Oasys

Oasys GSA

Output Data References

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Oasys GSA

Contents

Introduction

The following is a complete list of data options available to GSA Graphic Views and Output Views.Not all of this data is handled by the GSA COM interface 'Output' family of functions. Typically data is available via the Output functions if it can be contoured in GSA or can be output in a regular Output View table, (i.e. a table for which the summary of Maxima and Minima are available) (e.g. Nodal Displacements, but not Total Loads and Reactions)The vast majority of data options are available via the COM Output functions; most of the remainder are available via the COM GwaCommand function.

The Output_Init COM function requires an integer Data Reference as an argument, iDataRef. The DataReference to be used to access a particular item of data is deduced as follows:

A table consists of a header followed by several components. In the list below, table headers are assigned reference numbers; components are implicitly numbered consecutively following the header e.g.

Nodes table header: REF_NODE = 1002000

so Node X coordinate: REF_NODE_Z = REF_NODE + 4 = 1002004

Results marked "not available via COM Output" apply to the entire result type; e.g. in case of REF_RESP_DET, none of the types from REF_RESP_DET through to REF_RESP_DET_ETA are available via COM.

enum DataRef

```
{
// not available via COM Output
	REF_NO_DATA                                                    = 0,

// not available via COM Output
	REF_TITLES                                                     = 1000,

// not available via COM Output
	REF_MODEL_HISTORY                                              = 1100,

// not available via COM Output
	REF_ENV_IMPACT_SUM                                             = 1200,

// not available via COM Output
```

```
	REF_ANAL_TASK                                                   = 1400,

// not available via COM Output
	REF_COMB_CASE                                                   = 1500,

// not available via COM Output
	REF_PERM_FACT                                                   = 1600,

// not available via COM Output
	REF_ALL_INPUT_DATA                                              = 2000,

	REF_FIRST_MODEL

		REF_FIRST_GR_ENT

			REF_EL_1D_SHAPE                                         = 801000,
				REF_EL_1D_SHAPE_PER_LEN                         ,
				REF_EL_1D_SHAPE_AREA_PER_LEN                    ,

			REF_EL_2D_SHAPE                                         = 802000,
				REF_EL_2D_SHAPE_ANG                             ,
				REF_EL_2D_SHAPE_WARP                            ,
				REF_EL_2D_SHAPE_PROJ_AX                         ,

		REF_LAST_GR_ENT

			REF_AXIS                                                = 1001000,
				REF_AXIS_NAME                                   ,
				REF_AXIS_TYPE                                   ,
				REF_AXIS_OX                                     ,
				REF_AXIS_OY                                     ,
				REF_AXIS_OZ                                     ,
				REF_AXIS_XX                                     ,
```

```
        REF_AXIS_XY                         ,
        REF_AXIS_XZ                         ,
        REF_AXIS_XYX                        ,
        REF_AXIS_XYY                        ,
        REF_AXIS_XYZ                        ,

REF_NODE                                    = 1002000,
        REF_NODE_NAME                       ,
        REF_NODE_X                          ,
        REF_NODE_Y                          ,
        REF_NODE_Z                          ,
        REF_NODE_COOR                       ,
        REF_NODE_AXIS                       ,
        REF_NODE_RESTR                      ,
        REF_NODE_GEN_RESTR                  ,
        REF_NODE_STF                        ,

REF_SUPT                                    = 1003000,
        REF_SUPT_AXIS                       ,
        REF_SUPT_RESTR                      ,
        REF_SUPT_STF_TRANS_X                ,
        REF_SUPT_STF_TRANS_Y                ,
        REF_SUPT_STF_TRANS_Z                ,
        REF_SUPT_STF_TRANS_VECT             ,
        REF_SUPT_STF_ROT_XX                 ,
        REF_SUPT_STF_ROT_YY                 ,
        REF_SUPT_STF_ROT_ZZ                 ,
        REF_SUPT_STF_ROT_VECT               ,

REF_ELEM                                    = 1011000,
        REF_ELEM_NAME                       ,
        REF_ELEM_TYPE                       ,
        REF_ELEM_PROP                       ,
```

```
        REF_ELEM_GROUP                  ,
        REF_ELEM_NODE                   ,
        REF_ELEM_ANGLE                  ,
        REF_ELEM_VERT                   ,
        REF_ELEM_LEN                    ,
        REF_ELEM_TOPO                   ,

REF_ELEM_RLS                            = 1012000,
        REF_ELEM_RLS_X                  ,
        REF_ELEM_RLS_Y                  ,
        REF_ELEM_RLS_Z                  ,
        REF_ELEM_RLS_XX                 ,
        REF_ELEM_RLS_YY                 ,
        REF_ELEM_RLS_ZZ                 ,

REF_ELEM_OFFSET                         = 1013000,
        REF_ELEM_OFFSET_X               ,
        REF_ELEM_OFFSET_Y               ,
        REF_ELEM_OFFSET_Z               ,
        REF_ELEM_OFFSET_VECT            ,

REF_ELEM_DC                             = 1014000,
        REF_ELEM_DC_XX                  ,
        REF_ELEM_DC_XY                  ,
        REF_ELEM_DC_XZ                  ,
        REF_ELEM_DC_X                   ,
        REF_ELEM_DC_YX                  ,
        REF_ELEM_DC_YY                  ,
        REF_ELEM_DC_YZ                  ,
        REF_ELEM_DC_Y                   ,
        REF_ELEM_DC_ZX                  ,
        REF_ELEM_DC_ZY                  ,
        REF_ELEM_DC_ZZ                  ,
```

```
        REF_ELEM_DC_Z                           ,

REF_MEMB                                        = 1021000,
        REF_MEMB_NAME                           ,
        REF_MEMB_TYPE                           ,
        REF_MEMB_PROP                           ,
        REF_MEMB_DES_PROP                       ,
        REF_MEMB_REST_PROP                      ,
        REF_MEMB_BAR_LAYOUT_LEFT                ,
        REF_MEMB_BAR_LAYOUT_MIDDLE              ,
        REF_MEMB_BAR_LAYOUT_RIGHT               ,
        REF_MEMB_GROUP                          ,
        REF_MEMB_NODE                           ,
        REF_MEMB_ANGLE                          ,
        REF_MEMB_VERT                           ,
        REF_MEMB_LEN                            ,
        REF_MEMB_TOPO                           ,

REF_MEMB_RLS                                    = 1022000,
        REF_MEMB_RLS_X                          ,
        REF_MEMB_RLS_Y                          ,
        REF_MEMB_RLS_Z                          ,
        REF_MEMB_RLS_XX                         ,
        REF_MEMB_RLS_YY                         ,
        REF_MEMB_RLS_ZZ                         ,

REF_MEMB_OFFSET                                 = 1023000,
        REF_MEMB_OFFSET_X                       ,
        REF_MEMB_OFFSET_Y                       ,
        REF_MEMB_OFFSET_Z                       ,
        REF_MEMB_OFFSET_VECT                    ,

REF_RC_BEAM                                     = 1025000,
```

```
        REF_RC_BEAM_MEMB                    ,
        REF_RC_BEAM_SUP_FIX                 ,
        REF_RC_BEAM_LWR_SEC                 ,
        REF_RC_BEAM_LWR_LEN                 ,
        REF_RC_BEAM_LWR_FIX                 ,
        REF_RC_BEAM_UPR_SEC                 ,
        REF_RC_BEAM_UPR_LEN                 ,
        REF_RC_BEAM_UPR_FIX                 ,

REF_GRID_PLANE                              = 1031000,
        REF_GRID_PLANE_NAME                 ,
        REF_GRID_PLANE_TYPE                 ,
        REF_GRID_PLANE_AXIS                 ,
        REF_GRID_PLANE_ELEV                 ,
        REF_GRID_PLANE_STOREY_NUM           ,
        REF_GRID_PLANE_BELOW                ,
        REF_GRID_PLANE_ABOVE                ,
        REF_GRID_PLANE_LIST                 ,
        REF_GRID_PLANE_TOL                  ,
        REF_GRID_PLANE_SPAN_TYPE            ,
        REF_GRID_PLANE_SPAN_ANG             ,
        REF_GRID_PLANE_EXPANSION            ,
        REF_GRID_PLANE_AREA                 ,

//REF_STOREY                                = 1032000,
//      REF_STOREY_NAME                     ,
//      REF_STOREY_ELEV                     ,
//      REF_STOREY_ABOVE                    ,
//      REF_STOREY_BELOW                    ,

REF_POLYLINE_2D                             = 1033000,
        REF_POLYLINE_2D_NAME                ,
        REF_POLYLINE_2D_PERIM               ,
```

```
                REF_POLYLINE_2D_AREA                    ,
                REF_POLYLINE_2D_CENTRE_X                ,
                REF_POLYLINE_2D_CENTRE_Y                ,
                REF_POLYLINE_2D_X                       ,
                REF_POLYLINE_2D_Y                       ,
                REF_POLYLINE_2D_LENGTH                  ,

REF_FIRST_GR_PROP

        REF_ND_SPR_STF                                  = 1041000,
                REF_ND_SPR_STF_TRANS_X                  ,
                REF_ND_SPR_STF_TRANS_Y                  ,
                REF_ND_SPR_STF_TRANS_Z                  ,
                REF_ND_SPR_STF_TRANS_VECT               ,
                REF_ND_SPR_STF_ROT_XX                   ,
                REF_ND_SPR_STF_ROT_YY                   ,
                REF_ND_SPR_STF_ROT_ZZ                   ,
                REF_ND_SPR_STF_ROT_VECT                 ,

        REF_EL_MAT                                      = 1041500,
                REF_EL_MAT_E                            ,
                REF_EL_MAT_NU                           ,
                REF_EL_MAT_G                            ,
                REF_EL_MAT_RHO                          ,
                REF_EL_MAT_ALPHA                        ,
                REF_EL_MAT_DAMP                         ,

        REF_EL_PROP_BEAM                                = 1042000,
                REF_EL_PROP_BEAM_AREA                   ,
                REF_EL_PROP_BEAM_IYY                    ,
                REF_EL_PROP_BEAM_IZZ                    ,
                REF_EL_PROP_BEAM_TORS                   ,
                REF_EL_PROP_BEAM_KY                     ,
```

```
        REF_EL_PROP_BEAM_KZ                 ,
        REF_EL_PROP_BEAM_A_KY               ,
        REF_EL_PROP_BEAM_A_KZ               ,
        REF_EL_PROP_BEAM_E_A                ,
        REF_EL_PROP_BEAM_E_IYY              ,
        REF_EL_PROP_BEAM_E_IZZ              ,
        REF_EL_PROP_BEAM_G_J                ,
        REF_EL_PROP_BEAM_G_A_KY             ,
        REF_EL_PROP_BEAM_G_A_KZ             ,

REF_EL_PROP_BEAM_MOD                        = 1042500,
        REF_EL_PROP_BEAM_MOD_AREA           ,
        REF_EL_PROP_BEAM_MOD_IYY            ,
        REF_EL_PROP_BEAM_MOD_IZZ            ,
        REF_EL_PROP_BEAM_MOD_TORS           ,
        REF_EL_PROP_BEAM_MOD_KY             ,
        REF_EL_PROP_BEAM_MOD_KZ             ,

REF_EL_PROP_MASS                            = 1043000,
        REF_EL_PROP_MASS_MASS               ,

REF_EL_PROP_2DEL                            = 1044000,
        REF_EL_PROP_2DEL_THK                ,
        REF_EL_PROP_2DEL_BENDING            ,
        REF_EL_PROP_2DEL_INPLANE            ,
        REF_EL_PROP_2DEL_WEIGHT             ,
        REF_EL_PROP_2DEL_MASS               ,

REF_EL_ENV_IMPACT_1D                        = 1051000,
        REF_EL_ENV_IMPACT_1D_E_A            ,
        REF_EL_ENV_IMPACT_1D_CO2_A          ,
        REF_EL_ENV_IMPACT_1D_CO2_B          ,
        REF_EL_ENV_IMPACT_1D_CO2_C          ,
```

```
        REF_EL_ENV_IMPACT_1D_CO2_D          ,
        REF_EL_ENV_IMPACT_1D_RC             ,
        REF_EL_ENV_IMPACT_1D_USER           ,

    REF_EL_ENV_IMPACT_2D                    = 1051100,
        REF_EL_ENV_IMPACT_2D_E_A            ,
        REF_EL_ENV_IMPACT_2D_CO2_A          ,
        REF_EL_ENV_IMPACT_2D_CO2_B          ,
        REF_EL_ENV_IMPACT_2D_CO2_C          ,
        REF_EL_ENV_IMPACT_2D_CO2_D          ,
        REF_EL_ENV_IMPACT_2D_RC             ,
        REF_EL_ENV_IMPACT_2D_USER           ,

    REF_EL_ENV_IMPACT_MEMB                  = 1051200,
        REF_EL_ENV_IMPACT_MEMB_E_A          ,
        REF_EL_ENV_IMPACT_MEMB_CO2_A        ,
        REF_EL_ENV_IMPACT_MEMB_CO2_B        ,
        REF_EL_ENV_IMPACT_MEMB_CO2_C        ,
        REF_EL_ENV_IMPACT_MEMB_CO2_D        ,
        REF_EL_ENV_IMPACT_MEMB_RC           ,
        REF_EL_ENV_IMPACT_MEMB_USER         ,

REF_LAST_GR_PROP

    REF_MAT_STD                             = 1061000,
        REF_MAT_STD_NAME                    ,
        REF_MAT_STD_TYPE                    ,
        REF_MAT_STD_E                       ,
        REF_MAT_STD_NU                      ,
        REF_MAT_STD_G                       ,
        REF_MAT_STD_RHO                     ,
        REF_MAT_STD_ALPHA                   ,
        REF_MAT_STD_DAMP                    ,
```

```
// not available via COM Output
                    REF_MAT_USER                                = 1062000,
                        REF_MAT_USER_NAME                       ,
                        REF_MAT_USER_TYPE                       ,
                        REF_MAT_USER_E                          ,
                        REF_MAT_USER_NU                         ,
                        REF_MAT_USER_G                          ,
                        REF_MAT_USER_RHO                        ,
                        REF_MAT_USER_ALPHA                      ,
                        REF_MAT_USER_DAMP                       ,

                    REF_PROP_BEAM                               = 1071000,
                        REF_PROP_BEAM_NAME                      ,
                        REF_PROP_BEAM_MAT                       ,
                        REF_PROP_BEAM_DESC                      ,
                        REF_PROP_BEAM_MOD                       ,
                        REF_PROP_BEAM_AREA                      ,
                        REF_PROP_BEAM_IYY                       ,
                        REF_PROP_BEAM_IZZ                       ,
                        REF_PROP_BEAM_IYZ                       ,
                        REF_PROP_BEAM_TORS                      ,
                        REF_PROP_BEAM_KY                        ,
                        REF_PROP_BEAM_KZ                        ,
                        REF_PROP_BEAM_TYPE                      ,
                        REF_PROP_BEAM_COST                      ,

                    REF_PROP_BEAM_DEFN                          = 1071200,
                        REF_PROP_BEAM_DEFN_NAME                 ,
                        REF_PROP_BEAM_DEFN_DESC                 ,
                        REF_PROP_BEAM_DEFN_AREA_BASE            ,
                        REF_PROP_BEAM_DEFN_AREA_MOD             ,
                        REF_PROP_BEAM_DEFN_IYY_BASE             ,
```

```
        REF_PROP_BEAM_DEFN_IYY_MOD              ,
        REF_PROP_BEAM_DEFN_IZZ_BASE             ,
        REF_PROP_BEAM_DEFN_IZZ_MOD              ,
        REF_PROP_BEAM_DEFN_TORS_BASE            ,
        REF_PROP_BEAM_DEFN_TORS_MOD             ,
        REF_PROP_BEAM_DEFN_KY_BASE              ,
        REF_PROP_BEAM_DEFN_KY_MOD               ,
        REF_PROP_BEAM_DEFN_KZ_BASE              ,
        REF_PROP_BEAM_DEFN_KZ_MOD               ,
        REF_PROP_BEAM_DEFN_MOD_MASS             ,
        REF_PROP_BEAM_DEFN_STRS_CALC            ,

REF_PROP_BEAM_SUM                               = 1071400,
        REF_PROP_BEAM_SUM_NAME                  ,
        REF_PROP_BEAM_SUM_DESC                  ,
        REF_PROP_BEAM_SUM_EL_NUM                ,
        REF_PROP_BEAM_SUM_EL_LEN                ,
        REF_PROP_BEAM_SUM_EL_MASS               ,
        REF_PROP_BEAM_SUM_EL_SURF               ,
        REF_PROP_BEAM_SUM_EL_COST               ,
        REF_PROP_BEAM_SUM_MB_NUM                ,
        REF_PROP_BEAM_SUM_MB_LEN                ,
        REF_PROP_BEAM_SUM_MB_MASS               ,
        REF_PROP_BEAM_SUM_MB_SURF               ,
        REF_PROP_BEAM_SUM_MB_COST               ,

REF_PROP_BEAM_EXT                               = 1071600,
        REF_PROP_BEAM_EXT_NAME                  ,
        REF_PROP_BEAM_EXT_DESC                  ,
        REF_PROP_BEAM_EXT_REF_PT                ,
        REF_PROP_BEAM_EXT_AREA                  ,
        REF_PROP_BEAM_EXT_IYY                   ,
        REF_PROP_BEAM_EXT_IZZ                   ,
```

```
                REF_PROP_BEAM_EXT_IYZ                   ,
                REF_PROP_BEAM_EXT_IUU                   ,
                REF_PROP_BEAM_EXT_IVV                   ,
                REF_PROP_BEAM_EXT_ANGLE                 ,
                REF_PROP_BEAM_EXT_KY                    ,
                REF_PROP_BEAM_EXT_KZ                    ,
                REF_PROP_BEAM_EXT_J                     ,
                REF_PROP_BEAM_EXT_CTOR                  ,
                REF_PROP_BEAM_EXT_ZY                    ,
                REF_PROP_BEAM_EXT_ZZ                    ,
                REF_PROP_BEAM_EXT_ZPY                   ,
                REF_PROP_BEAM_EXT_ZPZ                   ,
                REF_PROP_BEAM_EXT_CY                    ,
                REF_PROP_BEAM_EXT_CZ                    ,
                REF_PROP_BEAM_EXT_RY                    ,
                REF_PROP_BEAM_EXT_RZ                    ,
                REF_PROP_BEAM_EXT_MASS                  ,
                REF_PROP_BEAM_EXT_PERIM                 ,

        REF_PROP_SPR                                    = 1073000,
                REF_PROP_SPR_NAME                       ,
                REF_PROP_SPR_AXIS                       ,
                REF_PROP_SPR_TYPE                       ,
                REF_PROP_SPR_REF_X                      ,
                REF_PROP_SPR_KX                         ,
                REF_PROP_SPR_REF_Y                      ,
                REF_PROP_SPR_KY                         ,
                REF_PROP_SPR_REF_Z                      ,
                REF_PROP_SPR_KZ                         ,
                REF_PROP_SPR_MATRIX                     ,
                REF_PROP_SPR_DAMP                       ,

// not available via COM Output
```

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REF_PROP_NLSPRING_CURVE                    = 1073500,

REF_PROP_SPRMAT                            = 1073600,
       REF_PROP_SPRMAT_NAME                ,
       REF_PROP_SPRMAT_K11                 ,
       REF_PROP_SPRMAT_K12                 ,
       REF_PROP_SPRMAT_K13                 ,
       REF_PROP_SPRMAT_K14                 ,
       REF_PROP_SPRMAT_K15                 ,
       REF_PROP_SPRMAT_K16                 ,
       REF_PROP_SPRMAT_K22                 ,
       REF_PROP_SPRMAT_K23                 ,
       REF_PROP_SPRMAT_K24                 ,
       REF_PROP_SPRMAT_K25                 ,
       REF_PROP_SPRMAT_K26                 ,
       REF_PROP_SPRMAT_K33                 ,
       REF_PROP_SPRMAT_K34                 ,
       REF_PROP_SPRMAT_K35                 ,
       REF_PROP_SPRMAT_K36                 ,
       REF_PROP_SPRMAT_K44                 ,
       REF_PROP_SPRMAT_K45                 ,
       REF_PROP_SPRMAT_K46                 ,
       REF_PROP_SPRMAT_K55                 ,
       REF_PROP_SPRMAT_K56                 ,
       REF_PROP_SPRMAT_K66                 ,

REF_PROP_MASS                              = 1075000,
       REF_PROP_MASS_NAME                  ,
       REF_PROP_MASS_AXIS                  ,
       REF_PROP_MASS_MASS                  ,
       REF_PROP_MASS_IXX                   ,
       REF_PROP_MASS_IYY                   ,
       REF_PROP_MASS_IZZ                   ,
```

```
        REF_PROP_MASS_IXY                       ,
        REF_PROP_MASS_IYZ                       ,
        REF_PROP_MASS_IZX                       ,
        REF_PROP_MASS_ADD_X                     ,
        REF_PROP_MASS_ADD_Y                     ,
        REF_PROP_MASS_ADD_Z                     ,

REF_PROP_2DEL                                   = 1076000,
        REF_PROP_2DEL_NAME                      ,
        REF_PROP_2DEL_AXIS                      ,
        REF_PROP_2DEL_TYPE                      ,
        REF_PROP_2DEL_MAT                       ,
        REF_PROP_2DEL_THICK                     ,
        REF_PROP_2DEL_BENDING                   ,
        REF_PROP_2DEL_INPLANE                   ,
        REF_PROP_2DEL_WEIGHT                    ,
        REF_PROP_2DEL_SUPT_PAT                  ,
        REF_PROP_2DEL_REF_EDGE                  ,
        REF_PROP_2DEL_MASS                      ,

REF_PROP_LINK                                   = 1077000,
        REF_PROP_LINK_NAME                      ,
        REF_PROP_LINK_TYPE                      ,

REF_PROP_CABLE                                  = 1078000,
        REF_PROP_CABLE_NAME                     ,
        REF_PROP_CABLE_STIFF                    ,
        REF_PROP_CABLE_MASS                     ,
        REF_PROP_CABLE_ALPHA                    ,
        REF_PROP_CABLE_DAMP                     ,

REF_PROP_SPACE                                  = 1079000,
        REF_PROP_SPACE_NAME                     ,
```

```
        REF_PROP_SPACE_AXIS                     ,
        REF_PROP_SPACE_TYPE                     ,
        REF_PROP_SPACE_LEGLEN                   ,
        REF_PROP_SPACE_STIFF                    ,
        REF_PROP_SPACE_RATIO                    ,

REF_PROP_DES_STL_BEAM                           = 1082000,
        REF_PROP_DES_STL_BEAM_NAME              ,
        REF_PROP_DES_STL_BEAM_GRADE             ,
        REF_PROP_DES_STL_BEAM_L_OVERRIDE        ,
        REF_PROP_DES_STL_BEAM_LYY               ,
        REF_PROP_DES_STL_BEAM_LZZ               ,
        REF_PROP_DES_STL_BEAM_LLT               ,
        REF_PROP_DES_STL_BEAM_PLAS_ELAS_RATIO   ,
        REF_PROP_DES_STL_BEAM_AREA_RATIO        ,
        REF_PROP_DES_STL_BEAM_BETA_FACTOR       ,

REF_PROP_DES_STL_REST                           = 1082200,
        REF_PROP_DES_STL_REST_NAME              ,
        REF_PROP_DES_STL_REST_TYPE              ,
        REF_PROP_DES_STL_REST_REF               ,
        REF_PROP_DES_STL_REST_LD_HT             ,
        REF_PROP_DES_STL_REST_DESC              ,

REF_PROP_DES_RC_BEAM                            = 1084000,
        REF_PROP_DES_RC_BEAM_NAME               ,
        REF_PROP_DES_RC_BEAM_TYPE               ,
        REF_PROP_DES_RC_BEAM_CONC               ,
        REF_PROP_DES_RC_BEAM_REBAR_MAIN         ,
        REF_PROP_DES_RC_BEAM_REBAR_LINK         ,
        REF_PROP_DES_RC_BEAM_LINK_SIZE          ,
        REF_PROP_DES_RC_BEAM_AGGREGATE          ,
        REF_PROP_DES_RC_BEAM_COVER_TOP          ,
```

```
        REF_PROP_DES_RC_BEAM_COVER_BOT          ,
        REF_PROP_DES_RC_BEAM_COVER_LEFT         ,
        REF_PROP_DES_RC_BEAM_COVER_RIGHT        ,
        REF_PROP_DES_RC_BEAM_LAYOUT_LEFT_NAME   ,
        REF_PROP_DES_RC_BEAM_LAYOUT_MIDDLE_NAME ,
        REF_PROP_DES_RC_BEAM_LAYOUT_RIGHT_NAME  ,

REF_PROP_DES_RC2D_BS8110_A                      = 1089000,
        REF_PROP_DES_RC2D_BS8110_A_NAME         ,
        REF_PROP_DES_RC2D_BS8110_A_THETA1       ,
        REF_PROP_DES_RC2D_BS8110_A_THETA2       ,
        REF_PROP_DES_RC2D_BS8110_A_ZT1          ,
        REF_PROP_DES_RC2D_BS8110_A_ZB1          ,
        REF_PROP_DES_RC2D_BS8110_A_ZT2          ,
        REF_PROP_DES_RC2D_BS8110_A_ZB2          ,
        REF_PROP_DES_RC2D_BS8110_A_THICK        ,
        REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_T1  ,
        REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_T2  ,
        REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_B1  ,
        REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_B2  ,

REF_PROP_DES_RC2D_BS8110_B                      = 1089050,
        REF_PROP_DES_RC2D_BS8110_B_NAME         ,
        REF_PROP_DES_RC2D_BS8110_B_FCU          ,
        REF_PROP_DES_RC2D_BS8110_B_GAMMA_MC     ,
        REF_PROP_DES_RC2D_BS8110_B_FCD1         ,
        REF_PROP_DES_RC2D_BS8110_B_FCD2         ,
        REF_PROP_DES_RC2D_BS8110_B_FT           ,
        REF_PROP_DES_RC2D_BS8110_B_EPS_CTRANS   ,
        REF_PROP_DES_RC2D_BS8110_B_EPS_CAX      ,
        REF_PROP_DES_RC2D_BS8110_B_EPS_CU       ,
        REF_PROP_DES_RC2D_BS8110_B_XOVERD_MIN   ,
        REF_PROP_DES_RC2D_BS8110_B_XOVERD_MAX   ,
```

```
        REF_PROP_DES_RC2D_BS8110_B_BETA          ,
        REF_PROP_DES_RC2D_BS8110_B_MOD_GAMMA_MC  ,
        REF_PROP_DES_RC2D_BS8110_B_MOD_PARAMS    ,

REF_PROP_DES_RC2D_BS8110_C                       = 1089100,
        REF_PROP_DES_RC2D_BS8110_C_NAME          ,
        REF_PROP_DES_RC2D_BS8110_C_FY            ,
        REF_PROP_DES_RC2D_BS8110_C_GAMMA_MS      ,
        REF_PROP_DES_RC2D_BS8110_C_FYD           ,
        REF_PROP_DES_RC2D_BS8110_C_FYDC          ,
        REF_PROP_DES_RC2D_BS8110_C_ES            ,
        REF_PROP_DES_RC2D_BS8110_C_FLIM          ,
        REF_PROP_DES_RC2D_BS8110_C_EPS_PLAS      ,
        REF_PROP_DES_RC2D_BS8110_C_EPS_PLASC     ,
        REF_PROP_DES_RC2D_BS8110_C_MOD_GAMMA_MS  ,
        REF_PROP_DES_RC2D_BS8110_C_MOD_PARAMS    ,

REF_PROP_DES_RC2D_BS5400_A                       = 1089150,
        REF_PROP_DES_RC2D_BS5400_A_NAME          ,
        REF_PROP_DES_RC2D_BS5400_A_THETA1        ,
        REF_PROP_DES_RC2D_BS5400_A_THETA2        ,
        REF_PROP_DES_RC2D_BS5400_A_ZT1           ,
        REF_PROP_DES_RC2D_BS5400_A_ZB1           ,
        REF_PROP_DES_RC2D_BS5400_A_ZT2           ,
        REF_PROP_DES_RC2D_BS5400_A_ZB2           ,
        REF_PROP_DES_RC2D_BS5400_A_THICK         ,
        REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_T1   ,
        REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_T2   ,
        REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_B1   ,
        REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_B2   ,

REF_PROP_DES_RC2D_BS5400_B                       = 1089200,
        REF_PROP_DES_RC2D_BS5400_B_NAME          ,
```

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        REF_PROP_DES_RC2D_BS5400_B_FCU          ,
        REF_PROP_DES_RC2D_BS5400_B_GAMMA_MC     ,
        REF_PROP_DES_RC2D_BS5400_B_FCD1         ,
        REF_PROP_DES_RC2D_BS5400_B_FCD2         ,
        REF_PROP_DES_RC2D_BS5400_B_FT           ,
        REF_PROP_DES_RC2D_BS5400_B_EPS_CTRANS   ,
        REF_PROP_DES_RC2D_BS5400_B_EPS_CAX      ,
        REF_PROP_DES_RC2D_BS5400_B_EPS_CU       ,
        REF_PROP_DES_RC2D_BS5400_B_XOVERD_MIN   ,
        REF_PROP_DES_RC2D_BS5400_B_XOVERD_MAX   ,
        REF_PROP_DES_RC2D_BS5400_B_BETA         ,
        REF_PROP_DES_RC2D_BS5400_B_MOD_GAMMA_MC ,
        REF_PROP_DES_RC2D_BS5400_B_MOD_PARAMS   ,

    REF_PROP_DES_RC2D_BS5400_C                  = 1089250,
        REF_PROP_DES_RC2D_BS5400_C_NAME         ,
        REF_PROP_DES_RC2D_BS5400_C_FY           ,
        REF_PROP_DES_RC2D_BS5400_C_GAMMA_MS     ,
        REF_PROP_DES_RC2D_BS5400_C_FYD          ,
        REF_PROP_DES_RC2D_BS5400_C_FYDC         ,
        REF_PROP_DES_RC2D_BS5400_C_ES           ,
        REF_PROP_DES_RC2D_BS5400_C_FLIM         ,
        REF_PROP_DES_RC2D_BS5400_C_EPS_PLAS     ,
        REF_PROP_DES_RC2D_BS5400_C_EPS_PLASC    ,
        REF_PROP_DES_RC2D_BS5400_C_MOD_GAMMA_MS ,
        REF_PROP_DES_RC2D_BS5400_C_MOD_PARAMS   ,

    REF_PROP_DES_RC2D_EC2_A                     = 1089300,
        REF_PROP_DES_RC2D_EC2_A_NAME            ,
        REF_PROP_DES_RC2D_EC2_A_THETA1          ,
        REF_PROP_DES_RC2D_EC2_A_THETA2          ,
        REF_PROP_DES_RC2D_EC2_A_ZT1             ,
        REF_PROP_DES_RC2D_EC2_A_ZB1             ,
```

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        REF_PROP_DES_RC2D_EC2_A_ZT2             ,
        REF_PROP_DES_RC2D_EC2_A_ZB2             ,
        REF_PROP_DES_RC2D_EC2_A_THICK           ,
        REF_PROP_DES_RC2D_EC2_A_MIN_AREA_T1     ,
        REF_PROP_DES_RC2D_EC2_A_MIN_AREA_T2     ,
        REF_PROP_DES_RC2D_EC2_A_MIN_AREA_B1     ,
        REF_PROP_DES_RC2D_EC2_A_MIN_AREA_B2     ,

REF_PROP_DES_RC2D_EC2_B                         = 1089350,
        REF_PROP_DES_RC2D_EC2_B_NAME            ,
        REF_PROP_DES_RC2D_EC2_B_FCU             ,
        REF_PROP_DES_RC2D_EC2_B_GAMMA_MC        ,
        REF_PROP_DES_RC2D_EC2_B_FCD1            ,
        REF_PROP_DES_RC2D_EC2_B_FCD2            ,
        REF_PROP_DES_RC2D_EC2_B_FT              ,
        REF_PROP_DES_RC2D_EC2_B_EPS_CTRANS      ,
        REF_PROP_DES_RC2D_EC2_B_EPS_CAX         ,
        REF_PROP_DES_RC2D_EC2_B_EPS_CU          ,
        REF_PROP_DES_RC2D_EC2_B_XOVERD_MIN      ,
        REF_PROP_DES_RC2D_EC2_B_XOVERD_MAX      ,
        REF_PROP_DES_RC2D_EC2_B_BETA            ,
        REF_PROP_DES_RC2D_EC2_B_MOD_GAMMA_MC    ,
        REF_PROP_DES_RC2D_EC2_B_MOD_PARAMS      ,

REF_PROP_DES_RC2D_EC2_C                         = 1089400,
        REF_PROP_DES_RC2D_EC2_C_NAME            ,
        REF_PROP_DES_RC2D_EC2_C_FY              ,
        REF_PROP_DES_RC2D_EC2_C_GAMMA_MS        ,
        REF_PROP_DES_RC2D_EC2_C_FYD             ,
        REF_PROP_DES_RC2D_EC2_C_FYDC            ,
        REF_PROP_DES_RC2D_EC2_C_ES              ,
        REF_PROP_DES_RC2D_EC2_C_FLIM            ,
        REF_PROP_DES_RC2D_EC2_C_EPS_PLAS        ,
```

```
        REF_PROP_DES_RC2D_EC2_C_EPS_PLASC        ,
        REF_PROP_DES_RC2D_EC2_C_MOD_GAMMA_MS     ,
        REF_PROP_DES_RC2D_EC2_C_MOD_PARAMS       ,

REF_PROP_DES_RC2D_ACI318_A                       = 1089450,
        REF_PROP_DES_RC2D_ACI318_A_NAME          ,
        REF_PROP_DES_RC2D_ACI318_A_THETA1        ,
        REF_PROP_DES_RC2D_ACI318_A_THETA2        ,
        REF_PROP_DES_RC2D_ACI318_A_ZT1           ,
        REF_PROP_DES_RC2D_ACI318_A_ZB1           ,
        REF_PROP_DES_RC2D_ACI318_A_ZT2           ,
        REF_PROP_DES_RC2D_ACI318_A_ZB2           ,
        REF_PROP_DES_RC2D_ACI318_A_THICK         ,
        REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_T1   ,
        REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_T2   ,
        REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_B1   ,
        REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_B2   ,
        REF_PROP_DES_RC2D_ACI318_A_PHI_C         ,
        REF_PROP_DES_RC2D_ACI318_A_PHI_T         ,

REF_PROP_DES_RC2D_ACI318_B                       = 1089500,
        REF_PROP_DES_RC2D_ACI318_B_NAME          ,
        REF_PROP_DES_RC2D_ACI318_B_FCU           ,
        REF_PROP_DES_RC2D_ACI318_B_FCD1          ,
        REF_PROP_DES_RC2D_ACI318_B_FCD2          ,
        REF_PROP_DES_RC2D_ACI318_B_FT            ,
        REF_PROP_DES_RC2D_ACI318_B_EPS_CTRANS    ,
        REF_PROP_DES_RC2D_ACI318_B_EPS_CAX       ,
        REF_PROP_DES_RC2D_ACI318_B_EPS_CU        ,
        REF_PROP_DES_RC2D_ACI318_B_XOVERD_MIN    ,
        REF_PROP_DES_RC2D_ACI318_B_XOVERD_MAX    ,
        REF_PROP_DES_RC2D_ACI318_B_BETA          ,
        REF_PROP_DES_RC2D_ACI318_B_MOD_PARAMS    ,
```

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REF_PROP_DES_RC2D_ACI318_C                      = 1089550,
       REF_PROP_DES_RC2D_ACI318_C_NAME          ,
       REF_PROP_DES_RC2D_ACI318_C_FY            ,
       REF_PROP_DES_RC2D_ACI318_C_FYD           ,
       REF_PROP_DES_RC2D_ACI318_C_FYDC          ,
       REF_PROP_DES_RC2D_ACI318_C_ES            ,
       REF_PROP_DES_RC2D_ACI318_C_FLIM          ,
       REF_PROP_DES_RC2D_ACI318_C_EPS_PLAS      ,
       REF_PROP_DES_RC2D_ACI318_C_EPS_PLASC     ,
       REF_PROP_DES_RC2D_ACI318_C_MOD_PARAMS    ,

REF_PROP_DES_RC2D_AS3600_A                      = 1089600,
       REF_PROP_DES_RC2D_AS3600_A_NAME          ,
       REF_PROP_DES_RC2D_AS3600_A_THETA1        ,
       REF_PROP_DES_RC2D_AS3600_A_THETA2        ,
       REF_PROP_DES_RC2D_AS3600_A_ZT1           ,
       REF_PROP_DES_RC2D_AS3600_A_ZB1           ,
       REF_PROP_DES_RC2D_AS3600_A_ZT2           ,
       REF_PROP_DES_RC2D_AS3600_A_ZB2           ,
       REF_PROP_DES_RC2D_AS3600_A_THICK         ,
       REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_T1   ,
       REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_T2   ,
       REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_B1   ,
       REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_B2   ,
       REF_PROP_DES_RC2D_AS3600_A_PHI_C         ,
       REF_PROP_DES_RC2D_AS3600_A_PHI_T         ,

REF_PROP_DES_RC2D_AS3600_B                      = 1089650,
       REF_PROP_DES_RC2D_AS3600_B_NAME          ,
       REF_PROP_DES_RC2D_AS3600_B_FCU           ,
       REF_PROP_DES_RC2D_AS3600_B_FCD1          ,
       REF_PROP_DES_RC2D_AS3600_B_FCD2          ,
```

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        REF_PROP_DES_RC2D_AS3600_B_FT           ,
        REF_PROP_DES_RC2D_AS3600_B_EPS_CTRANS   ,
        REF_PROP_DES_RC2D_AS3600_B_EPS_CAX      ,
        REF_PROP_DES_RC2D_AS3600_B_EPS_CU       ,
        REF_PROP_DES_RC2D_AS3600_B_XOVERD_MIN   ,
        REF_PROP_DES_RC2D_AS3600_B_XOVERD_MAX   ,
        REF_PROP_DES_RC2D_AS3600_B_BETA         ,
        REF_PROP_DES_RC2D_AS3600_B_MOD_PARAMS   ,

REF_PROP_DES_RC2D_AS3600_C                      = 1089700,
        REF_PROP_DES_RC2D_AS3600_C_NAME         ,
        REF_PROP_DES_RC2D_AS3600_C_FY           ,
        REF_PROP_DES_RC2D_AS3600_C_FYD          ,
        REF_PROP_DES_RC2D_AS3600_C_FYDC         ,
        REF_PROP_DES_RC2D_AS3600_C_ES           ,
        REF_PROP_DES_RC2D_AS3600_C_FLIM         ,
        REF_PROP_DES_RC2D_AS3600_C_EPS_PLAS     ,
        REF_PROP_DES_RC2D_AS3600_C_EPS_PLASC    ,
        REF_PROP_DES_RC2D_AS3600_C_MOD_PARAMS   ,

REF_PROP_DES_RC2D_IS456_A                       = 1089750,
        REF_PROP_DES_RC2D_IS456_A_NAME          ,
        REF_PROP_DES_RC2D_IS456_A_THETA1        ,
        REF_PROP_DES_RC2D_IS456_A_THETA2        ,
        REF_PROP_DES_RC2D_IS456_A_ZT1           ,
        REF_PROP_DES_RC2D_IS456_A_ZB1           ,
        REF_PROP_DES_RC2D_IS456_A_ZT2           ,
        REF_PROP_DES_RC2D_IS456_A_ZB2           ,
        REF_PROP_DES_RC2D_IS456_A_THICK         ,
        REF_PROP_DES_RC2D_IS456_A_MIN_AREA_T1   ,
        REF_PROP_DES_RC2D_IS456_A_MIN_AREA_T2   ,
        REF_PROP_DES_RC2D_IS456_A_MIN_AREA_B1   ,
        REF_PROP_DES_RC2D_IS456_A_MIN_AREA_B2   ,
```

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REF_PROP_DES_RC2D_IS456_B                       = 1089800,
       REF_PROP_DES_RC2D_IS456_B_NAME           ,
       REF_PROP_DES_RC2D_IS456_B_FCU            ,
       REF_PROP_DES_RC2D_IS456_B_GAMMA_MC       ,
       REF_PROP_DES_RC2D_IS456_B_FCD1           ,
       REF_PROP_DES_RC2D_IS456_B_FCD2           ,
       REF_PROP_DES_RC2D_IS456_B_FT             ,
       REF_PROP_DES_RC2D_IS456_B_EPS_CTRANS     ,
       REF_PROP_DES_RC2D_IS456_B_EPS_CAX        ,
       REF_PROP_DES_RC2D_IS456_B_EPS_CU         ,
       REF_PROP_DES_RC2D_IS456_B_XOVERD_MIN     ,
       REF_PROP_DES_RC2D_IS456_B_XOVERD_MAX     ,
       REF_PROP_DES_RC2D_IS456_B_BETA           ,
       REF_PROP_DES_RC2D_IS456_B_MOD_GAMMA_MC   ,
       REF_PROP_DES_RC2D_IS456_B_MOD_PARAMS     ,

REF_PROP_DES_RC2D_IS456_C                       = 1089850,
       REF_PROP_DES_RC2D_IS456_C_NAME           ,
       REF_PROP_DES_RC2D_IS456_C_FY             ,
       REF_PROP_DES_RC2D_IS456_C_GAMMA_MS       ,
       REF_PROP_DES_RC2D_IS456_C_FYD            ,
       REF_PROP_DES_RC2D_IS456_C_FYDC           ,
       REF_PROP_DES_RC2D_IS456_C_ES             ,
       REF_PROP_DES_RC2D_IS456_C_FLIM           ,
       REF_PROP_DES_RC2D_IS456_C_EPS_PLAS       ,
       REF_PROP_DES_RC2D_IS456_C_EPS_PLASC      ,
       REF_PROP_DES_RC2D_IS456_C_MOD_GAMMA_MS   ,
       REF_PROP_DES_RC2D_IS456_C_MOD_PARAMS     ,

REF_PROP_DES_RC_BEAM_BAR_LIM                    = 1090000,

REF_GEN_RESTR                                   = 1101000,
```

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        REF_GEN_RESTR_NAME                  ,
        REF_GEN_RESTR_STAGE                 ,
        REF_GEN_RESTR_LIST                  ,
        REF_GEN_RESTR_TYPE                  ,

REF_JOINT                                   = 1102000,
        REF_JOINT_NAME                      ,
        REF_JOINT_STAGE                     ,
        REF_JOINT_SLAVE                     ,
        REF_JOINT_MASTER                    ,
        REF_JOINT_TYPE                      ,

REF_RIGID_CONSTR                            = 1103000,
        REF_RIGID_CONSTR_NAME               ,
        REF_RIGID_CONSTR_STAGE              ,
        REF_RIGID_CONSTR_LIST               ,
        REF_RIGID_CONSTR_MASTER             ,
        REF_RIGID_CONSTR_TYPE               ,

REF_CONST_EQN                               = 1104000,
        REF_CONST_EQN_NAME                  ,
        REF_CONST_EQN_STAGE                 ,
        REF_CONST_EQN_SLAVE                 ,
        REF_CONST_EQN_DIR                   ,
        REF_CONST_EQN_EQUATION              ,

REF_TIED_INTER                              = 1105000,
        REF_TIED_INTER_NAME                 ,
        REF_TIED_INTER_STAGE                ,
        REF_TIED_INTER_SLAVE                ,
        REF_TIED_INTER_MASTER               ,
        REF_TIED_INTER_TYPE                 ,
        REF_TIED_INTER_TOL                  ,
```

```
REF_LAST_MODEL

REF_FIRST_LOAD

       REF_FIRST_GR_LOAD

              REF_ALL_LOADS                                = 2000200,

              REF_GRID_POINT_LOAD                          = 2001000,
                     REF_GRID_POINT_FRC                    ,
                     REF_GRID_POINT_MOM                    ,

              REF_GRID_LINE_LOAD                           = 2001100,
                     REF_GRID_LINE_FRC                     ,
                     REF_GRID_LINE_MOM                     ,

              REF_GRID_AREA_LOAD                           = 2001200,
                     REF_GRID_AREA_FRC                     ,
                     REF_GRID_AREA_FX                      ,
                     REF_GRID_AREA_FY                      ,
                     REF_GRID_AREA_FZ                      ,

              REF_ND_LOAD                                  = 2002000,
                     REF_ND_LOAD_FRC                       ,
                     REF_ND_LOAD_MOM                       ,
                     REF_ND_APPL_TRANS                     ,
                     REF_ND_APPL_ROT                       ,
                     REF_ND_SETTLE_TRANS                   ,
                     REF_ND_SETTLE_ROT                     ,

              REF_EL1D_LOAD                                = 2003000,
                     REF_EL1D_POINT_FRC                    ,
```

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                REF_EL1D_POINT_MOM                  ,
                REF_EL1D_PATCH_FRC                  ,
                REF_EL1D_PATCH_MOM                  ,
                REF_EL1D_PRESTR                     ,
                REF_EL1D_PRESTR_MOM                 ,
                REF_EL1D_STRAIN                     ,
                REF_EL1D_INIT_LEN                   ,
                REF_EL1D_DIST_TRANS                 ,
                REF_EL1D_DIST_ROT                   ,
                REF_EL1D_TEMP                       ,
                REF_EL1D_TEMP_GRAD                  ,

        REF_EL2D_LOAD                               = 2004000,
                REF_EL2D_FACE_PRESS                 ,
                REF_EL2D_EDGE_PRESS                 ,
                REF_EL2D_PRESTR                     ,
                REF_EL2D_PRESTR_MOM                 ,
                REF_EL2D_STRAIN                     ,
                REF_EL2D_TEMP                       ,
                REF_EL2D_TEMP_GRAD                  ,

REF_LAST_GR_LOAD

        REF_LOAD_GRID_PT                            = 2011000,
                REF_LOAD_GRID_PT_NAME               ,
                REF_LOAD_GRID_PT_GRID_PL            ,
                REF_LOAD_GRID_PT_GRID_X             ,
                REF_LOAD_GRID_PT_GRID_Y             ,
                REF_LOAD_GRID_PT_CASE               ,
                REF_LOAD_GRID_PT_AXIS               ,
                REF_LOAD_GRID_PT_DIR                ,
                REF_LOAD_GRID_PT_VAL                ,
```

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REF_LOAD_GRID_LN                        = 2011100,
       REF_LOAD_GRID_LN_NAME            ,
       REF_LOAD_GRID_LN_GRID_PL         ,
       REF_LOAD_GRID_LN_POLY            ,
       REF_LOAD_GRID_LN_CASE            ,
       REF_LOAD_GRID_LN_AXIS            ,
       REF_LOAD_GRID_LN_PROJ            ,
       REF_LOAD_GRID_LN_DIR             ,
       REF_LOAD_GRID_LN_VAL1            ,
       REF_LOAD_GRID_LN_VAL2            ,

REF_LOAD_GRID_AR                        = 2011200,
       REF_LOAD_GRID_AR_NAME            ,
       REF_LOAD_GRID_AR_GRID_PL         ,
       REF_LOAD_GRID_AR_POLY            ,
       REF_LOAD_GRID_AR_CASE            ,
       REF_LOAD_GRID_AR_AXIS            ,
       REF_LOAD_GRID_AR_PROJ            ,
       REF_LOAD_GRID_AR_DIR             ,
       REF_LOAD_GRID_AR_VAL             ,

REF_LOAD_NODE                           = 2012000,
       REF_LOAD_NODE_NAME               ,
       REF_LOAD_NODE_LIST               ,
       REF_LOAD_NODE_CASE               ,
       REF_LOAD_NODE_AXIS               ,
       REF_LOAD_NODE_DIR                ,
       REF_LOAD_NODE_VAL                ,

REF_APPL_DISP                           = 2013000,
       REF_APPL_DISP_NAME               ,
       REF_APPL_DISP_LIST               ,
       REF_APPL_DISP_CASE               ,
```

```
        REF_APPL_DISP_AXIS                  ,
        REF_APPL_DISP_DIR                   ,
        REF_APPL_DISP_VAL                   ,

REF_SETTLE                                  = 2014000,
        REF_SETTLE_NAME                     ,
        REF_SETTLE_LIST                     ,
        REF_SETTLE_CASE                     ,
        REF_SETTLE_DIR                      ,
        REF_SETTLE_VAL                      ,

REF_LOAD_BEAM                               = 2015000,
        REF_LOAD_BEAM_NAME                  ,
        REF_LOAD_BEAM_LIST                  ,
        REF_LOAD_BEAM_CASE                  ,
        REF_LOAD_BEAM_TYPE                  ,
        REF_LOAD_BEAM_AXIS                  ,
        REF_LOAD_BEAM_PROJ                  ,
        REF_LOAD_BEAM_DIR                   ,
        REF_LOAD_BEAM_POS1                  ,
        REF_LOAD_BEAM_VAL1                  ,
        REF_LOAD_BEAM_POS2                  ,
        REF_LOAD_BEAM_VAL2                  ,

REF_LOAD_PRESTR                             = 2017000,
        REF_LOAD_PRESTR_NAME                ,
        REF_LOAD_PRESTR_LIST                ,
        REF_LOAD_PRESTR_CASE                ,
        REF_LOAD_PRESTR_TYPE                ,
        REF_LOAD_PRESTR_FRC                 ,
        REF_LOAD_PRESTR_OFFY                ,
        REF_LOAD_PRESTR_OFFZ                ,
        REF_LOAD_PRESTR_INITSTRN            ,
```

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        REF_LOAD_PRESTR_LACKFIT                 ,

REF_LOAD_MEMDIST                                = 2018000,
        REF_LOAD_MEMDIST_NAME                   ,
        REF_LOAD_MEMDIST_LIST                   ,
        REF_LOAD_MEMDIST_CASE                   ,
        REF_LOAD_MEMDIST_DIR                    ,
        REF_LOAD_MEMDIST_POS                    ,
        REF_LOAD_MEMDIST_VAL                    ,

REF_BEAM_TEMP                                   = 2019000,
        REF_BEAM_TEMP_NAME                      ,
        REF_BEAM_TEMP_LIST                      ,
        REF_BEAM_TEMP_CASE                      ,
        REF_BEAM_TEMP_TYPE                      ,
        REF_BEAM_TEMP_CONST                     ,
        REF_BEAM_TEMP_POS1                      ,
        REF_BEAM_TEMP_VAL1                      ,
        REF_BEAM_TEMP_POS2                      ,
        REF_BEAM_TEMP_VAL2                      ,

REF_LOAD_2D_FACE                                = 2020000,
        REF_LOAD_2D_FACE_NAME                   ,
        REF_LOAD_2D_FACE_LIST                   ,
        REF_LOAD_2D_FACE_CASE                   ,
        REF_LOAD_2D_FACE_AXIS                   ,
        REF_LOAD_2D_FACE_TYPE                   ,
        REF_LOAD_2D_FACE_DIR                    ,
        REF_LOAD_2D_FACE_VAL1                   ,
        REF_LOAD_2D_FACE_VAL2                   ,
        REF_LOAD_2D_FACE_VAL3                   ,
        REF_LOAD_2D_FACE_VAL4                   ,
```

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REF_LOAD_2D_EDGE                                = 2021000,
       REF_LOAD_2D_EDGE_NAME                    ,
       REF_LOAD_2D_EDGE_LIST                    ,
       REF_LOAD_2D_EDGE_CASE                    ,
       REF_LOAD_2D_EDGE_AXIS                    ,
       REF_LOAD_2D_EDGE_EDGE                    ,
       REF_LOAD_2D_EDGE_DIR                     ,
       REF_LOAD_2D_EDGE_VAL1                    ,
       REF_LOAD_2D_EDGE_VAL2                    ,

REF_LOAD_2D_INPLANE                             = 2022000,
       REF_LOAD_2D_INPLANE_NAME                 ,
       REF_LOAD_2D_INPLANE_LIST                 ,
       REF_LOAD_2D_INPLANE_CASE                 ,
       REF_LOAD_2D_INPLANE_TYPE                 ,
       REF_LOAD_2D_INPLANE_DIR                  ,
       REF_LOAD_2D_INPLANE_VAL                  ,
       REF_LOAD_2D_INPLANE_OFFSET               ,
       REF_LOAD_2D_INPLANE_STRAIN               ,

REF_LOAD_2D_TEMP                                = 2023000,
       REF_LOAD_2D_TEMP_NAME                    ,
       REF_LOAD_2D_TEMP_LIST                    ,
       REF_LOAD_2D_TEMP_CASE                    ,
       REF_LOAD_2D_TEMP_TYPE                    ,
       REF_LOAD_2D_TEMP_CONST                   ,
       REF_LOAD_2D_TEMP_VAL1_TOP                ,
       REF_LOAD_2D_TEMP_VAL1_BOT                ,
       REF_LOAD_2D_TEMP_VAL2_TOP                ,
       REF_LOAD_2D_TEMP_VAL2_BOT                ,
       REF_LOAD_2D_TEMP_VAL3_TOP                ,
       REF_LOAD_2D_TEMP_VAL3_BOT                ,
       REF_LOAD_2D_TEMP_VAL4_TOP                ,
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                REF_LOAD_2D_TEMP_VAL4_BOT                ,

            REF_LOAD_GRAV                                = 2024000,
                REF_LOAD_GRAV_NAME                       ,
                REF_LOAD_GRAV_LIST                       ,
                REF_LOAD_GRAV_CASE                       ,
                REF_LOAD_GRAV_X                          ,
                REF_LOAD_GRAV_Y                          ,
                REF_LOAD_GRAV_Z                          ,

REF_LAST_LOAD

REF_FIRST_RESP

            REF_RESP_SPECTRA                             = 2100000,

            REF_RESP_BASIC                               = 2101000,
                REF_RESP_BASIC_NAME                      ,
                REF_RESP_BASIC_AXIS                      ,
                REF_RESP_BASIC_DIR                       ,
                REF_RESP_BASIC_SPECTRUM                  ,
                REF_RESP_BASIC_MODE                      ,
                REF_RESP_BASIC_COMB_TYPE                 ,
                REF_RESP_BASIC_DAMPING                   ,

            REF_RESP_COMB                                = 2102000,
                REF_RESP_COMB_NAME                       ,
                REF_RESP_COMB_CASE_X                     ,
                REF_RESP_COMB_FAC_X                      ,
                REF_RESP_COMB_CASE_Y                     ,
                REF_RESP_COMB_FAC_Y                      ,
                REF_RESP_COMB_CASE_Z                     ,
                REF_RESP_COMB_FAC_Z                      ,
```

```
                REF_DAMPING_TABLE                                = 2103000,

                REF_LOAD_CURVE                                   = 2103100,

                REF_DLF_CURVE                                    = 2103110,

                REF_FREQ_WT_CURVE                                = 2103120,

REF_LAST_RESP

REF_FIRST_BRIDGE

      REF_FIRST_GR_BRIDGE

            REF_BRG_ALIGN_AND_PATH                               = 3000200,
            REF_BRG_INFL_POINT                                   = 3000300,

      REF_LAST_GR_BRIDGE

            REF_ALIGNMENT                                        = 3001000,
                  REF_ALIGNMENT_NAME                             ,
                  REF_ALIGNMENT_GRID_PL                          ,
                  REF_ALIGNMENT_CHAINAGE                         ,
                  REF_ALIGNMENT_CURVATURE                        ,
                  REF_ALIGNMENT_RADIUS                           ,

            REF_BRG_PATH                                         = 3002000,
                  REF_BRG_PATH_NAME                              ,
                  REF_BRG_PATH_TYPE                              ,
                  REF_BRG_PATH_GROUP                             ,
                  REF_BRG_PATH_ALIGNMENT                         ,
                  REF_BRG_PATH_LEFT                              ,
```

```
        REF_BRG_PATH_CENTRE                     ,
        REF_BRG_PATH_RIGHT                      ,
        REF_BRG_PATH_GAUGE                      ,
        REF_BRG_PATH_RAIL_FACTOR                ,

REF_VEH_STD                                     = 3003000,
        REF_VEH_STD_NAME                        ,
        REF_VEH_STD_WIDTH                       ,
        REF_VEH_STD_AXLE_POS                    ,
        REF_VEH_STD_WHEEL_OFFSET                ,
        REF_VEH_STD_WHEEL_LOAD_LEFT             ,
        REF_VEH_STD_WHEEL_LOAD_RIGHT            ,

REF_VEH_USER                                    = 3004000,
        REF_VEH_USER_NAME                       ,
        REF_VEH_USER_WIDTH                      ,
        REF_VEH_USER_AXLE_POS                   ,
        REF_VEH_USER_WHEEL_OFFSET               ,
        REF_VEH_USER_WHEEL_LOAD_LEFT            ,
        REF_VEH_USER_WHEEL_LOAD_RIGHT           ,

REF_BRG_VUDL_STD                                = 3010000,
        REF_BRG_VUDL_STD_NAME                   ,
        REF_BRG_VUDL_STD_NUM_SEG                ,
        REF_BRG_VUDL_STD_SEG1_FAC               ,
        REF_BRG_VUDL_STD_SEG1_IND               ,
        REF_BRG_VUDL_STD_TRANS1                 ,
        REF_BRG_VUDL_STD_SEG2_FAC               ,
        REF_BRG_VUDL_STD_SEG2_IND               ,
        REF_BRG_VUDL_STD_TRANS2                 ,
        REF_BRG_VUDL_STD_SEG3_FAC               ,
        REF_BRG_VUDL_STD_SEG3_IND               ,
```

```
REF_BRG_VUDL_USER                           = 3011000,
       REF_BRG_VUDL_USER_NAME               ,
       REF_BRG_VUDL_USER_NUM_SEG            ,
       REF_BRG_VUDL_USER_SEG1_FAC           ,
       REF_BRG_VUDL_USER_SEG1_IND           ,
       REF_BRG_VUDL_USER_TRANS1             ,
       REF_BRG_VUDL_USER_SEG2_FAC           ,
       REF_BRG_VUDL_USER_SEG2_IND           ,
       REF_BRG_VUDL_USER_TRANS2             ,
       REF_BRG_VUDL_USER_SEG3_FAC           ,
       REF_BRG_VUDL_USER_SEG3_IND           ,

REF_BRG_INFL_EFF_NODE                       = 3012000,
       REF_BRG_INFL_EFF_NODE_NAME           ,
       REF_BRG_INFL_EFF_NODE_EFF            ,
       REF_BRG_INFL_EFF_NODE_NODE           ,
       REF_BRG_INFL_EFF_NODE_FAC            ,
       REF_BRG_INFL_EFF_NODE_TYPE           ,
       REF_BRG_INFL_EFF_NODE_AXIS           ,
       REF_BRG_INFL_EFF_NODE_DIR            ,

REF_BRG_INFL_EFF_BEAM                       = 3013000,
       REF_BRG_INFL_EFF_BEAM_NAME           ,
       REF_BRG_INFL_EFF_BEAM_EFF            ,
       REF_BRG_INFL_EFF_BEAM_BEAM           ,
       REF_BRG_INFL_EFF_BEAM_POS            ,
       REF_BRG_INFL_EFF_BEAM_FAC            ,
       REF_BRG_INFL_EFF_BEAM_TYPE           ,
       REF_BRG_INFL_EFF_BEAM_AXIS           ,
       REF_BRG_INFL_EFF_BEAM_DIR            ,

REF_BRG_PATH_LOAD                           = 3014000,
       REF_BRG_PATH_LOAD_PATH               ,
```

```
        REF_BRG_PATH_LOAD_TYPE                  ,
        REF_BRG_PATH_LOAD_VUDL                  ,
        REF_BRG_PATH_LOAD_VUDL_FAC              ,
        REF_BRG_PATH_LOAD_KEL                   ,
        REF_BRG_PATH_LOAD_VEH                   ,
        REF_BRG_PATH_LOAD_VEH_FAC               ,
        REF_BRG_PATH_LOAD_VEH_EXCL              ,
        REF_BRG_PATH_LOAD_VEH2                  ,
        REF_BRG_PATH_LOAD_VEH_FAC2              ,
        REF_BRG_PATH_LOAD_VEH_EXCL2             ,

    REF_BRG_LOAD_STATIC                         = 3015000,
        REF_BRG_LOAD_STATIC_NAME                ,
        REF_BRG_LOAD_STATIC_GROUP               ,
        REF_BRG_LOAD_STATIC_PATH                ,
        REF_BRG_LOAD_STATIC_TYPE                ,
        REF_BRG_LOAD_STATIC_CHAIN_START         ,
        REF_BRG_LOAD_STATIC_CHAIN_END           ,
        REF_BRG_LOAD_STATIC_VEH                 ,
        REF_BRG_LOAD_STATIC_FACTOR              ,
        REF_BRG_LOAD_STATIC_EFFECT              ,
        REF_BRG_LOAD_STATIC_GRP_EFFECT          ,

    REF_BRG_LOAD_MOVING                         = 3016000,
        REF_BRG_LOAD_MOVING_NAME                ,
        REF_BRG_LOAD_MOVING_PATH                ,
        REF_BRG_LOAD_MOVING_TYPE                ,
        REF_BRG_LOAD_MOVING_CHAIN_START         ,
        REF_BRG_LOAD_MOVING_CHAIN_END           ,
        REF_BRG_LOAD_MOVING_CHAIN_INT           ,
        REF_BRG_LOAD_MOVING_VEH                 ,
        REF_BRG_LOAD_MOVING_FACTOR              ,
```

```
REF_BRG_AUTO_PATH                           = 3017000,
       REF_BRG_AUTO_PATH_NAME               ,
       REF_BRG_AUTO_PATH_TYPE               ,
       REF_BRG_AUTO_PATH_GROUP              ,
       REF_BRG_AUTO_PATH_ALIGNMENT          ,
       REF_BRG_AUTO_PATH_LEFT               ,
       REF_BRG_AUTO_PATH_CENTRE             ,
       REF_BRG_AUTO_PATH_RIGHT              ,
       REF_BRG_AUTO_PATH_GAUGE              ,
       REF_BRG_AUTO_PATH_RAIL_FACTOR        ,
       REF_BRG_AUTO_PATH_ANALYSE                  ,

REF_BRG_AUTO_PATH_LOAD                      = 3018000,
       REF_BRG_AUTO_PATH_LOAD_PATH          ,
       REF_BRG_AUTO_PATH_LOAD_TYPE          ,
       REF_BRG_AUTO_PATH_LOAD_VUDL          ,
       REF_BRG_AUTO_PATH_LOAD_VUDL_FAC      ,
       REF_BRG_AUTO_PATH_LOAD_KEL           ,
       REF_BRG_AUTO_PATH_LOAD_VEH           ,
       REF_BRG_AUTO_PATH_LOAD_VEH_FAC       ,
       REF_BRG_AUTO_PATH_LOAD_VEH_EXCL      ,
       REF_BRG_AUTO_PATH_LOAD_VEH2          ,
       REF_BRG_AUTO_PATH_LOAD_VEH_FAC2      ,
       REF_BRG_AUTO_PATH_LOAD_VEH_EXCL2     ,

REF_BRG_LOAD_BASIC                          = 3019000,
       REF_BRG_LOAD_BASIC_NAME              ,
       REF_BRG_LOAD_BASIC_GROUP             ,
       REF_BRG_LOAD_BASIC_PATH              ,
       REF_BRG_LOAD_BASIC_TYPE              ,
       REF_BRG_LOAD_BASIC_CHAIN_START       ,
       REF_BRG_LOAD_BASIC_CHAIN_END         ,
       REF_BRG_LOAD_BASIC_VEH               ,
```

```
        REF_BRG_LOAD_BASIC_FACTOR                ,
        REF_BRG_LOAD_BASIC_EFFECT                ,
        REF_BRG_LOAD_BASIC_GRP_EFFECT            ,

REF_BRG_AUTO_OPTI_SUM                            = 3020000,
        REF_BRG_AUTO_OPTI_SUM_NAME               ,
        REF_BRG_AUTO_OPTI_SUM_HBPATH             ,
        REF_BRG_AUTO_OPTI_SUM_LANE1PATH          ,
        REF_BRG_AUTO_OPTI_SUM_LANE1FAC           ,
        REF_BRG_AUTO_OPTI_SUM_LANE2PATH          ,
        REF_BRG_AUTO_OPTI_SUM_LANE2FAC           ,
        REF_BRG_AUTO_OPTI_SUM_LANE3PATH          ,
        REF_BRG_AUTO_OPTI_SUM_LANE3FAC           ,
        REF_BRG_AUTO_OPTI_SUM_LANE4PATH          ,
        REF_BRG_AUTO_OPTI_SUM_LANE4FAC           ,
        REF_BRG_AUTO_OPTI_SUM_TOTEFFECT          ,
        REF_BRG_AUTO_OPTI_SUM_FACEFFECT          ,
        REF_BRG_AUTO_OPTI_SUM_CRITICAL           ,

REF_BRG_AUTO_OPTI_SUM_EC1                        = 3021000,
        REF_BRG_AUTO_OPTI_SUM_EC1_NAME           ,
        REF_BRG_AUTO_OPTI_SUM_EC1_HBPATH         ,
        REF_BRG_AUTO_OPTI_SUM_EC1_LANE1PATH      ,
        REF_BRG_AUTO_OPTI_SUM_EC1_LANE2PATH      ,
        REF_BRG_AUTO_OPTI_SUM_EC1_LANE3PATH      ,
        REF_BRG_AUTO_OPTI_SUM_EC1_LANE4PATH      ,
        REF_BRG_AUTO_OPTI_SUM_EC1_TOTEFFECT      ,
        REF_BRG_AUTO_OPTI_SUM_EC1_FACEFFECT      ,
        REF_BRG_AUTO_OPTI_SUM_EC1_CRITICAL       ,

REF_BRG_AUTO_OPTI_SUM_US                         = 3022000,
        REF_BRG_AUTO_OPTI_SUM_US_NAME            ,
        REF_BRG_AUTO_OPTI_SUM_US_SIDE            ,
```

```
//number of loaded lanes   REF_BRG_AUTO_OPTI_SUM_US_NUM_LDL          ,
                           REF_BRG_AUTO_OPTI_SUM_US_LANEA           ,
                           REF_BRG_AUTO_OPTI_SUM_US_LANEB           ,
                           REF_BRG_AUTO_OPTI_SUM_US_LANEC           ,
                           REF_BRG_AUTO_OPTI_SUM_US_TOTEFFECT       ,
                           REF_BRG_AUTO_OPTI_SUM_US_CRITICAL        ,

      REF_LAST_BRIDGE

      REF_FIRST_STAGE

                  REF_STAGE_DEFN                                    = 4001000,
                        REF_STAGE_DEFN_NAME                         ,
                        REF_STAGE_DEFN_LIST                         ,
                        REF_STAGE_DEFN_PHI                          ,

                  REF_STAGE_PROP                                    = 4002000,
                        REF_STAGE_PROP_STAGE                        ,
                        REF_STAGE_PROP_TYPE                         ,
                        REF_STAGE_PROP_ELEM_PROP                    ,
                        REF_STAGE_PROP_REC                          ,

      REF_LAST_STAGE

      REF_FIRST_GENERAL

                  REF_LIST                                          = 5001000,
                        REF_LIST_NAME                               ,
                        REF_LIST_TYPE                               ,
                        REF_LIST_DEFN                               ,

                  REF_ASSEMBLY                                      = 5002000,
                        REF_ASSEMBLY_NAME                           ,
```

```
                        REF_ASSEMBLY_ELEM                       ,
                        REF_ASSEMBLY_TYPE                       ,
                        REF_ASSEMBLY_TOP1                       ,
                        REF_ASSEMBLY_TOP2                       ,
                        REF_ASSEMBLY_TOP3                       ,
                        REF_ASSEMBLY_ITOP                       ,
                        REF_ASSEMBLY_FIT                        ,
                        REF_ASSEMBLY_AXIS                       ,
                        REF_ASSEMBLY_AUTO                       ,
                        REF_ASSEMBLY_END1                       ,
                        REF_ASSEMBLY_END2                       ,
                        REF_ASSEMBLY_OFF                        ,
                        REF_ASSEMBLY_Y                          ,
                        REF_ASSEMBLY_Z                          ,
                        REF_ASSEMBLY_DEFN                       ,
                        REF_ASSEMBLY_POINTS                     ,
                        REF_ASSEMBLY_SPACING                    ,
                        REF_ASSEMBLY_STOREY                     ,
                        REF_ASSEMBLY_EXPLICIT                   ,


      REF_LAST_GENERAL


      REF_FIRST_RESULT

//////////////////////////////////////
// global results
//////////////////////////////////////

// not available via COM Output
                  REF_GLOBAL_DET                        = 10000800,
                        REF_MASS_DET                    =
REF_GLOBAL_DET,
```

```
                        REF_MASS_DET_MASS                       ,
                        REF_MASS_DET_INERTIA                    ,
                        REF_MASS_DET_CENTRE                     ,
                        REF_GLOBAL_ENERGY                       ,
                        REF_MAT_ENERGY                          ,
                        REF_MAT_ENERGY_STD                      ,
                        REF_ERROR_NORM                          ,
                        REF_RESID_LIMIT_FRC                     ,
                        REF_RESID_LIMIT_MOM                     ,
                        REF_RESID_LIMIT_DISP                    ,
                        REF_INFL_POS                            ,
// superseded           REF_MASS_DET_UNRES_MASS                 ,

                        REF_MASS_STOREY_MASS                    ,
                        REF_MASS_STOREY_INERTIA                 ,
                        REF_MASS_STOREY_CENTRE                  ,

// active mass          REF_MASS_DET_MASS3                      ,
// active inertia       REF_MASS_DET_INERTIA3                   ,
                        REF_MASS_STOREY_MASS3                   ,
                        REF_MASS_STOREY_INERTIA3                ,

// not available via COM Output
                  REF_DYN_DET                                   = 10001000,
                        REF_DYN_DET_MODE                        ,
                        REF_DYN_DET_FREQUENCY                   ,
                        REF_DYN_DET_MODAL_MASS                  ,
                        REF_DYN_DET_MODAL_STIFF                 ,
                        REF_DYN_DET_MODAL_GEO_STIFF             ,
                        REF_DYN_DET_EFF_MASS                    ,
                        REF_DYN_DET_EFF_INERTIA                 ,
                        REF_DYN_DET_PART_FAC                    ,
                        REF_DYN_DET_ROT_PART_FAC                ,
```

```
                        REF_DYN_DET_MODAL_DAMP                  ,

// not available via COM Output
                    REF_DYN_SUM                                 = 10001100,

// not available via COM Output
                    REF_MODEL_STAB                              = 10001200,

// not available via COM Output
                    REF_BUCK_DET                                = 10002000,
                        REF_BUCK_DET_LOAD_FAC                   ,

// not available via COM Output
                    REF_RESP_DET                                = 10003000,
                        REF_RESP_DET_CASES                      ,
                        REF_RESP_DET_MODE                       ,
                        REF_RESP_DET_FREQ                       ,
                        REF_RESP_DET_MASS                       ,
                        REF_RESP_DET_SPECACC                    ,
                        REF_RESP_DET_BASESHEAR                  ,
                        REF_RESP_DET_MODEMULT                   ,
                        REF_RESP_DET_PERIOD                     ,
                        REF_RESP_DET_UBCMETHOD                  ,
                        REF_RESP_DET_TOTALBASESHEAR             ,
                        REF_RESP_DET_DAMP                       ,
                        REF_RESP_DET_ETA                        ,
                        REF_RESP_DET_REACT                      ,
                        REF_RESP_DET_SCALE                      ,
                        REF_RESP_DET_FORCE                      ,
                        REF_RESP_DET_MOMENT                     ,
                        REF_RESP_DET_ORIGIN                     ,
                        REF_RESP_DET_BASESHEAR_EQN              ,
```

```
// not available via COM Output
                    REF_STL_DES_SYNOPSIS                        = 10004000,

                    REF_NL_LOAD_FACT_DISP                       = 10005000,
                          REF_NL_LOAD_FACT_DISP_X               ,
                          REF_NL_LOAD_FACT_DISP_Y               ,
                          REF_NL_LOAD_FACT_DISP_Z               ,
                          REF_NL_LOAD_FACT_DISP_TRANS           ,
                          REF_NL_LOAD_FACT_DISP_XX              ,
                          REF_NL_LOAD_FACT_DISP_YY              ,
                          REF_NL_LOAD_FACT_DISP_ZZ              ,
                          REF_NL_LOAD_FACT_DISP_ROT             ,

                    REF_NL_AX_FRC_DISP                          = 10006000,
                          REF_NL_AX_FRC_DISP_X                  ,
                          REF_NL_AX_FRC_DISP_Y                  ,
                          REF_NL_AX_FRC_DISP_Z                  ,
                          REF_NL_AX_FRC_DISP_TRANS              ,
                          REF_NL_AX_FRC_DISP_XX                 ,
                          REF_NL_AX_FRC_DISP_YY                 ,
                          REF_NL_AX_FRC_DISP_ZZ                 ,
                          REF_NL_AX_FRC_DISP_ROT                ,

// not available via COM Output
                    REF_INFL_NODE_RES_DET                       = 10007000,

// not available via COM Output
                    REF_INFL_NODE_LOBE_DET                      = 10008000,

// not available via COM Output
                    REF_INFL_BEAM_RES_DET                       = 10009000,

// not available via COM Output
```

```
                    REF_INFL_BEAM_LOBE_DET                          = 10010000,

// not available via COM Output
                    REF_TOTALS                                      = 11001000,
                          REF_TOTALS_FX                             ,
                          REF_TOTALS_FY                             ,
                          REF_TOTALS_FZ                             ,
                          REF_TOTALS_FRC                            ,
                          REF_TOTALS_MXX                            ,
                          REF_TOTALS_MYY                            ,
                          REF_TOTALS_MZZ                            ,
                          REF_TOTALS_MOM                            ,

                    REF_DEFM_ELEV                                   = 11002000,
                          REF_DEFM_ELEV_X                           ,
                          REF_DEFM_ELEV_Y                           ,
                          REF_DEFM_ELEV_Z                           ,

// not available via COM Output
                    REF_BRG_INFLUENCE                               = 11003000,

////////////////////////////////////
// nodal results
////////////////////////////////////

                    REF_DISP                                        = 12001000,
                          REF_DISP_DX                               ,
                          REF_DISP_DY                               ,
                          REF_DISP_DZ                               ,
                          REF_DISP_TRANS                            ,
                          REF_DISP_RXX                              ,
                          REF_DISP_RYY                              ,
                          REF_DISP_RZZ                              ,
```

```
        REF_DISP_ROT                    ,
        REF_DISP_DXY                    ,

REF_VEL                                 = 12002000,
        REF_VEL_VX                      ,
        REF_VEL_VY                      ,
        REF_VEL_VZ                      ,
        REF_VEL_TRANS                   ,
        REF_VEL_VXX                     ,
        REF_VEL_VYY                     ,
        REF_VEL_VZZ                     ,
        REF_VEL_ROT                     ,

REF_ACC                                 = 12003000,
        REF_ACC_AX                      ,
        REF_ACC_AY                      ,
        REF_ACC_AZ                      ,
        REF_ACC_TRANS                   ,
        REF_ACC_AXX                     ,
        REF_ACC_AYY                     ,
        REF_ACC_AZZ                     ,
        REF_ACC_ROT                     ,

REF_REAC                                = 12004000,
        REF_REAC_FX                     ,
        REF_REAC_FY                     ,
        REF_REAC_FZ                     ,
        REF_REAC_FRC                    ,
        REF_REAC_MXX                    ,
        REF_REAC_MYY                    ,
        REF_REAC_MZZ                    ,
        REF_REAC_MOM                    ,
```

```
                        REF_FORCE_CONSTR                                = 12005000,
                               REF_FORCE_CONSTR_FX                      ,
                               REF_FORCE_CONSTR_FY                      ,
                               REF_FORCE_CONSTR_FZ                      ,
                               REF_FORCE_CONSTR_FRC                     ,
                               REF_FORCE_CONSTR_MXX                     ,
                               REF_FORCE_CONSTR_MYY                     ,
                               REF_FORCE_CONSTR_MZZ                     ,
                               REF_FORCE_CONSTR_MOM                     ,

                        REF_FORCE_NODAL                                 = 12006000,
                               REF_FORCE_NODAL_FX                       ,
                               REF_FORCE_NODAL_FY                       ,
                               REF_FORCE_NODAL_FZ                       ,
                               REF_FORCE_NODAL_FRC                      ,
                               REF_FORCE_NODAL_MXX                      ,
                               REF_FORCE_NODAL_MYY                      ,
                               REF_FORCE_NODAL_MZZ                      ,
                               REF_FORCE_NODAL_MOM                      ,

                        REF_MASS_NODAL                                  = 12007000,
                               REF_MASS_NODAL_MASS                      ,
                               REF_MASS_NODAL_IXX                       ,
                               REF_MASS_NODAL_IYY                       ,
                               REF_MASS_NODAL_IZZ                       ,
                               REF_MASS_NODAL_IXY                       ,
                               REF_MASS_NODAL_IYZ                       ,
                               REF_MASS_NODAL_IZX                       ,

// not used directly in output but written to file
                               REF_MASS_NODAL_INERTIA                   = 12007100,

                        REF_SOIL_NODAL                                  = 12008000,
```

```
        REF_SOIL_NODAL_AREA_X                   ,
        REF_SOIL_NODAL_PRESSURE_X               ,
        REF_SOIL_NODAL_AREA_Y                   ,
        REF_SOIL_NODAL_PRESSURE_Y               ,
        REF_SOIL_NODAL_AREA_Z                   ,
        REF_SOIL_NODAL_PRESSURE_Z               ,
        REF_SOIL_NODAL_AREA_S                   ,
        REF_SOIL_NODAL_PRESSURE_S               ,

    REF_FOOTFALL_RESON                          = 12009000,
        REF_FOOTFALL_RESON_RESP_FACTOR          ,
        REF_FOOTFALL_RESON_PEAK_VELOCITY        ,
        REF_FOOTFALL_RESON_RMS_VELOCITY         ,
        REF_FOOTFALL_RESON_PEAK_ACC             ,
        REF_FOOTFALL_RESON_RMS_ACC              ,
        REF_FOOTFALL_RESON_CRIT_NODE            ,
        REF_FOOTFALL_RESON_CRIT_FREQ            ,

    REF_FOOTFALL_TRANS                          = 12009100,
        REF_FOOTFALL_TRANS_RESP_FACTOR          ,
        REF_FOOTFALL_TRANS_PEAK_VELOCITY        ,
        REF_FOOTFALL_TRANS_RMS_VELOCITY         ,
        REF_FOOTFALL_TRANS_PEAK_ACC             ,
        REF_FOOTFALL_TRANS_RMS_ACC              ,
        REF_FOOTFALL_TRANS_CRIT_NODE            ,
        REF_FOOTFALL_TRANS_CRIT_FREQ            ,

    REF_FOOTFALL_SUM                            = 12009200,
        REF_FOOTFALL_SUM_RESON_RESP_FACTOR      ,
        REF_FOOTFALL_SUM_TRANS_RESP_FACTOR      ,
        REF_FOOTFALL_SUM_MAX_RESP_FACTOR        ,

//////////////////////////////////////
```

```
// nodal results on elements - table placeholders only; components as per
respective nodal tables
////////////////////////////////////////

                    REF_VEL_ON_ELEM                                 = 12502000,

                    REF_ACC_ON_ELEM                                 = 12503000,

                    REF_SOIL_NODAL_ON_ELEM                          = 12508000,

                    REF_FOOTFALL_RESON_ON_ELEM                      = 12509000,

                    REF_FOOTFALL_TRANS_ON_ELEM                      = 12509100,

                    REF_FOOTFALL_SUM_ON_ELEM                        = 12509200,

////////////////////////////////////////
// 0D element results
////////////////////////////////////////

            REF_FIRST_EL0D_RESULT

                    REF_DISP_EL0D                                   = 13001000,
                          REF_DISP_EL0D_DX                          ,
                          REF_DISP_EL0D_DY                          ,
                          REF_DISP_EL0D_DZ                          ,
                          REF_DISP_EL0D_TRANS                       ,
                          REF_DISP_EL0D_RXX                         ,
                          REF_DISP_EL0D_RYY                         ,
                          REF_DISP_EL0D_RZZ                         ,
                          REF_DISP_EL0D_ROT                         ,

                    REF_FORCE_EL0D                                  = 13002000,
```

```
                        REF_FORCE_EL0D_FX                       ,
                        REF_FORCE_EL0D_FY                       ,
                        REF_FORCE_EL0D_FZ                       ,
                        REF_FORCE_EL0D_FRC                      ,
                        REF_FORCE_EL0D_MXX                      ,
                        REF_FORCE_EL0D_MYY                      ,
                        REF_FORCE_EL0D_MZZ                      ,
                        REF_FORCE_EL0D_MOM                      ,

            REF_LAST_EL0D_RESULT

//////////////////////////////////////
// 1D element results
//////////////////////////////////////

            REF_FIRST_EL1D_RESULT

                  REF_DISP_EL1D                                 = 14001000,
                        REF_DISP_EL1D_DX                        ,
                        REF_DISP_EL1D_DY                        ,
                        REF_DISP_EL1D_DZ                        ,
                        REF_DISP_EL1D_TRANS                     ,
                        REF_DISP_EL1D_RXX                       ,
                        REF_DISP_EL1D_RYY                       ,
                        REF_DISP_EL1D_RZZ                       ,
                        REF_DISP_EL1D_ROT                       ,

                  REF_END_ROT_EL1D                              = 14001500,
                        REF_END_ROT_EL1D_MAJOR                  ,

                  REF_FORCE_EL1D                                = 14002000,
                        REF_FORCE_EL1D_FX                       ,
                        REF_FORCE_EL1D_FY                       ,
```

```
        REF_FORCE_EL1D_FZ                       ,
        REF_FORCE_EL1D_FRC                      ,
        REF_FORCE_EL1D_MXX                      ,
        REF_FORCE_EL1D_MYY                      ,
        REF_FORCE_EL1D_MZZ                      ,
        REF_FORCE_EL1D_MOM                      ,
        REF_FORCE_EL1D_FYZ                      ,
        REF_FORCE_EL1D_MYZ                      ,

REF_STRESS_EL1D                                 = 14003000,
        REF_STRESS_EL1D_A                       ,
        REF_STRESS_EL1D_SY                      ,
        REF_STRESS_EL1D_SZ                      ,
        REF_STRESS_EL1D_BY_POSZ                 ,
        REF_STRESS_EL1D_BY_NEGZ                 ,
        REF_STRESS_EL1D_BZ_POSY                 ,
        REF_STRESS_EL1D_BZ_NEGY                 ,
        REF_STRESS_EL1D_C1                      ,
        REF_STRESS_EL1D_C2                      ,
        REF_STRESS_EL1D_CY                      ,
        REF_STRESS_EL1D_CZ                      ,

REF_STRESS_EL1D_DRV                             = 14003200,
        REF_STRESS_EL1D_DRV_SY                  ,
        REF_STRESS_EL1D_DRV_SZ                  ,
        REF_STRESS_EL1D_DRV_ST                  ,
        REF_STRESS_EL1D_DRV_V_MISES             ,

REF_STRAIN_EL1D                                 = 14003500,
        REF_STRAIN_EL1D_A                       ,

REF_SED_EL1D                                    = 14004000,
        REF_SED_EL1D_WEB                        ,
```

```
                        REF_SED_EL1D_FLG                        ,
                        REF_SED_EL1D_TOT                        ,

                    REF_SED_AVG_EL1D                            = 14005000,
                        REF_SED_AVG_EL1D_WEB                    ,
                        REF_SED_AVG_EL1D_FLG                    ,
                        REF_SED_AVG_EL1D_TOT                    ,

// per member
                    REF_STL_UTIL                                = 14006000,
                        REF_STL_UTIL_OVER_ALL                   ,
                        REF_STL_UTIL_LCL_COMB                   ,
                        REF_STL_UTIL_BCK_COMB                   ,
                        REF_STL_UTIL_LCL_A                      ,
                        REF_STL_UTIL_LCL_SU                     ,
                        REF_STL_UTIL_LCL_SV                     ,
                        REF_STL_UTIL_LCL_MXX                    ,
                        REF_STL_UTIL_LCL_MUU                    ,
                        REF_STL_UTIL_LCL_MVV                    ,
                        REF_STL_UTIL_BCK_UU                     ,
                        REF_STL_UTIL_BCK_VV                     ,
                        REF_STL_UTIL_BCK_LT                     ,
                        REF_STL_UTIL_BCK_TOR                    ,
                        REF_STL_UTIL_BCK_FT                     ,
                        REF_STL_UTIL_GOVERN                     ,

// per member
                    REF_STL_DES_MEMB_EFF_LEN_FAC                = 14006100,
                        REF_STL_DES_MEMB_EFF_LEN_FAC_MAJ        ,
                        REF_STL_DES_MEMB_EFF_LEN_FAC_MIN        ,
                        REF_STL_DES_MEMB_EFF_LEN_FAC_LT         ,

// per member
```

```
                    REF_STL_DES_SUMMARY                         = 14006200,
// per member
                    REF_STL_DES_CALC_VRB                        = 14006400,
// per member
                    REF_STL_DES_CALC_BRF                        = 14006500,
// per member
                    REF_STL_DES_MEMB_EFF_LEN                    = 14006600,

                    REF_TORCE_LINE                              = 14007000,
                           REF_TORCE_LINE_POS                   ,
                           REF_TORCE_LINE_NEG                   ,

                    REF_SHEAR_LINE                              = 14008000,
                           REF_SHEAR_LINE_POS                   ,
                           REF_SHEAR_LINE_NEG                   ,

             REF_LAST_EL1D_RESULT

//////////////////////////////////////
// 2D element results
//////////////////////////////////////

             REF_FIRST_EL2D_RESULT

                    REF_DISP_EL2D                               = 15001000,
                           REF_DISP_EL2D_DX                     ,
                           REF_DISP_EL2D_DY                     ,
                           REF_DISP_EL2D_DZ                     ,
                           REF_DISP_EL2D_TRANS                  ,
                           REF_DISP_EL2D_RXX                    ,
                           REF_DISP_EL2D_RYY                    ,
                           REF_DISP_EL2D_RZZ                    ,
                           REF_DISP_EL2D_ROT                    ,
```

```
REF_FORCE_EL2D_DRV                          = 15002000,
       REF_FORCE_EL2D_DRV_PRIN_M            ,
       REF_FORCE_EL2D_DRV_PRIN_N            ,
       REF_FORCE_EL2D_DRV_MMAX              ,
       REF_FORCE_EL2D_DRV_MMIN              ,
       REF_FORCE_EL2D_DRV_MANG              ,
       REF_FORCE_EL2D_DRV_NMAX              ,
       REF_FORCE_EL2D_DRV_NMIN              ,
       REF_FORCE_EL2D_DRV_NANG              ,
       REF_FORCE_EL2D_DRV_QMAX              ,

REF_MOMENT_EL2D_PRJ                         = 15003000,
       REF_MOMENT_EL2D_PRJ_M                ,
       REF_MOMENT_EL2D_PRJ_MX               ,
       REF_MOMENT_EL2D_PRJ_MY               ,
       REF_MOMENT_EL2D_PRJ_MXY              ,
       REF_MOMENT_EL2D_PRJ_MXMXY            ,
       REF_MOMENT_EL2D_PRJ_MYMYX            ,

REF_FORCE_EL2D_PRJ                          = 15004000,
       REF_FORCE_EL2D_PRJ_N                 ,
       REF_FORCE_EL2D_PRJ_Q                 ,
       REF_FORCE_EL2D_PRJ_NX                ,
       REF_FORCE_EL2D_PRJ_NY                ,
       REF_FORCE_EL2D_PRJ_NXY               ,
       REF_FORCE_EL2D_PRJ_QX                ,
       REF_FORCE_EL2D_PRJ_QY                ,

REF_STRESS_EL2D_DRV                         = 15005000,
       REF_STRESS_EL2D_DRV_PRIN             ,
       REF_STRESS_EL2D_DRV_MAX              ,
       REF_STRESS_EL2D_DRV_MIN              ,
```

```
                        REF_STRESS_EL2D_DRV_ANG                 ,
                        REF_STRESS_EL2D_DRV_MAX_SH              ,
                        REF_STRESS_EL2D_DRV_V_MISES             ,
                        REF_STRESS_EL2D_DRV_AVERAGE             ,

                    REF_STRESS_EL2D_AX                          = 15006000,
                        REF_STRESS_EL2D_AX_XX                   ,
                        REF_STRESS_EL2D_AX_YY                   ,
                        REF_STRESS_EL2D_AX_ZZ                   ,
                        REF_STRESS_EL2D_AX_XY                   ,
                        REF_STRESS_EL2D_AX_YZ                   ,
                        REF_STRESS_EL2D_AX_ZX                   ,

                    REF_STRESS_EL2D_PRJ                         = 15007000,
                        REF_STRESS_EL2D_PRJ_XX                  ,
                        REF_STRESS_EL2D_PRJ_YY                  ,
                        REF_STRESS_EL2D_PRJ_ZZ                  ,
                        REF_STRESS_EL2D_PRJ_XY                  ,
                        REF_STRESS_EL2D_PRJ_YZ                  ,
                        REF_STRESS_EL2D_PRJ_ZX                  ,

                    REF_EL2D_STRESS_ERROR                       = 15008000,
                        REF_EL2D_STRESS_ERROR_ERR               ,

                    REF_SOIL_EL2D                               = 15009000,
                        REF_SOIL_EL2D_PRESSURE                  ,

//WallRes           REF_FORCE_ELWALL                            = 15009500,
                        REF_FORCE_ELWALL_FX                     ,
                        REF_FORCE_ELWALL_FY                     ,
                        REF_FORCE_ELWALL_FZ                     ,
                        REF_FORCE_ELWALL_FRC                    ,
                        REF_FORCE_ELWALL_MXX                    ,
```

```
                        REF_FORCE_ELWALL_MYY                    ,
                        REF_FORCE_ELWALL_MZZ                    ,
                        REF_FORCE_ELWALL_MOM                    ,

                    REF_RC_SLAB_REINF                           = 15010000,
                        REF_RC_SLAB_REINF_NOTE                  ,
                        REF_RC_SLAB_REINF_TOP_A                 ,
                        REF_RC_SLAB_REINF_TOP_B                 ,
                        REF_RC_SLAB_REINF_BOT_A                 ,
                        REF_RC_SLAB_REINF_BOT_B                 ,
                        REF_RC_SLAB_REINF_TOP                   ,
                        REF_RC_SLAB_REINF_BOT                   ,

            REF_LAST_EL2D_RESULT

////////////////////////////////////
// element gen results
////////////////////////////////////

            REF_FIRST_ELGEN_RESULT

                    REF_STRAIN_ENERGY                           = 16001000,
                        REF_STRAIN_ENERGY_ENERGY                ,

                    REF_VIRTUAL_ENERGY                          = 16002000,
                        REF_VIRTUAL_ENERGY_ENERGY               ,

                    REF_RES_ACCURACY                            = 16008000,
                        REF_RES_ACCURACY_SIGFIG                 ,

            REF_LAST_ELGEN_RESULT

////////////////////////////////////
```

```
// assembly results
////////////////////////////////////

            REF_FIRST_ASSEM_RESULT

                  REF_DISP_ASSEM                              = 18001000,
                        REF_DISP_ASSEM_DX                     ,
                        REF_DISP_ASSEM_DY                     ,
                        REF_DISP_ASSEM_DZ                     ,
                        REF_DISP_ASSEM_TRANS                  ,
                        REF_DISP_ASSEM_RXX                    ,
                        REF_DISP_ASSEM_RYY                    ,
                        REF_DISP_ASSEM_RZZ                    ,
                        REF_DISP_ASSEM_ROT                    ,

                  REF_DRIFT_ASSEM                             = 18001500,
                        REF_DRIFT_ASSEM_DX                    ,
                        REF_DRIFT_ASSEM_DY                    ,
                        REF_DRIFT_ASSEM_DZ                    ,
                        REF_DRIFT_ASSEM_TRANS                 ,
                        REF_DRIFT_ASSEM_RXX                   ,
                        REF_DRIFT_ASSEM_RYY                   ,
                        REF_DRIFT_ASSEM_RZZ                   ,
                        REF_DRIFT_ASSEM_ROT                   ,
                        REF_DRIFT_ASSEM_DXY                   ,

                  REF_DRIFTINDEX_ASSEM                        = 18001600,
                        REF_DRIFTINDEX_ASSEM_DX               ,
                        REF_DRIFTINDEX_ASSEM_DY               ,
                        REF_DRIFTINDEX_ASSEM_DZ               ,
                        REF_DRIFTINDEX_ASSEM_TRANS            ,
                        REF_DRIFTINDEX_ASSEM_RXX              ,
                        REF_DRIFTINDEX_ASSEM_RYY              ,
```

```
                        REF_DRIFTINDEX_ASSEM_RZZ                ,
                        REF_DRIFTINDEX_ASSEM_ROT                ,
                        REF_DRIFTINDEX_ASSEM_DXY                ,

                    REF_FORCE_ASSEM                             = 18002000,
                        REF_FORCE_ASSEM_FX                      ,
                        REF_FORCE_ASSEM_FY                      ,
                        REF_FORCE_ASSEM_FZ                      ,
                        REF_FORCE_ASSEM_FRC                     ,
                        REF_FORCE_ASSEM_MXX                     ,
                        REF_FORCE_ASSEM_MYY                     ,
                        REF_FORCE_ASSEM_MZZ                     ,
                        REF_FORCE_ASSEM_MOM                     ,

            REF_LAST_ASSEM_RESULT
        REF_LAST_RESULT

////////////////////////////////////////
// user module data
////////////////////////////////////////

            REF_FIRST_USER_MOD                                  = 1000000000,

// e.g. REF_USER_MOD_NODE + n refers to Node User Module n
// (gap between user module enums must be MAX_USER_MOD min.)

// per node
                    REF_USER_MOD_NODE                           = 1020000000,

// per element
                    REF_USER_MOD_NODE_ON_ELEM                   = 1025000000,

// per element
```

```
                    REF_USER_MOD_ELEM                                   = 1030000000,

// per member
                    REF_USER_MOD_MEMBER                                 = 1035000000,

               REF_LAST_USER_MOD                                        = 1100000000,
};
```