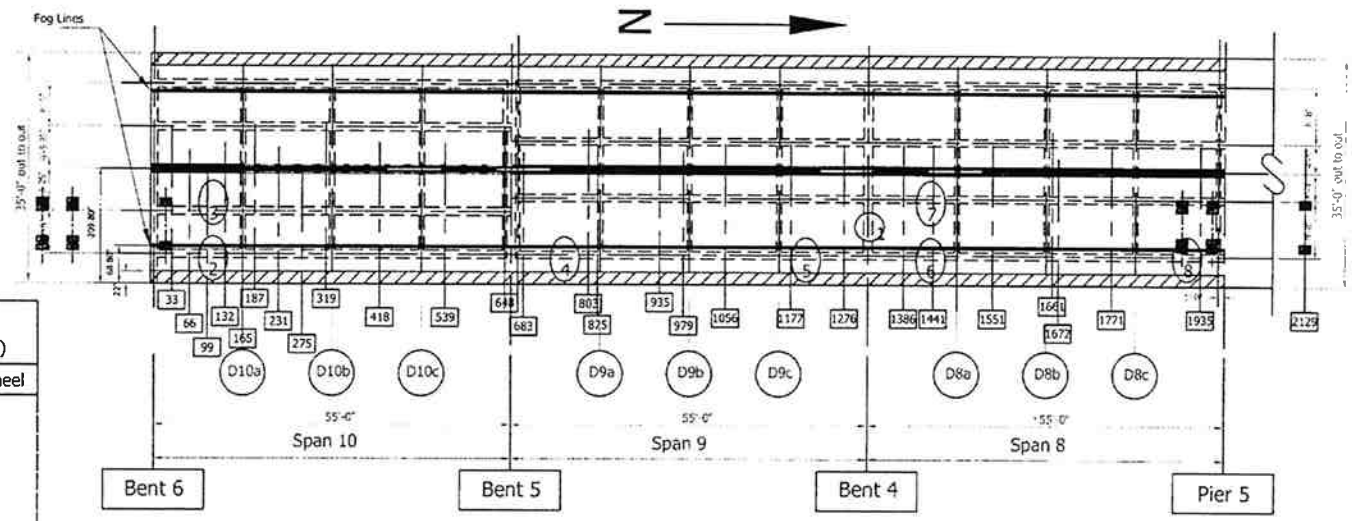
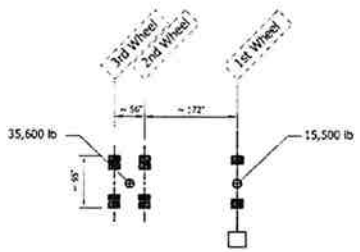
Appendix C: Test truck Passing Simulation



Truck Locations for Finite Element Analysis

Test Truck Positions (distance in inches from Bent 6)		
3rd Wheel	2nd Wheel	1st Wheel
--	--	33
--	--	66
--	--	99
--	--	132
--	--	165
--	11	187
--	55	231
44	99	275
88	143	319
187	242	418
308	363	539
418	473	648
451	506	683
572	626	803
593	648	825
705	759	935
749	803	979
825	880	1056
946	1001	1177
1045	1100	1276
1155	1210	1386
1210	1265	1441
1320	1375	1551
1430	1485	1661
1441	1496	1672
1540	1595	1771
1705	1760	1935
1901	1957	2129



FE Truckload

No.	Result Locations (distance in inches from Bent 6)	
	Experiment	FEA
1	1320	1320
2	38.25	44
3	88.75	88
4	744	748.5
5	1172.5	1177
6	1445.75	1441
7	1433	1430
8	1932.5	1935.2

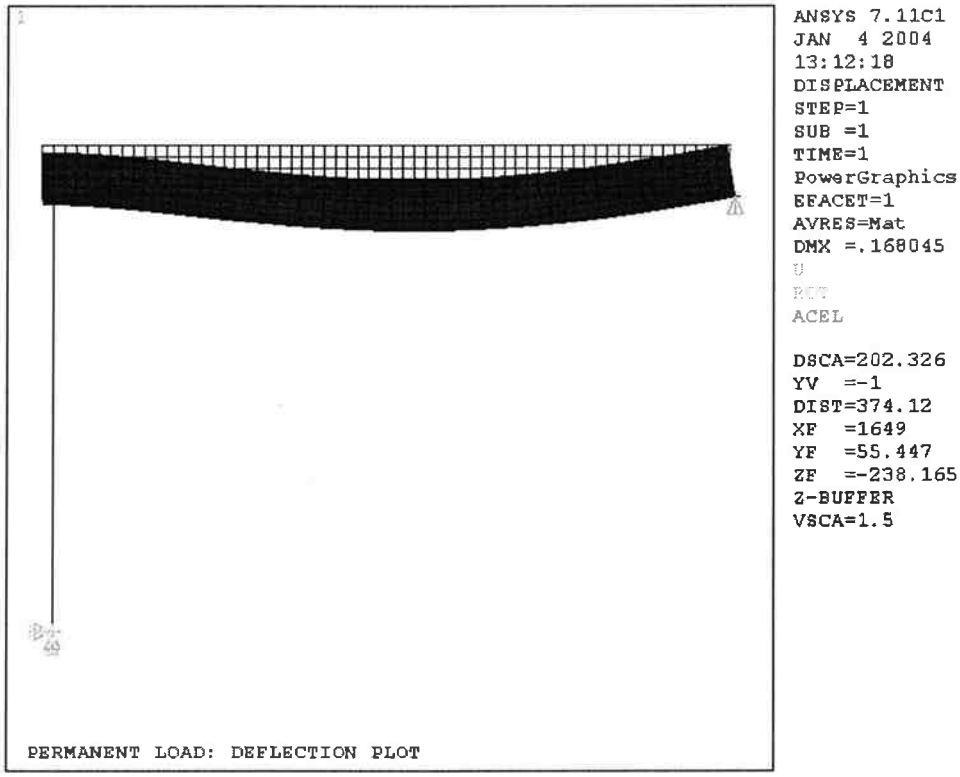
Figure C1: Testtruck passing simulation using finite element modeling

Appendix D: Finite Element Analysis Results

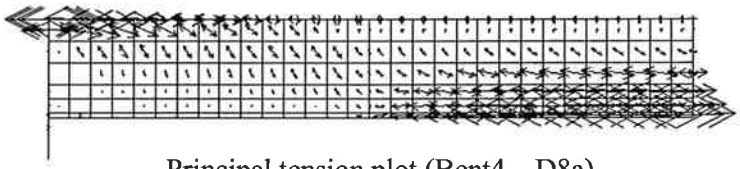
Table D1: Summary of finite element analysis results

Model	Reaction (kip)						Spring Stiffness (kip/in)		Support Displacement (in)		
	Center Column (vertical)	End Support (vertical)		Vertical* Total Reaction	End Support (longitudinal)				Center (vertical)	End (longitudinal)	
		Exterior Girder	Interior Girder		Exterior Girder	Interior Girder	Exterior Girder	Interior Girder	Exterior Girder	Exterior Girder	Interior Girder
1) Permanent Loads	308.6	46.8	41.6	970.8	23.4	20.8	848	785	-0.034	0.028	0.027
2) Temperature Change											
2.1) Uniform Contraction	320.3	43.4	39.1	970.7	21.7	19.5	732	615	-0.085	-0.030	-0.032
2.2) Uniform Expansion	312.1	45.9	40.7	970.7	23.0	20.3	197	176	0.023	0.117	0.116
2.3) Nonuniform	263.9	82.1	28.5	970.4	41.0	14.3	697	296	-0.029	0.059	0.048
3) Shrinkage	359.9	15.2	47.5	970.6	7.61	23.8	58	207	-0.112	-0.132	-0.115
4) Creep	303.7	52.4	43.0	989.1	26.4	21.4	950	900	-0.034	0.028	0.024
5) Support Displacement											
5.1) Center Support	302.8	48.2	43.1	970.6	24.1	21.5	671	622	-0.134	0.036	0.035
5.2) End Support	311.5	46.1	40.9	971.1	23.0	20.4	990	920	-0.035	-0.100	-0.100
6) Load Combination: Shrinkage and Nonuniform Temperature Change	318.9	43.9	39.3	970.7	22.0	19.7	241	211	-0.107	-0.091	-0.093

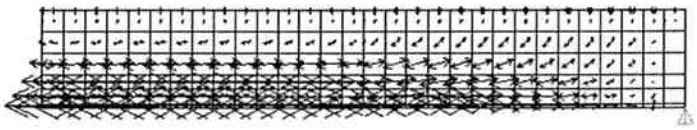
*Obtained from (center-column reaction x 2) + (exterior end-support reaction x 4) + (interior end-support reaction x 4)



Deflection plot: Permanent load

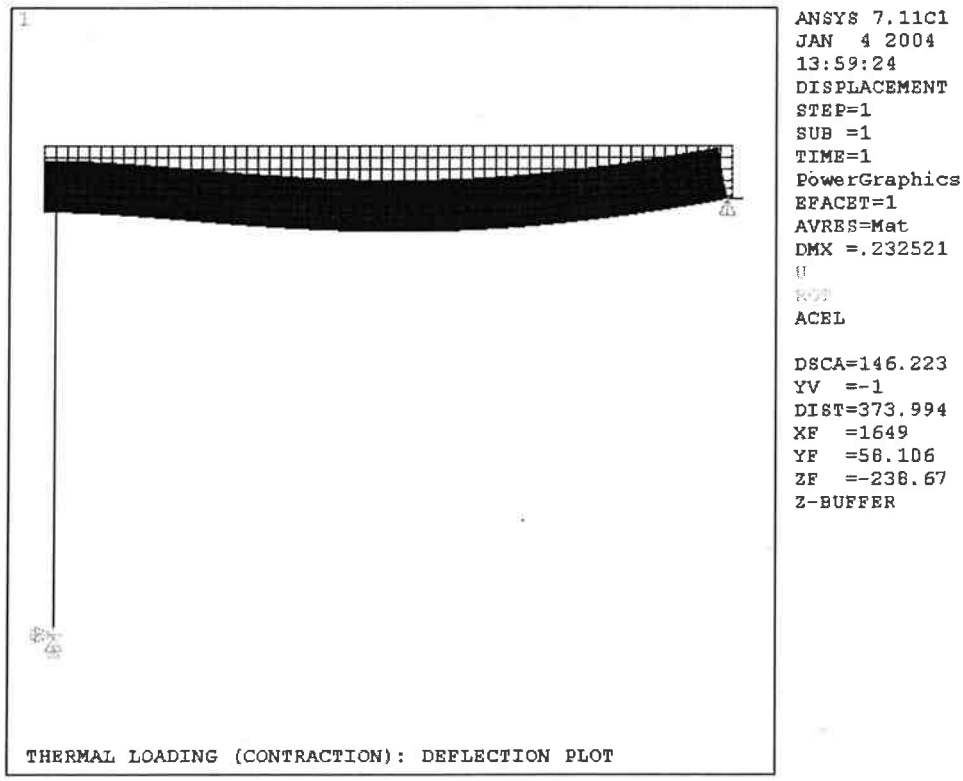


Principal tension plot (Bent4 – D8a)

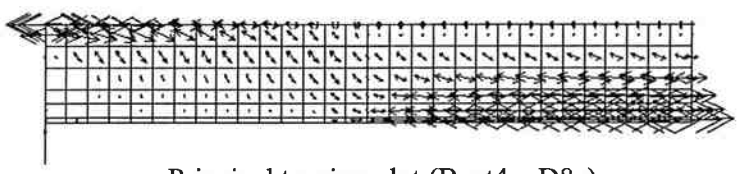


Principal tension plot (D8c – Pier5)

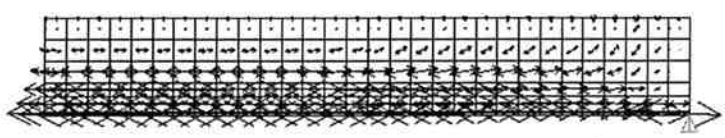
Figure D1: FE results of bridge model subjected to permanent load



Deflection plot: Uniform temperature change (contraction)

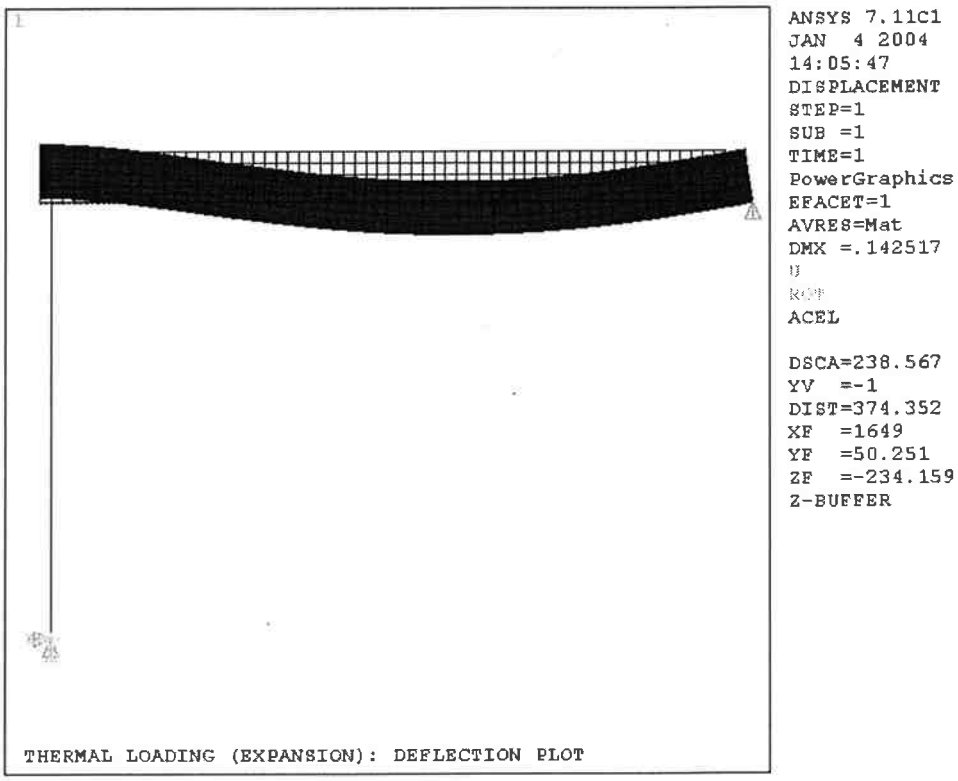


Principal tension plot (Bent4 – D8a)

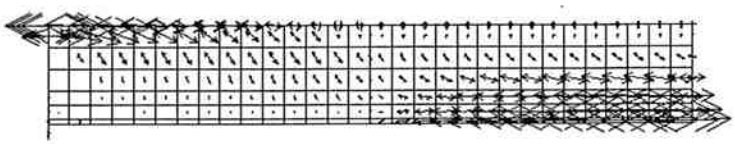


Principal tension plot (D8c – Pier5)

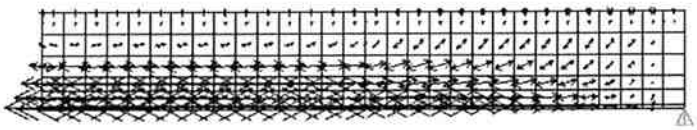
Figure D2: FE results of bridge model subjected to permanent load and uniform temperature change (contraction)



Deflection plot: Uniform temperature change (expansion)

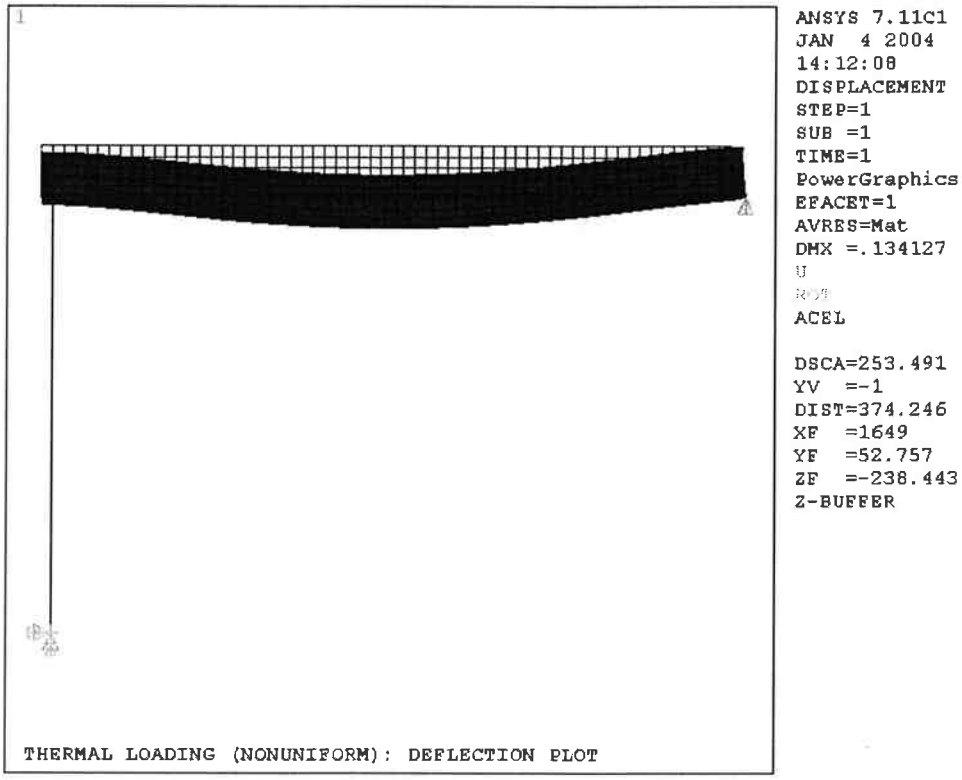


Principal tension plot (Bent4 – D8a)

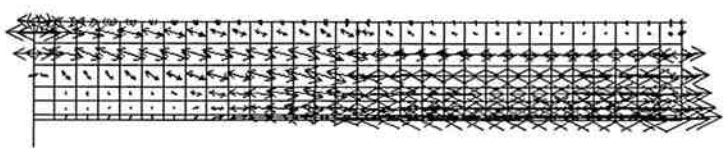


Principal tension plot (D8c – Pier5)

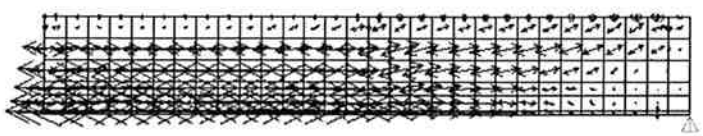
Figure D3: FE results of bridge model subjected to permanent load and uniform temperature change (expansion)



Deflection plot: Nonuniform temperature change

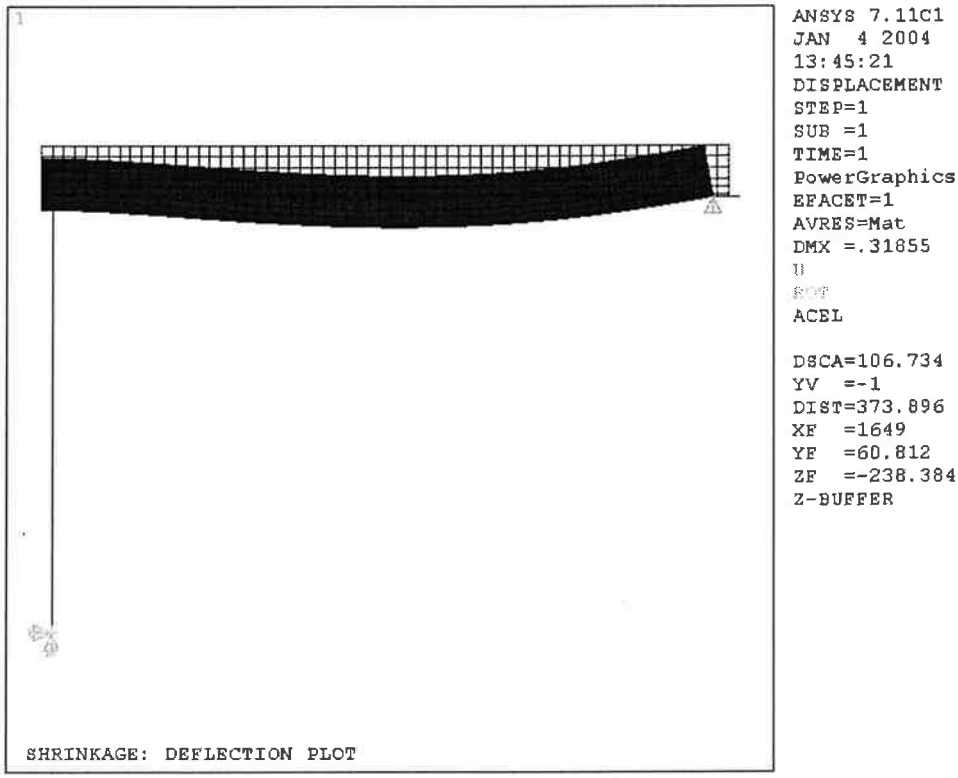


Principal tension plot (Bent4 – D8a)

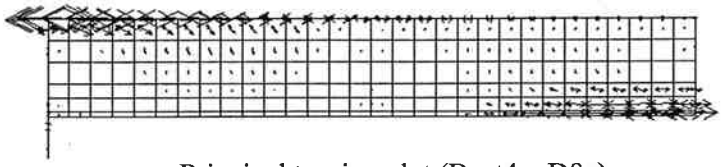


Principal tension plot (D8c – Pier5)

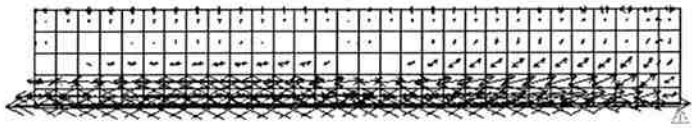
Figure D4: FE results of bridge model subjected to permanent load and nonuniform temperature change



Deflection plot: Shrinkage

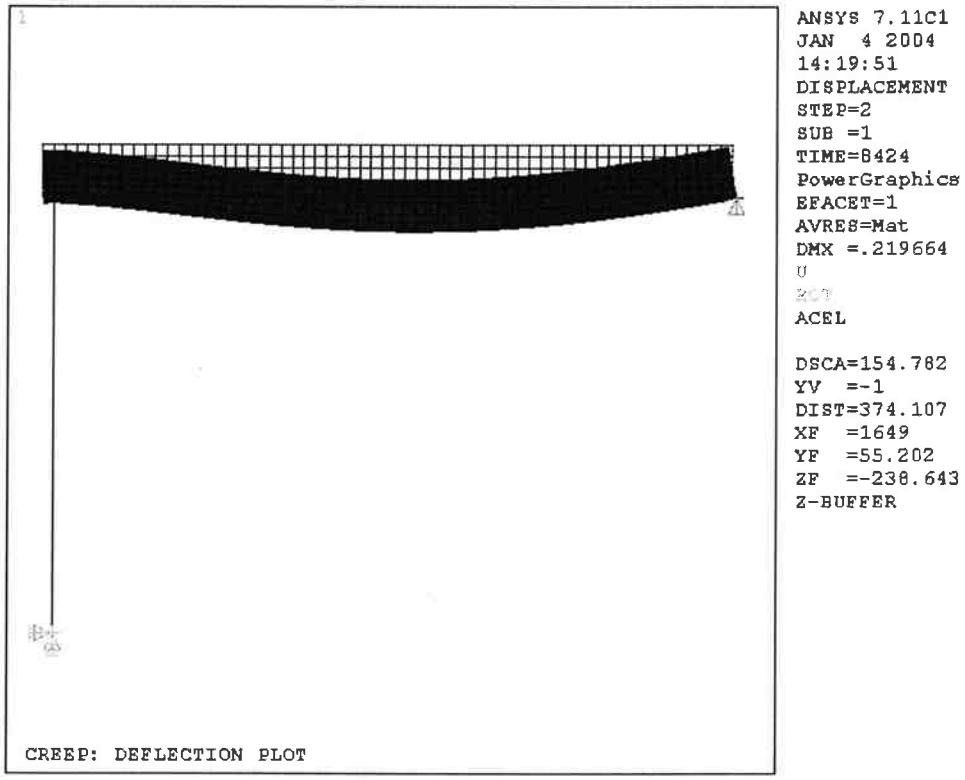


Principal tension plot (Bent4 – D8a)

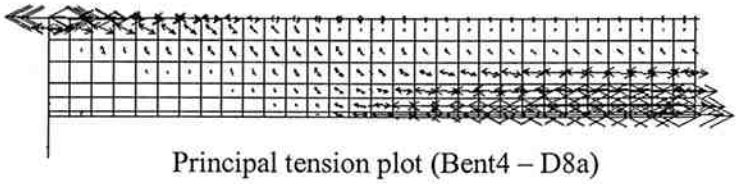


Principal tension plot (D8c – Pier5)

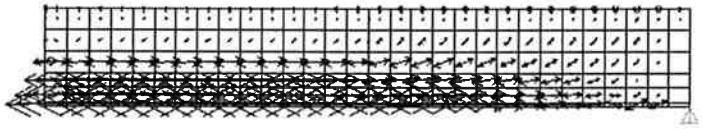
Figure D5: FE results of bridge model subjected to permanent load and shrinkage



Deflection plot: Creep

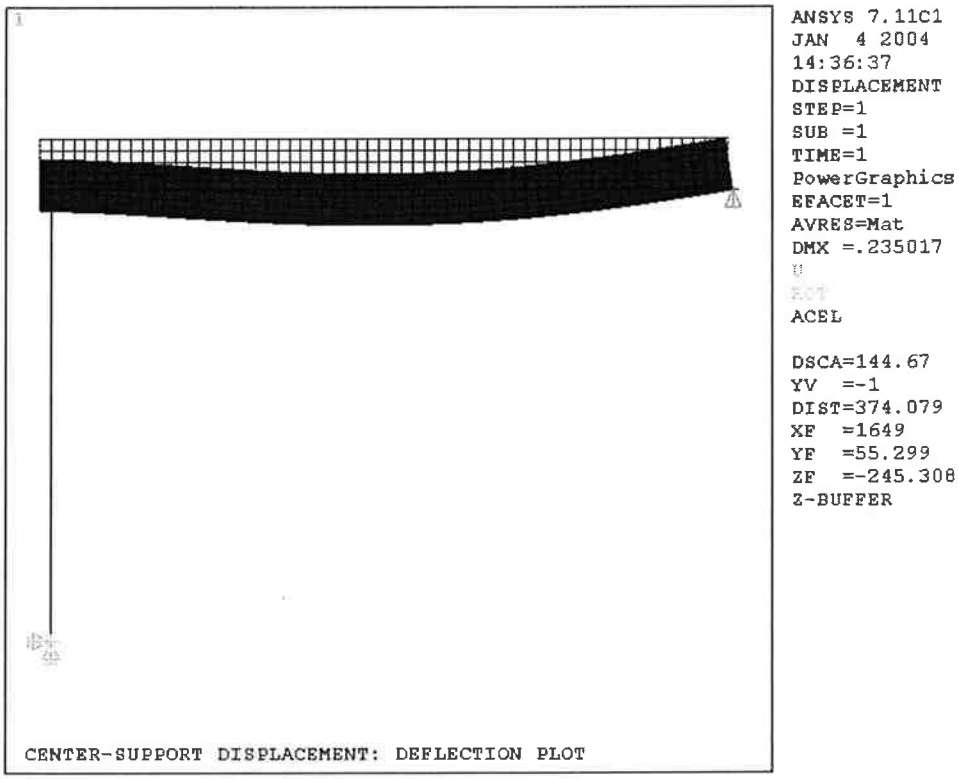


Principal tension plot (Bent4 – D8a)

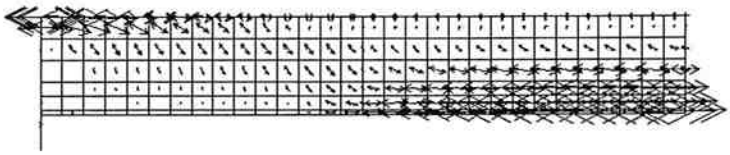


Principal tension plot (D8c – Pier5)

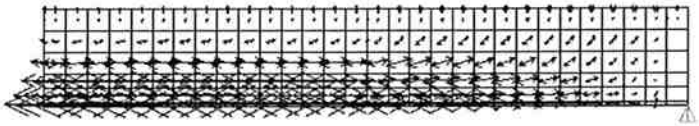
Figure D6: FE results of bridge model subjected to permanent load and creep



Deflection plot: Center - support displacement

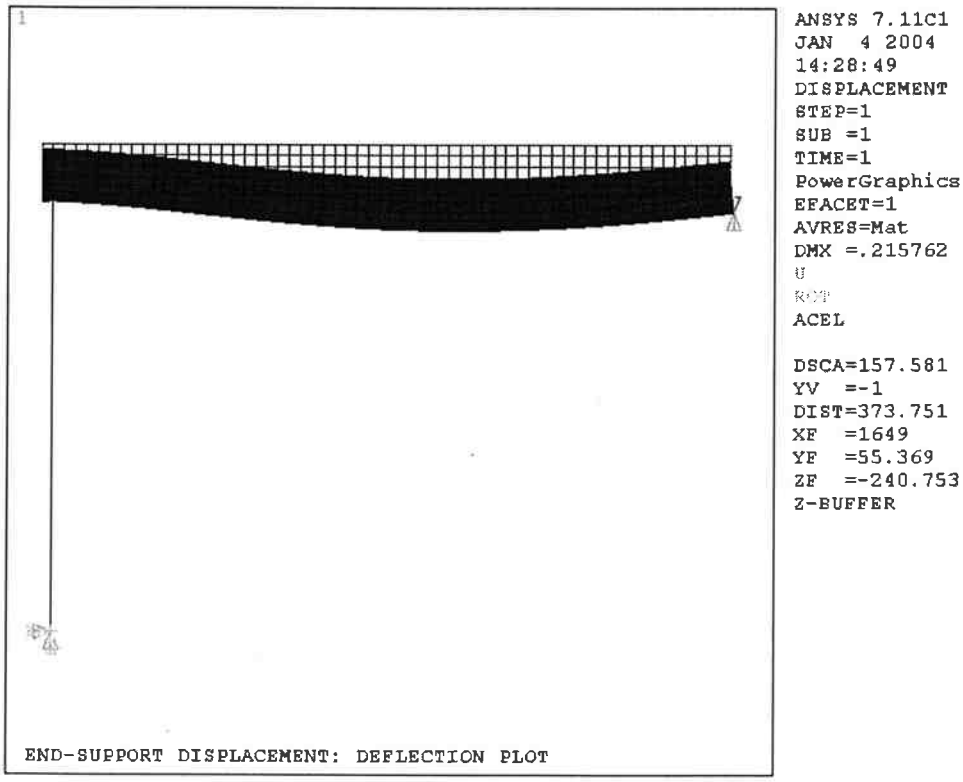


Principal tension plot (Bent4 – D8a)

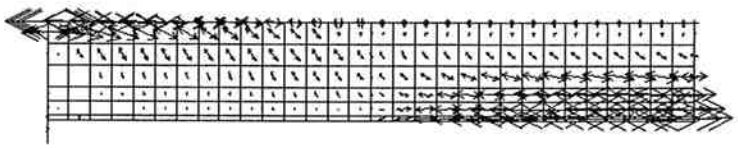


Principal tension plot (D8c – Pier5)

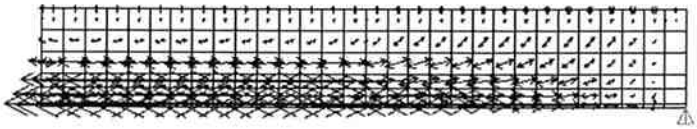
Figure D7: FE results of bridge model subjected to permanent load and center - support displacement



Deflection plot: End - support displacement

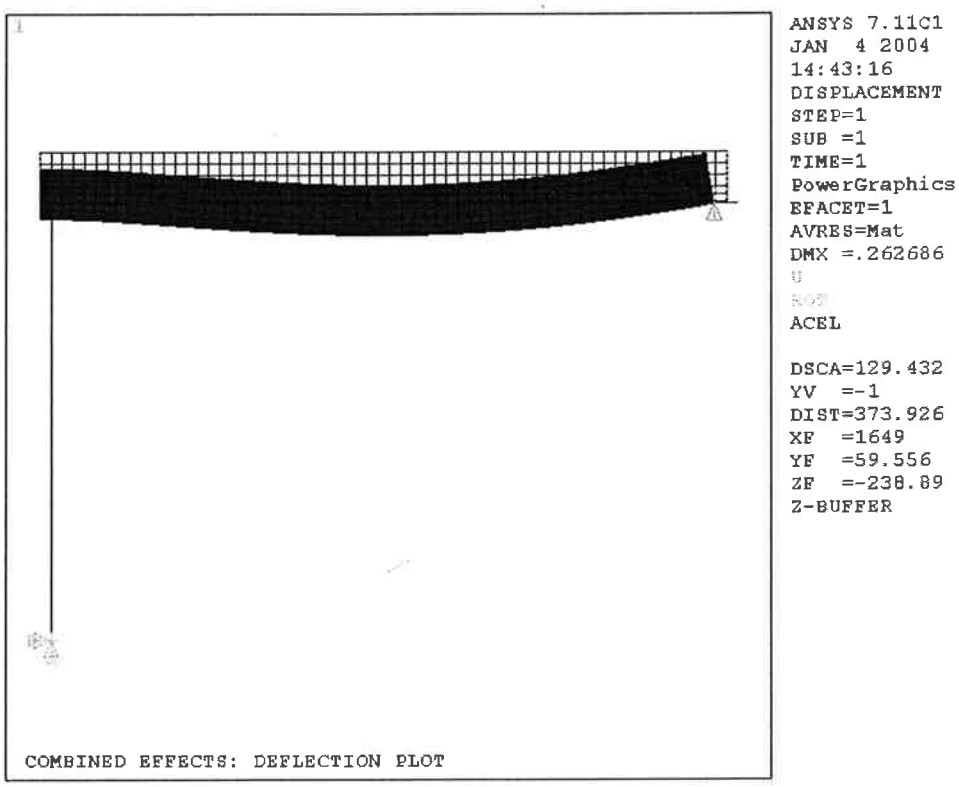


Principal tension plot (Bent4 – D8a)

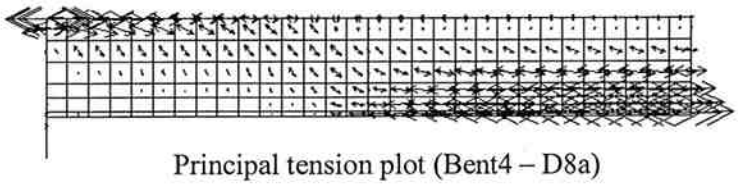


Principal tension plot (D8c – Pier5)

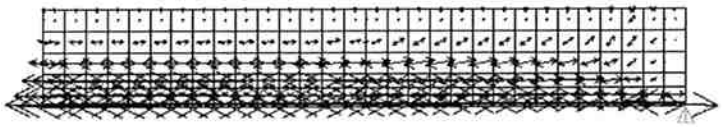
Figure D8: FE results of bridge model subjected to permanent load and end - support displacement



Deflection plot: Load combination (shrinkage and nonuniform temperature change)



Principal tension plot (Bent4 – D8a)



Principal tension plot (D8c – Pier5)

Figure D9: FE results of bridge model subjected to permanent load and load combination (shrinkage and nonuniform temperature change)