URS CORPORATION

JOB: **Cline Avenue Ramp B Mainline Seg 6** COMPUTED BY: TSP DATE: 12/8/08

DESCRP: **Ultimate Flexural Strength** CHECKED BY: DATE:

FILENAME: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Flexural Strength.xls]Mn (t=00)

Forces Worksheet: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Forces.xls]

Props&Reinf Worksheet: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Props&Reinf.xls]

Ultimate Moment Capacity (T=1) Rating Truck HL-93 LL Factor Inventory

Material Properties:

Concrete			*P-T Strands*			*Mild Steel*						
f'_c =	*5.00*	ksi	f_{pu} =	*270.00*	ksi	f_y =	*60.00*	ksi				
β_1 =	*0.800*		f_{pe} =	*65%*								
ϕ_{bonded} =	*0.95*		A_{strand} =	*0.153*	in^2	A_{bar} =	*0.200*	in^2	*for bottom flange <11.5"*	I_{tendon}=	*1670.0*	I_{tendon}= *405.0*
$\phi_{unbonded}$ =	*0.90*		k* =	*0.280*	Low-lax	A_{bar} =	*0.310*	in^3	*for bottom flange >11.5"*	N_s=	*2.0*	N_s= *0.0*

Draped Tendon Bonded

		MOMENTS (t=1)										*Positive Bending Capacity*														
		Service Loads								Ultimate		As^*_{bottom}	f_{ps}	As^*_{bottom}	f_{ps}	$As^*_{mild\ steel}$	fy	Section			Area					
ELEM	Node	DC	DW	PSEC	PTLS	CR & SH	Max LL	Min LL	TU	$M_{u\ (LLmax)}$	$M_{u\ (LLmin)}$	Bottom		Draped/External		Mild Steel		Centroid	y_{na}	y_{cg}	Concrete	Equilibrium	ϕ	ϕ_w	$\phi M_n(+)$
		(k-ft)	(k-ft)	(k-ft)	(k-ft)	(k-ft)	(k-ft)	(k-ft)	(k-ft)	(k-ft)	(k-ft)	(in^2)	(ksi)	(in^2)	(ksi)	(in^2)	(ksi)	(in)	(in)	(in)	(in^2)				(kip-ft)
1	1	5732	1989	19104	0	975	5317	-1151	-16	39045	27727	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	67205
1	2	6096	1980	19845	0	430	5168	-1263	-23	39745	26121	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	66684
2	2	6026	1958	19134	0	652	5131	-1245	48	39033	25186	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	66684
2	3	6252	1875	19781	0	-23	4943	-1378	25	39670	27375	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	65178
3	3	6211	1853	19058	0	166	4908	-1359	89	38802	26927	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	65178
3	4	6073	1693	19305	0	-423	5023	-1470	55	**39844**	23082	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	62797
4	4	6065	1676	18690	0	-293	5016	-1454	104	39056	22695	0.00	270	33.05	265	0.00	60	71.87	102.51	105.26	2061	0	0.95	1.00	62797
4	5	5553	1444	18574	0	-812	4718	-1547	60	38083	21342	0.00	270	33.05	265	3.60	60	71.87	102.37	105.19	2112	0	0.95	1.00	61240
5	5	5575	1430	18035	0	-724	4721	-1533	96	37373	20722	0.00	270	33.05	265	3.60	60	71.87	102.37	105.19	2112	0	0.95	1.00	61240
5	6	4686	1133	17611	0	-1186	4366	-1613	46	35103	18897	0.00	270	33.05	265	3.60	60	71.87	102.37	105.19	2112	0	0.95	1.00	57070
6	6	4736	1122	17127	0	-1128	4379	-1600	74	33309	17186	0.00	270	33.05	265	3.60	60	71.87	102.37	105.19	2112	0	0.95	1.00	57070
6	7	3464	762	16279	0	-1511	3944	-1677	29	30121	14434	0.00	270	33.05	265	3.60	60	70.45	102.37	105.19	2112	0	0.95	1.00	51702
7	7	3538	753	15815	0	-1478	3965	-1665	56	29654	14030	0.00	270	33.05	265	3.60	60	70.45	102.37	105.19	2112	0	0.95	1.00	51702
7	8	1847	332	14768	0	-1845	3440	-1834	7	25972	10765	0.00	270	33.05	265	3.60	60	68.66	102.37	105.18	2112	0	0.95	1.00	45893
8	8	1947	325	14320	0	-1831	3467	-1819	34	25535	10384	0.00	270	33.05	265	3.60	60	68.66	102.37	105.18	2112	0	0.95	1.00	45893
8	9	-203	-157	13136	0	-2198	2876	-2047	-20	21370	6625	0.00	270	33.05	265	3.60	60	67.02	102.36	105.18	2112	0	0.95	1.00	39645
9	9	-80	-160	12710	0	-2201	2908	-2109	7	20972	6137	0.00	270	33.05	265	3.60	60	67.02	102.36	105.18	2112	0	0.95	1.00	39645
9	10	-2728	-703	11454	0	-2580	2252	-2793	-51	15629	489	0.00	270	33.05	265	3.60	60	65.49	102.36	105.18	2112	0	0.95	1.00	33019
10	10	-2587	-703	11060	0	-2596	2286	-2749	-22	15286	228	0.00	270	33.05	265	3.60	60	65.49	102.36	105.18	2112	0	0.95	1.00	33019
10	11	-5773	-1306	9792	0	-2999	1578	-3753	-83	8562	-7583	0.00	270	33.05	265	5.58	60	64.08	102.27	105.14	2140	0	0.95	1.00	26524
11	11	-5621	-1300	9440	0	-3023	1614	-3697	-52	8309	-7571	0.00	270	33.05	265	5.58	60	64.08	102.27	105.14	2140	0	0.95	1.00	26524
11	12	-9516	-1988	8180	0	-3474	984	-4871	-119	3179	-19906	0.00	270	33.05	265	5.58	60	62.77	102.26	105.13	2140	0	0.95	1.00	18119
12	12	-9462	-1980	8101	0	-3481	995	-4853	-115	1411	-18158	0.00	270	33.05	265	5.58	60	62.77	102.26	105.13	2140	0	0.95	1.00	18119
12	13	-10657	-2187	7638	0	-3598	818	-5207	-126	599	-22786	0.00	270	33.05	265	5.58	60	61.54	102.26	105.13	2140	0	0.95	1.00	16280
13	13	-10648	-2186	7624	0	-3596	819	-5203	-125	705	-22904	0.00	270	33.05	265	5.58	60	61.54	102.26	105.13	2140	0	0.95	1.00	16280
13	14	-11897	-2398	7181	0	-3719	646	-5569	-137	235	-27824	0.00	270	33.05	265	5.58	60	61.21	102.25	105.13	2140	0	0.95	1.00	14238
14	14	-11857	-2392	7105	0	-3708	650	-5555	-122	2329	-29920	0.00	270	33.05	265	5.58	60	61.21	102.25	105.13	2140	0	0.95	1.00	14238
14	15	-16821	-3184	6186	0	-4256	340	-7056	-207	-21150	-34091	0.00	270	33.05	265	5.58	60	58.36	102.24	105.12	2140	0	0.95	1.00	13065
15	15	-16794	-3169	6193	0	-4234	336	-7041	-187	-21081	-33992	0.00	270	33.05	265	5.58	60	58.36	102.24	105.12	2140	0	0.95	1.00	13065
15	16	-17649	-3301	6064	0	-4329	319	-7312	-201	-22554	-35909	0.00	270	33.05	265	5.58	60	58.35	102.24	105.12	2140	0	0.95	1.00	13000
16	16	-17658	-3306	6021	0	-4321	322	-7309	-198	-22607	**-35961**	0.00	270	33.05	265	5.58	60	58.35	102.24	105.12	2140	0	0.95	1.00	13000
16	17	-13265	-2678	5529	0	-3754	650	-5852	-172	-15808	-27187	0.00	270	33.05	265	5.58	60	58.32	102.22	105.11	2140	0	0.95	1.00	16074
17	17	-13319	-2660	5672	0	-3765	641	-5870	-147	-15727	-27122	0.00	270	33.05	265	5.58	60	58.32	102.22	105.11	2140	0	0.95	1.00	16074
17	18	-8692	-1972	5216	0	-3145	1324	-4432	-118	-5694	-26985	0.00	270	33.05	265	5.58	60	58.27	102.20	105.10	2140	0	0.95	1.00	22974
18	18	-8815	-1957	5494	0	-3159	1290	-4474	-95	-5989	-26380	0.00	270	33.05	265	5.58	60	58.27	102.20	105.10	2140	0	0.95	1.00	22974
18	19	-4871	-1338	5343	0	-2625	2227	-3640	-81	1245	-18093	0.00	270	33.05	265	5.58	60	62.63	102.18	105.09	2139	0	0.95	1.00	26823
19	19	-5023	-1327	5674	0	-2641	2168	-3637	-63	1490	-18035	0.00	270	33.05	265	5.58	60	62.63	102.18	105.09	2139	0	0.95	1.00	26823
19	20	-1720	-780	5632	0	-2169	3126	-3359	-49	7167	-11021	0.00	270	33.05	265	5.58	60	63.86	102.16	105.08	2139	0	0.95	1.00	32029
20	20	-1878	-773	5983	0	-2184	3101	-3327	-37	7378	-10923	0.00	270	33.05	265	5.58	60	63.86	102.16	105.08	2139	0	0.95	1.00	32029
20	21	824	-299	6013	0	-1775	3946	-3220	-23	13089	-5220	0.00	270	33.05	265	3.60	60	65.20	102.21	105.11	2111	0	0.95	1.00	35607
21	21	675	-294	6363	0	-1787	3917	-2996	-18	13083	-4800	0.00	270	33.05	265	3.60	60	65.20	102.21	105.11	2111	0	0.95	1.00	35607
21	22	2823	106	6421	0	-1438	4575	-2771	-2	18696	174	0.00	270	33.05	265	3.60	60	66.66	102.19	105.09	2111	0	0.95	1.00	39276
22	22	2691	110	6758	0	-1444	4551	-2751	-7	18683	227	0.00	270	33.05	265	3.60	60	66.66	102.19	105.09	2111	0	0.95	1.00	39276
22	23	4332	437	6793	0	-1153	5030	-2567	12	23371	4490	0.00	270	33.05	265	3.60	60	68.24	102.16	105.08	2111	0	0.95	1.00	42176
23	23	4222	440	7112	0	-1149	4992	-2550	-5	23324	4535	0.00	270	33.05	265	3.60	60	68.24	102.16	105.08	2111	0	0.95	1.00	42176
23	24	5408	694	7071	0	-914	5299	-2341	19	26742	7852	0.00	270	33.05	265	3.60	60	69.97	102.13	105.06	2111	0	0.95	1.00	44357
24	24	5320	696	7375	0	-901	5275	-2326	-14	26724	7910	0.00	270	33.05	265	3.60	60	69.97	102.13	105.06	2111	0	0.95	1.00	44357
24	25	6100	879	7200	0	-716	5406	-2096	15	26170	10289	0.00	270	33.05	265	3.60	60	71.25	102.09	105.05	2110	0	0.95	1.00	45976
25	25	6037	881	7496	0	-695	5371	-2084	-35	26015	9121	0.00	270	33.05	265	3.60	60	71.25	102.09	105.05	2110	0	0.95	1.00	45976
25	26	6430	991	6932	0	-512	5331	-1839	23	28263	11334	0.00	270	33.05	265	3.60	60	71.18	102.06	105.03	2110	0	0.95	1.00	46530
26	26	6425	991	6941	0	-517	5328	-1838	31	28176	11269	0.00	270	33.05	265	3.60	60	71.18	102.06	105.03	2110	0	0.95	1.00	46530
26	27	6341	1033	6313	0	-341	5107	-1587	89	28895	12591	0.00	270	33.05	265	3.60	60	71.10	102.02	105.01	2110	0	0.95	1.00	46383
27	27	6357	1034	6370	0	-349	5106	-1582	83	28743	12789	0.00	270	33.05	265	3.60	60	71.10	102.02	105.01	2110	0	0.95	1.00	46383
27	28	6269	1033	6123	0	-300	5016	-1504	101	28573	11804	0.00	270	33.05	265	3.60	60	71.07	102.01	105.00	2110	0	0.95	1.00	46162
28	28	6243	1034	6239	0	-301	5003	-1501	95	28429	12001	0.00	270	33.05	265	3.60	60	71.07	102.01	105.00	2110	0	0.95	1.00	46162
28	29	5738	985	5235	0	-149	4587	-1238	155	27121	11437	0.00	270	33.05	265	3.60	60	70.98	101.97	104.98	2109	0	0.95	1.00	44917
29	29	5768	989	5524	0	-150	4576	-1233	94	27124	11643	0.00	270	33.05	265	3.60	60	70.98	101.97	104.98	2109	0	0.95	1.00	44917
29	30	4943	872	4209	0	-3	3969	-962	151	24674	9467	0.00	270	33.05	265	3.60	60	70.89	101.92	104.96	2109	0	0.95	1.00	42843
30	30	5005	877	4515	0	-55	3964	-958	131	24761	9921	0.00	270	33.05	265	3.60	60	70.89	101.92	104.96	2109	0	0.95	1.00	42843
30	31	3846	690	2894	0	99	3131	-680	179	21206	6217	0.00	270	33.05	265	3.60	60	70.79	101.87	104.94	2109	0	0.95	1.00	39922
31	31	3944	697	3275	0	-62	3136	-676	242	21450	6670	0.00	270	33.05	265	3.60	60	70.79	101.87	104.94	2109	0	0.95	1.00	39922
31	32	2417	440	1387	0	112	2022	-389	274	16838	2105	0.00	270	33.05	265	3.60	60	70.69	101.82	104.91	2109	0	0.95	1.00	36266
32	32	2595	453	2195	0	-455	2065	-379	650	17580	2863	0.00	270	33.05	265	3.60	60	70.69	101.82	104.91	2109	0	0.95	1.00	36266
32	33	133	40	-338	0	-213	162	-179	666	9862	-3574	0.00	270	33.05	265	3.60	60	70.56	101.76	104.88	2108	0	0.95	1.00	30713
33	33	216	40	89	0	-282	179	-182	447	10418	-3094	0.00	270	33.05	265	3.60	60	70.56	101.76	104.88	2108	0	0.95	1.00	30713
33	34	-11	3	-118	0	-262	26	-207	448	9816	-3774	0.00	270	33.05	265	3.60	60	70.55	101.75	104.88	2108	0	0.95	1.00	30223
34	34	-19	-1	-31	0	-97	9	-197	163	4991	-2977	0.00	270	33.05	265	3.60	60	70.55	101.75	104.88	2108	0	0.95	1.00	30223

URS CORPORATION

JOB: **Cline Avenue Ramp B Mainline Seg 6** COMPUTED BY: TSP DATE: 12/8/08

DESCRP: **Ultimate Flexural Strength** CHECKED BY: DATE:

FILENAME: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Flexural Strength.xls]Mn (t=00)

Forces Worksheet: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Forces.xls]

Props&Reinf Worksheet: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Props&Reinf.xls]

Ultimate Moment Capacity (T=1) Rating Truck HL-93 LL Factor Inventory

Material Properties:

Concrete			*P-T Strands*			*Mild Steel*						
f'_c =	*5.00*	ksi	f_{pu} =	*270.00*	ksi	f_y =	*60.00*	ksi				
β_1 =	*0.800*		f_{pe} =	*65%*								
ϕ_{bonded} =	*0.95*		A_{strand} =	*0.153*	in^2	A_{bar} =	*0.200*	in^2	*for bottom flange <11.5"*	I_{tendon}=	*1670.0*	I_{tendon}= *405.0*
$\phi_{unbonded}$ =	*0.90*		k* =	*0.280*	Low-lax	A_{bar} =	*0.310*	in^3	*for bottom flange >11.5"*	N_s=	*2.0*	N_s= *0.0*

Draped Tendon Bonded

		MOMENTS (t=1)										*Positive Bending Capacity*													
		Service Loads								Ultimate		As^*_{bottom} Bottom	f_{ps}	As^*_{bottom} Draped/External	f_{ps}	$As^*_{mild\ steel}$ Mild Steel	fy	Section Centroid	y_{na}	y_{cg}	Area Concrete	Equilibrium	ϕ	ϕ_w	$\phi M_n(+)$
ELEM	Node	DC (k-ft)	DW (k-ft)	PSEC (k-ft)	PTLS (k-ft)	CR & SH (k-ft)	Max LL (k-ft)	Min LL (k-ft)	TU (k-ft)	$M_{u\ (LLmax)}$ (k-ft)	$M_{u\ (LLmin)}$ (k-ft)	(in^2)	(ksi)	(in^2)	(ksi)	(in^2)	(ksi)	(in)	(in)	(in)	(in^2)				(kip-ft)
34	35	-3	1	-35	0	-97	9	-7	163	-70	-99	0.00	270	0.00	270	3.60	60	70.52	107.85	107.92	51	0	0.95	1.00	1816

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DESCRP: **Ultimate Flexural Strength** CHECKED BY: DATE:

FILENAME: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Flexural Strength.xls]Mn (t=00)

Ultimate Moment Capacity (T=00)

Material Properties:

Concrete			*P-T Strands*			*P-T Bars*		
f'_c =	5.00	ksi	f_{pu} =	270.00	ksi	f_{pu} =	60.00	ksi
β_1 =	0.800		f_{pe} =	65%		f_{pe} =	0%	
ϕ_{bonded} =	0.95		A_{strand} =	0.153	in^2	A_{bar} =	0.200	in^2
$\phi_{unbonded}$ =	0.90		k* =	0.280	Low-lax	k* =	0.000	

Negative Bending Capacity															RATING FLEXURAL RESISTANCE, RF				LIMITS FOR MINIMUM REINFORCEMENT							
As^*_{top} Top	f_{ps}	As^*_{top} Draped/External	f_{ps}	$As^*_{mild\ steel}$ Mild Steel	fy	Section Centroid	y_{na}	y_{cg}	Area Concrete	Equilibrium	ϕ	ϕ_w	ϕM_n (-)	Section No.	POSITIVE		NEGATIVE		f_{cpe} (top)	f_{cpe} (bot)	POSITIVE			NEGATIVE		
															RF	Status	RF	Status			Mcr (+)	ϕ Mn (-) / 1.2Mcr	Status	Mcr (-)	ϕ Mn (-) / 1.2Mcr	Status
(in^2)	(ksi)	(in^2)	(ksi)	(in^2)	(ksi)	(in)	(in)	(in)	(in^2)				(kip-ft)						(ksf)	(ksf)						
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	704	1	4.03	OK	14.42	OK	-40.15	-201.54	29141	1.92	OK	-24409	-0.02	OK
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	191	2	2.95	OK	7.32	OK	-44.84	-194.90	28447	1.95	OK	-25385	-0.01	OK
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	191	2	3.09	OK	6.48	OK	-37.27	-197.19	28686	1.94	OK	-23810	-0.01	OK
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	-1292	3	2.68	OK	7.87	OK	-44.52	-186.09	27526	1.97	OK	-25319	0.04	OK
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	-1292	3	2.83	OK	7.03	OK	-36.96	-188.60	27788	1.95	OK	-23747	0.05	OK
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	-3636	4	2.47	OK	8.16	OK	-45.39	-174.93	26360	1.99	OK	-25498	0.12	OK
0.00	270	33.05	261	0.00	60	71.87	32.77	9.39	2029	0	0.95	1.00	-3636	4	2.92	OK	6.60	OK	-39.04	-177.22	26599	1.97	OK	-24178	0.13	OK
0.00	270	33.05	261	6.40	60	71.87	35.99	10.46	2120	0	0.95	1.00	-9049	5	2.86	OK	8.06	OK	-49.19	-158.14	24605	2.07	OK	-26289	0.29	OK
0.00	270	33.05	261	6.40	60	71.87	35.99	10.46	2120	0	0.95	1.00	-9049	5	2.97	OK	7.54	OK	-43.69	-160.30	24830	2.06	OK	-25145	0.30	OK
0.00	270	33.05	261	6.40	60	71.87	35.99	10.46	2120	0	0.95	1.00	-13154	6	2.85	OK	8.43	OK	-55.83	-136.47	22340	2.13	OK	-27668	0.40	OK
0.00	270	33.05	261	6.40	60	71.87	35.99	10.46	2120	0	0.95	1.00	-13154	6	3.04	OK	7.73	OK	-50.83	-138.46	22547	2.11	OK	-26629	0.41	OK
0.00	270	33.05	261	6.40	60	70.45	29.17	8.14	2120	0	0.95	1.00	-20093	7	2.90	OK	9.01	OK	-66.70	-100.41	20099	2.14	OK	-30549	0.55	OK
0.00	270	33.05	261	6.40	60	70.45	29.17	8.14	2120	0	0.95	1.00	-20093	7	2.98	OK	8.62	OK	-62.34	-102.36	20319	2.12	OK	-29624	0.57	OK
0.00	270	33.05	261	6.40	60	68.66	19.99	6.15	2120	0	0.95	1.00	-27231	8	2.85	OK	9.55	OK	-79.27	-66.27	17829	2.15	OK	-33942	0.67	OK
0.00	270	33.05	261	6.40	60	68.66	19.99	6.15	2120	0	0.95	1.00	-27231	8	2.92	OK	9.22	OK	-75.27	-68.05	18051	2.12	OK	-33074	0.69	OK
0.00	270	33.05	261	6.40	60	67.02	13.25	5.31	2120	0	0.95	1.00	-33973	9	2.81	OK	9.74	OK	-92.35	-34.92	15120	2.19	OK	-37380	0.76	OK
0.00	270	33.05	261	6.40	60	67.02	13.25	5.31	2120	0	0.95	1.00	-33973	9	2.88	OK	9.21	OK	-88.73	-36.52	15335	2.15	OK	-36584	0.77	OK
0.00	270	33.05	261	6.40	60	65.49	10.39	5.20	2120	0	0.95	1.00	-40577	10	2.97	OK	7.94	OK	-105.80	-5.54	11991	2.29	OK	-40836	0.83	OK
0.00	270	33.05	261	6.40	60	65.49	10.39	5.20	2120	0	0.95	1.00	-40577	10	3.03	OK	7.88	OK	-102.60	-6.93	12191	2.26	OK	-40123	0.84	OK
0.00	270	33.05	261	6.40	60	64.08	10.39	5.20	2120	0	0.95	1.00	-47899	11	3.27	OK	6.38	OK	-120.92	24.39	11920	1.85	OK	-44602	0.89	OK
0.00	270	33.05	261	6.40	60	64.08	10.39	5.20	2120	0	0.95	1.00	-47899	11	3.31	OK	6.40	OK	-118.21	23.28	11920	1.85	OK	-43993	0.91	OK
0.00	270	33.05	261	6.40	60	62.77	10.39	5.20	2120	0	0.95	1.00	-56170	12	3.71	OK	4.87	OK	-138.15	54.71	12609	1.20	OK	-48783	0.96	OK
0.00	270	33.05	261	6.40	60	62.77	10.39	5.20	2120	0	0.95	1.00	-56170	12	3.53	OK	5.06	OK	-137.30	54.76	12609	1.20	OK	-48590	0.96	OK
0.00	270	33.05	261	6.40	60	61.54	10.39	5.20	2120	0	0.95	1.00	-57979	13	3.86	OK	4.53	OK	-141.35	59.56	13279	1.02	OK	-49768	0.97	OK
0.00	270	33.05	261	6.40	60	61.54	10.39	5.20	2120	0	0.95	1.00	-57979	13	3.88	OK	4.52	OK	-141.32	59.47	13279	1.02	OK	-49762	0.97	OK
0.00	270	33.05	261	6.40	60	61.21	10.39	5.20	2120	0	0.95	1.00	-59988	14	4.14	OK	4.03	OK	-144.53	62.83	13458	0.88	OK	-50536	0.99	OK
0.00	270	33.05	261	6.40	60	61.21	10.39	5.20	2120	0	0.95	1.00	-59988	14	2.50	OK	5.32	OK	-144.32	62.29	13458	0.88	OK	-50487	0.99	OK
0.00	270	33.05	261	6.40	60	58.36	10.39	5.20	2120	0	0.95	1.00	-61137	15	58.73	OK	3.18	OK	-148.41	69.72	15058	0.72	OK	-51697	0.99	OK
0.00	270	33.05	261	6.40	60	58.36	10.39	5.20	2120	0	0.95	1.00	-61137	15	59.20	OK	3.20	OK	-148.44	69.74	15058	0.72	OK	-51704	0.99	OK
0.00	270	33.05	261	6.40	60	58.35	10.39	5.20	2120	0	0.95	1.00	-61200	16	64.86	OK	2.97	OK	-147.90	69.28	15058	0.72	OK	-51568	0.99	OK
0.00	270	33.05	261	6.40	60	58.35	10.39	5.20	2120	0	0.95	1.00	-61200	16	64.32	OK	2.97	OK	-147.83	68.92	15058	0.72	OK	-51551	0.99	OK
0.00	270	33.05	261	6.40	60	58.32	10.39	5.20	2120	0	0.95	1.00	-58168	17	29.11	OK	4.02	OK	-132.36	53.94	15053	0.89	OK	-47937	1.01	OK
0.00	270	33.05	261	6.40	60	58.32	10.39	5.20	2120	0	0.95	1.00	-58168	17	29.40	OK	4.02	OK	-133.47	54.22	15053	0.89	OK	-48190	1.01	OK
0.00	270	33.05	261	6.40	60	58.27	10.39	5.20	2120	0	0.95	1.00	-51365	18	11.16	OK	**2.77**	OK	-111.14	24.91	15048	1.27	OK	-42997	1.00	OK
0.00	270	33.05	261	6.40	60	58.27	10.39	5.20	2120	0	0.95	1.00	-51365	18	11.86	OK	2.81	OK	-113.13	25.66	15048	1.27	OK	-43451	0.99	OK
0.00	270	33.05	261	6.20	60	62.63	10.38	5.19	2117	0	0.95	1.00	-47475	19	6.90	OK	3.51	OK	-93.92	-0.52	12655	1.77	OK	-38434	1.03	OK
0.00	270	33.05	261	6.20	60	62.63	10.38	5.19	2117	0	0.95	1.00	-47475	19	7.30	OK	3.50	OK	-96.51	0.29	12570	1.78	OK	-39016	1.01	OK
0.00	270	33.05	261	6.20	60	63.86	10.38	5.19	2117	0	0.95	1.00	-42337	20	4.91	OK	3.94	OK	-79.99	-24.16	15586	1.71	OK	-34960	1.01	OK
0.00	270	33.05	261	6.20	60	63.86	10.38	5.19	2117	0	0.95	1.00	-42337	20	4.99	OK	3.93	OK	-82.86	-23.21	15440	1.73	OK	-35597	0.99	OK
0.00	270	33.05	261	6.20	60	65.20	10.38	5.19	2117	0	0.95	1.00	-37872	21	3.68	OK	4.30	OK	-68.26	-46.79	17877	1.66	OK	-31947	0.99	OK
0.00	270	33.05	261	6.20	60	65.20	10.38	5.19	2117	0	0.95	1.00	-37872	21	3.74	OK	4.42	OK	-71.22	-45.75	17728	1.67	OK	-32598	0.97	OK
0.00	270	33.05	261	6.20	60	66.66	13.37	5.32	2117	0	0.95	1.00	-34154	22	3.09	OK	4.97	OK	-58.90	-67.95	19462	1.68	OK	-29423	0.97	OK
0.00	270	33.05	261	6.20	60	66.66	13.37	5.32	2117	0	0.95	1.00	-34154	22	3.14	OK	4.90	OK	-61.88	-66.86	19315	1.69	OK	-30067	0.95	OK
0.00	270	33.05	261	6.20	60	68.24	20.23	6.18	2117	0	0.95	1.00	-30670	23	2.73	OK	5.42	OK	-51.35	-88.62	20469	1.72	OK	-27242	0.94	OK
0.00	270	33.05	261	6.20	60	68.24	20.23	6.18	2117	0	0.95	1.00	-30670	23	2.80	OK	5.30	OK	-54.30	-87.48	20329	1.73	OK	-27867	0.92	OK
0.00	270	33.05	261	6.20	60	69.97	29.42	8.21	2117	0	0.95	1.00	-27056	24	2.50	OK	5.88	OK	-45.07	-109.50	20962	1.76	OK	-25262	0.89	OK
0.00	270	33.05	261	6.20	60	69.97	29.42	8.21	2117	0	0.95	1.00	-27056	24	2.55	OK	5.72	OK	-48.08	-108.32	20830	1.77	OK	-25883	0.87	OK
0.00	270	33.05	261	6.20	60	71.25	35.89	10.42	2117	0	0.95	1.00	-23870	25	2.56	OK	6.04	OK	-40.51	-130.19	21587	1.77	OK	-23763	0.84	OK
0.00	270	33.05	261	6.20	60	71.25	35.89	10.42	2117	0	0.95	1.00	-23870	25	2.56	OK	5.94	OK	-43.75	-129.01	21465	1.78	OK	-24416	0.81	OK
0.00	270	33.05	261	6.20	60	71.18	35.89	10.42	2117	0	0.95	1.00	-23307	26	2.45	OK	7.03	OK	-39.33	-136.87	22270	1.74	OK	-23438	0.83	OK
0.00	270	33.05	261	6.20	60	71.18	35.89	10.42	2117	0	0.95	1.00	-23307	26	2.47	OK	6.93	OK	-39.38	-136.81	22264	1.74	OK	-23450	0.83	OK
0.00	270	33.05	261	6.20	60	71.10	35.89	10.42	2117	0	0.95	1.00	-23432	27	**2.41**	OK	8.30	OK	-36.72	-140.23	22606	1.71	OK	-22825	0.86	OK
0.00	270	33.05	261	6.20	60	71.10	35.89	10.42	2117	0	0.95	1.00	-23432	27	2.45	OK	8.06	OK	-37.54	-140.16	22598	1.71	OK	-22989	0.85	OK
0.00	270	33.05	261	6.00	60	71.07	35.79	10.39	2114	0	0.95	1.00	-23577	28	2.44	OK	8.52	OK	-37.02	-140.79	22660	1.70	OK	-22857	0.86	OK
0.00	270	33.05	261	6.00	60	71.07	35.79	10.39	2114	0	0.95	1.00	-23577	28	2.49	OK	8.27	OK	-38.10	-140.16	22594	1.70	OK	-23073	0.85	OK
0.00	270	33.05	261	6.00	60	70.98	35.79	10.39	2114	0	0.95	1.00	-24783	29	2.51	OK	10.25	OK	-37.02	-140.89	22656	1.65	OK	-22761	0.91	OK
0.00	270	33.05	261	6.00	60	70.98	35.79	10.39	2114	0	0.95	1.00	-24783	29	2.57	OK	9.79	OK	-40.44	-139.90	22553	1.66	OK	-23441	0.88	OK
0.00	270	33.05	261	6.00	60	70.89	35.79	10.39	2114	0	0.95	1.00	-26807	30	2.65	OK	12.76	OK	-40.35	-138.73	22417	1.59	OK	-23320	0.96	OK
0.00	270	33.05	261	6.00	60	70.89	35.79	10.39	2114	0	0.95	1.00	-26807	30	2.71	OK	12.16	OK	-44.06	-137.78	22318	1.60	OK	-24056	0.93	OK
0.00	270	33.05	261	6.00	60	70.79	35.79	10.39	2114	0	0.95	1.00	-29664	31	2.90	OK	17.09	OK	-45.01	-134.76	21988	1.51	OK	-24132	1.02	OK
0.00	270	33.05	261	6.00	60	70.79	35.79	10.39	2114	0	0.95	1.00	-29664	31	2.93	OK	16.46	OK	-49.81	-133.70	21879	1.52	OK	-25078	0.99	OK
0.00	270	33.05	261	6.00	60	70.69	35.79	10.39	2114	0	0.95	1.00	-33246	32	3.30	OK	25.29	OK	-51.61	-129.28	21405	1.41	OK	-25308	1.09	OK
0.00	270	33.05	261	6.00	60	70.69	35.79	10.39	2114	0	0.95	1.00	-33246	32	3.22	OK	24.97	OK	-61.72	-127.05	21173	1.43	OK	-27293	1.02	OK
0.00	270	33.05	261	6.00	60	70.56	35.79	10.39	2114	0	0.95	1.00	-38694	33	4.34	OK	35.47	OK	-66.07	-117.86	20202	1.27	OK	-27968	1.15	OK
0.00	270	33.05	261	6.00	60	70.56	35.79	10.39	2114	0	0.95	1.00	-38694	33	4.26	OK	34.52	OK	-71.70	-117.06	20118	1.27	OK	-29067	1.11	OK
0.00	270	33.05	261	5.80	60	70.55	35.69	10.36	2111	0	0.95	1.00	-39108	34	4.37	OK	33.36	OK	-72.19	-116.18	20026	1.26	OK	-29147	1.12	OK
0.00	270	33.05	261	5.80	60	70.55	35.69	10.36	2111	0	0.95	1.00	-39108	34	1069.00	OK	15.28	OK	-73.05	-115.75	19981	1.26	OK	-29316	1.11	OK

URS CORPORATION

JOB: **Cline Avenue Ramp B Mainline Seg 6** COMPUTED BY: TSP DATE: 12/8/08

DESCRP: **Ultimate Flexural Strength** CHECKED BY: DATE:

FILENAME: D:\Cline Ave_tsp\Orig Ab with increased Vc AASHTO\Ramp B\Rating Ramp B Seg 6\[Flexural Strength.xls]Mn (t=00)

Ultimate Moment Capacity (T=00)

Material Properties:

Concrete			*P-T Strands*			*P-T Bars*		
f'_c =	*5.00*	ksi	f_{pu} =	*270.00*	ksi	f_{pu} =	*60.00*	ksi
β_1 =	*0.800*		f_{pe} =	*65%*		f_{pe} =	*0%*	
ϕ_{bonded} =	*0.95*		A_{strand} =	*0.153*	in^2	A_{bar} =	*0.200*	in^2
$\phi_{unbonded}$ =	*0.90*		k* =	*0.280*	Low-lax	k* =	*0.000*	

Negative Bending Capacity														
As^*_{top} Top (in^2)	f_{ps} (ksi)	As^*_{top} Draped/External (in^2)	f_{ps} (ksi)	$As^*_{mild\ steel}$ Mild Steel (in^2)	fy (ksi)	Section Centroid (in)	y_{na} (in)	y_{cg} (in)	Area Concrete (in^2)	Equilibrium	ϕ	ϕ_w	ϕM_n (-) (kip-ft)	Section No.
0.00	270	0.00	270	5.80	60	70.52	0.40	0.20	82	0	0.95	1.00	-2922	35

RATING FLEXURAL RESISTANCE, RF			
POSITIVE		NEGATIVE	
RF	Status	RF	Status
115.66	OK	224.09	OK
2.41		2.77	

LIMITS FOR MINIMUM REINFORCEMENT							
		POSITIVE			NEGATIVE		
f_{cpc} (top) (ksf)	f_{cpc} (bot) (ksf)	Mcr (+)	ϕ Mn (+) / 1.2Mcr	Status	Mcr (-)	ϕ Mn (-) / 1.2Mcr	Status
0.48	-0.04	8002	0.19	OK	-15051	0.16	OK