

# **PENNDOT e-Notification**

Bureau of Design  
Bridge Quality Assurance Division



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## **PAPIER**

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### **Description of Output Levels Available for Intermediate Factored Force Results**

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On the following pages is a description of the three different levels of output available for Parameter 8 of the OUI command — "Factored Forces".

This information was requested by those attending the PAPIER Pilot Training course held in State College in July 2002.

Note that, at this time, all other intermediate output parameters have only one output level available.

Please direct any questions concerning the above issue to:

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# DESCRIPTION OF VARIOUS LEVELS OF INTERMEDIATE OUTPUT AVAILABLE FOR 'FACTORED FORCES' VIA PARAMETER #8 OF THE 'OUI' COMMAND

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## LEVEL '1'

### This option produces:

"Combined Forces" Report: combined factored forces for each load case, of each POI location for each pier component (cap, column, footing) grouped by limit state/group load.

Below is an excerpt of the "Table of Contents" of a dump file in which the "factored forces" parameter in the OUI command is set to '1':

```

Combined Forces Report . . . . . 43208
  Combined Forces in the Pier Cap . . . . . 43213
  Combined Forces in Column 1 . . . . . 52878
  Combined Forces in Column 2 . . . . . 54799
  Combined Forces in Column 3 . . . . . 56720
  Combined Forces in Column 4 . . . . . 58641
  Combined Forces - Footing 1 - Bottom of Footing . . . . . 60562
  Combined Forces - Footing 1 - Punching Shear . . . . . 61287
  Combined Forces - Footing 1 - Max/Min Spread Forces . . . . . 61452
  Combined Forces - Footing 1 - Bearing Capacity . . . . . 62066
  Combined Forces - Footing 1 - Settlement . . . . . 62657
  Combined Forces - Footing 1 - Critical Faces . . . . . 62671
  
```

Below is a sample "Combined Forces" report. Note that the loadings contributing to the final limit state/group load case results are not reported.

```

Combined Forces in Column 1 -----
Column 1      0.000 Center          LC: 1      (Ax+  Mt+  Ml)

Limit State   Ax+      Mt+      Ml      Concur V1  Concur Vt
-----
STR-I         28145.    101.     215.     25.        18.
STR-IP        26284.    213.     812.     15.        18.
STR-III       24114.   -8604.   1593.     0.        -716.
STR-IV        25763.    182.    2023.     0.         21.
STR-V         27119.   -2830.    846.     15.       -235.
SER-I         19290.   -2004.    397.     10.       -169.
  
```

## LEVEL '2'

### This option produces:

- "Factored Forces" Report: component factored force results comprising each load case, for each POI location of each pier component.
- "Beta d Calculations" Report: intermediate values the program uses internally to compute moment magnification factors for columns (slenderness effects.)
- "Combined Forces" Report: as described under Level '1' option.

## DESCRIPTION OF VARIOUS LEVELS OF INTERMEDIATE OUTPUT AVAILABLE FOR 'FACTORED FORCES' VIA PARAMETER #8 OF THE 'OUI' COMMAND

Below is an excerpt of the "Table of Contents" of a dump file in which the "factored forces" parameter in the OUI command is set to '2':

Factored Forces Report . . . . .	43209	}	Additional Reports for Level 2
Factored Forces in the Pier Cap . . . . .	43214		
Factored Forces in Column 1 . . . . .	110839		
Factored Forces in Column 2 . . . . .	124548		
Factored Forces in Column 3 . . . . .	138257		
Factored Forces in Column 4 . . . . .	151966		
Factored Forces - Footing 1 - Bottom (per Column) . . . . .	165675		
Beta d Calculations . . . . .	170576		
Combined Forces Report . . . . .	170673		
Combined Forces in the Pier Cap . . . . .	170678		
Combined Forces in Column 1 . . . . .	180343		
Combined Forces in Column 2 . . . . .	182264		
Combined Forces in Column 3 . . . . .	184185		
Combined Forces in Column 4 . . . . .	186106		
Combined Forces - Footing 1 - Bottom of Footing . . . . .	188027		
Combined Forces - Footing 1 - Punching Shear . . . . .	188752		
Combined Forces - Footing 1 - Max/Min Spread Forces . . . . .	188917		
Combined Forces - Footing 1 - Bearing Capacity . . . . .	189531		
Combined Forces - Footing 1 - Settlement . . . . .	190122		
Combined Forces - Footing 1 - Critical Faces . . . . .	190136		

Below is a sample "Factored Forces" report. Note that the loadings contributing to the final limit state/group load case results are reported.

```

----- Factored Forces Report -----
Factored Forces in Column 1 -----

Column 1      0.000 C      STR-I      LC: 1      (Ax+ Mt+ Ml)

Load Type      Ax+      Mt+      Ml      Control Information
-----
DEAD SUB      5639.347      -23.922      0.000      *Eta, MAX factor
DEAD SUP      14511.421      155.485      706.101      *Eta, + Ecc, MAX factor
WEARING      1581.887      16.949      76.972      *Eta, + Ecc, MAX factor
DES B LL      6412.053      -52.417      0.000      *Eta, 3 Trucks
BRAKING      0.000      0.000      -695.837      *Eta, Forwr, 3 Prim
-----
Subtot:      28144.708      96.095      87.235
Magnify:      1.047      2.460      PhiG 0.750, PhiV 0.750
Comb:      28144.708      100.609      214.567
  
```

Below is a sample "Beta d Calculation" report. This report is useful for reproducing the moment magnifications factors computed for columns to account for slenderness effects.

```

Beta d Calculations -----

Column 1

Location      DirTyp      M total      Control      LC      M dead      Control      LC      Beta D
-----
  
```

## DESCRIPTION OF VARIOUS LEVELS OF INTERMEDIATE OUTPUT AVAILABLE FOR 'FACTORED FORCES' VIA PARAMETER #8 OF THE 'OUI' COMMAND

0.000C	Mt STR	8557.	STR-III	24	180.	STR-IV	9	0.0210
	Mt SER	2361.	SER-I	21	106.	SER-I	1	0.0449
	Ml STR	-13460.	STR-III	6	924.	STR-IV	1	0.0687
	Ml SER	-4103.	SER-I	6	560.	SER-I	1	0.1365
23.602C	Mt STR	-7698.	STR-III	19	-326.	STR-IV	9	0.0423
	Mt SER	-2478.	SER-I	16	-192.	SER-I	1	0.0774
	Ml STR	-2354.	STR-III	6	928.	STR-IV	1	0.3940
	Ml SER	-1105.	SER-I	6	562.	SER-I	1	0.5090

Location	Typ	Mt	EI	Beta D	P crit	Ml	EI	Beta D	P crit
0.000C	STR	14960419.	0.0210	627363.38	14327589.	0.0687	47426.81		
	SER	20904732.	0.0449	876637.46	19265218.	0.1365	63771.22		
23.602C	STR	14654876.	0.0423	614550.48	10983747.	0.3940	36358.11		
	SER	20273377.	0.0774	850161.66	14509719.	0.5090	48029.69		

### LEVEL '3'

#### This option produces:

- "Combined Forces (by location)" Report: in addition to combined forces report generated for Level '1' option, the combined forces are grouped by POI location.
- "Factored Forces" Report: as described under Level '2' option.
- "Beta d Calculations" Report: as described under Level '2' option.
- "Combined Forces" Report: as described under Level '1' option.

Below is an excerpt of the "Table of Contents" of a dump file in which the "factored forces" parameter in the OUI command is set to '3':

Factored Forces Report . . . . .	43210	
Factored Forces in the Pier Cap	43215	
Factored Forces in Column 1 . . . . .	110840	
Factored Forces in Column 2	124549	
Factored Forces in Column 3 . . . . .	138258	
Factored Forces in Column 4	151967	
Factored Forces - Footing 1 - Bottom (per Column) . . . . .	165676	
Combined Forces (by location) Report . . . . .	170577	} Additional Report for Level 3
Combined Forces (by location) in Pier Cap	170582	
Combined Forces (by location) in Column 1 . . . . .	175669	
Combined Forces (by location) in Column 2	177018	
Combined Forces (by location) in Column 3 . . . . .	178367	
Combined Forces (by location) in Column 4	179716	
Beta d Calculations . . . . .	181065	
Combined Forces Report . . . . .	181162	
Combined Forces in the Pier Cap	181167	
Combined Forces in Column 1 . . . . .	190832	
Combined Forces in Column 2	192753	
Combined Forces in Column 3 . . . . .	194674	
Combined Forces in Column 4	196595	

## DESCRIPTION OF VARIOUS LEVELS OF INTERMEDIATE OUTPUT AVAILABLE FOR 'FACTORED FORCES' VIA PARAMETER #8 OF THE 'OUI' COMMAND

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Combined Forces - Footing	1 - Bottom of Footing	198516
Combined Forces - Footing	1 - Punching Shear	199241
Combined Forces - Footing	1 - Max/Min Spread Forces	199406
Combined Forces - Footing	1 - Bearing Capacity	200020
Combined Forces - Footing	1 - Settlement	200611
Combined Forces - Footing	1 - Critical Faces	200625

Below is a sample "Combined Forces (by location)" report generated for a column. Note that this report differs from the combined forces report generated by the Level '1' option in that the combined factored forces are tabulated for all POI locations for a particular limit state/group load and load case.

Combined Forces (by location) in Column 1 -----

Column 1                      STR-I                      LC: 1      (Ax+ Mt+ Ml)

POI Locat	Ax+	Mt+	Ml
-----	-----	-----	-----
0.000 C	28144.708	100.609	214.567
23.602 C	24579.038	-551.406	2095.213

Column 1                      STR-I                      LC: 2      (Ax+ Mt- Ml)

POI Locat	Ax+	Mt-	Ml
-----	-----	-----	-----
0.000 C	28144.708	100.609	214.567
23.602 C	24579.038	-551.406	2095.213