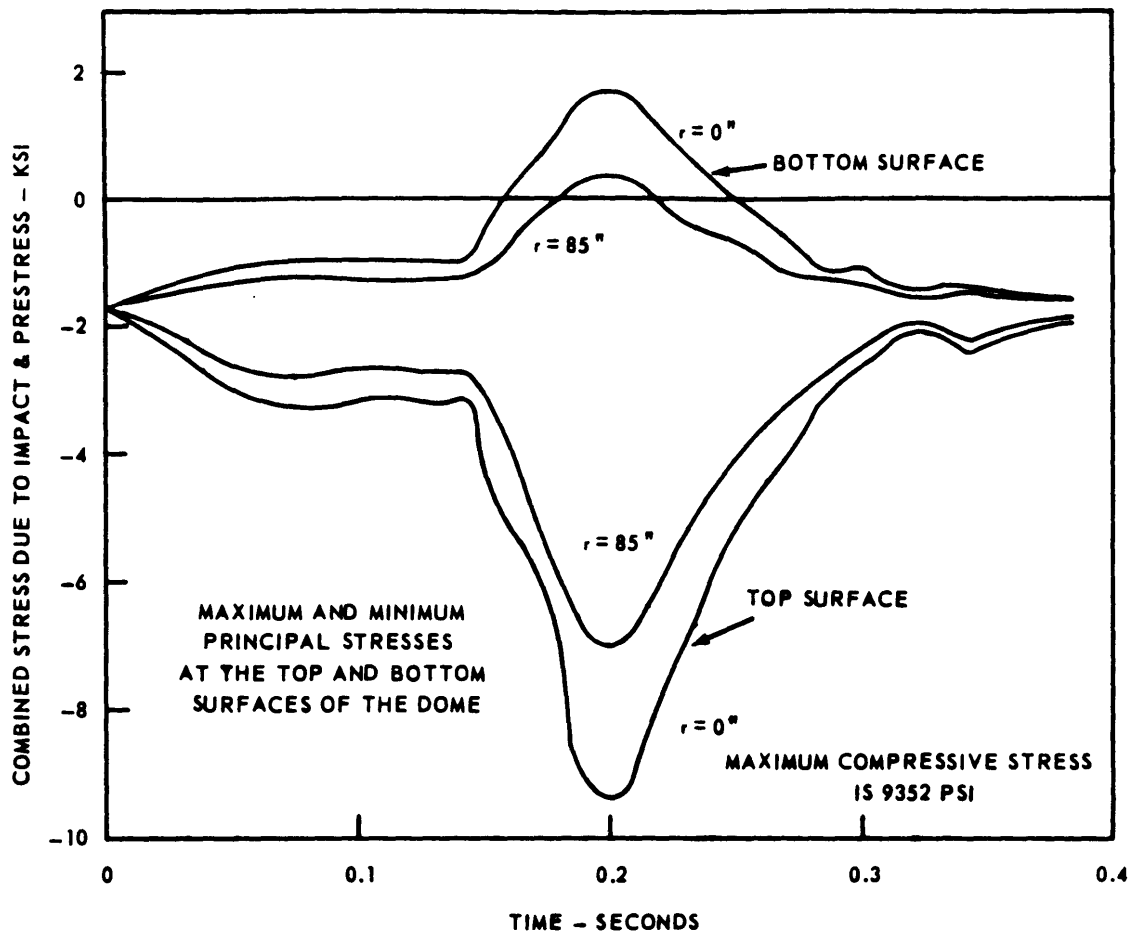
Update - 1

TMI Unit-1

7/82

Time Variation of Shell Surface Stresses Aircraft  
with Wings and Engines Detached

Fig. 5A-15

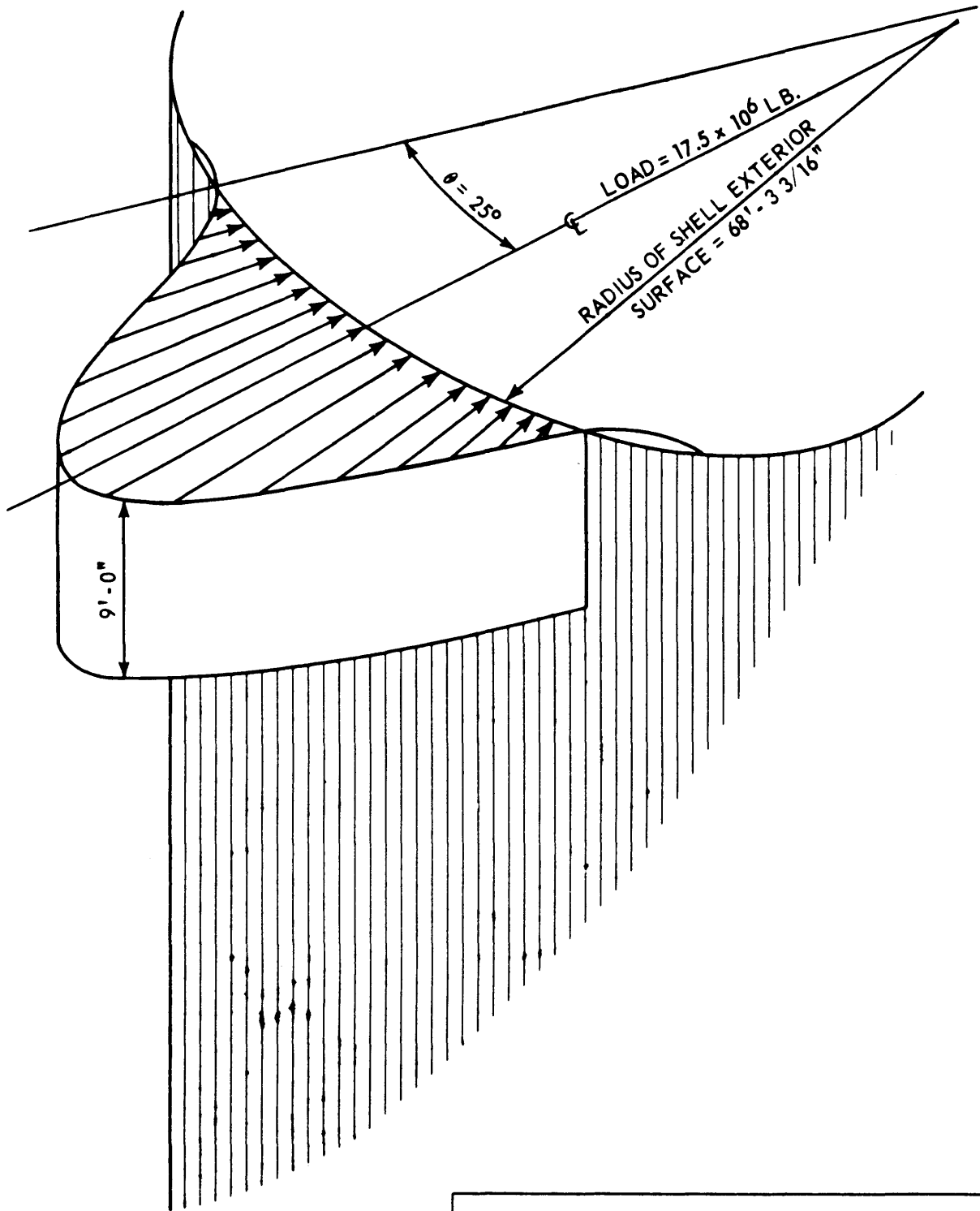


p. 5A.FIG-16

|            |  |
|------------|--|
|            | Update - 1   |
|            | 7/82   |
|            | Time Variation of Shells Surface Stresses Aircraft with Wings and Engines Attached |
| Fig. 5A-16 |  |

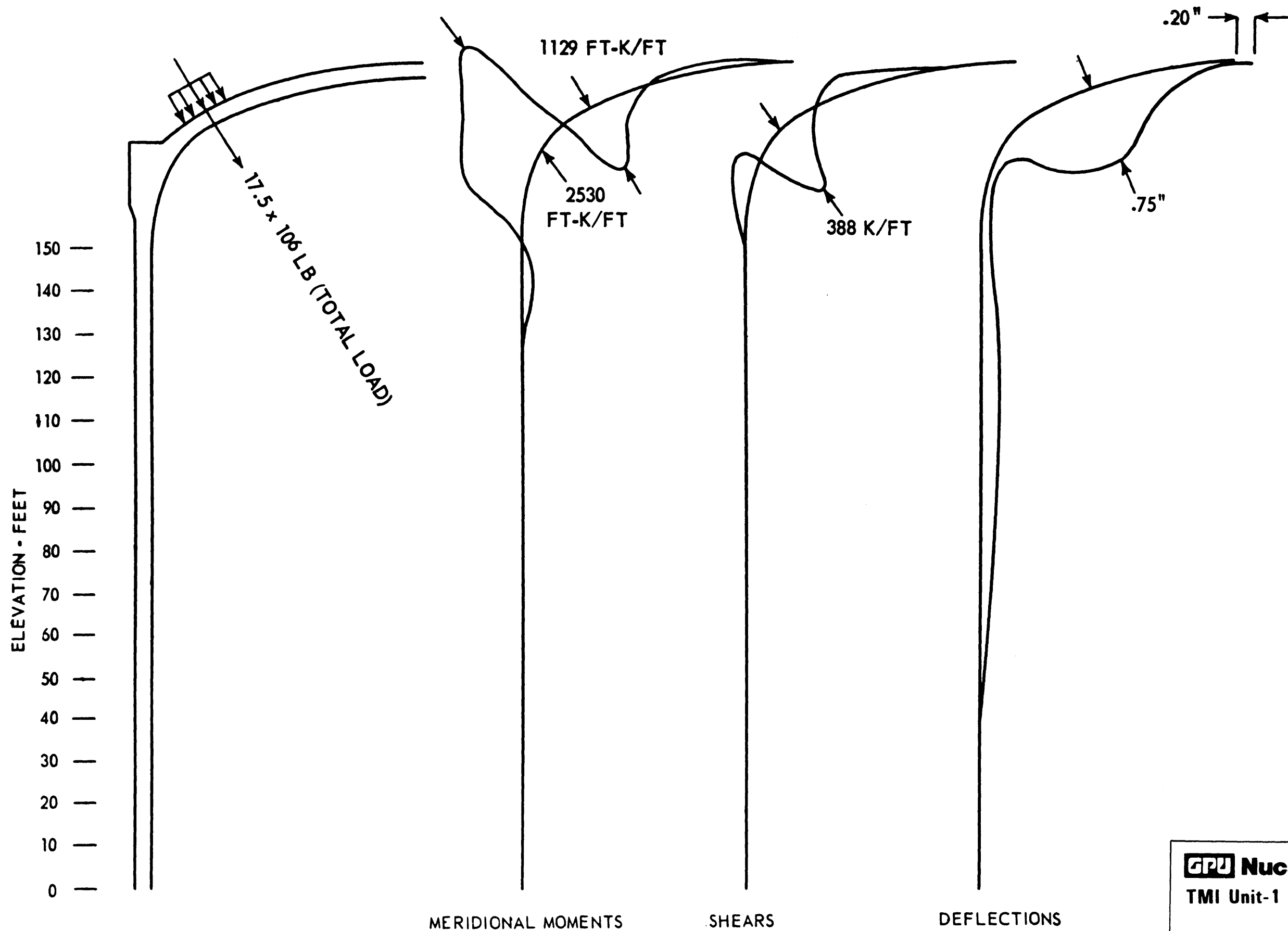


$$\begin{aligned} \text{FOURIER SERIES} = & .07955 - .1575 \cos \theta + .1558 \cos 2\theta - .1446 \cos 3\theta + .133 \cos 4\theta \\ & - .1208 \cos 5\theta + .1058 \cos 6\theta - .0894 \cos 7\theta + .0722 \cos 8\theta \\ & - .0551 \cos 9\theta \end{aligned}$$



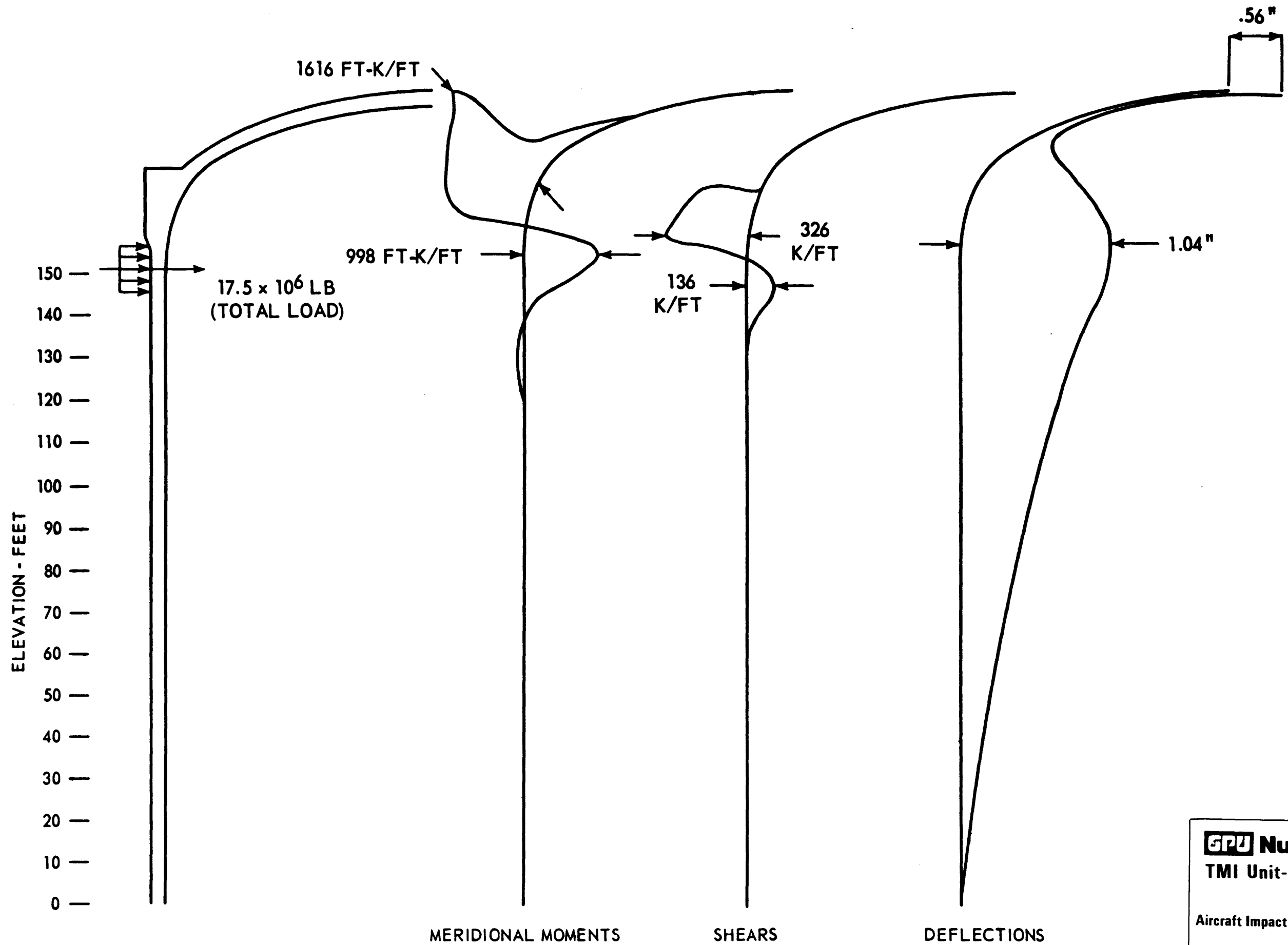
p. 5A.FIG-17

|   |            |
|---|------------|
| <b>GPU Nuclear</b><br>TMI Unit-1          | Update - 1 |
|   | 7/82       |
| Pressure Distribution for Aircraft Impact |            |
| Fig. 5A-17                                |            |



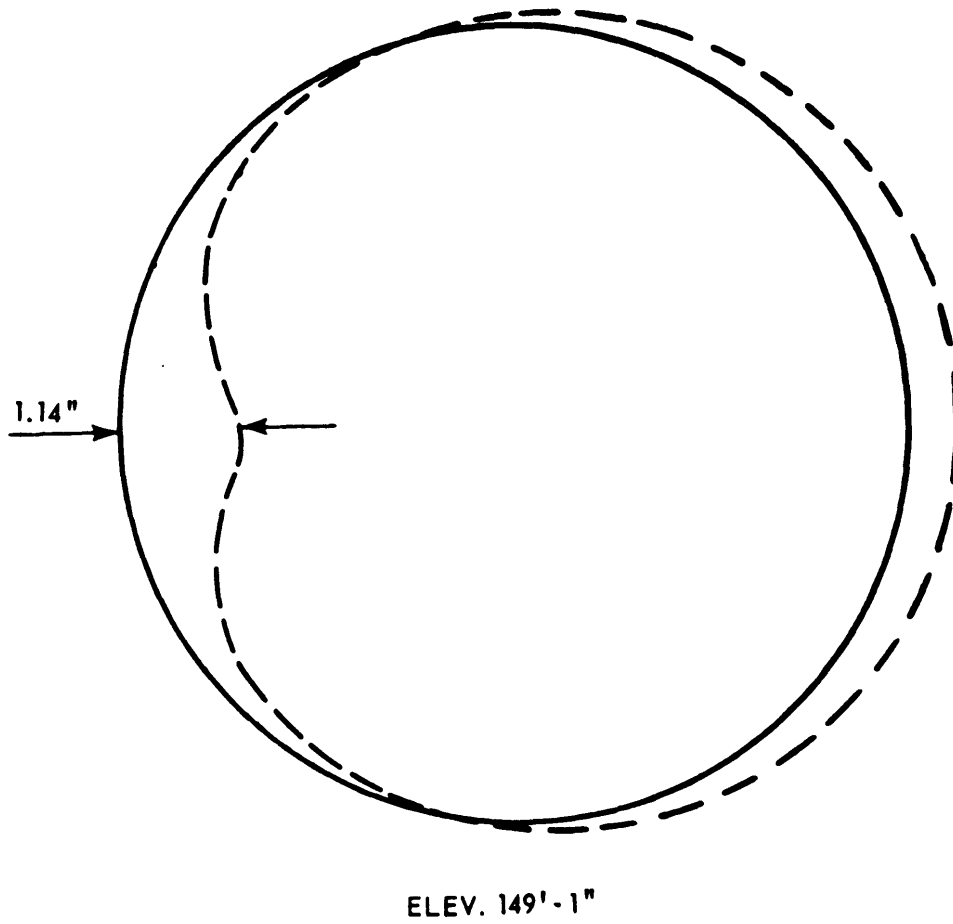
p. 5A.FIG-18

|  |           |
|--|-----------|
| <b>GPU Nuclear</b>                           | Update -1 |
| TMI Unit-1                                   | 7/82      |
| Aircraft Impact at Girder to Dome Transition |           |
| Fig. 5A-18                                   |           |



p. 5A.FIG-19

|                                  |            |
|----------------------------------|------------|
| <b>GPU Nuclear</b><br>TMI Unit-1 | Update - 1 |
|                                  | 7/82       |
| Aircraft Impact at Spring Line   |            |
| Fig. 5A-19                       |            |



p. 5A.FIG-20

**GPU Nuclear**

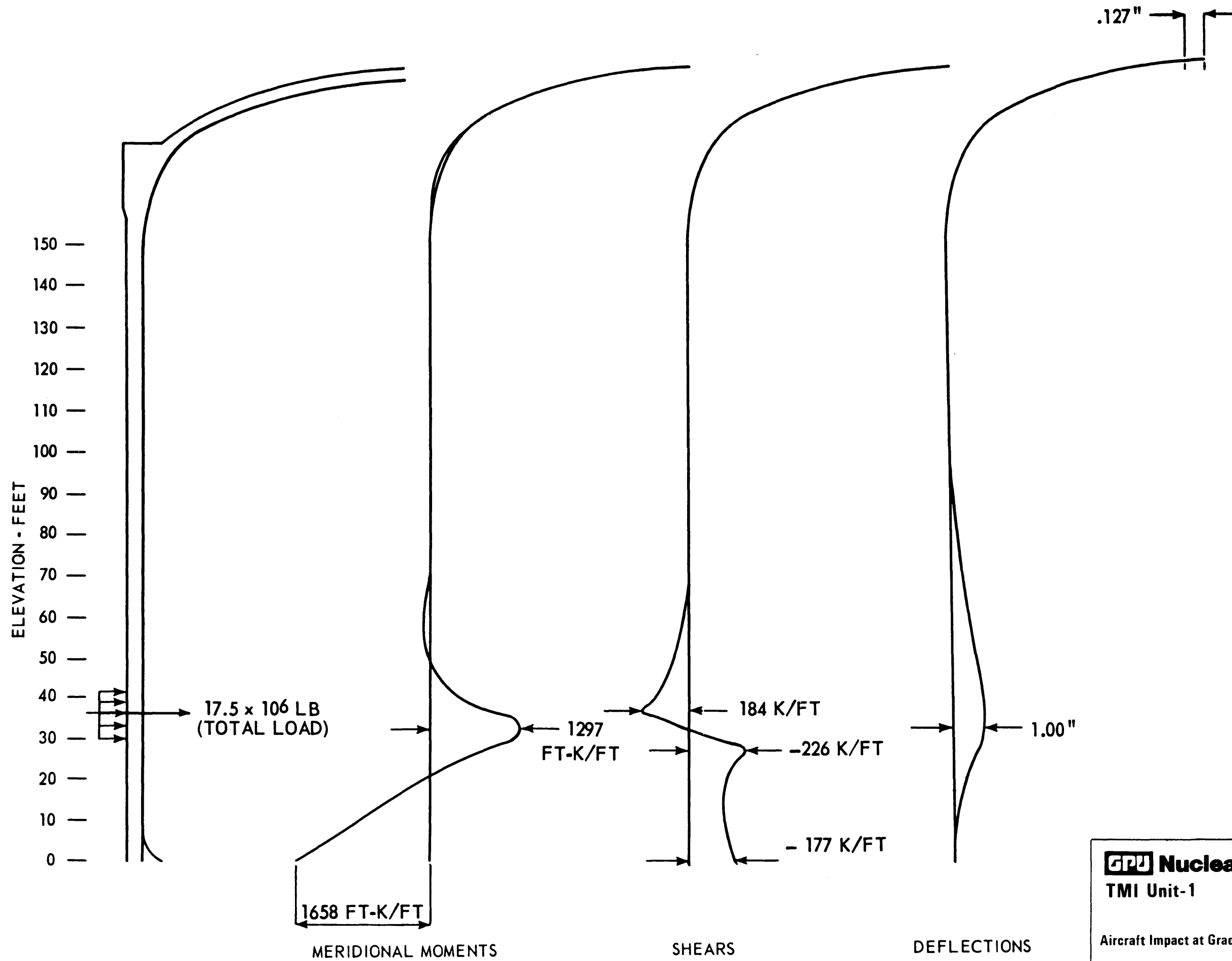
**TMI Unit-1**

**Update - 1**

**7/82**

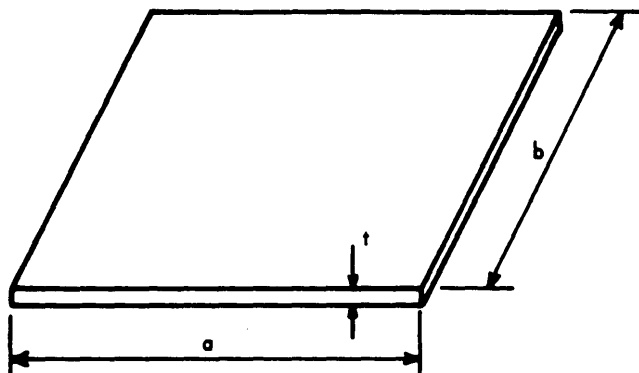
**Radial Deflection Impact at Spring Line**

**Fig. 5A-20**

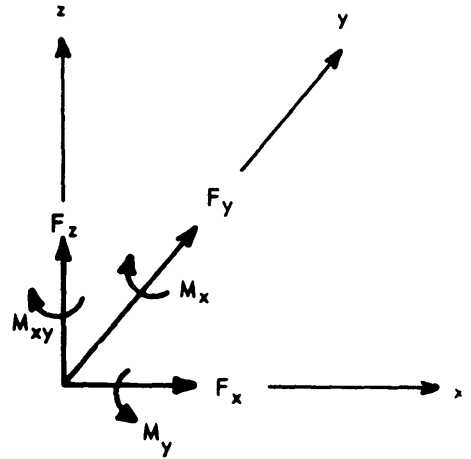


p. 5A.FIG-21

|                          |           |
|--------------------------|-----------|
| <b>GPU Nuclear</b>       | Update -1 |
| <b>TMI Unit-1</b>        | 7/82      |
| Aircraft Impact at Grade |           |
| Fig. 5A-21               |           |

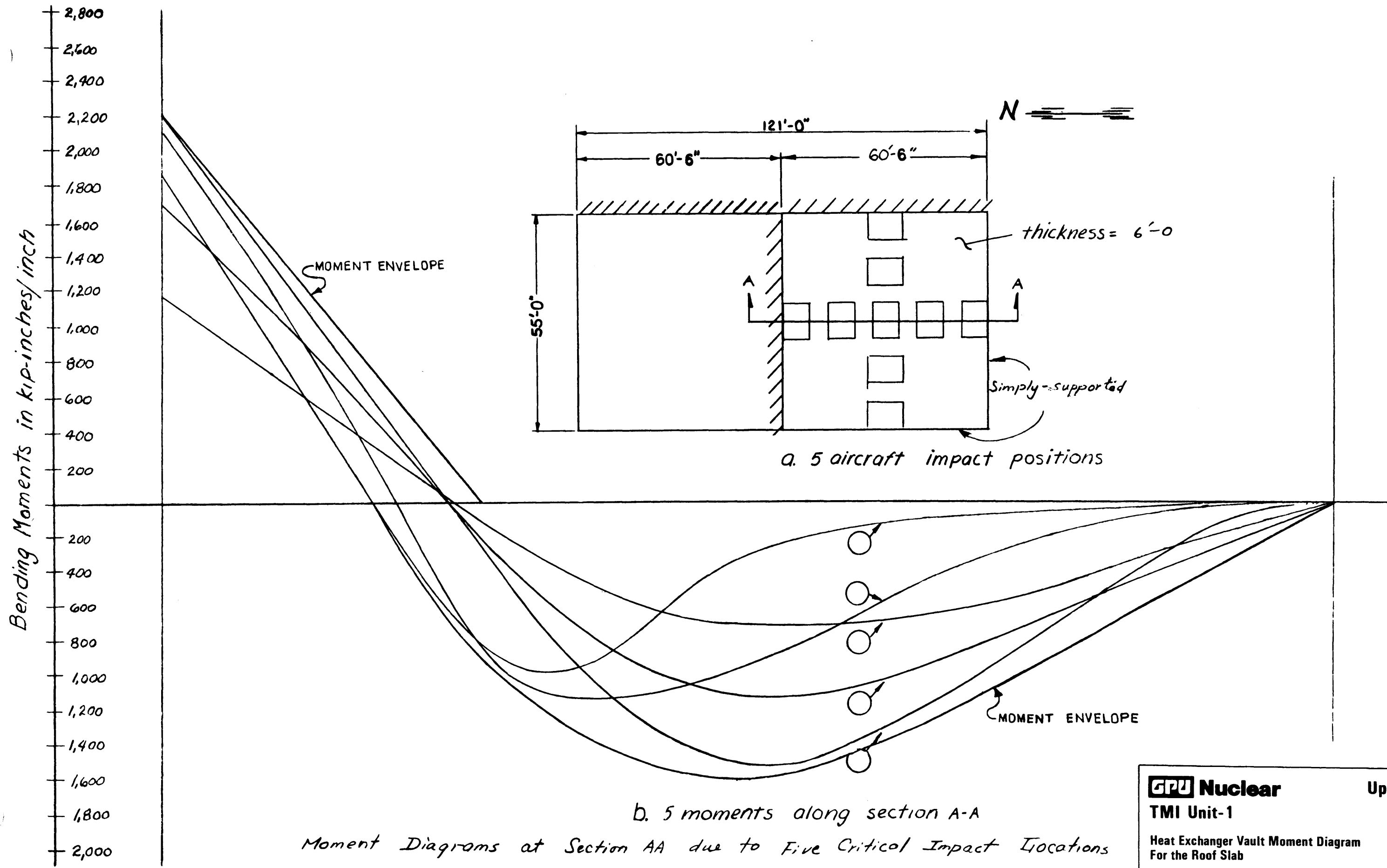


(a) GEOMETRY



(b) SIX FORCE COMPONENTS AT NODAL POINT

|  |                   |
|--|-------------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b><br><br><b>Rectangular Finite Element</b> | <b>Update - 1</b> |
|  | <b>7/82</b>       |
|  | <b>Fig. 5A-22</b> |



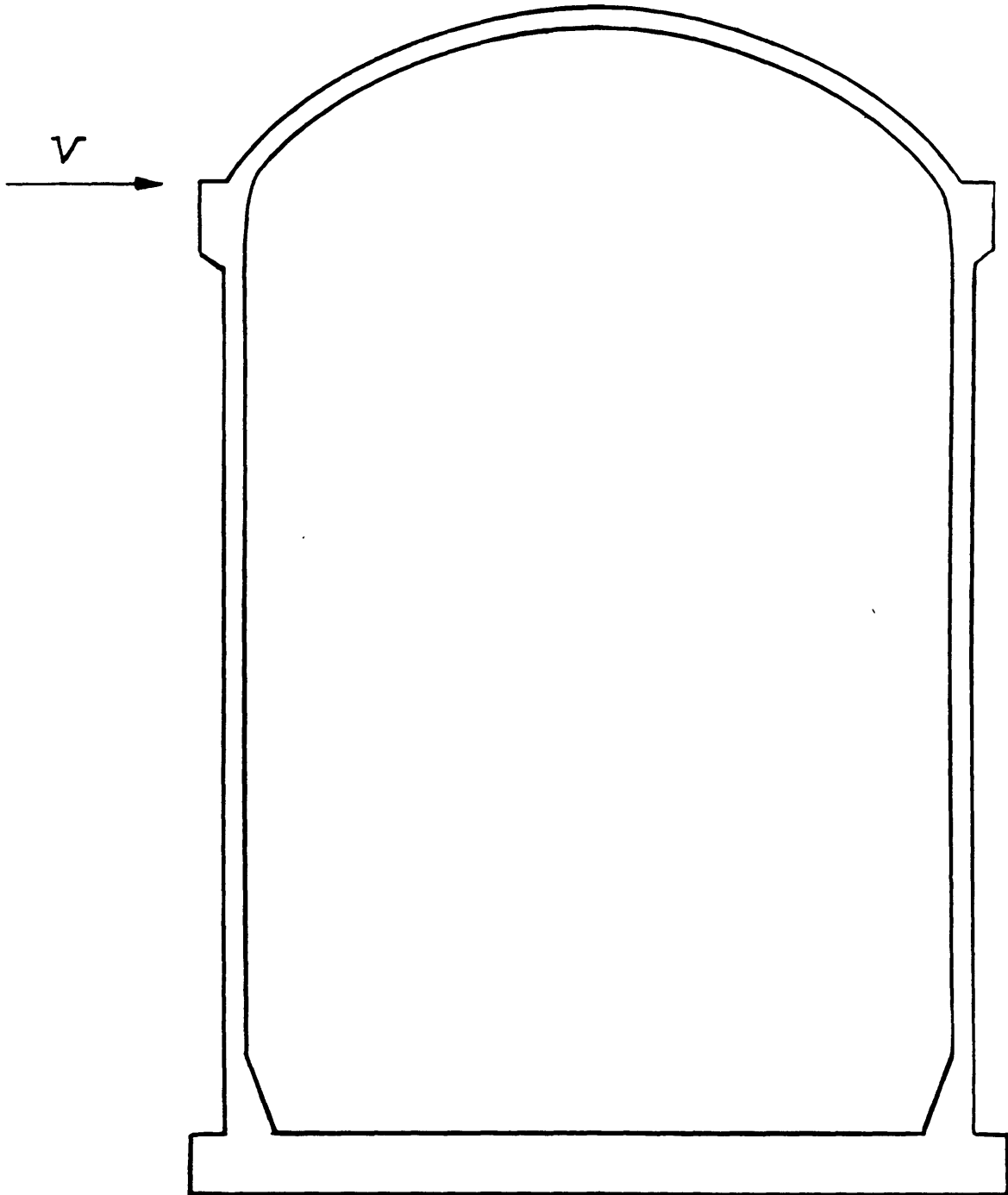
|  |            |
|--|------------|
| <b>GP Nuclear</b><br><b>TMI Unit-1</b><br>Heat Exchanger Vault Moment Diagram<br>For the Roof Slab | Update - 1 |
|  | 7/82       |
|  | Fig. 5A-23 |

## TMI UFSAR

Figures 5A-24 through 5A-25

Deleted





p. 5A.FIG-26

**GPU Nuclear**

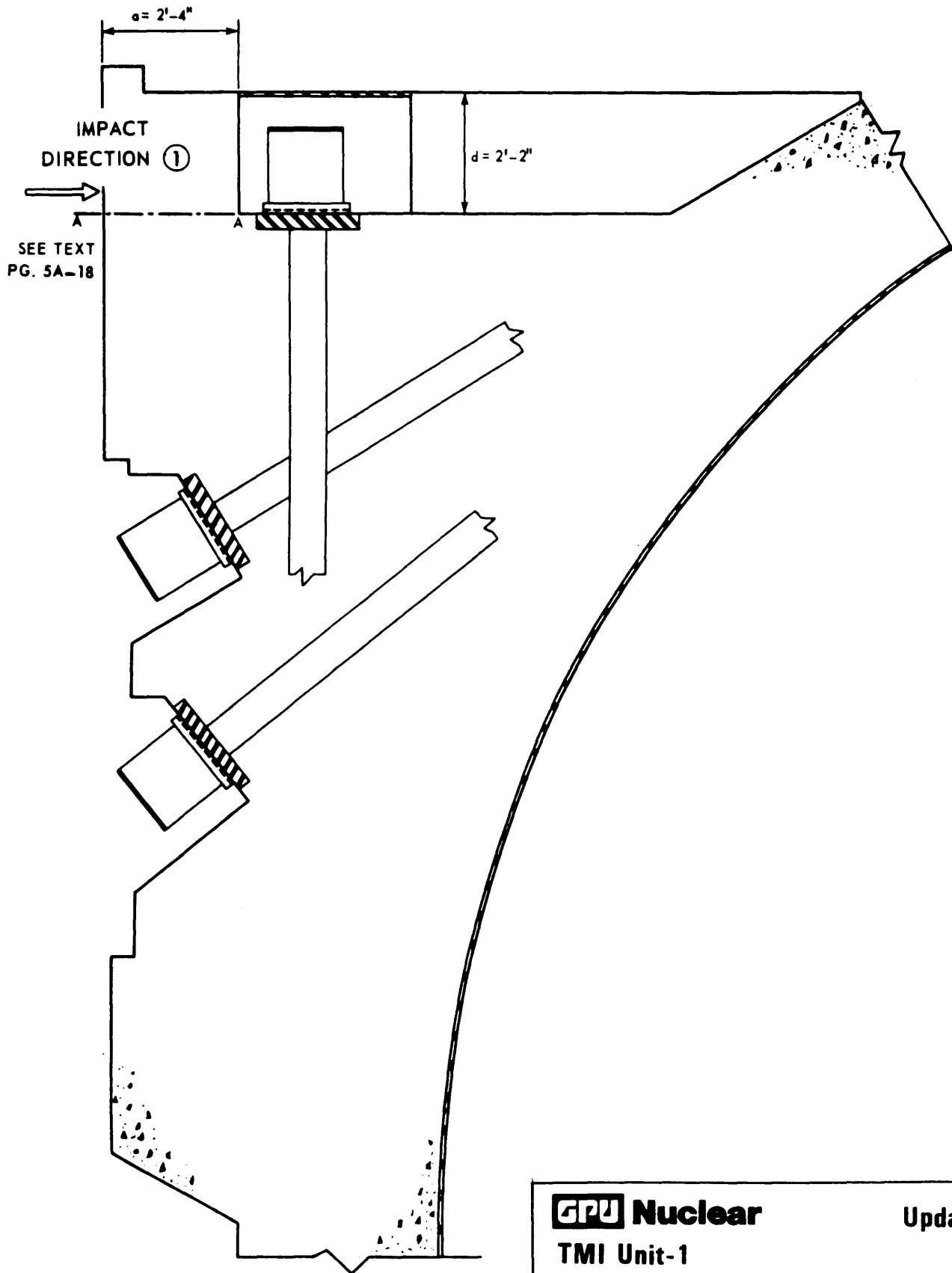
**TMI Unit-1**

**Critical Aircraft Impact-Direction 1**

**Update - 1**

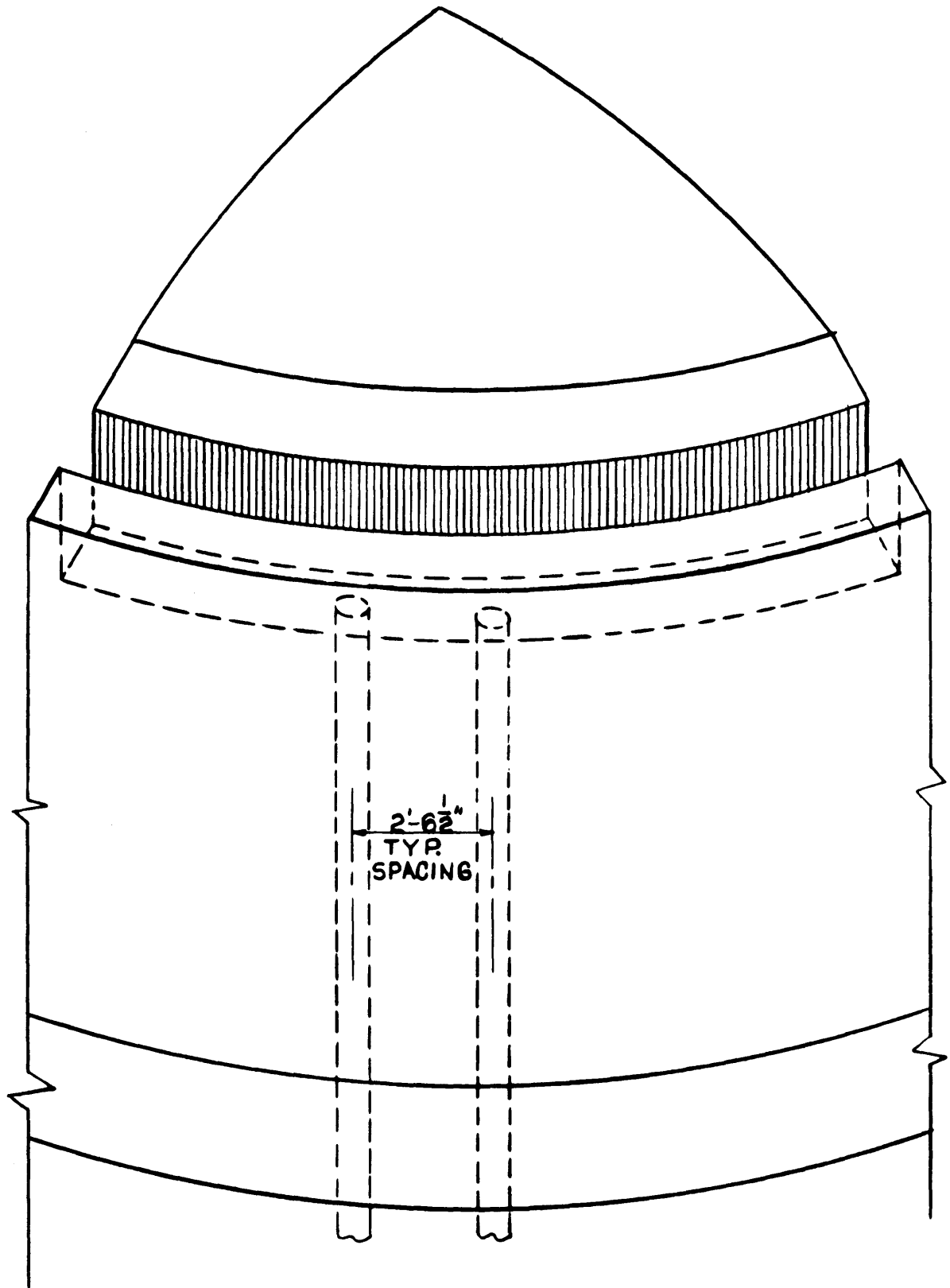
**7/82**

**Fig. 5A-26**



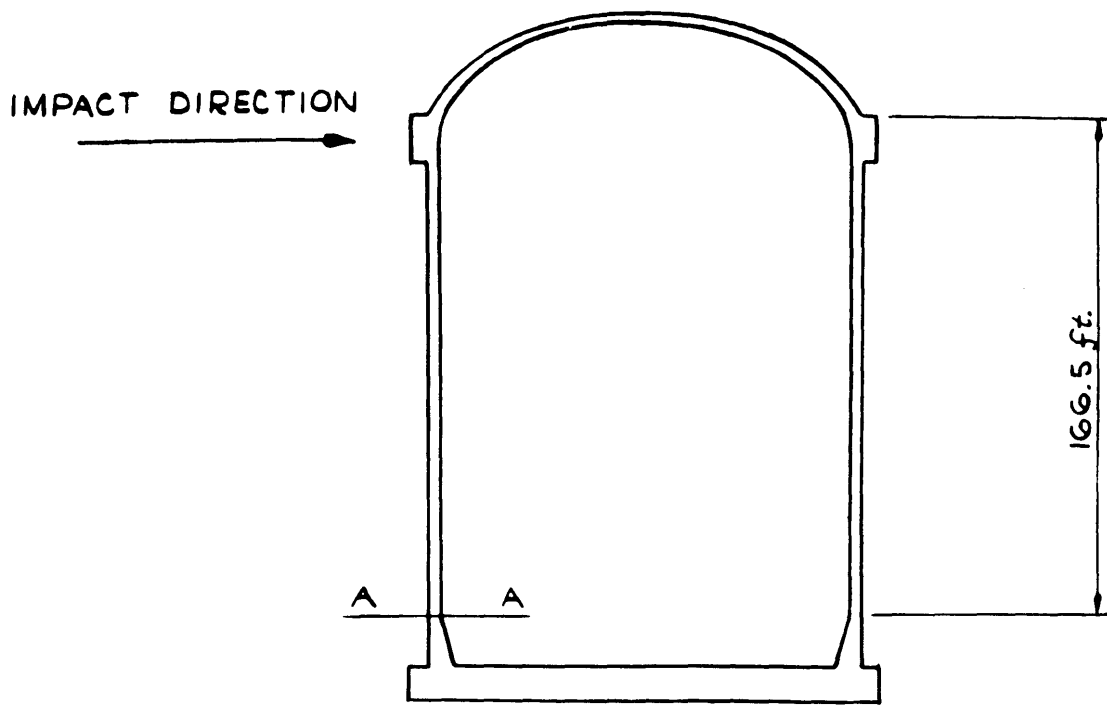
p. 5A.FIG-27

|  |           |
|--|-----------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b>                  | Update -1 |
|  | 7/82      |
| <b>Concrete Cover to Protect Against Aircraft Impact</b> |           |
| Fig. 5A-27   |           |

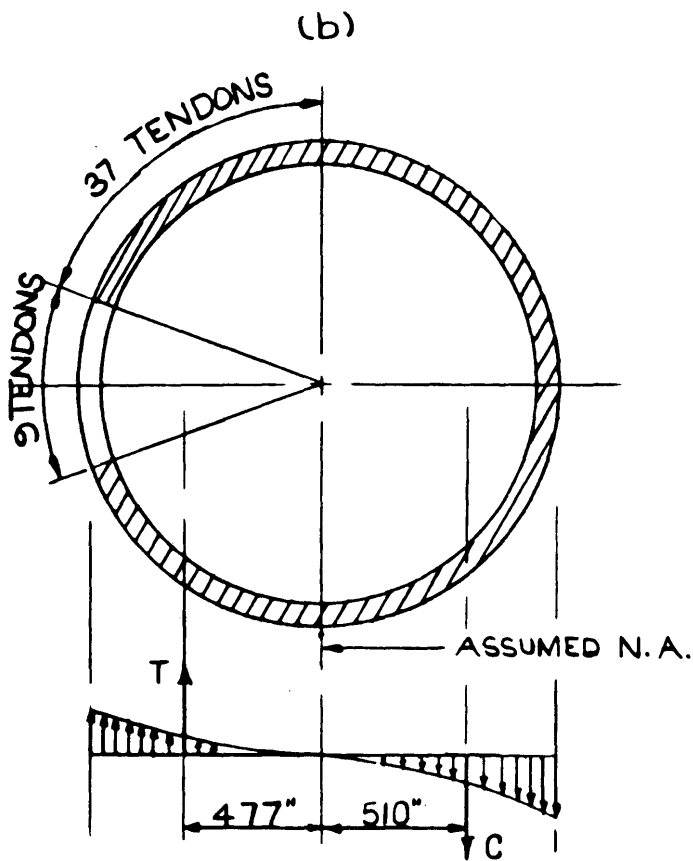


p. 5A.FIG-28

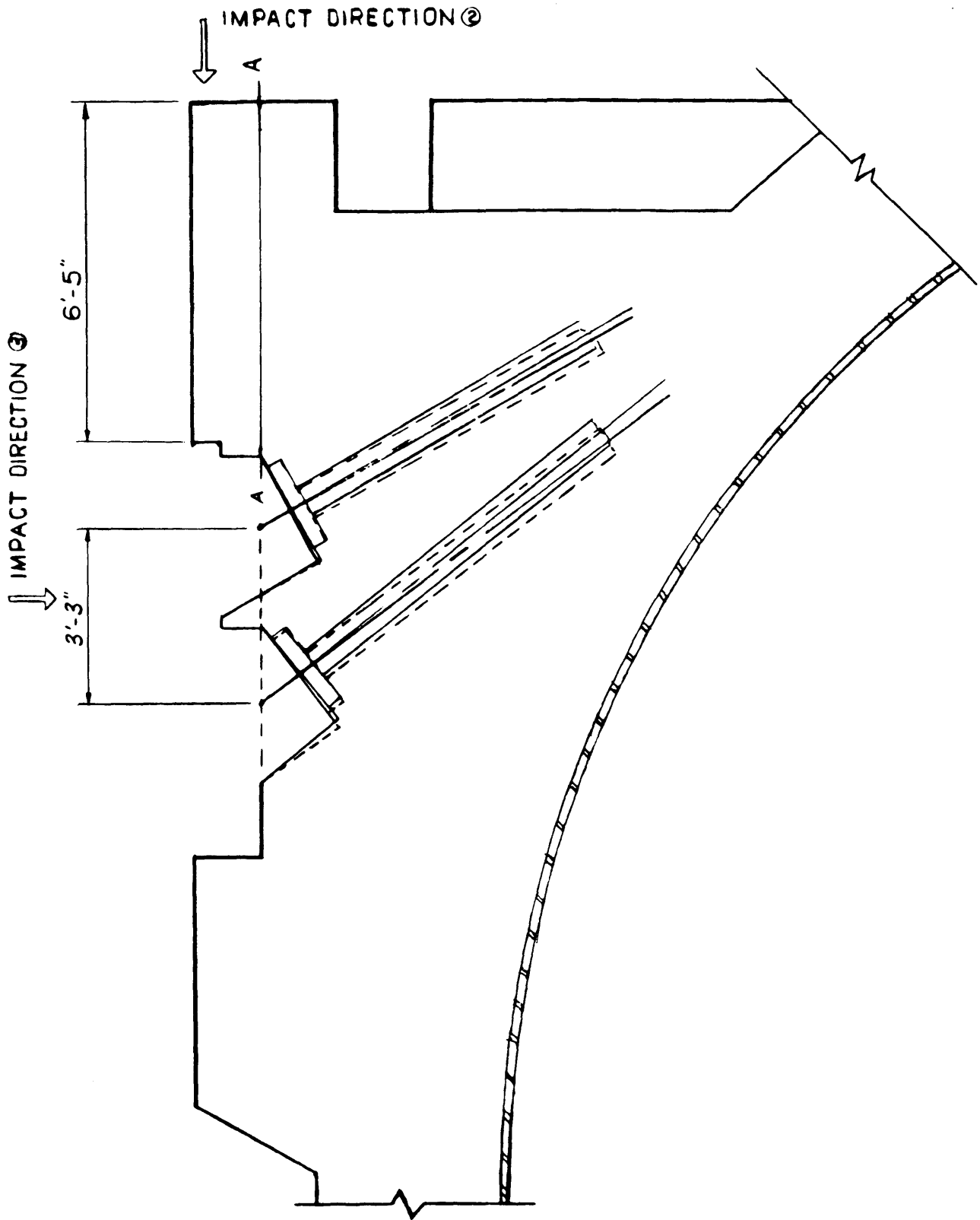
|                                  |           |
|----------------------------------|-----------|
| <b>GPU Nuclear</b><br>TMI Unit-1 | Update -1 |
|                                  | 7/82      |
| Detail of Anchor Block           |           |
| Fig. 5A-28                       |           |




(a)

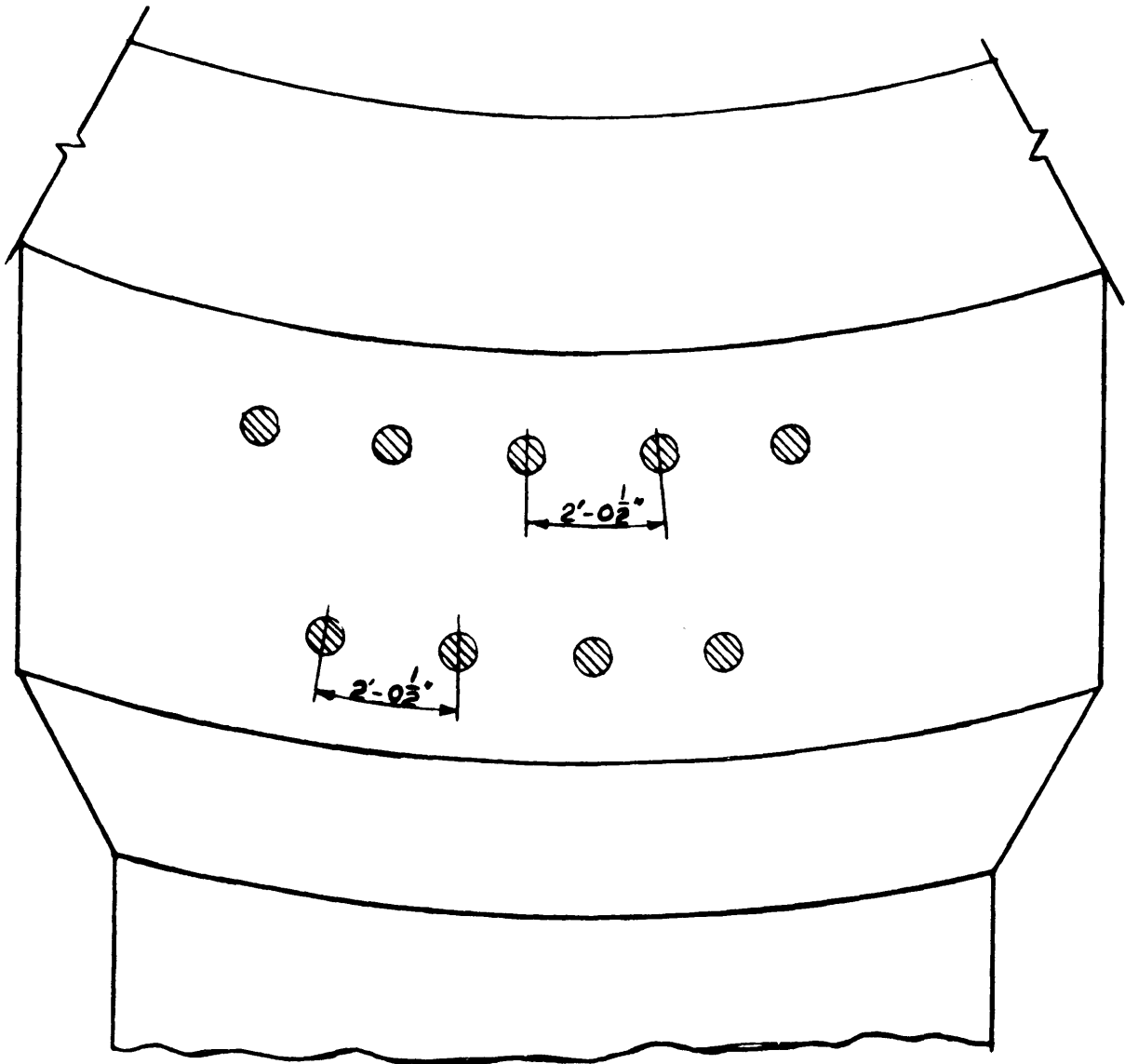


(b)




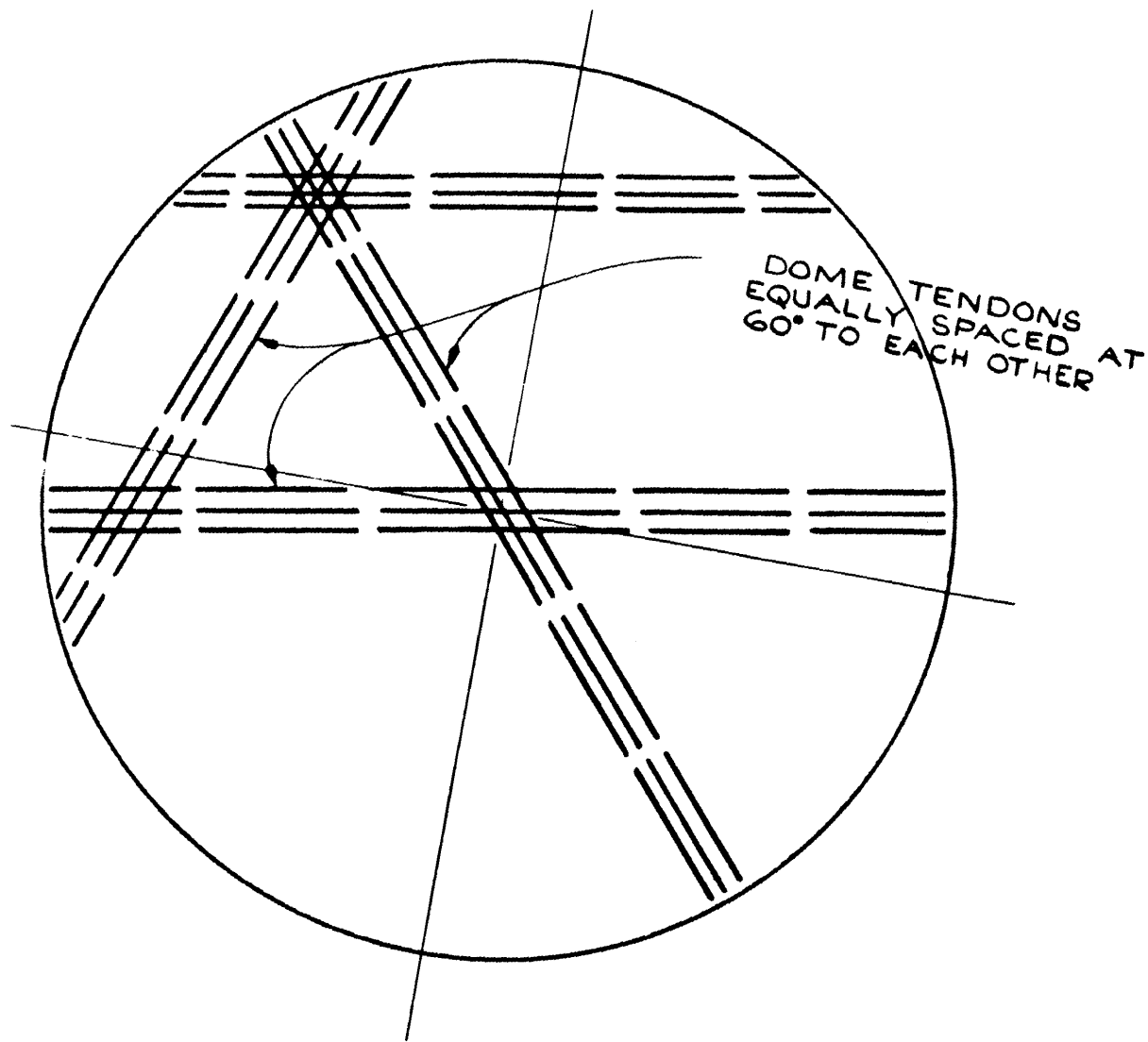
p. 5A.FIG-30

|  |   |
|--|---|
|  <b>Nuclear</b><br><b>TMI Unit-1</b> | Update - 1                                    |
|  | 7/82  |
|  | Critical Aircraft Impact - Directions 2 and 3 |
| Fig. 5A-30   |   |



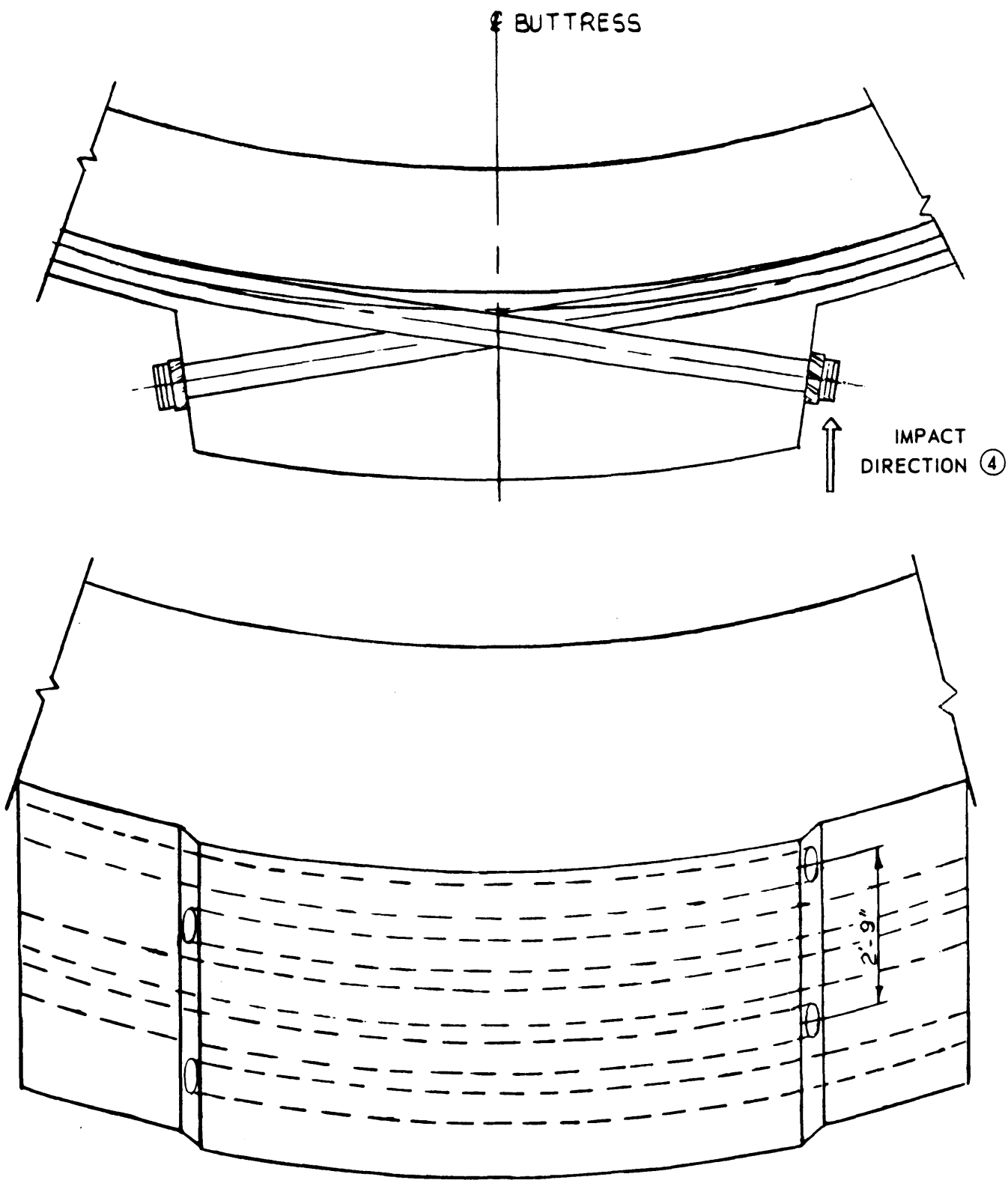
p. 5A.FIG-31

|  |           |
|--|-----------|
|  <b>Nuclear</b> | Update -1 |
| TMI Unit-1   | 7/82      |
| Equal Spacing of Roof Tendons  |           |
| Fig. 5A-31   |           |



P. 5A.FIG-32

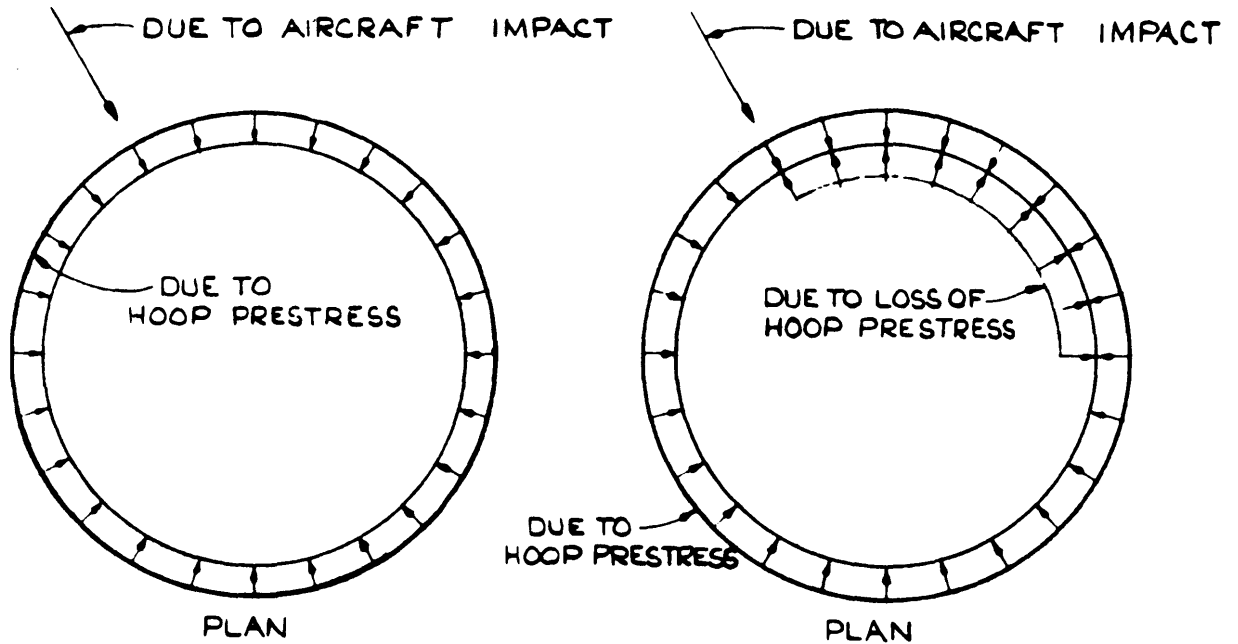
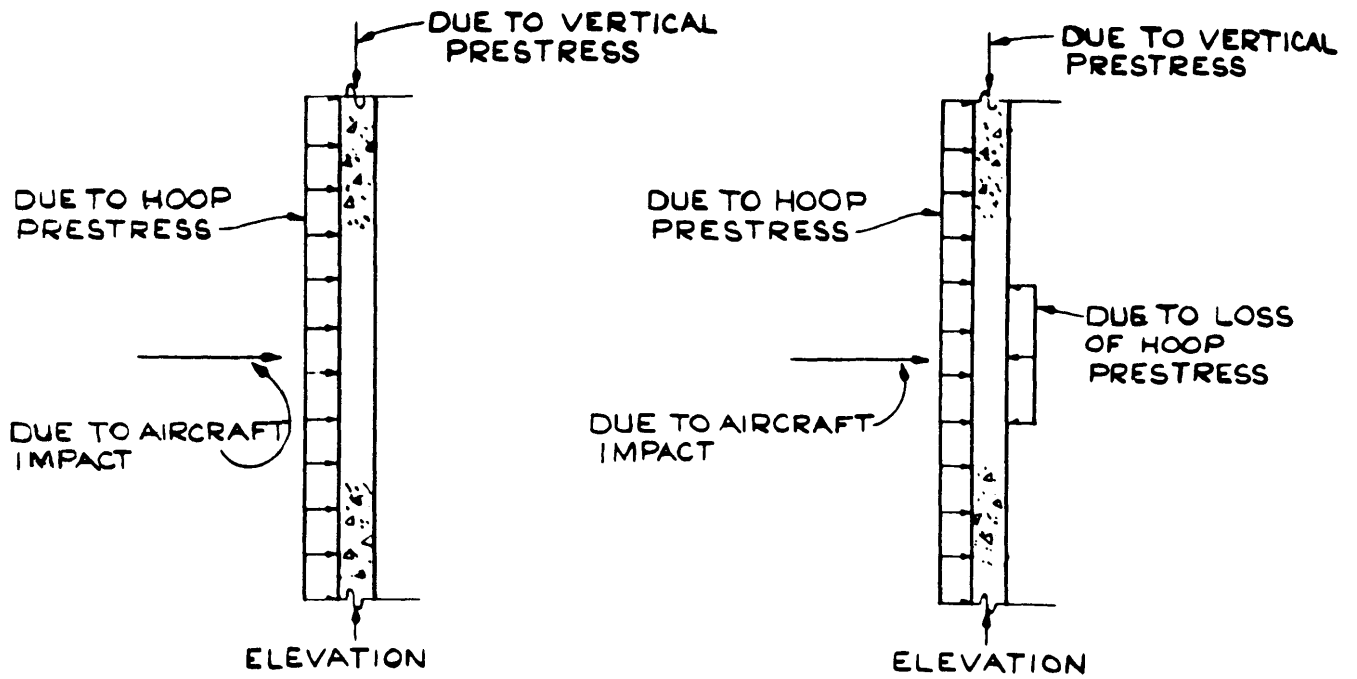
|                     |                   |
|---------------------|-------------------|
| <b>GPJ Nuclear</b>  | <b>Update -1</b>  |
| <b>TMI Unit-1</b>   | <b>7/82</b>       |
| <b>Dome Tendons</b> |                   |
|                     | <b>Fig. 5A-32</b> |



p. 5A.FIG-33

|   |                   |
|---|-------------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b> | <b>Update - 1</b> |
|   | <b>7/82</b>       |
| <b>Minimum Spacing of Hoop Tendons</b>  |                   |
| <b>Fig. 5A-33</b>                       |                   |

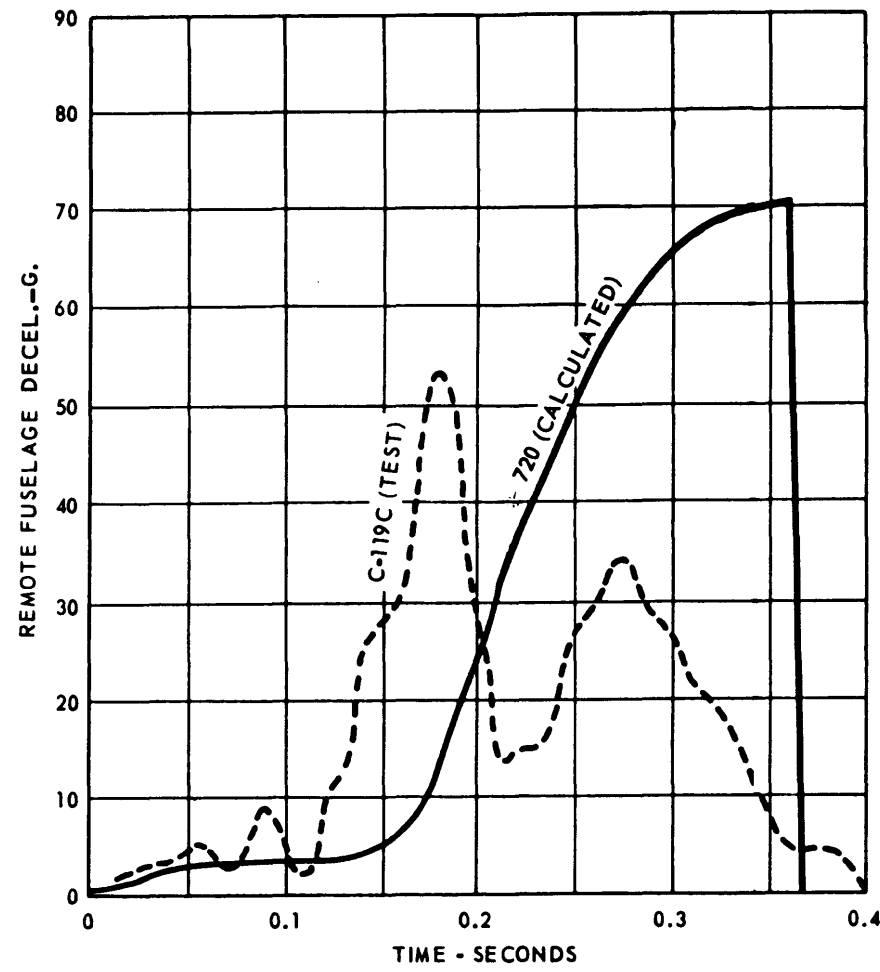
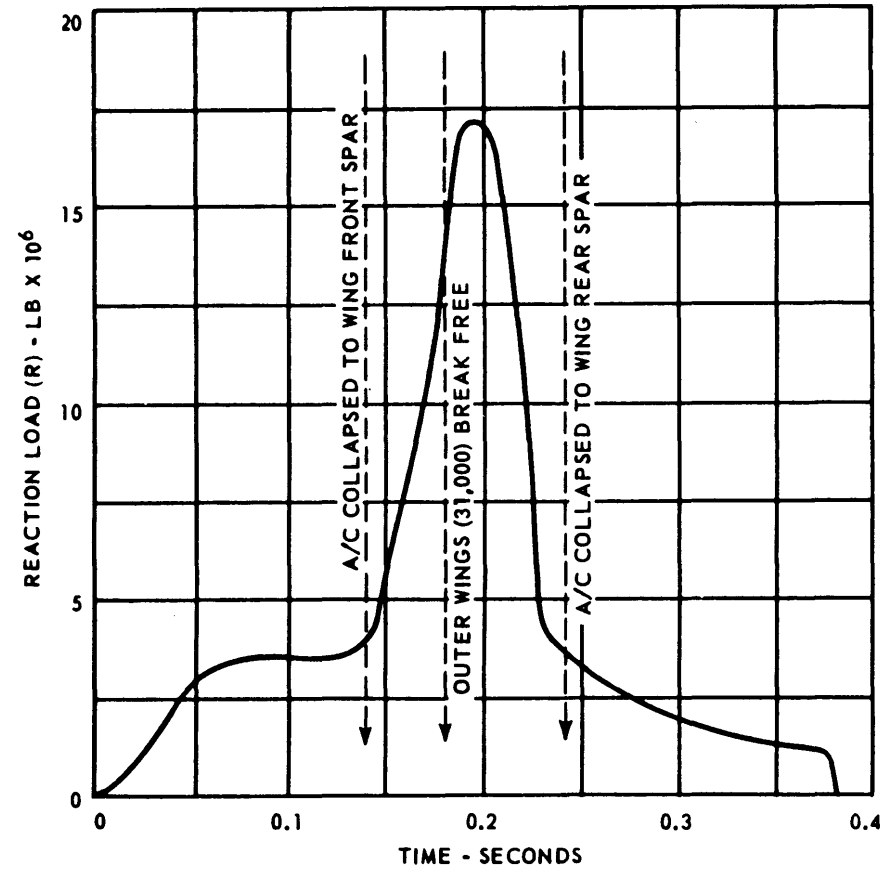
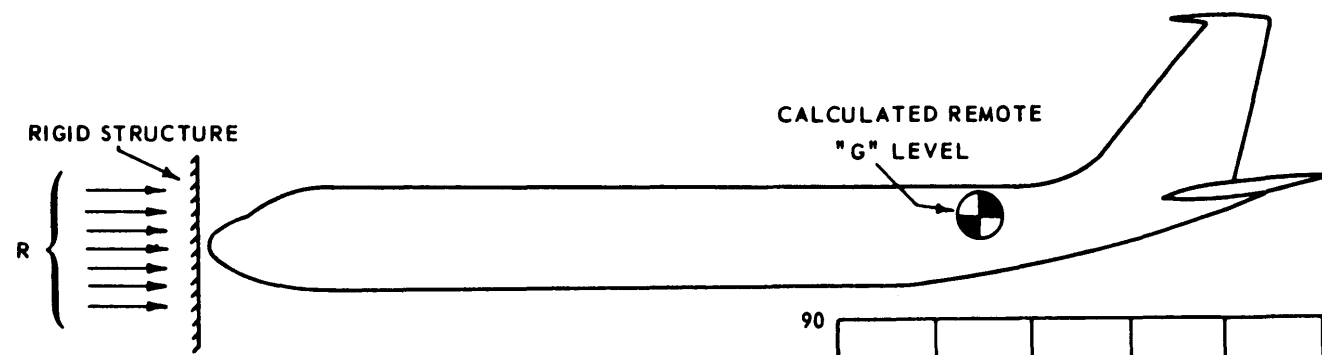




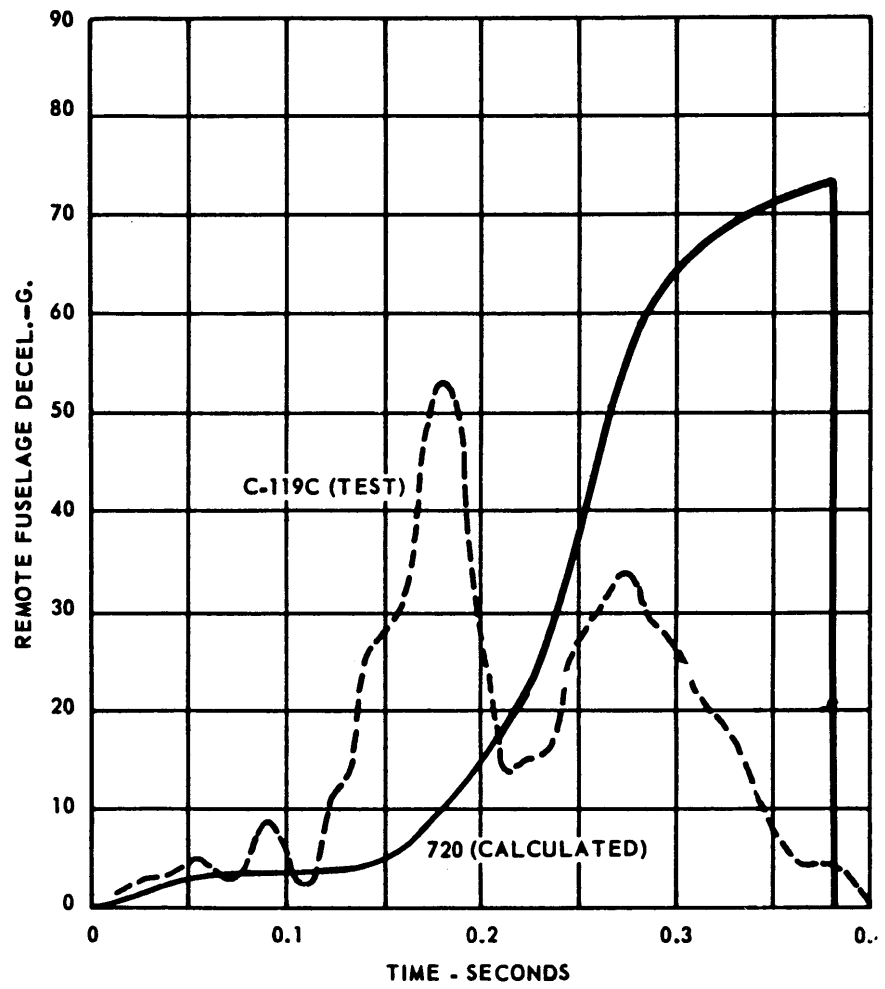
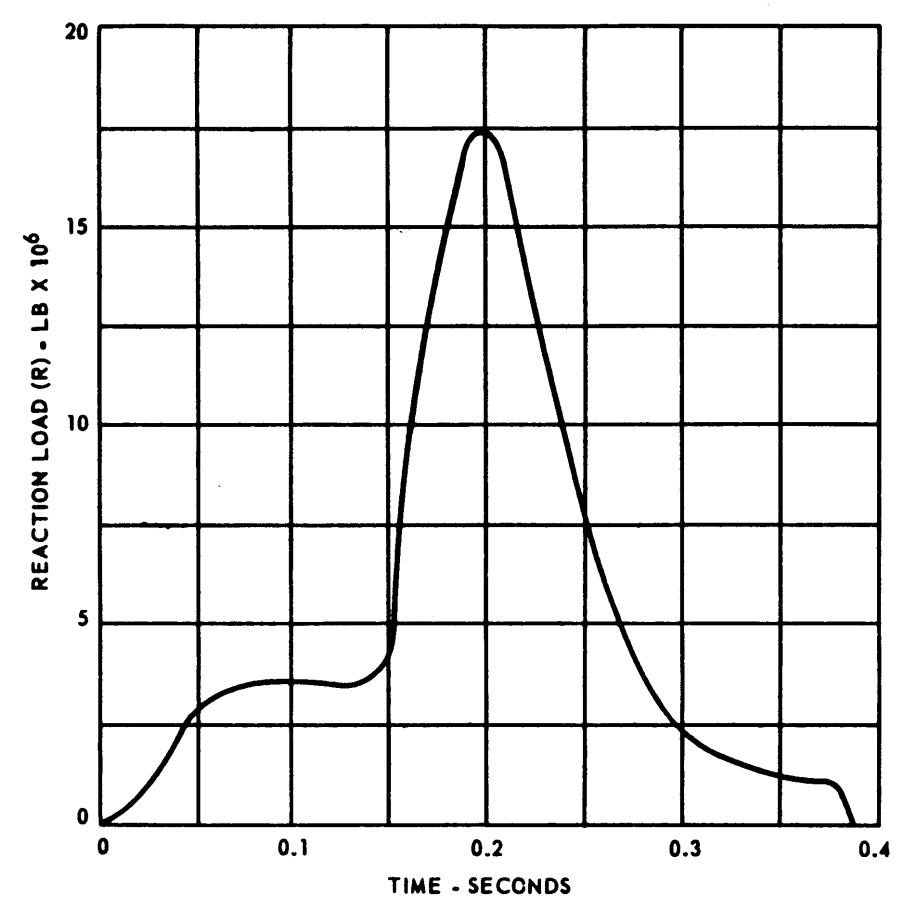
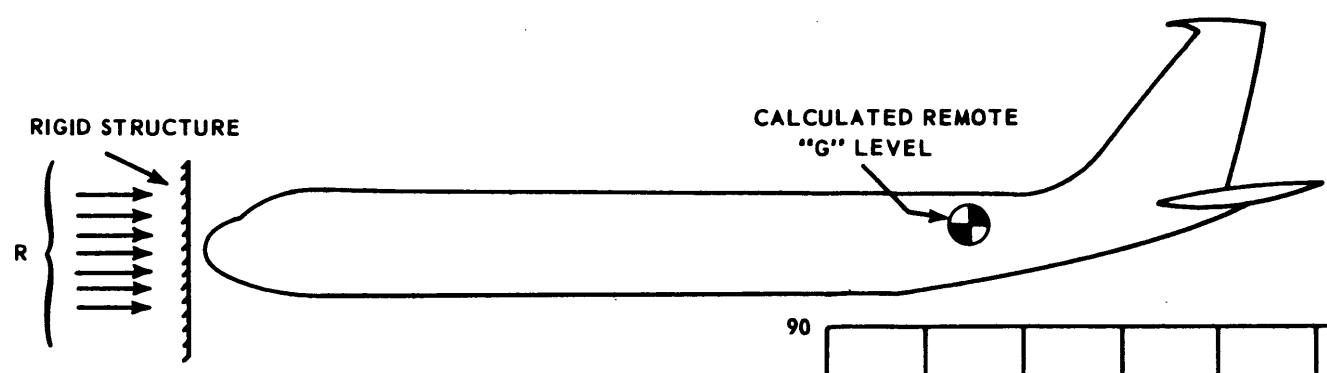
LOADING 1  
TOTAL PRESTRESS

LOADING 2  
LOSS OF HOOP PRESTRESS

|   |            |
|---|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b> | Update - 1 |
|   | 7/82       |
| <b>Comparison of Prestress Loading</b>  |            |
| <b>Fig. 5A-34</b>                       |            |

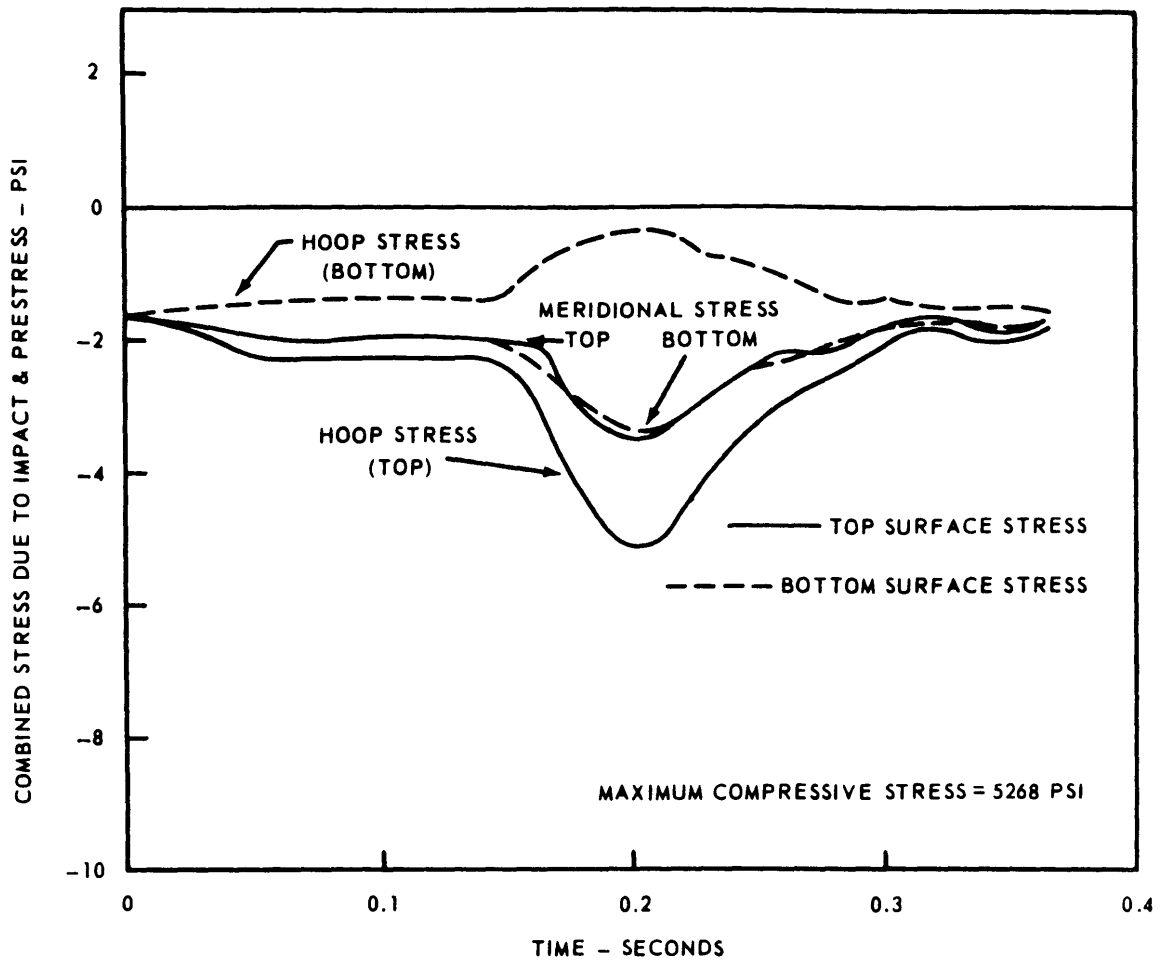


SEE TABLE 5A-6, REACTION LOAD CALCULATIONS WITH WINGS & ENGINES DETACHED



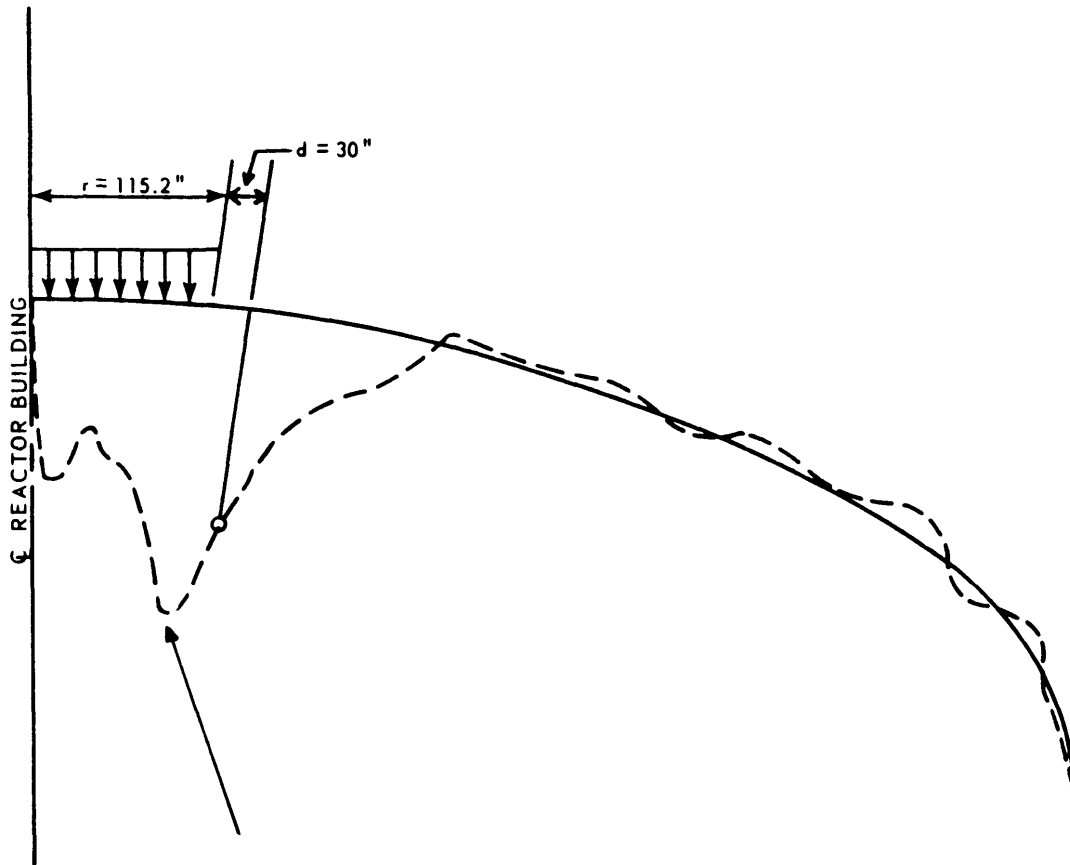
SEE TABLE 5A-7, REACTION LOAD CALCULATIONS WITH WINGS AND ENGINES ATTACHED

|  |            |
|--|------------|
| <b>GPU Nuclear</b>                                     | Update - 1 |
| <b>TMI Unit-1</b>                                      | 7/82       |
| Reaction Load and Fuselage Decel. (Calculated for 720) |            |
| Fig. 5A-36   |            |



p. 5A.FIG-37

|  |            |
|--|------------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b>                                  | Update - 1 |
|  | 7/82       |
| Hoop and Meridional Stresses at 36 Inches from the Edge of the Load Area |            |
| Fig. 5A-37   |            |



MAXIMUM AVERAGE SHEAR STRESS ACROSS SECTION = 482 PSI

SHEAR AT  $r = 145.2'' = 354$  PSI

ULTIMATE SHEAR STRESS FROM CHAPTER 26 OF ACI 318  $= v = 3.5 \sqrt{f'_c} + 0.3 f_{pc}$   
 $v = 3.5 \times 70.7 + 0.3 \times 1600 = 728$  PSI  $> 354$  PSI OK

p. 5A.FIG-38

**GPU Nuclear**

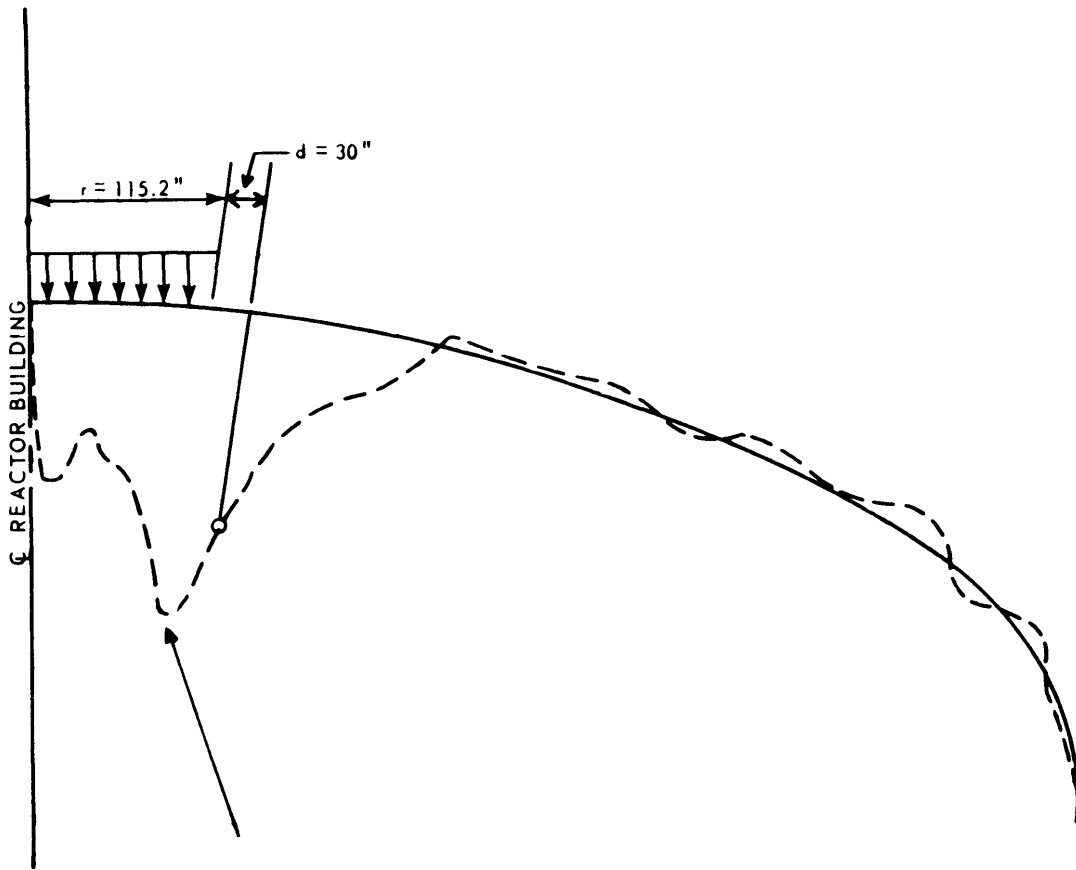
Update - 1

TMI Unit-1

7/82

Average Shear Stress in the Dome at the Time  
 $t = 0.20$  Seconds, Wing and Engines Remain Attached  
 to Fuselage

Fig. 5A-38

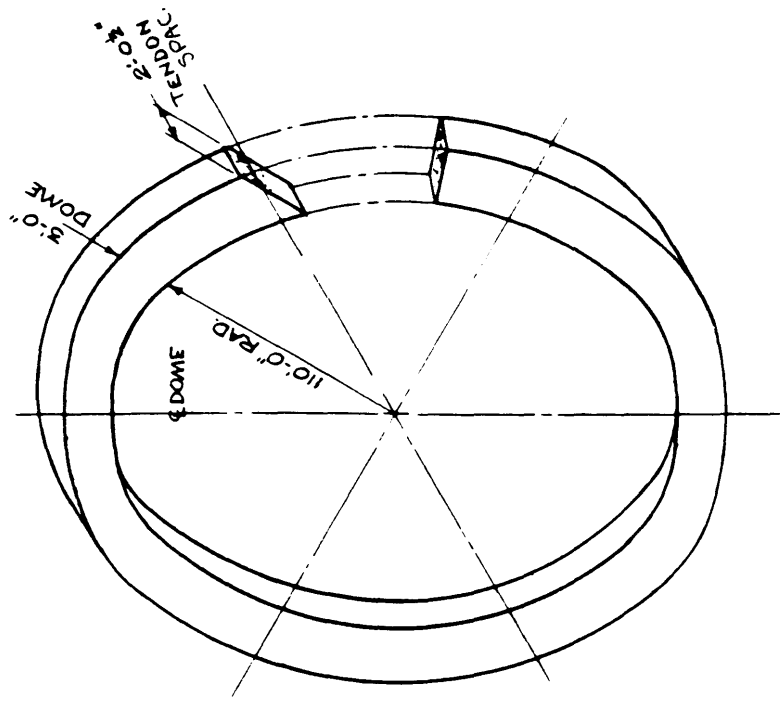


MAXIMUM AVERAGE SHEAR STRESS ACROSS SECTION = 482 PSI

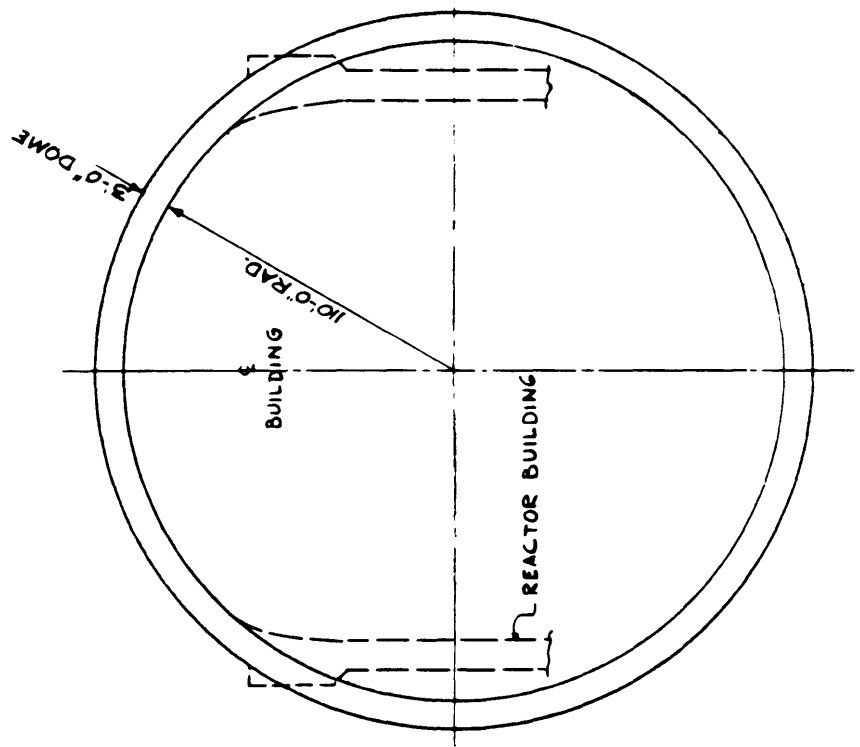
SHEAR AT  $r = 145.2'' = 354$  PSI

ULTIMATE SHEAR STRESS FROM CHAPTER 26 OF ACI 318  $= v = 3.5 \sqrt{f'_c} + 0.3 f_{pc}$


$v = 3.5 \times 70.7 + 0.3 \times 1600 = 728$  PSI  $> 354$  PSI OK

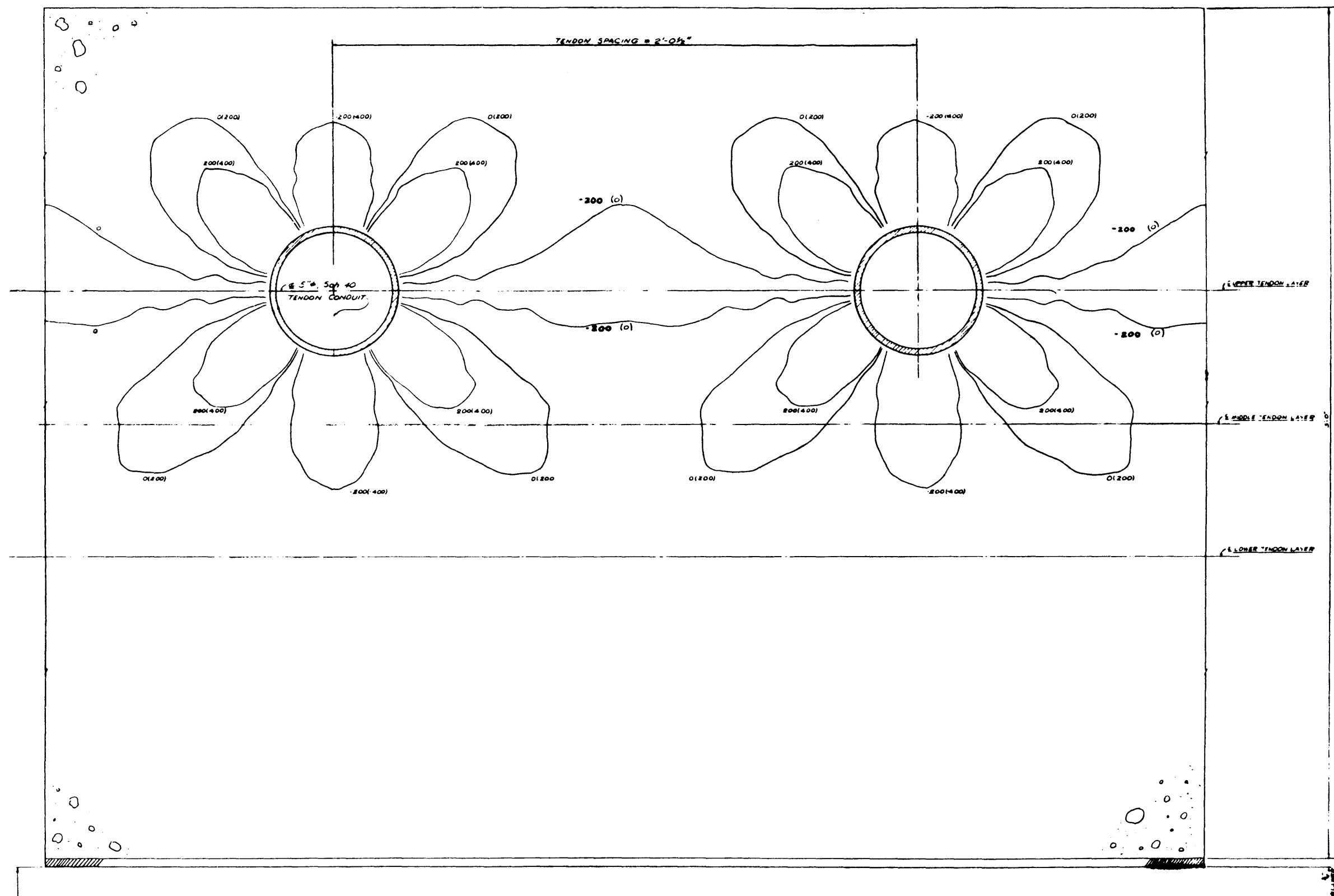


FEM - MODEL



FEM - MODEL , REACTOR BUILDING

|   |   |
|---|---|
|  <b>Nuclear</b> | Update - 1  |
|   | 7/82  |
|   | <b>TMI Unit-1</b><br><b>FEM Model-Radial Stresses Due to Prestress and Aircraft</b> |



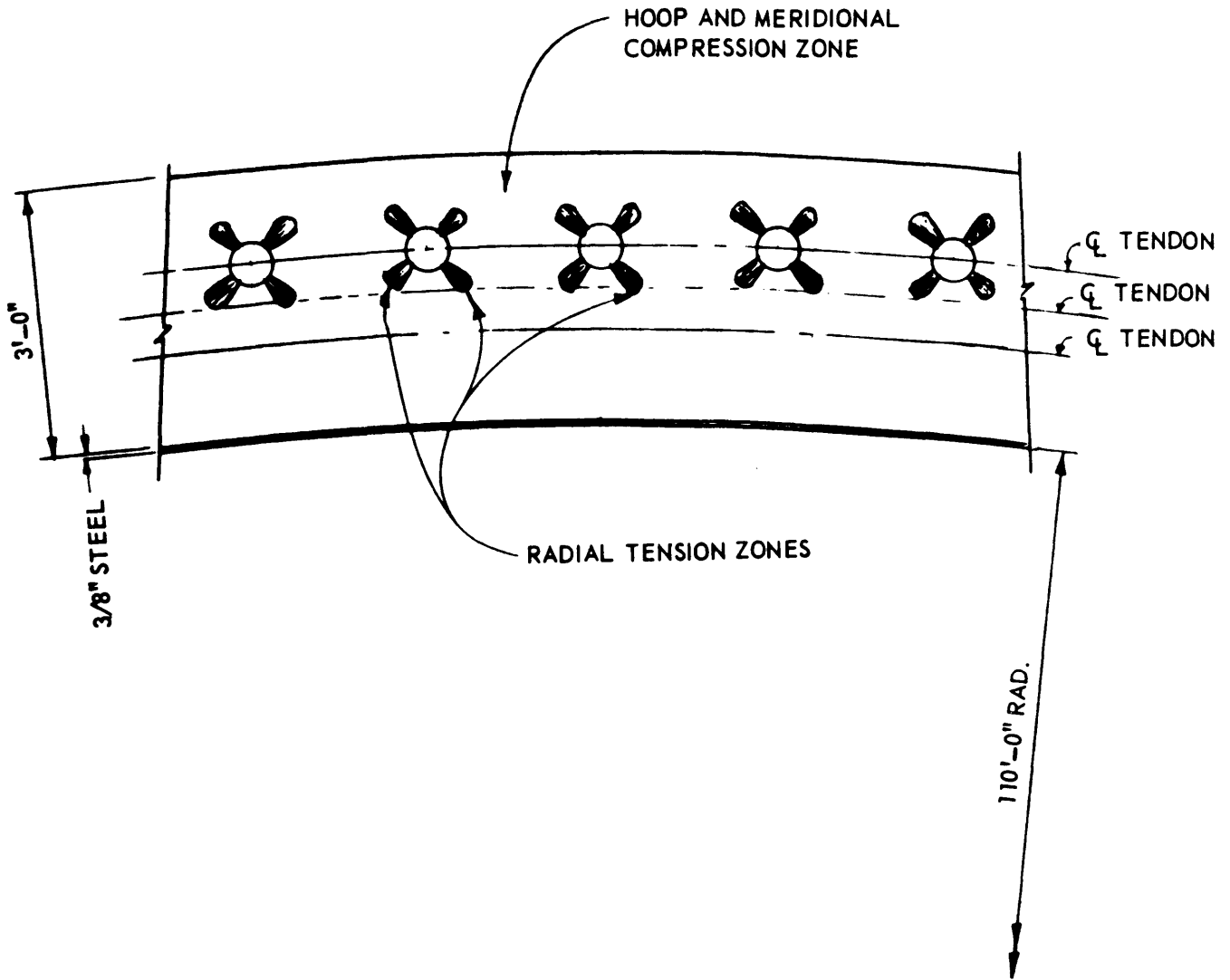
10'-0" PAD

DOME SECTION

p. 5A.FIG-41

|  |            |
|--|------------|
| <b>GPU Nuclear</b><br>TMI Unit-1                     | Update - 1 |
|  | 7/82       |
| Radial Stresses Due to Prestress and Aircraft Impact |            |
| Fig. 5A-41   |            |





p. 5A.FIG-42

|  |           |
|--|-----------|
| <b>GPU Nuclear</b><br><b>TMI Unit-1</b>                                    | Update -1 |
|  | 7/82      |
| <b>Zones in Compression or Tension Due to Prestress of Aircraft Impact</b> |           |
| <b>Fig. 5A-42</b>  |           |