Originator: S. C. Tumminelli
Date: May 25, 2001
Reissued: November 30, 2001

Appendix RL-2

BC Study - Reaction Loads

This Appendix presents reaction loads of the model for all 19 load cases. They are applicable to the soft rock and hard rock models for the boundary condition study presented in Appendix MD-3..

The first part of the calculation computes the expected forces. Input values are from Appendix AL-1. The sum of all applied loads are calculated followed by the sum of the forces at the pad/rock interface and the sum at the boundary of the rock. Since the rock is massless, the last two values are the same.

Then the databases are scanned for the same data. The first input file that processes the data is provided. This file processes data for both the soft rock and hard rock models in one execution, however, two output files are created. Then the results for the soft and hard rock analyses are provided.

A comparison of the expected forces and the forces scanned from the databases shows that the values are the same. This indicates that the analyses are in equilibrium and that, together with a review of the displacement plots, provides high confidence that the analyses are correct. The rock boundary in this analysis contains a subset of nodes referred to as "rockbot". These are all the nodes at the bottom of the rock. The forces are first output for this set of nodes to demonstrate that the vertical forces are all reacted at the bottom of the rock to insure that no vertical forces are reacted at the sides of the rock. Then the forces at the "boundary" nodes are output to demonstrate that equilibrium is maintained.

Appendix Contents

Below are the calculations that compute the expected reactions from the ANSYS analyses:

Pad Weight is 68*105*7.5*0.15 = 8032.5 Kip

Load Step 1 Gravity

Sum of Applied Loads

Fx = 0
Fy = 360000*20 = 7200000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 360000*20 + 8032500 = 15232500
Fz = 0

Load Step 2 - Apply in the North (Z) direction:

Sum of Applied Loads

Fx = 0
Fy = 267040*20 = 5340800
Fz = 515000*20 = 10300000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = = 0
Fy = 267040*20 + 0.800*8032500 = 11766800
Fz = 515000*20 + 0.808*8032500 = 16790260

Load Step 3 - Apply in the North 32.93 degrees West direction:

Sum of Applied Loads

Fx = 279961*20 = 5599220
Fy = 267040*20 = 5340800
Fz = 432258*20 = 8645160

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 279961*20 + 0.439 *8032500 = 9125488
Fy = 267040*20 + 0.800*8032500 = 11766800

Fz = 432258*20 + 0.678*8032500 = 14091195

Load Step 4 - Apply in the North 45 degrees West direction:

Sum of Applied Loads

Fx = 364160*20 = 7283200
Fy = 267040*20 = 5340800
Fz = 364160*20 = 7283200

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 364160*20 + 0.571*8032500 = 11869758
Fy = 267040*20 + 0.800*8032500 = 11766800
Fz = 364160*20 + 0.571*8032500 = 11869758

Load Step 5 - Apply in the North 57.07 degrees West direction:

Sum of Applied Loads

Fx = 432258*20 = 8645160
Fy = 267040*20 = 5340800
Fz = 279961*20 = 5599220

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 432258*20 + 0.678*8032500 = 14091195
Fy = 267040*20 + 0.800*8032500 = 11766800
Fz = 279961*20 + 0.439*8032500 = 9125488

Load Step 6 - Apply in the West direction

Sum of Applied Loads

Fx = 515000*20 = 10300000
Fy = 267040*20 = 5340800
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 515000*20 + 0.808*8032500 = 16790260
Fy = 267040*20 + 0.800*8032500 = 11766800
Fz = 0

Load Step 7 - Apply in the North direction

Sum of Applied Loads

Fx = 0
Fy = 127600*20 =2552000
Fz = 206000*20 = 4120000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 127600*20 + 0.500*8032500 = 6568250
Fz = 206000*20 + 0.424*8032500 = 7525780

Load Step 8 - Apply in the West direction:

Sum of Applied Loads

Fx = 206000*20 = 4120000
Fy = 127600*20 = 2552000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 206000*20 + 0.424*8032500 = 7525780
Fy = 127600*20 + 0.500*8032500 = 6568250
Fz = 0

Load Step 9 - Apply in the North direction:

Sum of Applied Loads

Fx = 0
Fy = 773300*20 = 15466000
Fz = 171200*20 = 3424000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 773300*20 + 1.500*8032500 = 27514750
Fz = 171200*20 + 0.424*8032500 = 6829780

Load Step 10 - Apply in the West direction:

Sum of Applied Loads

Fx = 171200*20 = 3424000
Fy = 773300*20 = 15466000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 171200*20 + 0.424*8032500 = 6829780
Fy = 773300*20 + 1.500*8032500 = 27514750
Fz = 0

Load Step 11 - Apply in the North (Z) direction:

Sum of Applied Loads

Fx = 0
Fy = 258320*20 = 5166400
Fz = 440000*20 = 8800000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 258320*20 + 0.720*8032500 = 10949800
Fz = 440000*20 + 0.894*8032500 = 15981055

Load Step 12 - Apply in the North 32.93 degrees West direction:

Sum of Applied Loads

Fx = 239190*20 = 4783800
Fy = 258320*20 = 5166400
Fz = 369308*20 = 7386160

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 239190*20 + 0.486*8032500 = 8687595
Fy = 258320*20 + 0.720*8032500 = 10949800
Fz = 369308*20 + 0.750*8032500 = 13410535

Load Step 13 - Apply in the North 45 degrees West direction:

Sum of Applied Loads

Fx = 311127*20 = 6222540
Fy = 258320*20 = 5166400
Fz = 311127*20 = 6222540

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 311127*20 + 0.632*8032500 = 11299080
Fy = 258320*20 + 0.720*8032500 = 10949800
Fz = 311127*20 + 0.632*8032500 = 11299080

Load Step 14 - Apply in the North 57.07 degrees West direction:

Sum of Applied Loads

Fx = 369308*20 = 7386160
Fy = 258320*20 = 5166400
Fz = 239190*20 = 4783800

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 369308*20 + 0.750*8032500 = 13410535
Fy = 258320*20 + 0.720*8032500 = 10949800
Fz = 239190*20 + 0.486*8032500 = 8687595

Load Step 15 - Apply in the West direction:

Sum of Applied Loads

Fx = 440000*20 = 8800000
Fy = 258320*20 = 5166400
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 440000*20 + 0.894*8032500 = 15981055
Fy = 258320*20 + 0.720*8032500 = 10949800
Fz = 0

Load Step 16 - Apply in the North direction:

Sum of Applied Loads

Fx = 0
Fy = 105800*20 = 2116000

Fz = 176000*20 = 3520000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 105800*20 + 0.300*8032500 = 4525750
Fz = 176000*20 + 0.470*8032500 = 7295275

Load Step 17 - Apply in the West direction:

Sum of Applied Loads

Fx = 176000*20 = 3520000
Fy = 105800*20 = 2116000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 176000*20 + 0.470*8032500 = 7295275
Fy = 105800*20 + 0.300*8032500 = 4525750
Fz = 0

Load Step 18 - Apply in the North direction:

Sum of Applied Loads

Fx = 0
Fy = 55600*20 = 1112000
Fz = 156000*20 = 3120000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 55600*20 + 0.300*8032500 = 3521750
Fz = 156000*20 + 0.470*8032500 = 6895275

Load Step 19 - Apply in the West direction:

Sum of Applied Loads

Fx = 156000*20 = 3120000
Fy = 55600*20 = 1112000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 156000*20 + 0.470*8032500 = 6895275
Fy = 55600*20 + 0.300*8032500 = 3521750
Fz = 0

Below is the file that scans the ANSYS database for the applied forces, the forces at the pad/rock interface and the boundary forces on the rock. It creates two output files, one for the soft rock model and one for the hard rock model.

```
/com,
/com, This routine processes load results data for the
/com,   evaluation of equilibrium.
/com
/com,   Soft Rock Load Step Results
/com
/output,padbcsoftreac,out
/com
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com
/com ************************ Soft Rock Reactions ****************************
/com
/file,dcslabs4
resume
/header,on,off,off,off,off,off
/post1
/com
/com ****************************************************************************
/com ****************************************************************************
/com ************************  LOAD CASE 1 ***********************************
set,1
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com ************************  LOAD CASE 2 ***********************************
set,2
```

```
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 3 ***********************************
set,3
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 4 ***********************************
set,4
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
```

```
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 5 ***********************************
set,5
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 6 ***********************************
set,6
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
```

```
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 7 ***********************************
set,7
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 8 ***********************************
set,8
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
```

```
/com ************************  LOAD CASE 9 ***********************************
set,9
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com ************************  LOAD CASE 10 ***********************************
set,10
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com ************************  LOAD CASE 11 ***********************************
set,11
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
```

```
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 12 ***********************************
set,12
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 13 ***********************************
set,13
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
```

```
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 14 ***********************************
set,14
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 15 ***********************************
set,15
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
```

```
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 16 ***********************************
set,16
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 17 ***********************************
set,17
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
```

```
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 18 ***********************************
set,18
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 19 ***********************************
set,19
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
```

```
/com
/com
finish
/output,padbchardreac,out
/com
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com
/com ************************ Hard Rock Reactions ****************************
/com
/file,dcslabh4
resume
/header,on,off,off,off,off,off
/post1
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 1 ***********************************
set,1
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 2 ***********************************
set,2
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
```

```
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 3 ***********************************
set,3
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 4 ***********************************
set,4
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
```

```
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 5 ***********************************
set,5
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 6 ***********************************
set,6
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
```

```
/com ************************  LOAD CASE 7 *********************************
set,7
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com ************************  LOAD CASE 8 *********************************
set,8
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com ************************  LOAD CASE 9 *********************************
set,9
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
```

```
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 10 ***********************************
set,10
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 11 ***********************************
set,11
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
```

```
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 12 ***********************************
set,12
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 13 ***********************************
set,13
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
```

```
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 14 ***********************************
set,14
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 15 ***********************************
set,15
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
```

```
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 16 ***********************************
set,16
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 17 ***********************************
set,17
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
```

```
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 18 ***********************************
set,18
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 19 ***********************************
set,19
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
cmsel,s,rockbot
fsum
cmsel,s,boundary
fsum
/com
/com
fini
/output
/exit
```

Below are the equilibrium results for the soft rock analyses:

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****************************************************************************

************************ Soft Rock Reactions ****************************


CURRENT JOBNAME REDEFINED AS dcslabs4

RESUME ANSYS DATA FROM FILE NAME=dcslabs4.db

*** ANSYS GLOBAL STATUS ***

TITLE = Pad, LTSP(4), 20 Casks, 156 Kips West (X), Max Up, Soft Rock (Ux,Uz)
ANALYSIS TYPE =  STATIC (STEADY-STATE)
NUMBER OF ELEMENT TYPES =      6
  15348 ELEMENTS CURRENTLY SELECTED.  MAX ELEMENT NUMBER =    33177
  17051 NODES CURRENTLY SELECTED.     MAX NODE NUMBER =       17051
    259 KEYPOINTS CURRENTLY SELECTED. MAX KEYPOINT NUMBER =     259
    250 LINES CURRENTLY SELECTED.     MAX LINE NUMBER =         396
    181 AREAS CURRENTLY SELECTED.     MAX AREA NUMBER =         295
     70 VOLUMES CURRENTLY SELECTED.   MAX VOL. NUMBER =          70
    12 COMPONENTS CURRENTLY DEFINED
MAXIMUM LINEAR PROPERTY NUMBER        =       5
MAXIMUM REAL CONSTANT SET NUMBER      =       6
ACTIVE COORDINATE SYSTEM              =       0  (CARTESIAN)
MAXIMUM CONSTRAINT EQUATION NUMBER    =    4620
NUMBER OF SPECIFIED CONSTRAINTS       =    1785
NUMBER OF NODAL LOADS                 =    2160
CURRENT LOAD CASE =      0 OF      0
LOAD SET    =      19
SUBSTEP     =       1
TIME/FREQ   =    19.000

INITIAL JOBNAME = dcslabs4
CURRENT JOBNAME = dcslabs4


PRINT HEADER
DO NOT PRINT SUBTITLE(S)
DO NOT PRINT LOAD STEP ID
DO NOT PRINT NOTE LINE(S)
DO NOT PRINT COLUMN HEADER LABELS
DO NOT PRINT REPORT TOTALS

***** ANSYS - ENGINEERING ANALYSIS SYSTEM  RELEASE 5.7     *****
ANSYS/Structural U
00150104          VERSION=INTEL NT      15:59:45  MAY 17, 2001 CP=      2.293
```

```
Pad, LTSP(4), 20 Casks, 156 Kips West (X), Max Up, Soft Rock (Ux,Uz)


         ***** ANSYS RESULTS INTERPRETATION (POST1) *****

ENTER   /SHOW,DEVICE-NAME  TO ENABLE GRAPHIC DISPLAY
ENTER   FINISH             TO LEAVE POST1

*** NOTE ***                                  CP=      2.293   TIME= 15:59:45
Reading results into the database (SET command) will update the current
 displacement and force boundary conditions in the database with the
 values from the results file for that load set.  Note that any
 subsequent solutions will use these values unless action is taken to
 either SAVE the current values or not overwrite them (/EXIT,NOSAVE).

********************************************************************************
********************************************************************************
************************  LOAD CASE 1 **********************************

USE LOAD STEP     1  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     1  SUBSTEP=     1  CUMULATIVE ITERATION=     4
  TIME/FREQUENCY=  1.0000
TITLE= Pad, Gravity, 20 Casks, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.5478336E-05
 FY   =   7200000.
 FZ   =  0.4073729E-04
 MX   =  0.2937600E+10
 MY   = -0.1321663E-01
 MZ   =  0.2203200E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.3366482E-05
```

```
 FY   = -0.1523250E+08
 FZ   =  0.1949664E-04
 MX   = -0.6214860E+10
 MY   = -0.3467895E-01
 MZ   = -0.4661145E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.6714364E-01
 FY   = -0.1523250E+08
 FZ   =  0.2449211
 MX   = -0.6214861E+10
 MY   =  -48.13500
 MZ   = -0.4661146E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.2933431E-05
 FY   = -0.1523250E+08
 FZ   = -0.8602593E-03
 MX   = -0.6214860E+10
 MY   =  0.2469008
 MZ   = -0.4661145E+10

SUMMATION POINT=  0.0000       0.0000       0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 2 *********************************


USE LOAD STEP     2  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     2  SUBSTEP=     1  CUMULATIVE ITERATION=    17
  TIME/FREQUENCY=  2.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips North (Z), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK
```

```
******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.2501722E-04
 FY   =    5340800.
 FZ   = -0.1030000E+08
 MX   =   0.9584964E+09
 MY   =   0.3151800E+10
 MZ   =   0.1634285E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.2630582E-05
 FY   = -0.1176680E+08
 FZ   =   0.1679026E+08
 MX   = -0.3872366E+10
 MY   = -0.5137820E+10
 MZ   = -0.3600641E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.3954542E-01
 FY   = -0.1176680E+08
 FZ   =   -858999.9
 MX   =   0.3190453E+10
 MY   =   0.2628528E+09
 MZ   = -0.3600642E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.4173972E-04
```

```
 FY   = -0.1176680E+08
 FZ   =  0.1679026E+08
 MX   = -0.3872366E+10
 MY   = -0.5137820E+10
 MZ   = -0.3600641E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*****************************************************************************
*****************************************************************************
************************** LOAD CASE 3 **********************************


USE LOAD STEP     3  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=      3  SUBSTEP=      1  CUMULATIVE ITERATION=     26
  TIME/FREQUENCY=  3.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips N 32.93 W (Z,X), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -5599220.
 FY   =   5340800.
 FZ   =  -8645160.
 MX   =  0.1154595E+10
 MY   =  0.4929901E+10
 MZ   =  0.2297792E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   9125487.
 FY   = -0.1176680E+08
 FZ   =  0.1409120E+08
 MX   = -0.4021475E+10
 MY   = -0.8035105E+10
 MZ   = -0.4105466E+10

SUMMATION POINT=  0.0000      0.0000      0.0000
```

```
ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =   -819803.7
 FY  = -0.1176680E+08
 FZ  =   -731342.3
 MX  =  0.1901121E+10
 MY  =  0.5532322E+09
 MZ  = -0.8205847E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =    9125487.
 FY  = -0.1176680E+08
 FZ  =  0.1409119E+08
 MX  = -0.4021475E+10
 MY  = -0.8035105E+10
 MZ  = -0.4105466E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 4 *********************************


USE LOAD STEP     4  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     4  SUBSTEP=     1  CUMULATIVE ITERATION=    30
  TIME/FREQUENCY=  4.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips N 45 W (Z,X), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =   -7283200.
 FY  =    5340800.
 FZ  =   -7283200.
```

```
 MX   =   0.1315987E+10
 MY   =   0.5200205E+10
 MZ   =   0.2497344E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      1 TO      1 BY     1

     9056   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1186976E+08
 FY   =  -0.1176680E+08
 FZ   =   0.1186976E+08
 MX   =  -0.4144190E+10
 MY   =  -0.8475007E+10
 MZ   =  -0.4257305E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      2 TO      2 BY     1

     1728   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT       COMPONENT ROCKBOT

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1061864.
 FY   =  -0.1176680E+08
 FZ   =   -622848.0
 MX   =   0.8413689E+09
 MY   =   0.6181537E+09
 MZ   =  -0.9592252E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1186976E+08
 FY   =  -0.1176680E+08
 FZ   =   0.1186976E+08
 MX   =  -0.4144190E+10
 MY   =  -0.8475007E+10
 MZ   =  -0.4257305E+10

SUMMATION POINT=   0.0000       0.0000       0.0000
```

```
**************************************************************************
**************************************************************************
************************  LOAD CASE 5 ***********************************

USE LOAD STEP     5  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     5  SUBSTEP=     1  CUMULATIVE ITERATION=     35
  TIME/FREQUENCY=  5.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips N 57.07 W (Z,X), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -8645160.
 FY   =    5340800.
 FZ   =   -5599220.
 MX   =   0.1515539E+10
 MY   =   0.5240587E+10
 MZ   =   0.2658736E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1409120E+08
 FY   =  -0.1176680E+08
 FZ   =    9125487.
 MX   =  -0.4296029E+10
 MY   =  -0.8541607E+10
 MZ   =  -0.4380021E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
```

```
SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1255052.
 FY   = -0.1176680E+08
 FZ   =   -484637.3
 MX   = -0.4662534E+09
 MY   =  0.6548989E+09
 MZ   = -0.1071406E+11

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1409119E+08
 FY   = -0.1176680E+08
 FZ   =    9125487.
 MX   = -0.4296029E+10
 MY   = -0.8541607E+10
 MZ   = -0.4380021E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 6 *********************************


USE LOAD STEP     6  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     6  SUBSTEP=     1  CUMULATIVE ITERATION=    43
  TIME/FREQUENCY=  6.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips West (W), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1030000E+08
 FY   =   5340800.
 FZ   =  0.2981973E-05
 MX   =  0.2179046E+10
 MY   =  0.4202400E+10
 MZ   =  0.2854835E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1
```

```
    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1679026E+08
 FY   =  -0.1176680E+08
 FZ   =   0.3548767E-05
 MX   =  -0.4800854E+10
 MY   =  -0.6850426E+10
 MZ   =  -0.4529129E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1485800.
 FY   =  -0.1176680E+08
 FZ   =   -22.39711
 MX   =  -0.4800871E+10
 MY   =   0.6061995E+09
 MZ   =  -0.1207753E+11

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1679026E+08
 FY   =  -0.1176680E+08
 FZ   =  -0.3722327E-03
 MX   =  -0.4800854E+10
 MY   =  -0.6850426E+10
 MZ   =  -0.4529129E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


********************************************************************************
********************************************************************************
************************  LOAD CASE 7 ********************************
```

```
USE LOAD STEP     7  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     7  SUBSTEP=     1  CUMULATIVE ITERATION=    55
  TIME/FREQUENCY=  7.0000
TITLE= Pad, HE(1), 20 Casks, 206 Kips North (z), Max Up, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.7493209E-06
 FY   =   2552000.
 FZ   =  -4120000.
 MX   =  0.5529960E+09
 MY   =  0.1260720E+10
 MZ   =  0.7809120E+09

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1114251E-04
 FY   =  -6568250.
 FZ   =   7525780.
 MX   = -0.2344886E+10
 MY   = -0.2302889E+10
 MZ   = -0.2009884E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -1.424059
 FY   =  -6568250.
 FZ   =  -361308.9
 MX   =  0.7888639E+09
```

```
 MY   =  0.1105617E+09
 MZ   = -0.2009884E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.2053417E-04
 FY   =  -6568250.
 FZ   =   7525780.
 MX   = -0.2344886E+10
 MY   = -0.2302889E+10
 MZ   = -0.2009884E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 8 *********************************


USE LOAD STEP     8  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     8  SUBSTEP=     1  CUMULATIVE ITERATION=    64
  TIME/FREQUENCY=  8.0000
TITLE= Pad, HE(1), 20 Casks, 206 Kips West (X), Max Up, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -4120000.
 FY   =   2552000.
 FZ   = -0.3471123E-04
 MX   =  0.1041216E+10
 MY   =  0.1680960E+10
 MZ   =  0.1269132E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    7525780.
 FY   =   -6568250.
 FZ   = -0.3022093E-04
 MX   = -0.2679846E+10
 MY   = -0.3070518E+10
 MZ   = -0.2344844E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -633012.8
 FY   =   -6568250.
 FZ   =   -2.284733
 MX   = -0.2679859E+10
 MY   =  0.2582665E+09
 MZ   = -0.5698043E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    7525780.
 FY   =   -6568250.
 FZ   = -0.8626838E-04
 MX   = -0.2679846E+10
 MY   = -0.3070518E+10
 MZ   = -0.2344844E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 9 *********************************


USE LOAD STEP     9  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     9  SUBSTEP=     1  CUMULATIVE ITERATION=    70
  TIME/FREQUENCY=  9.0000
TITLE= Pad, HE(3), 20 Casks, 171.2 Kips North (Z), Max Dn, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.
```

```
SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1182885E-04
 FY   =  0.1546600E+08
 FZ   =  -3424000.
 MX   =  0.5904384E+10
 MY   =  0.1047744E+10
 MZ   =  0.4732596E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.3875168E-04
 FY   = -0.2751475E+08
 FZ   =   6829780.
 MX   = -0.1097353E+11
 MY   = -0.2089913E+10
 MZ   = -0.8419514E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.5707517
 FY   = -0.2751475E+08
 FZ   =  -312958.4
 MX   = -0.8158818E+10
 MY   =  0.9576395E+08
 MZ   = -0.8419520E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1307185E-04
 FY   = -0.2751475E+08
 FZ   =   6829780.
 MX   = -0.1097353E+11
 MY   = -0.2089913E+10
 MZ   = -0.8419514E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 10 ********************************

USE LOAD STEP    10  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    10  SUBSTEP=     1  CUMULATIVE ITERATION=    73
  TIME/FREQUENCY=  10.000
TITLE= Pad, HE(3), 20 Casks, 171.2 Kips West (X), Max Dn, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -3424000.
 FY   =  0.1546600E+08
 FZ   = -0.5381182E-04
 MX   =  0.6310128E+10
 MY   =  0.1396992E+10
 MZ   =  0.5138340E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   6829780.
 FY   = -0.2751475E+08
 FZ   = -0.1474256E-03
 MX   = -0.1122602E+11
 MY   = -0.2786550E+10
 MZ   = -0.8671997E+10
```

```
 SUMMATION POINT=  0.0000       0.0000       0.0000

 ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

     1728  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

 ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

 SELECT       COMPONENT ROCKBOT

 ***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
  FX   =   -554457.1
  FY   = -0.2751475E+08
  FZ   =   0.1624745
  MX   = -0.1122604E+11
  MY   =  0.2262180E+09
  MZ   = -0.1168741E+11

 SUMMATION POINT=  0.0000       0.0000       0.0000

 SELECT       COMPONENT BOUNDARY

 ***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
  FX   =    6829780.
  FY   = -0.2751475E+08
  FZ   = -0.2112467E-02
  MX   = -0.1122602E+11
  MY   = -0.2786550E+10
  MZ   = -0.8671997E+10

 SUMMATION POINT=  0.0000       0.0000       0.0000


 ********************************************************************************
 ********************************************************************************
 ************************  LOAD CASE 11 *********************************


 USE LOAD STEP     11  SUBSTEP      0  FOR LOAD CASE 0

 SET COMMAND GOT LOAD STEP=     11  SUBSTEP=      1  CUMULATIVE ITERATION=     85
   TIME/FREQUENCY=  11.000
 TITLE= Pad, LTSP(2), 20 Casks, 440 Kips North (Z), Soft Rock (Ux,Uz)

    15348  ELEMENTS (OF     15348  DEFINED) SELECTED BY  EALL  COMMAND.

 SELECT       COMPONENT CASK

 ******** SUM OF LOADS APPLIED TO CASKS *******

 ***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
  FX   = -0.2045400E-05
```

```
 FY  =    5166400.
 FZ  =   -8800000.
 MX  =   0.1065091E+10
 MY  =   0.2692800E+10
 MZ  =   0.1580918E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  = -0.2181561E-04
 FY  = -0.1094980E+08
 FZ  =  0.1598106E+08
 MX  = -0.3747866E+10
 MY  = -0.4890203E+10
 MZ  = -0.3350639E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  = -0.3824719E-01
 FY  = -0.1094980E+08
 FZ  =  -759131.3
 MX  =  0.2932983E+10
 MY  =  0.2322931E+09
 MZ  = -0.3350639E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  = -0.1926718E-04
 FY  = -0.1094980E+08
 FZ  =  0.1598105E+08
 MX  = -0.3747866E+10
 MY  = -0.4890203E+10
 MZ  = -0.3350639E+10
```

```
SUMMATION POINT=  0.0000       0.0000       0.0000


*****************************************************************************
*****************************************************************************
************************  LOAD CASE 12 **********************************


USE LOAD STEP     12  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     12  SUBSTEP=      1  CUMULATIVE ITERATION=     94
  TIME/FREQUENCY=  12.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips N 32.93 W (Z,X), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -4783800.
 FY   =    5166400.
 FZ   =   -7386160.
 MX   =   0.1232631E+10
 MY   =   0.4211955E+10
 MZ   =   0.2147799E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    8687595.
 FY   =  -0.1094980E+08
 FZ   =   0.1341054E+08
 MX   =  -0.3863355E+10
 MY   =  -0.7648162E+10
 MZ   =  -0.3741848E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1
```

```
    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =  -741388.9
 FY  = -0.1094980E+08
 FZ  =  -645512.6
 MX  =  0.1738762E+10
 MY  =  0.4963783E+09
 MZ  = -0.7617650E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =   8687595.
 FY  = -0.1094980E+08
 FZ  =  0.1341053E+08
 MX  = -0.3863355E+10
 MY  = -0.7648162E+10
 MZ  = -0.3741848E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



*******************************************************************************
*******************************************************************************
************************  LOAD CASE 13 ********************************


USE LOAD STEP    13  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    13  SUBSTEP=     1  CUMULATIVE ITERATION=    98
  TIME/FREQUENCY=  13.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips N 45 W (Z,X), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =  -6222540.
 FY  =   5166400.
 FZ  =  -6222540.
 MX  =  0.1370520E+10
```

```
 MY   =   0.4442894E+10
 MZ   =   0.2318289E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

     9056  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1129908E+08
 FY   =  -0.1094980E+08
 FZ   =   0.1129908E+08
 MX   =  -0.3958592E+10
 MY   =  -0.8067543E+10
 MZ   =  -0.3859565E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

     1728  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT       COMPONENT ROCKBOT

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -960571.7
 FY   =  -0.1094980E+08
 FZ   =   -549596.5
 MX   =   0.7584491E+09
 MY   =   0.5558539E+09
 MZ   =  -0.8902014E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1129908E+08
 FY   =  -0.1094980E+08
 FZ   =   0.1129908E+08
 MX   =  -0.3958592E+10
 MY   =  -0.8067543E+10
 MZ   =  -0.3859566E+10

SUMMATION POINT=   0.0000       0.0000       0.0000
```

```
*****************************************************************************
*****************************************************************************
*************************  LOAD CASE 14 *************************************

USE LOAD STEP     14   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     14   SUBSTEP=      1   CUMULATIVE ITERATION=    102
  TIME/FREQUENCY=  14.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips N 57.03 W (Z,X), Soft Rock (Ux,Uz)

   15348   ELEMENTS (OF     15348   DEFINED) SELECTED BY   EALL   COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -7386160.
 FY   =    5166400.
 FZ   =   -4783800.
 MX   =   0.1541011E+10
 MY   =   0.4477396E+10
 MZ   =   0.2456178E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE   FROM      1 TO      1 BY     1

    9056   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1341054E+08
 FY   =  -0.1094980E+08
 FZ   =    8687595.
 MX   =  -0.4076309E+10
 MY   =  -0.8129902E+10
 MZ   =  -0.3954802E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE   FROM      2 TO      2 BY     1

    1728   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
```

```
SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1135628.
 FY   = -0.1094980E+08
 FZ   =   -427034.0
 MX   = -0.4521659E+09
 MY   =  0.5899621E+09
 MZ   = -0.9940667E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1341053E+08
 FY   = -0.1094980E+08
 FZ   =    8687595.
 MX   = -0.4076309E+10
 MY   = -0.8129902E+10
 MZ   = -0.3954802E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



********************************************************************************
********************************************************************************
*************************  LOAD CASE 15 ********************************


USE LOAD STEP    15  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    15  SUBSTEP=     1  CUMULATIVE ITERATION=   110
  TIME/FREQUENCY=  15.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips West (X), Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -8800000.
 FY   =    5166400.
 FZ   =  0.6257367E-05
 MX   =  0.2107891E+10
 MY   =  0.3590400E+10
 MZ   =  0.2623718E+10
```

```
SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1598106E+08
 FY   = -0.1094980E+08
 FZ   = -0.2169652E-05
 MX   = -0.4467518E+10
 MY   = -0.6520270E+10
 MZ   = -0.4070291E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -1345166.
 FY   = -0.1094980E+08
 FZ   =  -1.995697
 MX   = -0.4467521E+10
 MY   =  0.5488256E+09
 MZ   = -0.1120459E+11

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1598105E+08
 FY   = -0.1094980E+08
 FZ   = -0.2190985E-03
 MX   = -0.4467518E+10
 MY   = -0.6520270E+10
 MZ   = -0.4070291E+10

SUMMATION POINT=  0.0000      0.0000      0.0000
```

```
*****************************************************************************
*****************************************************************************
************************** LOAD CASE 16 **********************************


USE LOAD STEP     16  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     16  SUBSTEP=      1  CUMULATIVE ITERATION=    123
  TIME/FREQUENCY=  16.000
TITLE= Pad, LTSP(2), 20 Casks, 176 Kips North (Z), Max Up, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.7245306E-05
 FY   =    2116000.
 FZ   =   -3520000.
 MX   =   0.4462080E+09
 MY   =   0.1077120E+10
 MZ   =   0.6474960E+09

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.6830181E-05
 FY   =   -4525750.
 FZ   =    7295275.
 MX   = -0.1599273E+10
 MY   = -0.2232354E+10
 MZ   = -0.1384880E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT       COMPONENT ROCKBOT
```

```
***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1.676150
 FY   =   -4525750.
 FZ   =   -316512.3
 MX   =   0.1431937E+10
 MY   =   0.9685302E+08
 MZ   =  -0.1384879E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -0.3840997E-05
 FY   =   -4525750.
 FZ   =    7295275.
 MX   =  -0.1599273E+10
 MY   =  -0.2232354E+10
 MZ   =  -0.1384880E+10

SUMMATION POINT=   0.0000       0.0000       0.0000



********************************************************************************
********************************************************************************
*************************  LOAD CASE 17 ********************************

USE LOAD STEP     17  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     17  SUBSTEP=      1  CUMULATIVE ITERATION=    136
  TIME/FREQUENCY=  17.000
TITLE= Pad, LTSP(2), 20 Casks, 176 Kips West (X), Max Up, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF     15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -3520000.
 FY   =    2116000.
 FZ   =   0.1808066E-06
 MX   =   0.8633280E+09
 MY   =   0.1436160E+10
 MZ   =   0.1064616E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1
```

```
    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =    7295275.
 FY  =   -4525750.
 FZ  = -0.8801072E-05
 MX  = -0.1846506E+10
 MY  = -0.2976472E+10
 MZ  = -0.1632112E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =   -579413.8
 FY  =   -4525750.
 FZ  =   -5.249667
 MX  = -0.1846508E+10
 MY  =  0.2363989E+09
 MZ  = -0.4865238E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =    7295275.
 FY  =   -4525750.
 FZ  = -0.1770460E-04
 MX  = -0.1846506E+10
 MY  = -0.2976472E+10
 MZ  = -0.1632112E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

********************************************************************************
********************************************************************************
************************  LOAD CASE 18 ********************************
```

```
USE LOAD STEP    18  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    18  SUBSTEP=     1  CUMULATIVE ITERATION=   151
  TIME/FREQUENCY=  18.000
TITLE= Pad, LTSP(4), 20 Casks, 156 Kips North (Z), Max Up, Soft Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.7457038E-07
 FY   =   1112000.
 FZ   =  -3120000.
 MX   =  0.8397600E+08
 MY   =  0.9547200E+09
 MZ   =  0.3402720E+09

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.3268483E-05
 FY   =  -3521750.
 FZ   =   6895275.
 MX   = -0.1237041E+10
 MY   = -0.2109954E+10
 MZ   = -0.1077656E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -1.208784
 FY   =  -3521750.
```

```
 FZ   =   -285414.0
 MX   =   0.1621974E+10
 MY   =   0.8733711E+08
 MZ   =  -0.1077653E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.2974413E-05
 FY   =   -3521750.
 FZ   =    6895275.
 MX   =  -0.1237041E+10
 MY   =  -0.2109954E+10
 MZ   =  -0.1077656E+10

SUMMATION POINT=   0.0000       0.0000       0.0000



********************************************************************************
********************************************************************************
*************************  LOAD CASE 19 ********************************

USE LOAD STEP     19   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     19   SUBSTEP=      1   CUMULATIVE ITERATION=    168
  TIME/FREQUENCY=  19.000
TITLE= Pad, LTSP(4), 20 Casks, 156 Kips West (X), Max Up, Soft Rock (Ux,Uz)

   15348   ELEMENTS (OF     15348   DEFINED) SELECTED BY   EALL   COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -3120000.
 FY   =    1112000.
 FZ   =  -0.4374459E-05
 MX   =   0.4536960E+09
 MY   =   0.1272960E+10
 MZ   =   0.7099920E+09

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      1 TO      1 BY     1

     9056   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.
```

```
SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    6895275.
 FY   =   -3521750.
 FZ   = -0.7730789E-05
 MX   = -0.1436874E+10
 MY   = -0.2813272E+10
 MZ   = -0.1277488E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -532056.0
 FY   =   -3521750.
 FZ   = -0.3588729
 MX   = -0.1436875E+10
 MY   =  0.2170780E+09
 MZ   = -0.4324816E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    6895275.
 FY   =   -3521750.
 FZ   = -0.6228757E-05
 MX   = -0.1436874E+10
 MY   = -0.2813272E+10
 MZ   = -0.1277488E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


EXIT THE ANSYS POST1 DATABASE PROCESSOR


***** ROUTINE COMPLETED *****  CP =         60.096
```

```
*** NOTE ***                                CP=     60.096    TIME= 16:01:04
A total of 1 warnings and errors written to dcslabs4.err.

/OUTPUT FILE= padbchardreac.out
```

Below are the equilibrium results for the hard rock analyses:

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****************************************************************************

************************ Hard Rock Reactions ****************************


CURRENT JOBNAME REDEFINED AS dcslabh4

RESUME ANSYS DATA FROM FILE NAME=dcslabh4.db

*** ANSYS GLOBAL STATUS ***

TITLE = Pad, LTSP(4), 20 Casks, 156 Kips West (X), Max Up, Hard Rock (Ux,Uz)
ANALYSIS TYPE =  STATIC (STEADY-STATE)
NUMBER OF ELEMENT TYPES =      6
   1536 ELEMENTS CURRENTLY SELECTED.  MAX ELEMENT NUMBER =    33177
      0 NODES CURRENTLY SELECTED.     MAX NODE NUMBER =       17051
    259 KEYPOINTS CURRENTLY SELECTED. MAX KEYPOINT NUMBER =     259
      0 LINES CURRENTLY SELECTED.     MAX LINE NUMBER =         396
    181 AREAS CURRENTLY SELECTED.     MAX AREA NUMBER =         295
     70 VOLUMES CURRENTLY SELECTED.   MAX VOL. NUMBER =          70
    12 COMPONENTS CURRENTLY DEFINED
MAXIMUM LINEAR PROPERTY NUMBER        =       5
MAXIMUM REAL CONSTANT SET NUMBER      =       6
ACTIVE COORDINATE SYSTEM              =       0  (CARTESIAN)
MAXIMUM CONSTRAINT EQUATION NUMBER    =    4620
NUMBER OF SPECIFIED CONSTRAINTS       =    1785
NUMBER OF NODAL LOADS                 =    2160

INITIAL JOBNAME = dcslabs4
CURRENT JOBNAME = dcslabh4


PRINT HEADER
DO NOT PRINT SUBTITLE(S)
DO NOT PRINT LOAD STEP ID
DO NOT PRINT NOTE LINE(S)
DO NOT PRINT COLUMN HEADER LABELS
DO NOT PRINT REPORT TOTALS

         ***** ANSYS RESULTS INTERPRETATION (POST1) *****

ENTER  /SHOW,DEVICE-NAME  TO ENABLE GRAPHIC DISPLAY
ENTER  FINISH             TO LEAVE POST1

*****************************************************************************
*****************************************************************************
```

```
************************  LOAD CASE 1 *********************************

USE LOAD STEP     1  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     1  SUBSTEP=     1  CUMULATIVE ITERATION=     2
  TIME/FREQUENCY=  1.0000
TITLE= Pad, Gravity, 20 Casks, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.2336574E-05
 FY   =    7200000.
 FZ   =   0.1870073E-04
 MX   =   0.2937600E+10
 MY   =  -0.7909636E-02
 MZ   =   0.2203200E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -0.6838537E-05
 FY   =  -0.1523250E+08
 FZ   =   0.2795913E-04
 MX   =  -0.6214860E+10
 MY   =  -0.3689440E-01
 MZ   =  -0.4661145E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1942676E-01
```

```
 FY   = -0.1523250E+08
 FZ   =  0.1445923
 MX   = -0.6214861E+10
 MY   =  -52.20591
 MZ   = -0.4661146E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1153477E-04
 FY   = -0.1523250E+08
 FZ   =  0.1735607E-02
 MX   = -0.6214860E+10
 MY   = -0.5340235
 MZ   = -0.4661145E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 2 *********************************

USE LOAD STEP     2  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     2  SUBSTEP=     1  CUMULATIVE ITERATION=    17
  TIME/FREQUENCY=  2.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips North (Z), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.6905391E-05
 FY   =   5340800.
 FZ   = -0.1030000E+08
 MX   =  0.9584964E+09
 MY   =  0.3151800E+10
 MZ   =  0.1634285E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE
```

```
******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.8221587E-05
 FY   = -0.1176680E+08
 FZ   =  0.1679026E+08
 MX   = -0.3872366E+10
 MY   = -0.5137820E+10
 MZ   = -0.3600641E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.2787352E-01
 FY   = -0.1176680E+08
 FZ   =  -707244.2
 MX   =  0.3517095E+10
 MY   =  0.2164155E+09
 MZ   = -0.3600641E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.3103859E-04
 FY   = -0.1176680E+08
 FZ   =  0.1679026E+08
 MX   = -0.3872366E+10
 MY   = -0.5137820E+10
 MZ   = -0.3600641E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 3 *********************************

USE LOAD STEP     3  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     3  SUBSTEP=     1  CUMULATIVE ITERATION=    30
  TIME/FREQUENCY=  3.0000
```

```
TITLE= Pad, HE(1), 20 Casks, 515 Kips N 32.93 W (Z,X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -5599220.
 FY   =   5340800.
 FZ   =  -8645160.
 MX   =  0.1154595E+10
 MY   =  0.4929901E+10
 MZ   =  0.2297792E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   9125487.
 FY   = -0.1176680E+08
 FZ   =  0.1409120E+08
 MX   = -0.4021475E+10
 MY   = -0.8035105E+10
 MZ   = -0.4105466E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -780726.1
 FY   = -0.1176680E+08
 FZ   =  -613581.8
 MX   =  0.2170201E+10
 MY   =  0.4955775E+09
 MZ   = -0.8372519E+10

SUMMATION POINT=  0.0000      0.0000      0.0000
```

```
SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    9125488.
 FY   = -0.1176680E+08
 FZ   =  0.1409120E+08
 MX   = -0.4021475E+10
 MY   = -0.8035105E+10
 MZ   = -0.4105466E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 4 *********************************


USE LOAD STEP     4  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     4  SUBSTEP=     1  CUMULATIVE ITERATION=    36
  TIME/FREQUENCY=  4.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips N 45 W (Z,X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -7283200.
 FY   =    5340800.
 FZ   =   -7283200.
 MX   =  0.1315987E+10
 MY   =  0.5200205E+10
 MZ   =  0.2497344E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1186976E+08
 FY   = -0.1176680E+08
 FZ   =  0.1186976E+08
```

```
 MX   = -0.4144190E+10
 MY   = -0.8475007E+10
 MZ   = -0.4257305E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -1007359.
 FY   = -0.1176680E+08
 FZ   =  -530238.7
 MX   =  0.1063169E+10
 MY   =  0.5612854E+09
 MZ   = -0.9812455E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1186976E+08
 FY   = -0.1176680E+08
 FZ   =  0.1186976E+08
 MX   = -0.4144190E+10
 MY   = -0.8475007E+10
 MZ   = -0.4257305E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 5 *********************************


USE LOAD STEP     5  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     5  SUBSTEP=     1  CUMULATIVE ITERATION=    42
  TIME/FREQUENCY=  5.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips N 57.07 W (Z,X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******
```

```
***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -8645160.
 FY   =    5340800.
 FZ   =   -5599220.
 MX   =   0.1515539E+10
 MY   =   0.5240587E+10
 MZ   =   0.2658736E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

     9056  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1409120E+08
 FY   =  -0.1176680E+08
 FZ   =    9125487.
 MX   =  -0.4296029E+10
 MY   =  -0.8541607E+10
 MZ   =  -0.4380021E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

     1728  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT       COMPONENT ROCKBOT

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1186581.
 FY   =  -0.1176680E+08
 FZ   =   -419548.2
 MX   =  -0.2999393E+09
 MY   =   0.6012734E+09
 MZ   =  -0.1097580E+11

SUMMATION POINT=  0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1409120E+08
 FY   =  -0.1176680E+08
 FZ   =    9125488.
```

```
 MX   = -0.4296029E+10
 MY   = -0.8541607E+10
 MZ   = -0.4380021E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*****************************************************************************
*****************************************************************************
************************  LOAD CASE 6 ***********************************


USE LOAD STEP     6  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     6  SUBSTEP=     1  CUMULATIVE ITERATION=    54
  TIME/FREQUENCY=  6.0000
TITLE= Pad, HE(1), 20 Casks, 515 Kips West (W), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1030000E+08
 FY   =   5340800.
 FZ   = -0.2204044E-04
 MX   =  0.2179046E+10
 MY   =  0.4202400E+10
 MZ   =  0.2854835E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1679026E+08
 FY   = -0.1176680E+08
 FZ   = -0.2365172E-04
 MX   = -0.4800854E+10
 MY   = -0.6850426E+10
 MZ   = -0.4529129E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1
```

```
    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =  -1397675.
 FY  = -0.1176680E+08
 FZ  =  -13.25700
 MX  = -0.4800873E+10
 MY  =  0.5702472E+09
 MZ  = -0.1239037E+11

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =  0.1679026E+08
 FY  = -0.1176680E+08
 FZ  =  0.1484795E-02
 MX  = -0.4800854E+10
 MY  = -0.6850426E+10
 MZ  = -0.4529129E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 7 *********************************

USE LOAD STEP     7  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     7  SUBSTEP=     1  CUMULATIVE ITERATION=    74
  TIME/FREQUENCY=  7.0000
TITLE= Pad, HE(1), 20 Casks, 206 Kips North (z), Max Up, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  = -0.8438951E-07
 FY  =   2552000.
 FZ  =  -4120000.
 MX  =  0.5529960E+09
 MY  =  0.1260720E+10
```

```
 MZ   =  0.7809120E+09

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1333161E-04
 FY   =  -6568250.
 FZ   =   7525780.
 MX   = -0.2344886E+10
 MY   = -0.2302889E+10
 MZ   = -0.2009884E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -1.208761
 FY   =  -6568250.
 FZ   =  -301994.0
 MX   =  0.9217830E+09
 MY   =  0.9240988E+08
 MZ   = -0.2009887E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1426613E-04
 FY   =  -6568250.
 FZ   =   7525780.
 MX   = -0.2344886E+10
 MY   = -0.2302889E+10
 MZ   = -0.2009884E+10

SUMMATION POINT=  0.0000      0.0000      0.0000
```

```
*****************************************************************************
*****************************************************************************
************************  LOAD CASE 8 ***********************************


USE LOAD STEP     8  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     8  SUBSTEP=     1  CUMULATIVE ITERATION=    90
  TIME/FREQUENCY=  8.0000
TITLE= Pad, HE(1), 20 Casks, 206 Kips West (X), Max Up, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -4120000.
 FY   =   2552000.
 FZ   = -0.9498617E-06
 MX   =  0.1041216E+10
 MY   =  0.1680960E+10
 MZ   =  0.1269132E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   7525780.
 FY   =  -6568250.
 FZ   = -0.2137206E-06
 MX   = -0.2679846E+10
 MY   = -0.3070518E+10
 MZ   = -0.2344844E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -598368.8
 FY   =   -6568250.
 FZ   =   -4.703928
 MX   = -0.2679850E+10
 MY   =  0.2441313E+09
 MZ   = -0.5828534E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    7525780.
 FY   =   -6568250.
 FZ   =  0.6859088E-03
 MX   = -0.2679846E+10
 MY   = -0.3070518E+10
 MZ   = -0.2344844E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


********************************************************************************
********************************************************************************
************************  LOAD CASE 9 **********************************


USE LOAD STEP     9  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     9  SUBSTEP=     1  CUMULATIVE ITERATION=    95
  TIME/FREQUENCY=  9.0000
TITLE= Pad, HE(3), 20 Casks, 171.2 Kips North (Z), Max Dn, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1407689E-04
 FY   =  0.1546600E+08
 FZ   =  -3424000.
 MX   =  0.5904384E+10
 MY   =  0.1047744E+10
 MZ   =  0.4732596E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.
```

```
SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.3545911E-06
 FY   = -0.2751475E+08
 FZ   =   6829780.
 MX   = -0.1097353E+11
 MY   = -0.2089913E+10
 MZ   = -0.8419514E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.3696025
 FY   = -0.2751475E+08
 FZ   =  -265578.7
 MX   = -0.8049617E+10
 MY   =  0.8126646E+08
 MZ   = -0.8419517E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.8192083E-04
 FY   = -0.2751475E+08
 FZ   =   6829780.
 MX   = -0.1097353E+11
 MY   = -0.2089913E+10
 MZ   = -0.8419514E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 10 ********************************

USE LOAD STEP    10  SUBSTEP     0  FOR LOAD CASE 0
```

```
SET COMMAND GOT LOAD STEP=     10  SUBSTEP=      1  CUMULATIVE ITERATION=     99
  TIME/FREQUENCY=  10.000
TITLE= Pad, HE(3), 20 Casks, 171.2 Kips West (X), Max Dn, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -3424000.
 FY   =  0.1546600E+08
 FZ   =  0.1298196E-04
 MX   =  0.6310128E+10
 MY   =  0.1396992E+10
 MZ   =  0.5138340E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   6829780.
 FY   = -0.2751475E+08
 FZ   = -0.2038106E-05
 MX   = -0.1122602E+11
 MY   = -0.2786550E+10
 MZ   = -0.8671997E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -531443.7
 FY   = -0.2751475E+08
 FZ   =  0.2273579
 MX   = -0.1122602E+11
 MY   =  0.2168284E+09
 MZ   = -0.1178228E+11
```

```
SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    6829780.
 FY   = -0.2751475E+08
 FZ   =  0.3435816E-02
 MX   = -0.1122602E+11
 MY   = -0.2786550E+10
 MZ   = -0.8671997E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


********************************************************************************
********************************************************************************
************************  LOAD CASE 11 **********************************


USE LOAD STEP    11  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    11  SUBSTEP=     1  CUMULATIVE ITERATION=   117
  TIME/FREQUENCY=  11.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips North (Z), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.9947571E-06
 FY   =   5166400.
 FZ   =  -8800000.
 MX   =  0.1065091E+10
 MY   =  0.2692800E+10
 MZ   =  0.1580918E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.5555507E-05
```

```
 FY   = -0.1094980E+08
 FZ   =  0.1598106E+08
 MX   = -0.3747866E+10
 MY   = -0.4890203E+10
 MZ   = -0.3350639E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -1.163949
 FY   = -0.1094980E+08
 FZ   =  -618998.2
 MX   =  0.3236129E+10
 MY   =  0.1894133E+09
 MZ   = -0.3350639E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1237688E-04
 FY   = -0.1094980E+08
 FZ   =  0.1598106E+08
 MX   = -0.3747866E+10
 MY   = -0.4890203E+10
 MZ   = -0.3350639E+10

SUMMATION POINT=  0.0000       0.0000       0.0000



*******************************************************************************
*******************************************************************************
************************  LOAD CASE 12 ********************************


USE LOAD STEP    12  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    12  SUBSTEP=     1  CUMULATIVE ITERATION=   130
  TIME/FREQUENCY=  12.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips N 32.93 W (Z,X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.
```

```
SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -4783800.
 FY   =    5166400.
 FZ   =   -7386160.
 MX   =   0.1232631E+10
 MY   =   0.4211955E+10
 MZ   =   0.2147799E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    8687595.
 FY   = -0.1094980E+08
 FZ   =  0.1341054E+08
 MX   = -0.3863355E+10
 MY   = -0.7648162E+10
 MZ   = -0.3741848E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -705326.2
 FY   = -0.1094980E+08
 FZ   =   -535915.1
 MX   =   0.1988556E+10
 MY   =   0.4436364E+09
 MZ   = -0.7770988E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    8687595.
 FY   = -0.1094980E+08
 FZ   =  0.1341054E+08
 MX   = -0.3863355E+10
 MY   = -0.7648162E+10
 MZ   = -0.3741848E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



*******************************************************************************
*******************************************************************************
************************  LOAD CASE 13 ********************************


USE LOAD STEP    13  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    13  SUBSTEP=     1  CUMULATIVE ITERATION=   135
  TIME/FREQUENCY=  13.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips N 45 W (Z,X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -6222540.
 FY   =    5166400.
 FZ   =   -6222540.
 MX   =   0.1370520E+10
 MY   =   0.4442894E+10
 MZ   =   0.2318289E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1129908E+08
 FY   = -0.1094980E+08
 FZ   =   0.1129908E+08
 MX   = -0.3958592E+10
```

```
 MY   = -0.8067543E+10
 MZ   = -0.3859565E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT       COMPONENT ROCKBOT

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -910586.9
 FY   = -0.1094980E+08
 FZ   =   -462359.4
 MX   =  0.9650370E+09
 MY   =  0.5038940E+09
 MZ   = -0.9104714E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1129908E+08
 FY   = -0.1094980E+08
 FZ   =  0.1129908E+08
 MX   = -0.3958592E+10
 MY   = -0.8067543E+10
 MZ   = -0.3859565E+10

SUMMATION POINT=  0.0000       0.0000       0.0000



*******************************************************************************
*******************************************************************************
************************  LOAD CASE 14 ********************************

USE LOAD STEP     14   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     14   SUBSTEP=      1   CUMULATIVE ITERATION=    141
  TIME/FREQUENCY=  14.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips N 57.03 W (Z,X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF     15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT       COMPONENT CASK
```

```
******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -7386160.
 FY   =    5166400.
 FZ   =   -4783800.
 MX   =   0.1541011E+10
 MY   =   0.4477396E+10
 MZ   =   0.2456178E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1341054E+08
 FY   =  -0.1094980E+08
 FZ   =    8687595.
 MX   =  -0.4076309E+10
 MY   =  -0.8129902E+10
 MZ   =  -0.3954802E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1073078.
 FY   =  -0.1094980E+08
 FZ   =   -365047.5
 MX   =  -0.2970065E+09
 MY   =   0.5409423E+09
 MZ   =  -0.1018202E+11

SUMMATION POINT=  0.0000       0.0000       0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1341054E+08
 FY   =  -0.1094980E+08
```

```
 FZ   =    8687595.
 MX   = -0.4076309E+10
 MY   = -0.8129902E+10
 MZ   = -0.3954802E+10

SUMMATION POINT=  0.0000       0.0000       0.0000



********************************************************************************
********************************************************************************
************************  LOAD CASE 15 ***********************************

USE LOAD STEP     15  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     15  SUBSTEP=      1  CUMULATIVE ITERATION=    153
  TIME/FREQUENCY=  15.000
TITLE= Pad, LTSP(2), 20 Casks, 440 Kips West (X), Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -8800000.
 FY   =    5166400.
 FZ   = -0.1865430E-04
 MX   =  0.2107891E+10
 MY   =  0.3590400E+10
 MZ   =  0.2623718E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1598106E+08
 FY   = -0.1094980E+08
 FZ   = -0.1089614E-04
 MX   = -0.4467518E+10
 MY   = -0.6520270E+10
 MZ   = -0.4070291E+10
```

```
SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -1265535.
 FY   = -0.1094980E+08
 FZ   =   -12.50400
 MX   = -0.4467531E+10
 MY   =  0.5163336E+09
 MZ   = -0.1149400E+11

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1598106E+08
 FY   = -0.1094980E+08
 FZ   =  0.1395653E-02
 MX   = -0.4467518E+10
 MY   = -0.6520270E+10
 MZ   = -0.4070291E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



*******************************************************************************
*******************************************************************************
************************  LOAD CASE 16 ********************************


USE LOAD STEP    16  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    16  SUBSTEP=     1  CUMULATIVE ITERATION=   177
  TIME/FREQUENCY=  16.000
TITLE= Pad, LTSP(2), 20 Casks, 176 Kips North (Z), Max Up, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
```

```
 FX   =   0.3230364E-05
 FY   =    2116000.
 FZ   =   -3520000.
 MX   =   0.4462080E+09
 MY   =   0.1077120E+10
 MZ   =   0.6474960E+09

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1085526E-04
 FY   =   -4525750.
 FZ   =    7295275.
 MX   = -0.1599273E+10
 MY   = -0.2232354E+10
 MZ   = -0.1384880E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.2948885
 FY   =   -4525750.
 FZ   =   -253410.0
 MX   =   0.1567884E+10
 MY   =   0.7754302E+08
 MZ   = -0.1384879E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.3031691E-05
 FY   =   -4525750.
 FZ   =    7295275.
 MX   = -0.1599273E+10
 MY   = -0.2232354E+10
```

```
 MZ   = -0.1384880E+10

SUMMATION POINT=   0.0000       0.0000       0.0000



*****************************************************************************
*****************************************************************************
************************  LOAD CASE 17 **********************************


USE LOAD STEP     17  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     17  SUBSTEP=      1  CUMULATIVE ITERATION=    201
  TIME/FREQUENCY=  17.000
TITLE= Pad, LTSP(2), 20 Casks, 176 Kips West (X), Max Up, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -3520000.
 FY   =    2116000.
 FZ   =  0.8199710E-05
 MX   =  0.8633280E+09
 MY   =  0.1436160E+10
 MZ   =  0.1064616E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    7295275.
 FY   =   -4525750.
 FZ   = -0.2198053E-04
 MX   = -0.1846506E+10
 MY   = -0.2976472E+10
 MZ   = -0.1632112E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1
```

```
    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =  -544125.7
 FY  =  -4525750.
 FZ  =  -8.835029
 MX  = -0.1846515E+10
 MY  =  0.2220006E+09
 MZ  = -0.4994101E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =   7295275.
 FY  =  -4525750.
 FZ  =  0.5371485E-03
 MX  = -0.1846506E+10
 MY  = -0.2976472E+10
 MZ  = -0.1632112E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



*****************************************************************************
*****************************************************************************
*************************  LOAD CASE 18 *************************************

USE LOAD STEP    18  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    18  SUBSTEP=     1  CUMULATIVE ITERATION=   226
  TIME/FREQUENCY=  18.000
TITLE= Pad, LTSP(4), 20 Casks, 156 Kips North (Z), Max Up, Hard Rock (Ux,Uz)

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX  =  0.9470626E-05
 FY  =   1112000.
 FZ  =  -3120000.
```

```
 MX   =   0.8397600E+08
 MY   =   0.9547200E+09
 MZ   =   0.3402720E+09

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.4715513E-05
 FY   =  -3521750.
 FZ   =   6895275.
 MX   = -0.1237041E+10
 MY   = -0.2109954E+10
 MZ   = -0.1077656E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT       COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -5.447510
 FY   =  -3521750.
 FZ   =  -225404.9
 MX   =   0.1749726E+10
 MY   =   0.6897422E+08
 MZ   = -0.1077650E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

SELECT       COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.2105737E-05
 FY   =  -3521750.
 FZ   =   6895275.
 MX   = -0.1237041E+10
 MY   = -0.2109954E+10
 MZ   = -0.1077656E+10

SUMMATION POINT=   0.0000       0.0000       0.0000
```

```
*****************************************************************************
*****************************************************************************
*************************  LOAD CASE 19 *********************************

USE LOAD STEP     19   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     19   SUBSTEP=      1   CUMULATIVE ITERATION=    251
  TIME/FREQUENCY=  19.000
TITLE= Pad, LTSP(4), 20 Casks, 156 Kips West (X), Max Up, Hard Rock (Ux,Uz)

   15348   ELEMENTS (OF     15348   DEFINED) SELECTED BY   EALL   COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -3120000.
 FY   =    1112000.
 FZ   =   0.6654714E-05
 MX   =   0.4536960E+09
 MY   =   0.1272960E+10
 MZ   =   0.7099920E+09

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      1 TO      1 BY     1

    9056   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    6895275.
 FY   =   -3521750.
 FZ   =   0.1321486E-04
 MX   = -0.1436874E+10
 MY   = -0.2813272E+10
 MZ   = -0.1277488E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      2 TO      2 BY     1

    1728   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.
```

```
******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

SELECT      COMPONENT ROCKBOT

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -497581.0
 FY   =   -3521750.
 FZ   =   -8.311410
 MX   = -0.1436885E+10
 MY   =  0.2030114E+09
 MZ   = -0.4446427E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

SELECT      COMPONENT BOUNDARY

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    6895275.
 FY   =   -3521750.
 FZ   =  0.4158949E-03
 MX   = -0.1436874E+10
 MY   = -0.2813272E+10
 MZ   = -0.1277488E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


EXIT THE ANSYS POST1 DATABASE PROCESSOR


***** ROUTINE COMPLETED *****  CP =       118.280


*** NOTE ***                            CP=     118.280   TIME= 16:02:21
A total of 1 warnings and errors written to dcslabs4.err.
```

Originator: S. C. Tumminelli
Date: November 30, 2001

Appendix RL-3

Reaction Loads – 90% Pad Density

This Appendix presents reaction loads of the model with the pad reduced to 90% expected concrete density for all 19 load cases. They are applicable to the soft rock, hard rock and very hard rock models.

The first part of the calculation computes the expected forces. Input values are from Appendix AL-1. The sum of all applied loads are calculated followed by the sum of the forces at the pad/rock interface and the sum at the boundary of the rock. Since the rock is massless, the last two values are the same.

Then the databases are scanned for the same data. The first input file that processes the data is provided. This file processes data for both the soft rock and hard rock models in one execution, however, two output files are created. Then the results for the soft analyses are provided. Only Load Cases 1 through 6 and 11 through 15 are scanned, since those are the Load Cases that will provide the bounding results.

A comparison of the expected forces and the forces scanned from the soft rock analysis database shows that the values are the same. This indicates that the analyses are in equilibrium and that, together with a review of the displacement plots, provides high confidence that the analyses are correct.

Appendix Contents

Below are the calculations that compute the expected reactions from the ANSYS analyses:

Pad Weight is 68*105*7.5*0.15*0.90 = 7229.25 Kip

Load Step 1 Gravity

Sum of Applied Loads

Fx	= 0
Fy = 360000*20	= 7200000
Fz	= 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx	= 0
Fy = 360000*20 + 7229250	= 14429250
Fz	= 0

Load Step 2 - Apply in the North (Z) direction:

Sum of Applied Loads

Fx	= 0
Fy = 267040*20	= 5340800
Fz = 515000*20	= 10300000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx =	= 0
Fy = 267040*20 + 0.800*7229250	= 11124200
Fz = 515000*20 + 0.808*7229250	= 16141234

Load Step 3 - Apply in the North 32.93 degrees West direction:

Sum of Applied Loads

Fx = 279961*20	= 5599220
Fy = 267040*20	= 5340800
Fz = 432258*20	= 8645160

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 279961*20 + 0.439 *7229250	= 8772861
Fy = 267040*20 + 0.800*7229250	= 11124200
Fz = 432258*20 + 0.678*7229250	= 13546592

Load Step 4 - Apply in the North 45 degrees West direction:

Sum of Applied Loads

Fx = 364160*20 = 7283200
Fy = 267040*20 = 5340800
Fz = 364160*20 = 7283200

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 364160*20 + 0.571*7229250 = 11411102
Fy = 267040*20 + 0.800*7229250 = 11124200
Fz = 364160*20 + 0.571*7229250 = 11411102

Load Step 5 - Apply in the North 57.07 degrees West direction:

Sum of Applied Loads

Fx = 432258*20 = 8645160
Fy = 267040*20 = 5340800
Fz = 279961*20 = 5599220

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 432258*20 + 0.678*7229250 = 13546592
Fy = 267040*20 + 0.800*7229250 = 11124200
Fz = 279961*20 + 0.439*7229250 = 8772861

Load Step 6 - Apply in the West direction

Sum of Applied Loads

Fx = 515000*20 = 10300000
Fy = 267040*20 = 5340800
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 515000*20 + 0.808*7229250 = 16141234
Fy = 267040*20 + 0.800*7229250 = 11124200
Fz = 0

Load Step 7 - Apply in the North direction

Sum of Applied Loads

Fx = 0
Fy = 127600*20 =2552000
Fz = 206000*20 = 4120000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 127600*20 + 0.500*7229250 = 6166625
Fz = 206000*20 + 0.424*7229250 = 7185202

Load Step 8 - Apply in the West direction:

Sum of Applied Loads

Fx = 206000*20 = 4120000
Fy = 127600*20 = 2552000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 206000*20 + 0.424*7229250 = 7185202
Fy = 127600*20 + 0.500*7229250 = 6166625
Fz = 0

Load Step 9 - Apply in the North direction:

Sum of Applied Loads

Fx = 0
Fy = 773300*20 = 15466000
Fz = 171200*20 = 3424000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 773300*20 + 1.500*7229250 = 26309875
Fz = 171200*20 + 0.424*7229250 = 6489202

Load Step 10 - Apply in the West direction:

Sum of Applied Loads

Fx = 171200*20 = 3424000
Fy = 773300*20 = 15466000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 171200*20 + 0.424*7229250 = 6489202
Fy = 773300*20 + 1.500*7229250 = 26309875
Fz = 0

Load Step 11 - Apply in the North (Z) direction:

Sum of Applied Loads

Fx = 0
Fy = 258320*20 = 5166400
Fz = 440000*20 = 8800000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 258320*20 + 0.720*7229250 = 10371460
Fz = 440000*20 + 0.894*7229250 = 15262950

Load Step 12 - Apply in the North 32.93 degrees West direction:

Sum of Applied Loads

Fx = 239190*20 = 4783800
Fy = 258320*20 = 5166400
Fz = 369308*20 = 7386160

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 239190*20 + 0.486*7229250 = 8297216
Fy = 258320*20 + 0.720*7229250 = 10371460
Fz = 369308*20 + 0.750*7229250 = 12808098

Load Step 13 - Apply in the North 45 degrees West direction:

Sum of Applied Loads

Fx = 311127*20 = 6222540
Fy = 258320*20 = 5166400
Fz = 311127*20 = 6222540

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 311127*20 + 0.632*7229250 = 10791426
Fy = 258320*20 + 0.720*7229250 = 10371460

Fz = 311127*20 + 0.632*7229250 = 10791426

Load Step 14 - Apply in the North 57.07 degrees West direction:

Sum of Applied Loads

Fx = 369308*20 = 7386160
Fy = 258320*20 = 5166400
Fz = 239190*20 = 4783800

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 369308*20 + 0.750*7229250 = 12808098
Fy = 258320*20 + 0.720*7229250 = 10371460
Fz = 239190*20 + 0.486*7229250 = 8297216

Load Step 15 - Apply in the West direction:

Sum of Applied Loads

Fx = 440000*20 = 8800000
Fy = 258320*20 = 5166400
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 440000*20 + 0.894*7229250 = 15262950
Fy = 258320*20 + 0.720*7229250 = 10371460
Fz = 0

Load Step 16 - Apply in the North direction:

Sum of Applied Loads

Fx = 0
Fy = 105800*20 = 2116000
Fz = 176000*20 = 3520000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 105800*20 + 0.300*7229250 = 4284775
Fz = 176000*20 + 0.470*7229250 = 6917748

Load Step 17 - Apply in the West direction:

Sum of Applied Loads

Fx = 176000*20 = 3520000
Fy = 105800*20 = 2116000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 176000*20 + 0.470*7229250 = 6917748
Fy = 105800*20 + 0.300*7229250 = 4284775
Fz = 0

Load Step 18 - Apply in the North direction:

Sum of Applied Loads

Fx = 0
Fy = 55600*20 = 1112000
Fz = 156000*20 = 3120000

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 0
Fy = 55600*20 + 0.300*7229250 = 3280775
Fz = 156000*20 + 0.470*7229250 = 6517748

Load Step 19 - Apply in the West direction:

Sum of Applied Loads

Fx = 156000*20 = 3120000
Fy = 55600*20 = 1112000
Fz = 0

Sum of Forces at Pad/Rock Interface and at Rock Boundary

Fx = 156000*20 + 0.470*7229250 = 6517748
Fy = 55600*20 + 0.300*7229250 = 3280775
Fz = 0

Below is the file that scans the ANSYS database for the applied forces, the forces at the pad/rock interface and the boundary forces on the rock. It creates two output files, one for the soft rock model and one for the hard rock model.

```
/com,
/com, This routine processes load results data for the
/com,   evaluation of equilibrium for the 0.9D models
/com
/com,   0.9D Soft Rock Load Step Results
/com
/output,pad9Dsoftreac,out
/com
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com ****************************************************************************
/com
/com ************************ Soft Rock Reactions ***************************
/com
/file,dcslabs3
resume
/post1
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 1 ***********************************
set,1
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 2 ***********************************
set,2
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
```

```
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 3 ***********************************
set,3
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 4 ***********************************
set,4
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
/com
cmsel,s,boundary
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 5 ***********************************
set,5
```

```
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 6 ***********************************
set,6
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 11 ***********************************
set,11
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
```

```
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 12 ***********************************
set,12
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 13 ***********************************
set,13
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 14 ***********************************
set,14
eallr
cmsel,s,cask
/com
```

```
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com ************************  LOAD CASE 15 ***********************************
set,15
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com
finish
/output,pad9Dhardreac,out
/com
/com ********************************************************************************
/com ********************************************************************************
/com ********************************************************************************
/com ********************************************************************************
/com ********************************************************************************
/com ********************************************************************************
/com
/com ********************** 0.9D Hard Rock Reactions **********************
/com
/file,dcslabh3
resume
/post1
/com
/com ********************************************************************************
/com ********************************************************************************
```

```
/com *************************  LOAD CASE 1 *********************************
set,1
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ***************************************************************************
/com ***************************************************************************
/com *************************  LOAD CASE 2 *********************************
set,2
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ***************************************************************************
/com ***************************************************************************
/com *************************  LOAD CASE 3 *********************************
set,3
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
```

```
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 4 ***********************************
set,4
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 5 ***********************************
set,5
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ****************************************************************************
/com ****************************************************************************
/com *************************  LOAD CASE 6 ***********************************
set,6
eall
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
```

```
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 11 ***********************************
set,11
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 12 ***********************************
set,12
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com
/com ********************************************************************************
```

```
/com ********************************************************************************
/com *************************  LOAD CASE 13 ***********************************
set,13
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 14 ***********************************
set,14
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com ********************************************************************************
/com ********************************************************************************
/com *************************  LOAD CASE 15 ***********************************
set,15
eallr
cmsel,s,cask
/com
/com ******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******
fsum
esel,type,1
cmsel,s,base
/com
```

```
/com ******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
fsum
esel,type,2
cmsel,s,boundary
/com
/com ******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
fsum
/com
/com
/com
/com
fini
/output
/exit
```

Below are the equilibrium results for the soft rock analyses:

```
*******************************************************************************
*******************************************************************************
*******************************************************************************
*******************************************************************************
*******************************************************************************
*******************************************************************************

************************ Soft Rock Reactions ****************************


CURRENT JOBNAME REDEFINED AS dcslabs3

RESUME ANSYS DATA FROM FILE NAME=dcslabs3.db

*** ANSYS GLOBAL STATUS ***

TITLE = Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips West (X), Soft Rock
ANALYSIS TYPE =  STATIC (STEADY-STATE)
NUMBER OF ELEMENT TYPES =      6
  15348 ELEMENTS CURRENTLY SELECTED.  MAX ELEMENT NUMBER =    33177
  17051 NODES CURRENTLY SELECTED.     MAX NODE NUMBER =       17051
    259 KEYPOINTS CURRENTLY SELECTED. MAX KEYPOINT NUMBER =     259
    250 LINES CURRENTLY SELECTED.     MAX LINE NUMBER =         396
    181 AREAS CURRENTLY SELECTED.     MAX AREA NUMBER =         295
     70 VOLUMES CURRENTLY SELECTED.   MAX VOL. NUMBER =          70
    11 COMPONENTS CURRENTLY DEFINED
MAXIMUM LINEAR PROPERTY NUMBER        =       5
MAXIMUM REAL CONSTANT SET NUMBER      =       6
ACTIVE COORDINATE SYSTEM              =       0  (CARTESIAN)
MAXIMUM CONSTRAINT EQUATION NUMBER    =    4620
NUMBER OF SPECIFIED CONSTRAINTS       =    2193
NUMBER OF NODAL LOADS                 =    2160

INITIAL JOBNAME = dcslabs3
CURRENT JOBNAME = dcslabs3

***** ANSYS - ENGINEERING ANALYSIS SYSTEM  RELEASE 5.7     *****
ANSYS/Structural U
00150104          VERSION=INTEL NT      18:06:14  JUN 25, 2001 CP=      1.212

Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips West (X), Soft Rock


         ***** ANSYS RESULTS INTERPRETATION (POST1) *****

ENTER  /SHOW,DEVICE-NAME  TO ENABLE GRAPHIC DISPLAY
ENTER  FINISH             TO LEAVE POST1

*** NOTE ***                                CP=      1.212   TIME= 18:06:14
Reading results into the database (SET command) will update the current
 displacement and force boundary conditions in the database with the
 values from the results file for that load set.  Note that any
 subsequent solutions will use these values unless action is taken to
 either SAVE the current values or not overwrite them (/EXIT,NOSAVE).
```

```
*****************************************************************************
*****************************************************************************
************************** LOAD CASE 1 **********************************


USE LOAD STEP     1  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     1  SUBSTEP=     1  CUMULATIVE ITERATION=     4
  TIME/FREQUENCY=  1.0000
TITLE= Pad, 0.9D, Gravity, 20 Casks, Soft Rock

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1643858E-05
 FY   =   7200000.
 FZ   =  0.3279789E-04
 MX   =  0.2937600E+10
 MY   = -0.7614980E-02
 MZ   =  0.2203200E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.2394905E-05
 FY   = -0.1442918E+08
 FZ   = -0.2314172E-05
 MX   = -0.5887107E+10
 MY   = -0.1428637E-02
 MZ   = -0.4415330E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.1925732E-04
 FY   = -0.1442918E+08
```

```
 FZ   = -0.1000342E-02
 MX   = -0.5887107E+10
 MY   =  0.3160866
 MZ   = -0.4415330E+10

SUMMATION POINT=  0.0000       0.0000       0.0000


*****************************************************************************
*****************************************************************************
*************************  LOAD CASE 2 **********************************


USE LOAD STEP     2  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     2  SUBSTEP=     1  CUMULATIVE ITERATION=    17
  TIME/FREQUENCY=  2.0000
TITLE= Pad, 0.9D, HE(1), 20 Casks, 515 Kips North (Z), Soft Rock

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.5457026E-05
 FY   =   5340800.
 FZ   = -0.1030000E+08
 MX   =  0.9584964E+09
 MY   =  0.3151800E+10
 MZ   =  0.1634285E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.6531650E-04
 FY   = -0.1112415E+08
 FZ   =  0.1614118E+08
 MX   = -0.3580955E+10
 MY   = -0.4939201E+10
 MZ   = -0.3403989E+10

SUMMATION POINT=  0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.
```

```
SELECT      COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   = -0.3406595E-04
 FY   = -0.1112415E+08
 FZ   =  0.1614118E+08
 MX   = -0.3580955E+10
 MY   = -0.4939201E+10
 MZ   = -0.3403989E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 3 *********************************


USE LOAD STEP     3  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     3  SUBSTEP=     1  CUMULATIVE ITERATION=    26
  TIME/FREQUENCY=  3.0000
TITLE= Pad, 0.9D, HE(1), 20 Casks, 515 Kips N 32.93 W (Z,X), Soft Rock

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -5599220.
 FY   =   5340800.
 FZ   =  -8645160.
 MX   =  0.1154595E+10
 MY   =  0.4929901E+10
 MZ   =  0.2297792E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   8772832.
 FY   = -0.1112415E+08
 FZ   =  0.1354655E+08
 MX   = -0.3734763E+10
 MY   = -0.7724559E+10
 MZ   = -0.3924684E+10
```

```
SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    8772832.
 FY   = -0.1112415E+08
 FZ   =  0.1354655E+08
 MX   = -0.3734763E+10
 MY   = -0.7724559E+10
 MZ   = -0.3924684E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*********************************************************************************
*********************************************************************************
************************  LOAD CASE 4 **********************************


USE LOAD STEP     4  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     4  SUBSTEP=     1  CUMULATIVE ITERATION=    31
  TIME/FREQUENCY=  4.0000
TITLE= Pad, 0.9D, HE(1), 20 Casks, 515 Kips N 45 W (Z,X), Soft Rock

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -7283200.
 FY   =    5340800.
 FZ   =   -7283200.
 MX   =  0.1315987E+10
 MY   =  0.5200205E+10
 MZ   =  0.2497344E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1141106E+08
 FY   =  -0.1112415E+08
 FZ   =   0.1141106E+08
 MX   =  -0.3861347E+10
 MY   =  -0.8147500E+10
 MZ   =  -0.4081294E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.


SELECT      COMPONENT BOUNDARY
******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1141106E+08
 FY   =  -0.1112415E+08
 FZ   =   0.1141106E+08
 MX   =  -0.3861347E+10
 MY   =  -0.8147500E+10
 MZ   =  -0.4081294E+10

SUMMATION POINT=  0.0000      0.0000      0.0000


*******************************************************************************
*******************************************************************************
************************  LOAD CASE 5 *********************************


USE LOAD STEP     5  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     5  SUBSTEP=     1  CUMULATIVE ITERATION=    36
  TIME/FREQUENCY=  5.0000
TITLE= Pad, 0.9D, HE(1), 20 Casks, 515 Kips N 57.07 W (Z,X), Soft Rock

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -8645160.
 FY   =    5340800.
 FZ   =   -5599220.
 MX   =   0.1515539E+10
 MY   =   0.5240587E+10
 MZ   =   0.2658736E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1
```

9056 ELEMENTS (OF

```
 MX   =   0.2179046E+10
 MY   =   0.4202400E+10
 MZ   =   0.2854835E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      1 TO      1 BY     1

    9056  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1614118E+08
 FY   =  -0.1112415E+08
 FZ   =  -0.2537435E-04
 MX   =  -0.4538652E+10
 MY   =  -0.6585602E+10
 MZ   =  -0.4361686E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL  FOR LABEL= TYPE  FROM      2 TO      2 BY     1

    1728  ELEMENTS (OF     15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT       COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1614118E+08
 FY   =  -0.1112415E+08
 FZ   =  -0.5639542E-03
 MX   =  -0.4538652E+10
 MY   =  -0.6585602E+10
 MZ   =  -0.4361686E+10

SUMMATION POINT=   0.0000       0.0000       0.0000


*******************************************************************************
*******************************************************************************
*************************  LOAD CASE 11 ***************************************


USE LOAD STEP     11  SUBSTEP      0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     11  SUBSTEP=      1  CUMULATIVE ITERATION=     70
  TIME/FREQUENCY=  11.000
TITLE= Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips North (Z), Soft Rock

   15348  ELEMENTS (OF     15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT       COMPONENT CASK
```

```
******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.6135121E-05
 FY   =    5166400.
 FZ   =   -8800000.
 MX   =   0.1065091E+10
 MY   =   0.2692800E+10
 MZ   =   0.1580918E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.7324274E-05
 FY   =  -0.1037141E+08
 FZ   =   0.1526289E+08
 MX   =  -0.3479566E+10
 MY   =  -0.4670444E+10
 MZ   =  -0.3173652E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1125787E-05
 FY   =  -0.1037141E+08
 FZ   =   0.1526289E+08
 MX   =  -0.3479566E+10
 MY   =  -0.4670444E+10
 MZ   =  -0.3173652E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

********************************************************************************
********************************************************************************
************************  LOAD CASE 12 ********************************
```

```
USE LOAD STEP     12   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     12   SUBSTEP=      1   CUMULATIVE ITERATION=     79
  TIME/FREQUENCY=  12.000
TITLE= Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips N 32.93 W (Z,X), Soft Rock

   15348   ELEMENTS (OF    15348   DEFINED) SELECTED BY   EALL   COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -4783800.
 FY   =    5166400.
 FZ   =   -7386160.
 MX   =   0.1232631E+10
 MY   =   0.4211955E+10
 MZ   =   0.2147799E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      1 TO      1 BY     1

    9056   ELEMENTS (OF    15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    8297183.
 FY   =  -0.1037141E+08
 FZ   =   0.1280805E+08
 MX   =  -0.3600261E+10
 MY   =  -0.7304513E+10
 MZ   =  -0.3582430E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      2 TO      2 BY     1

    1728   ELEMENTS (OF    15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =    8297183.
 FY   =  -0.1037141E+08
 FZ   =   0.1280805E+08
 MX   =  -0.3600261E+10
 MY   =  -0.7304513E+10
 MZ   =  -0.3582430E+10

SUMMATION POINT=   0.0000       0.0000       0.0000
```

```
*****************************************************************************
*****************************************************************************
************************  LOAD CASE 13 ******************************

USE LOAD STEP     13   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     13   SUBSTEP=      1   CUMULATIVE ITERATION=     83
  TIME/FREQUENCY=  13.000
TITLE= Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips N 45 W (Z,X), Soft Rock

   15348   ELEMENTS (OF     15348   DEFINED) SELECTED BY   EALL   COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -6222540.
 FY   =    5166400.
 FZ   =   -6222540.
 MX   =   0.1370520E+10
 MY   =   0.4442894E+10
 MZ   =   0.2318289E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      1 TO      1 BY     1

    9056   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL     FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1079138E+08
 FY   =  -0.1037141E+08
 FZ   =   0.1079138E+08
 MX   =  -0.3699763E+10
 MY   =  -0.7705048E+10
 MZ   =  -0.3705425E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      2 TO      2 BY     1

    1728   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1079138E+08
 FY   =  -0.1037141E+08
 FZ   =   0.1079138E+08
 MX   =  -0.3699763E+10
 MY   =  -0.7705048E+10
 MZ   =  -0.3705425E+10

SUMMATION POINT=   0.0000       0.0000       0.0000



*******************************************************************************
*******************************************************************************
************************  LOAD CASE 14 ********************************


USE LOAD STEP     14   SUBSTEP      0   FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=     14   SUBSTEP=      1   CUMULATIVE ITERATION=     87
  TIME/FREQUENCY=  14.000
TITLE= Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips N 57.03 W (Z,X), Soft Rock

   15348   ELEMENTS (OF     15348   DEFINED) SELECTED BY   EALL   COMMAND.

SELECT       COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   -7386160.
 FY   =    5166400.
 FZ   =   -4783800.
 MX   =   0.1541011E+10
 MY   =   0.4477396E+10
 MZ   =   0.2456178E+10

SUMMATION POINT=   0.0000       0.0000       0.0000

ESEL   FOR LABEL= TYPE   FROM      1 TO      1 BY     1

    9056   ELEMENTS (OF     15348   DEFINED) SELECTED BY   ESEL   COMMAND.

SELECT       COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =   0.1280805E+08
 FY   =  -0.1037141E+08
 FZ   =    8297183.
 MX   =  -0.3822758E+10
 MY   =  -0.7764622E+10
 MZ   =  -0.3804927E+10

SUMMATION POINT=   0.0000       0.0000       0.0000
```

```
ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1280805E+08
 FY   = -0.1037141E+08
 FZ   =   8297183.
 MX   = -0.3822758E+10
 MY   = -0.7764622E+10
 MZ   = -0.3804927E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



********************************************************************************
********************************************************************************
************************  LOAD CASE 15 ********************************


USE LOAD STEP    15  SUBSTEP     0  FOR LOAD CASE 0

SET COMMAND GOT LOAD STEP=    15  SUBSTEP=     1  CUMULATIVE ITERATION=    95
  TIME/FREQUENCY=  15.000
TITLE= Pad, 0.9D, LTSP(2), 20 Casks, 440 Kips West (X), Soft Rock

   15348  ELEMENTS (OF    15348  DEFINED) SELECTED BY  EALL  COMMAND.

SELECT      COMPONENT CASK

******** SUM OF LOADS APPLIED TO CASKS -  0.9D MODEL *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  -8800000.
 FY   =   5166400.
 FZ   = -0.3448769E-04
 MX   =  0.2107891E+10
 MY   =  0.3590400E+10
 MZ   =  0.2623718E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     1 TO     1 BY    1

    9056  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BASE

******** LOADS TRANSMITTED THRU CONCRETE/ROCK INTERFACE *******
```

```
***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1526289E+08
 FY   = -0.1037141E+08
 FZ   = -0.1946858E-04
 MX   = -0.4231536E+10
 MY   = -0.6227259E+10
 MZ   = -0.3925622E+10

SUMMATION POINT=  0.0000      0.0000      0.0000

ESEL  FOR LABEL= TYPE  FROM     2 TO     2 BY    1

    1728  ELEMENTS (OF    15348  DEFINED) SELECTED BY  ESEL  COMMAND.

SELECT      COMPONENT BOUNDARY

******** LOADS REACTED AT ROCK BOUNDARY CONSTRAINTS *******

***** SUMMATION OF TOTAL    FORCES AND MOMENTS IN GLOBAL COORDINATES *****
 FX   =  0.1526289E+08
 FY   = -0.1037141E+08
 FZ   = -0.2892743E-03
 MX   = -0.4231536E+10
 MY   = -0.6227259E+10
 MZ   = -0.3925622E+10

SUMMATION POINT=  0.0000      0.0000      0.0000



EXIT THE ANSYS POST1 DATABASE PROCESSOR

***** ROUTINE COMPLETED *****  CP =        33.959


*** NOTE ***                                CP=     33.959   TIME= 18:07:00
A total of 1 warnings and errors written to dcslabs3.err.

/OUTPUT FILE= pad9Dhardreac.out
```