

DRAWINGS

ACCOMPANYING REPORT ON THE

Design and Construction

OF THE

QUEENSBORO BRIDGE

WILLIAM H. BURR, Consulting Engineer

BOLLER & HODGE, Consulting Engineers

1908

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Southern Methodist University
DALLAS, TEXAS

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MARTIN B. BROWN CO., Printers and Lithographers, 49-57 Park Pl., N. Y.

Top Chord Points

Footings

Top Chord

Verticals and Sub Verticals

Main Diagonals and Sub Diagonals

Pins

Longitudinal Struts

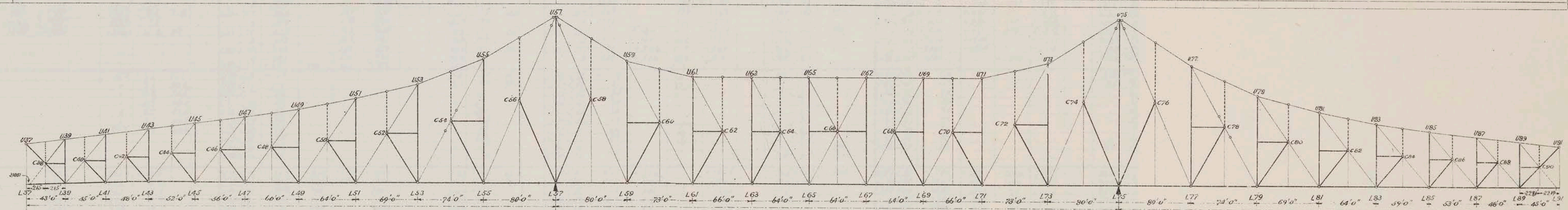
Top Lateral

Sway Frame

U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15	U16	U17	U18	U19	U20	U21	U22	U23	U24	U25	U26	U27	U28	U29	U30	U31	U32	U33	U34	U35	U36	U37
1180	2257	2298	2377	2499	3391	4470	5327	6136	6768	8143	9567	11150	12590	14425	17211	20126	23077	25934	28694	31364	33942	36427	38819	41119	43327	45544	47770	49905	51950	53905	55870	57845	59820	
2449	329	2740	741	2917	700	3216	286	3342	938	3072	1182	6179	1629	1558	4220	1111	4019	904	4498	610	3706	299	3366	784	2565	229	2037	540	1131	435	806	277	275	
2550	1810	1494	1049	2232	2581	2734	2913	3203	3683	4333	5130	6083	7203	8483	9933	11553	13353	15333	17503	19853	22383	25003	27713	30513	33403	36383	39453	42613	45863	49203	52633	56153		
189	294	333	343	323	384	428	461	477	458	564	624	639	594	496	388	288	198	108	18	48	102	152	202	252	302	352	402	452	502	552	602	652	702	
090	118	135	145	165	185	205	225	245	265	285	305	325	345	365	385	405	425	445	465	485	505	525	545	565	585	605	625	645	665	685	705	725		
184	127	125	123	121	119	117	115	113	111	109	107	105	103	101	99	97	95	93	91	89	87	85	83	81	79	77	75	73	71	69	67	65	63	
304	830	830	1014	1186	1463	1824	2265	2781	3357	3981	4641	5331	6041	6761	7491	8231	8981	9741	10501	11261	12021	12781	13541	14301	15061	15821	16581	17341	18101	18861	19621	20381		
5613	3343	8249	2619	2431	2498	1147	7378	14122	23516	35446	49846	66846	86446	108846	134046	162046	192846	226446	262846	302046	344046	388846	436346	486546	539546	595346	653946	715346	779546	846546	916346	988846		

U31	U32	U33	U34	U35	U36	U37	U38	U39	U40	U41	U42	U43	U44	U45	U46	U47	U48	U49	U50	U51	U52	U53	U54	U55	U56	U57	U58	U59	U60	U61	U62	U63	U64	U65
	146	127	113	103	113	180	238	298	359	420	481	542	603	664	725	786	847	908	969	1030	1091	1152	1213	1274	1335	1396	1457	1518	1579	1640	1701	1762	1823	1884
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	101				189	299	431	586	764	966	1192	1441	1712	2005	2320	2657	3016	3397	3799	4222	4666	5131	5616	6121	6646	7191	7756	8341	8946	9571	10216	10891	11586	
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153	435	235	227	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	

Upper Chord Points	U37	U38	U39	U40	U41	U42																																									U76	U77	U78	U79	U80	U81	U82	U83	U84	U85	U86	U87	U88	U89	U90	U91																																																																																																																																																																																																																																																																																																																																																					
Post-Points	150	180	185	190	197	1985	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380
Upper Chord	359	720	658	399	1086	1513	1294	1027	1357	1718	2156	2594	3304	3977	4825	5692	6693	8197	9743	11353	14500	12411	10553	8155	7168	6104	5708	5347	5031	4835	4824	4849	4923	4983	5382	6492	7216	9138	9253	8191	6439	5443	4610	3594	2822	2124	1665	1141	748	399	100	102	100	154	187	243	304	367	427	483	534	580	621	658	691	715	729	743	756	767	777	786	793	799	804	808	811	813	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000																																																																																																																																											
Verticals and Sub-Verticals	954	137	241	404	1089	393	1261	717	254	786	3128	3788	808	460	2699	3570	3190	10643	11874	11132	10471	11654	1713	10378	1650	5665	1234	7539	5347	6084	1254	3563	1250	4668	1150	5988	1692	10822	1798	1824	1644	1049	3630	814	2593	152	1043	352	104	767	1029	243	1036	356	604	254	467	543	617	677	728	773	811	840	860	876	890	901	910	918	924	929	933	937	940	943	945	947	949	951	953	955	957	959	961	963	965	967	969	971	973	975	977	979	981	983	985	987	989	991	993	995	997	999	1000																																																																																																																																																																																																																																																																																																										
Plan Diagonals	469	149	189	239	289	339	389	439	489	539	589	639	689	739	789	839	889	939	989	1039	1089	1139	1189	1239	1289	1339	1389	1439	1489	1539	1589	1639	1689	1739	1789	1839	1889	1939	1989	2039	2089	2139	2189	2239	2289	2339	2389	2439	2489	2539	2589	2639	2689	2739	2789	2839	2889	2939	2989	3039	3089	3139	3189	3239	3289	3339	3389	3439	3489	3539	3589	3639	3689	3739	3789	3839	3889	3939	3989	4039	4089	4139	4189	4239	4289	4339	4389	4439	4489	4539	4589	4639	4689	4739	4789	4839	4889	4939	4989	5039	5089	5139	5189	5239	5289	5339	5389	5439	5489	5539	5589	5639	5689	5739	5789	5839	5889	5939	5989	6039	6089	6139	6189	6239	6289	6339	6389	6439	6489	6539	6589	6639	6689	6739	6789	6839	6889	6939	6989	7039	7089	7139	7189	7239	7289	7339	7389	7439	7489	7539	7589	7639	7689	7739	7789	7839	7889	7939	7989	8039	8089	8139	8189	8239	8289	8339	8389	8439	8489	8539	8589	8639	8689	8739	8789	8839	8889	8939	8989	9039	9089	9139	9189	9239	9289	9339	9389	9439	9489	9539	9589	9639	9689	9739	9789	9839	9889	9939	9989	1000																																																																																																																																																																																																											
Plan	166	169	172	175	178	181	184	187	190	193	196	199	202	205	208	211	214	217	220	223	226	229	232	235	238	241	244	247	250	253	256	259	262	265	268	271	274	277	280	283	286	289	292	295	298	301	304	307	310	313	316	319	322	325	328	331	334	337	340	343	346	349	352	355	358	361	364	367	370	373	376	379	382	385	388	391	394	397	400	403	406	409	412	415	418	421	424	427	430	433	436	439	442	445	448	451	454	457	460	463	466	469	472	475	478	481	484	487	490	493	496	499	502	505	508	511	514	517	520	523	526	529	532	535	538	541	544	547	550	553	556	559	562	565	568	571	574	577	580	583	586	589	592	595	598	601	604	607	610	613	616	619	622	625	628	631	634	637	640	643	646	649	652	655	658	661	664	667	670	673	676	679	682	685	688	691	694	697	700	703	706	709	712	715	718	721	724	727	730	733	736	739	742	745	748	751	754	757	760	763	766	769	772	775	778	781	784	787	790	793	796	799	802	805	808	811	814	817	820	823	826	829	832	835	838	841	844	847	850	853	856	859	862	865	868	871	874	877	880	883	886	889	892	895	898	901	904	907	910	913	916	919	922	925	928	931	934	937	940	943	946	949	952	955	958	961	964	967	970	973	976	979	982	985	988	991	994	997	1000																																																																																																																												
Longitudinal Struts	46	97	61	308	293	871	124	692	274	690	62	694	899	694	894	103	837	747	918	746	106	745	867	715	869	615	861	677	814	669	811	636	810	664	815	111	825	733	203	716	818	724	870	704	846	765	734	762	728	683	657	318	583	310	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51																																																																																																																																																																																																														



Lower Chord Points	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Verticals and Hangers	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Diagonals	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Bottom Lateral	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Upper Floor Beams	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Upper Stringers	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Upper Floor Girders and Braces	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Stringers and Girders/Braces	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Lower Buckle Plates	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Curbs, Beams, and Castings	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190																																																																																																														

BLACKWELL'S ISLAND BRIDGE
DEAD PANEL LOADS

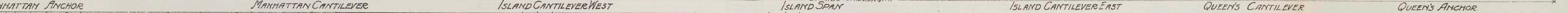
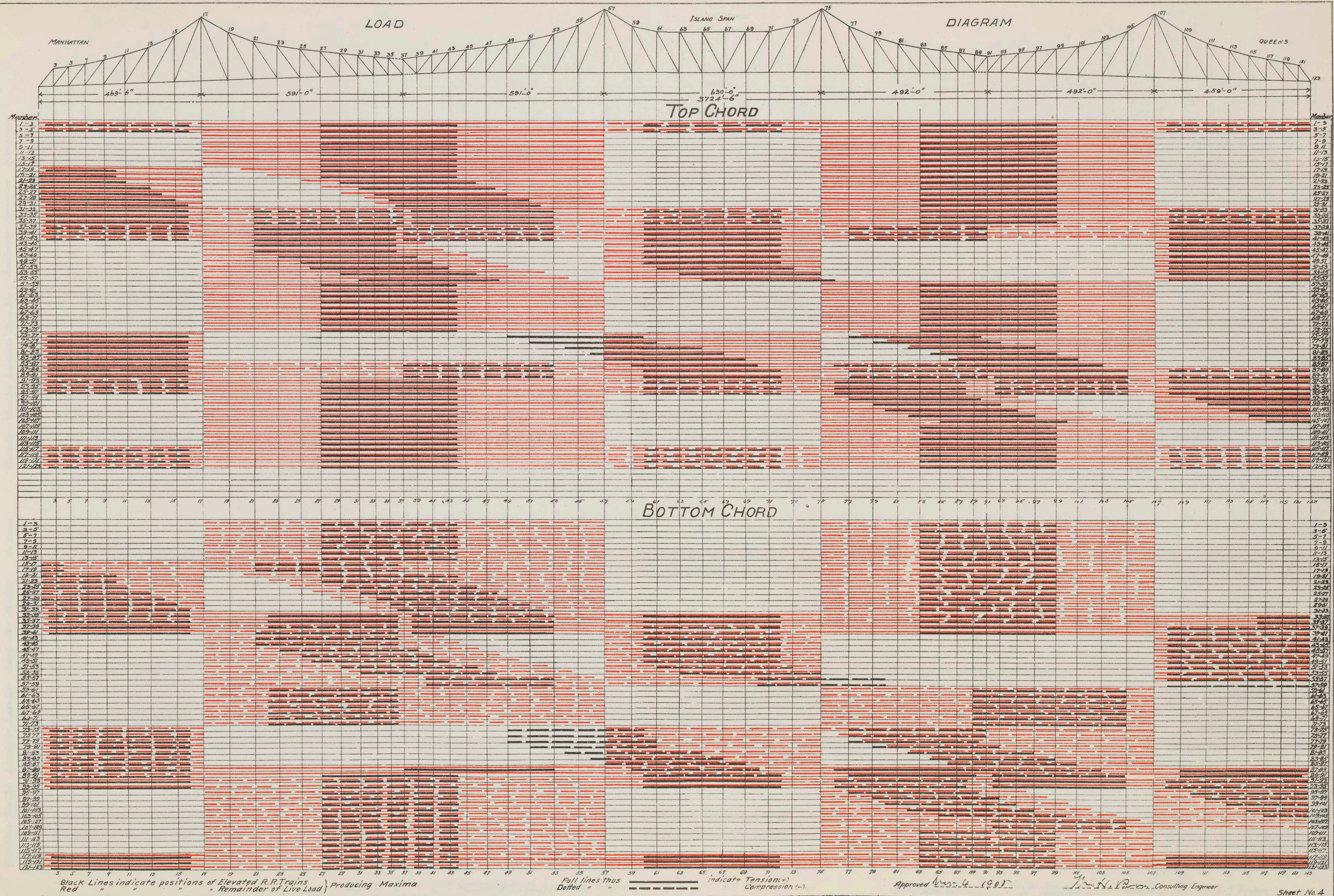
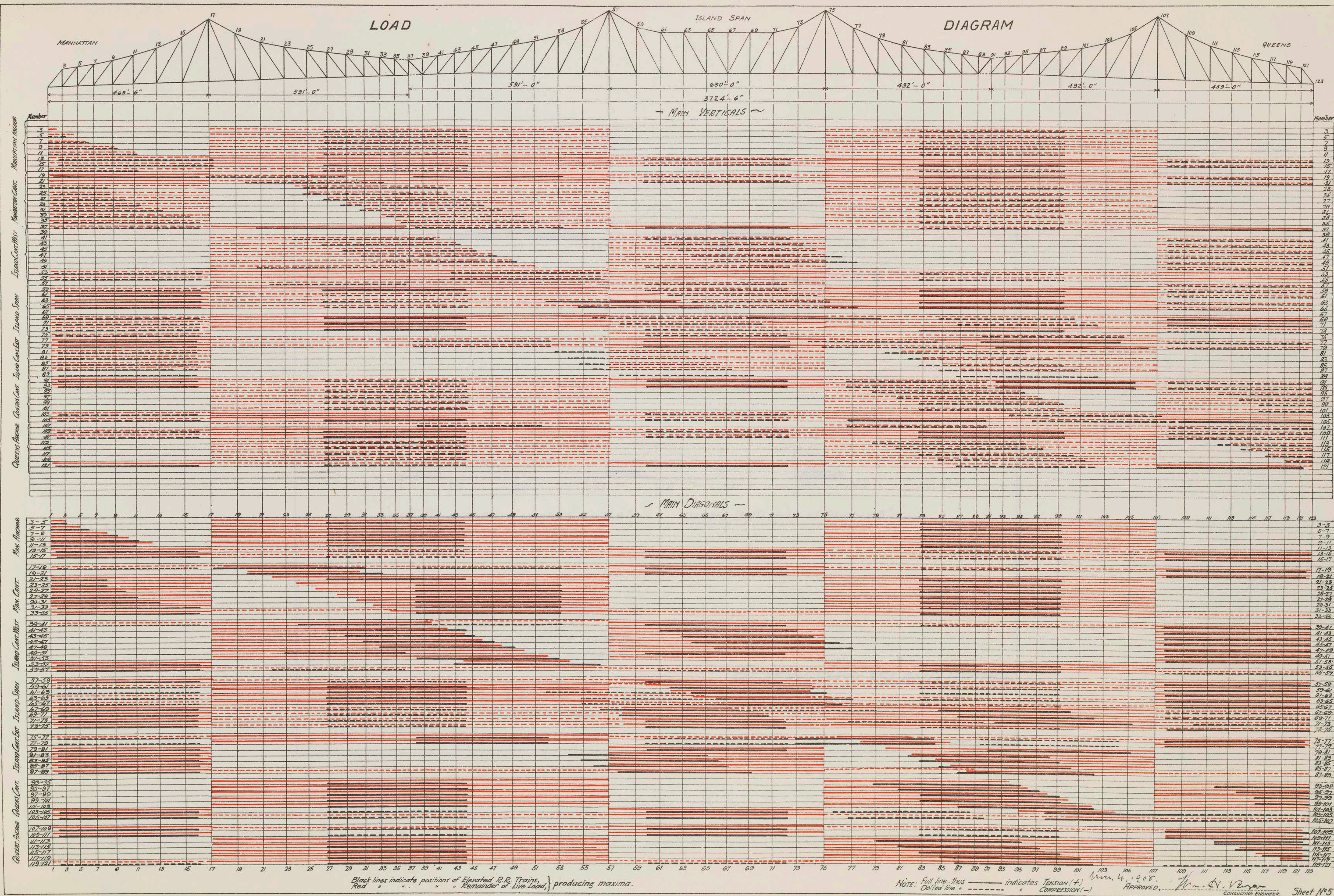
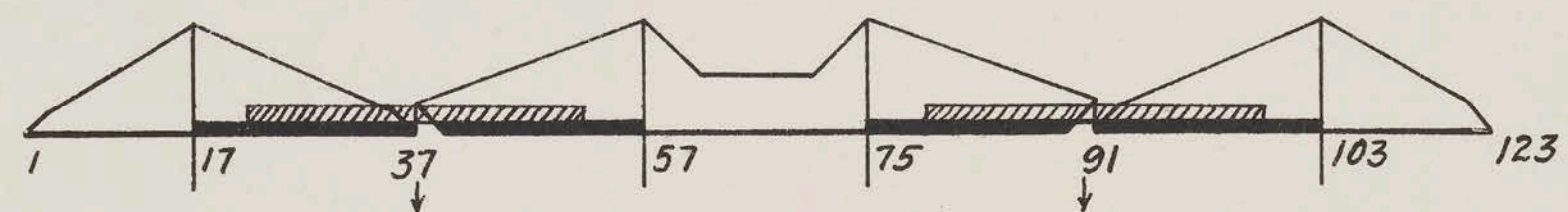
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Diagram illustrating the components of a truss section, including the Top Chord, Bottom Chord, Main Verticals, Diagonal, Subverticals, and Hangers. An arrow labeled 'East' indicates the direction of the wind.

Sheet No. 3

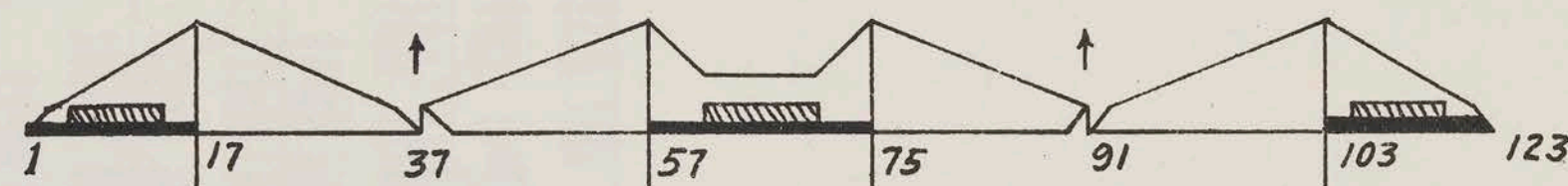






Downward Deflection at 37 = +20"±

Downward Deflection at 91 = +18"±



Upward Deflection at 37 = -4.9"

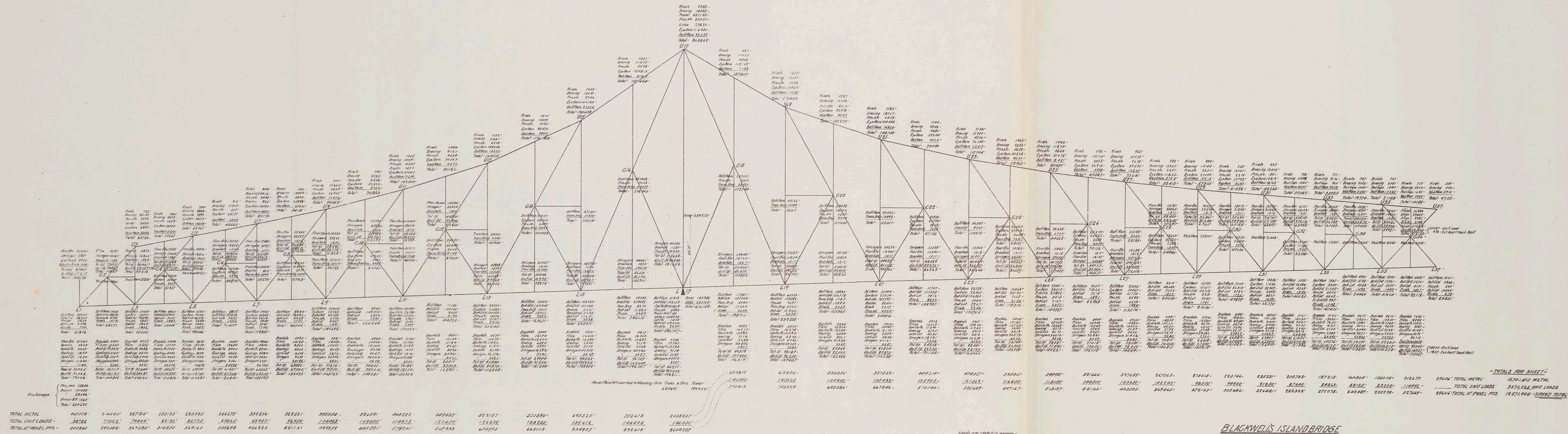
Upward Deflection at 91 = -4.8"

Live Load. { Elevated Trains = 1810* per lin. ft.
 Surface Cars = 1947* " " " (2 Car lengths apart.)
 Roadway 35.5' @ 50* = 1775*
 2 Sidewalks 11' @ 50* = 1100*

Thos. H. Burr.
 Nov 4, 1908. Cns. Engr.

BLACKWELL'S ISLAND BRIDGE.
 DEFLECTION SHEET.

Sheet No. 6

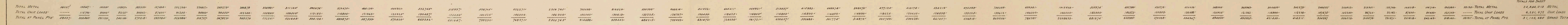


BLACKWELL'S ISLAND BRIDGE
MANHATTAN ANCHOR AND CANTILEVER ARMS
OUTLINE SKETCH OF TRUSSES SHOWING DISTRIBUTION OF DEAD LOADS

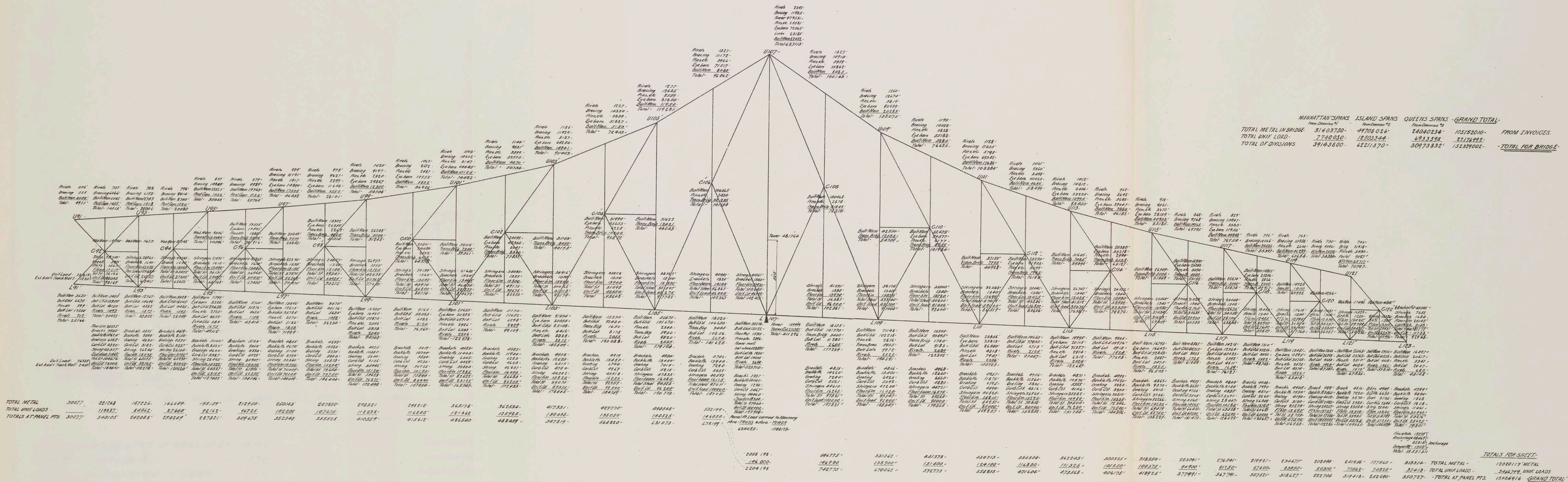
SEPTEMBER 29, 1908

BOILER AND HOOD
CONSULTING ENGINEERS
110 NASSAU ST. N.Y.

Drawing 71
C. J. C.



SEPTEMBER 29, 1908



BLACKWELL'S ISLAND BRIDGE
QUEEN'S CANTILEVER AND ANCHOR ARMS

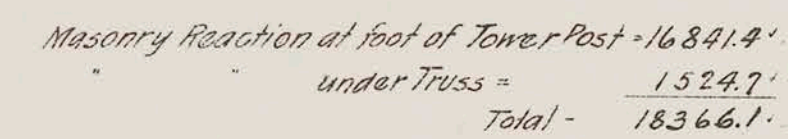
OUTLINE SKETCH OF TRUSSES SHOWING DISTRIBUTION OF DEAD LOADS

ROLLER AND HOLES
CONSULTING ENGINEERS
MANHATTAN, N.Y.

SEPTEMBER 29, 1908.

Weights are shown in pounds.
Weights of steel in the truss from shipping invoices.
Uniform Load of 60 lbs. per sq. ft. is assumed for the deck.
Weights of the deck are given for one cross only.

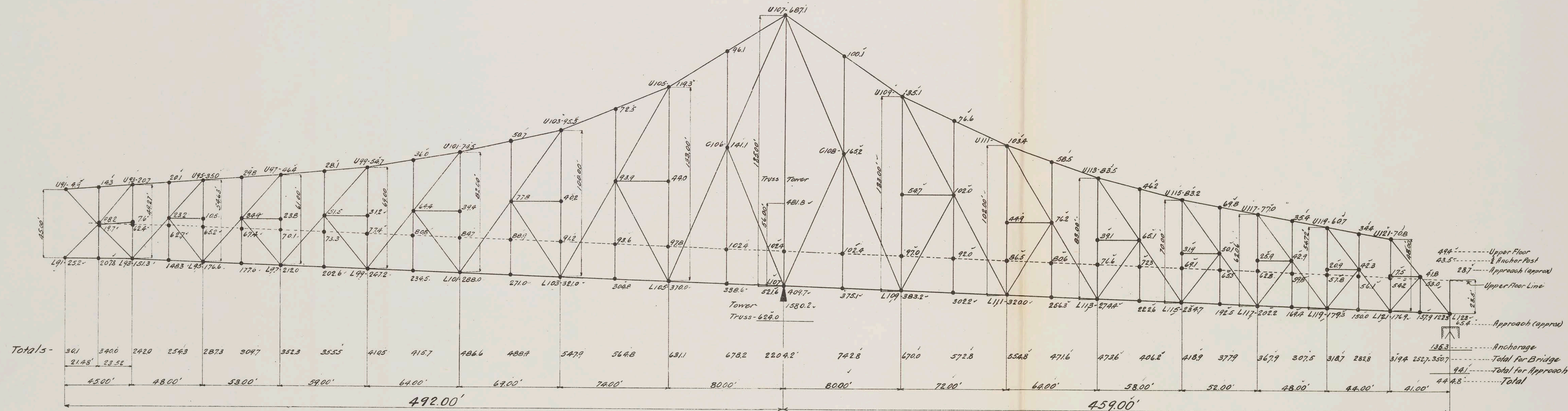
CA. Cur
UP
DRAWING #4



Masonry Reaction at foot of Tower Post = 114228
 " " under Truss = 13164
 Total = 127392

October 1, 1908.

DRAWING #5 UCM



Total Dead Wt of Anchor
and Cantilever Arms.
(= Sum of Panel Loads)

139187
13342
Total Reaction on Main Pier = 152529
Net Reaction on Anchor Pier = 328.1
Total Dead Load per Truss = 15581.0

Masonry Reaction at foot of Tower Post = 139187
under Truss = 13342
Total = 152529

All loads in thousands of pounds per truss.
See Drawing 3 for subdivision of Panel Concentrations

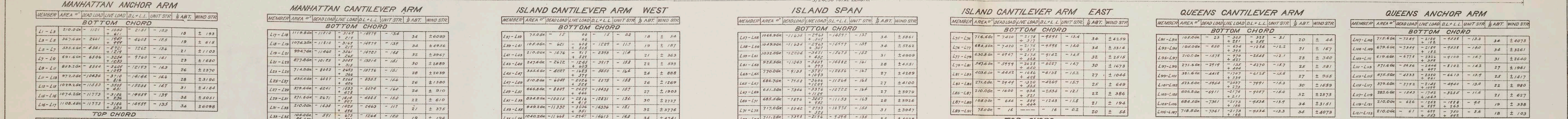
BLACKWELL'S ISLAND BRIDGE **QUEENS CANTILEVER AND ANCHOR ARMS** **Dead Load Panel Concentrations**

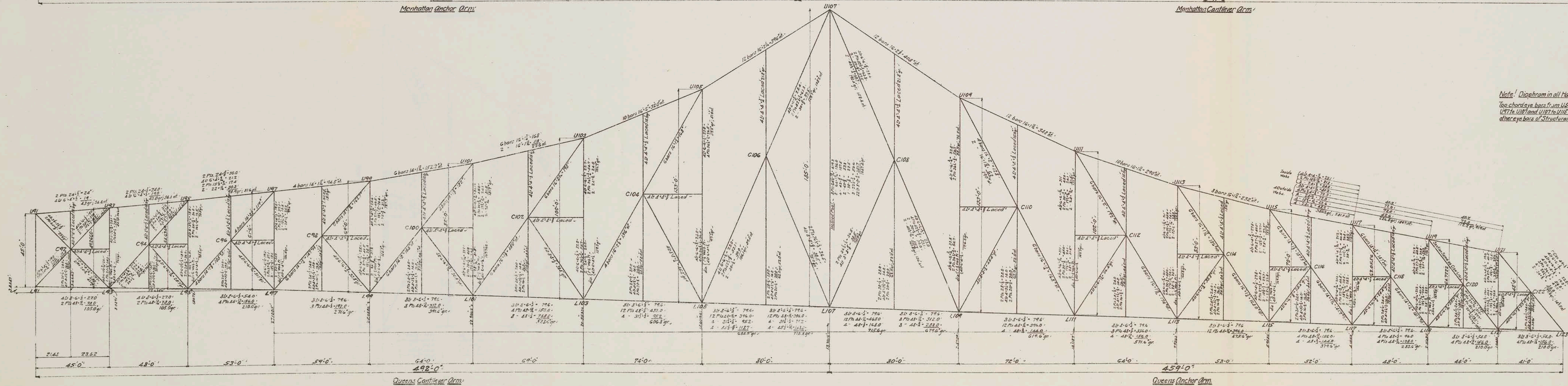
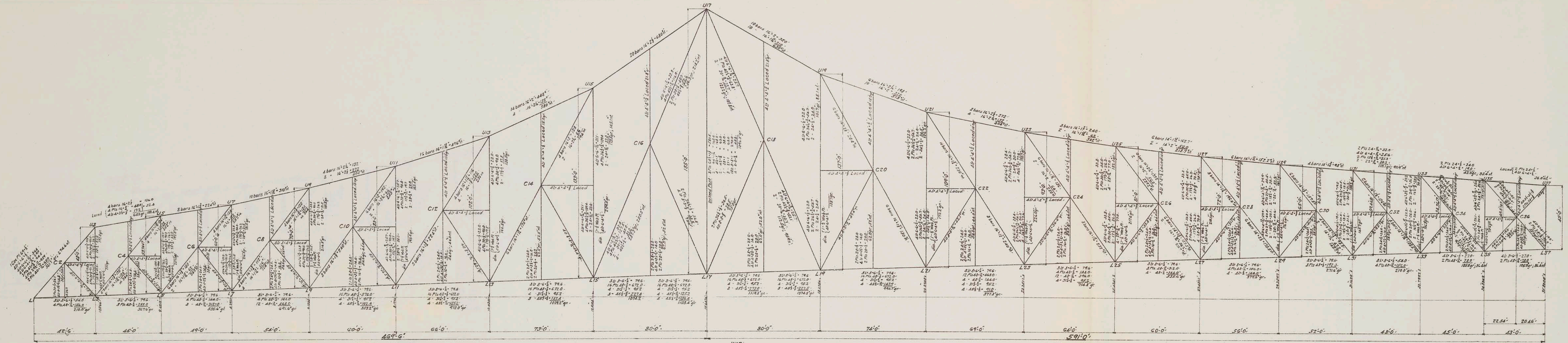
Scale 1/4" = 1 ft.
October 1, 1908.

Uplift not including effect of loads at L123 - 116.7
Load at L123 - lower deck - 189.1
Tensile Dead Load Stress in screw - 72.4
Load at L123 - upper deck - 121.6
Compressive Dead Stress in Anchor Post - 194.0
Anchorage Material - 134.1
Net reaction - 328.1

BOLLER AND HODGE
Consulting Engineers.
1 Nassau St., N.Y.

DRAWING #6
K. C. H. a12H

[illegible][illegible][illegible]

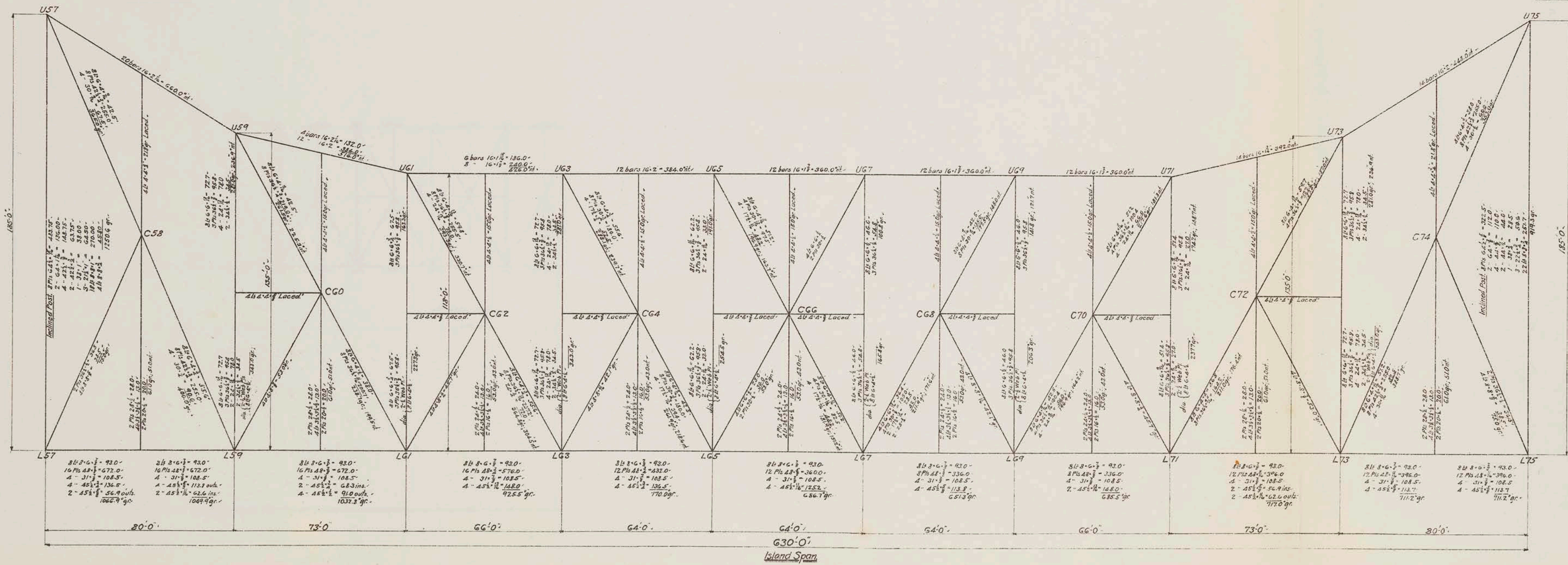
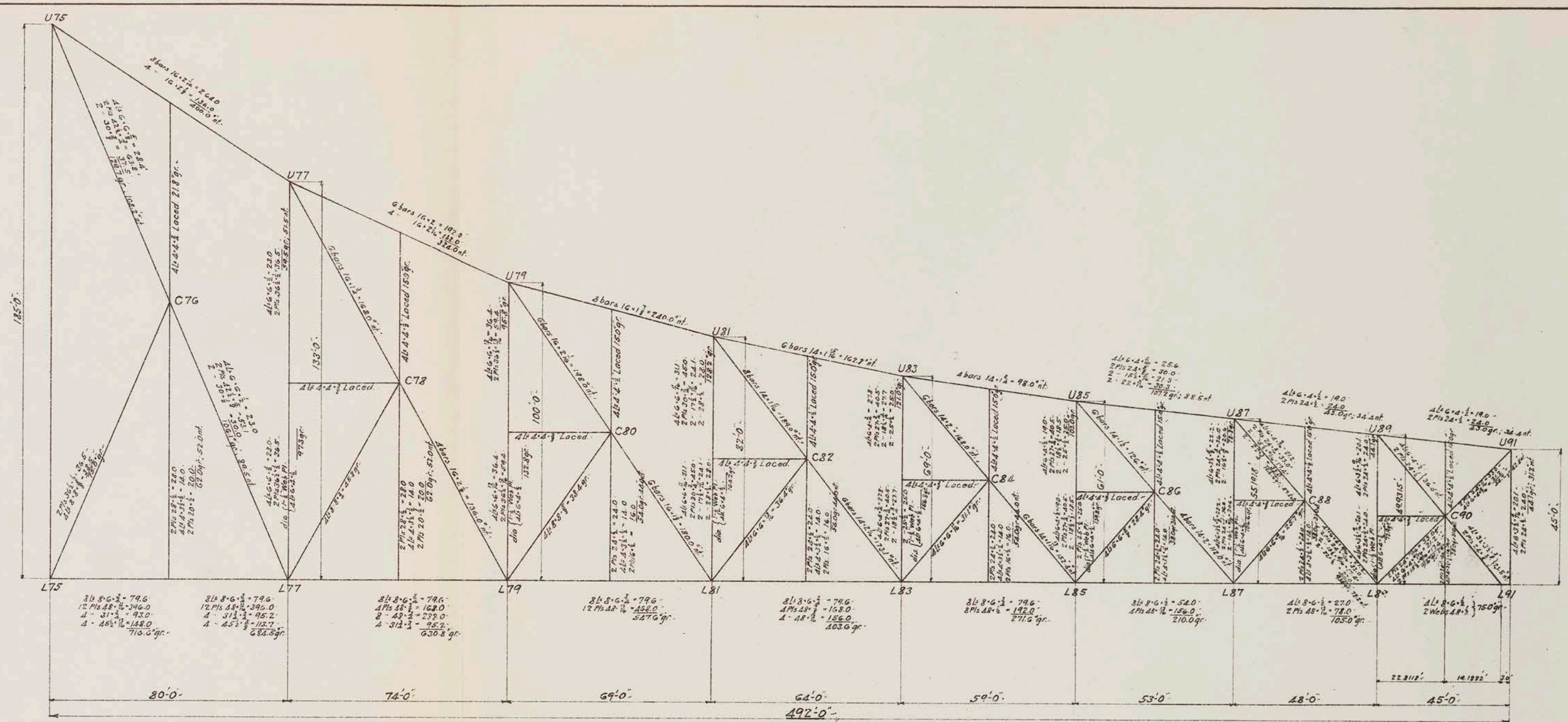
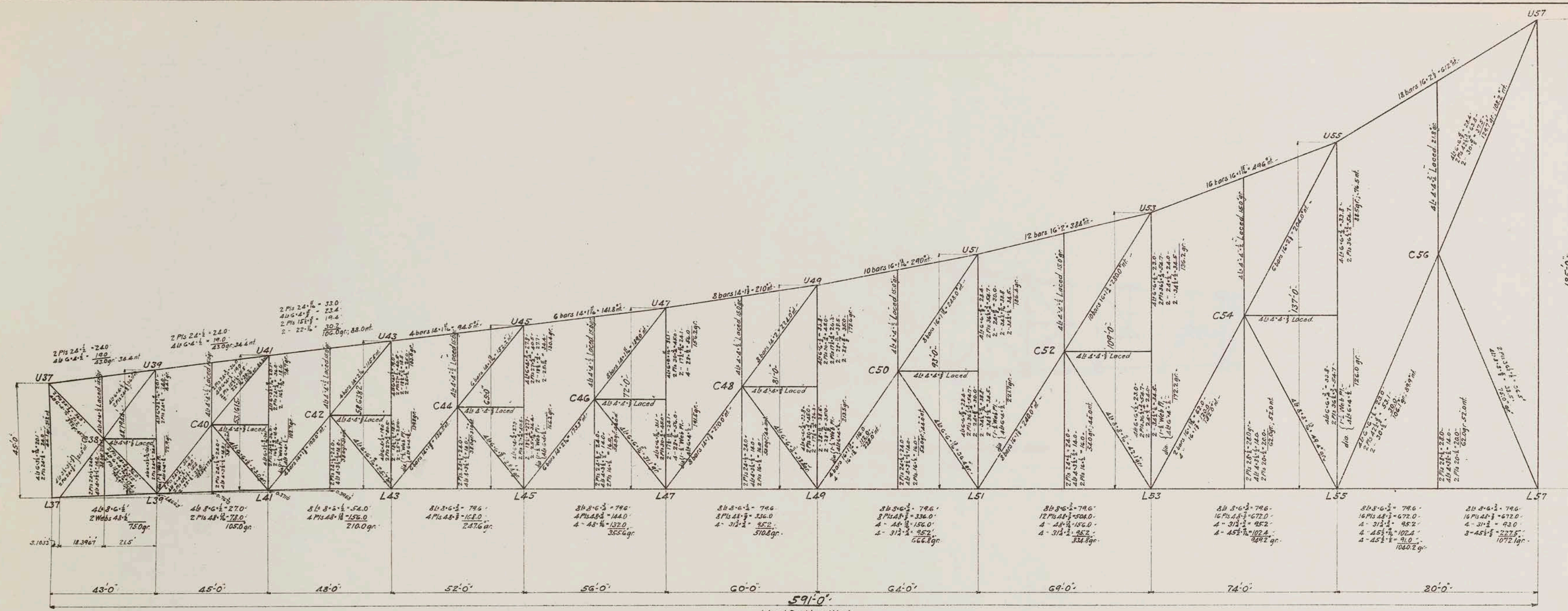


Note: Diagram in all Hangers
 100 chord eye bars from U1 to U17, U17 to U31,
 U31 to U45 and U45 to U59. Note: Steel 811
 other eye bars of Structural Steel.

Blackwell's Island Bridge
 Section Sheet
 Manhattan and Queens Anchor and Cantilever Arms
 Date Sept. 1908

Engineers and
 Consulting Engineers
 1 Nassau St. N.Y.C.

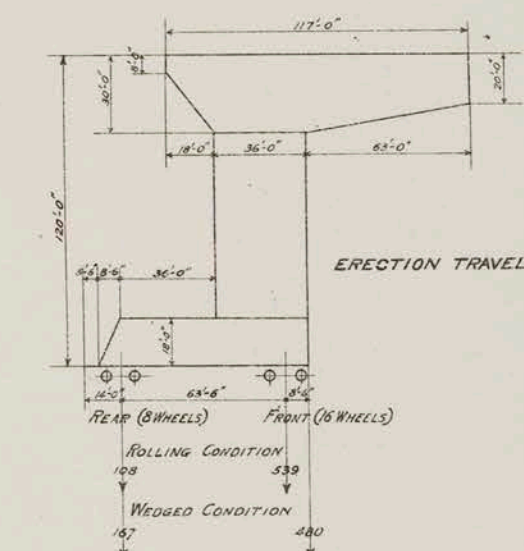
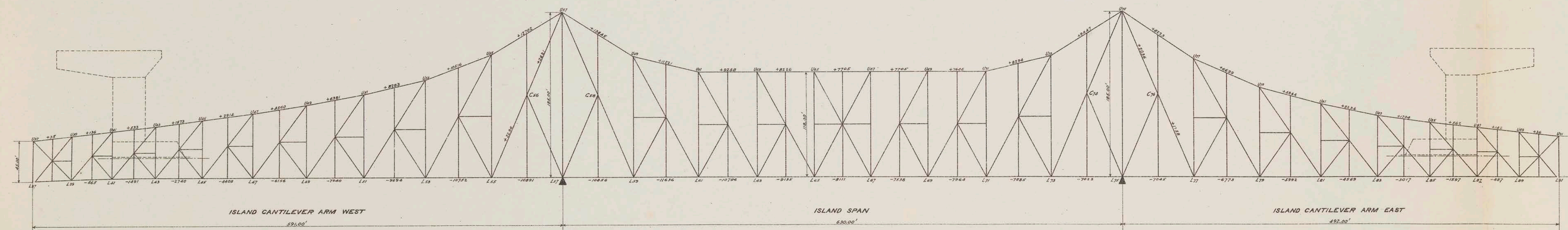
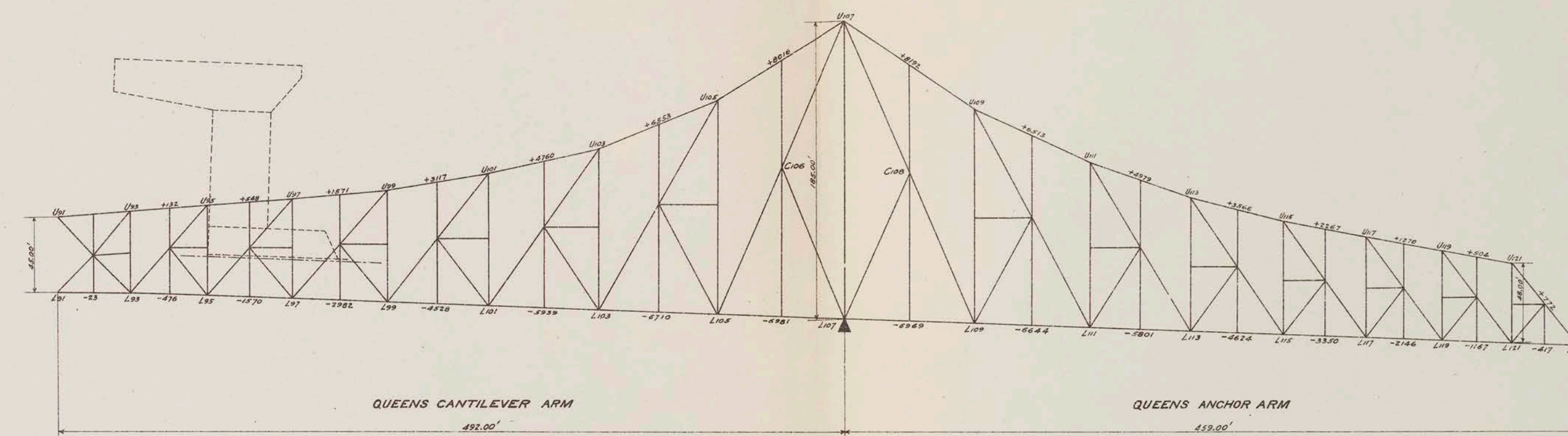
Drawing No. 8



Note: Diagram in all Hangers 1/4" Web Pl.
6x4 L.B.
Top chord eye bars from 1840's, 1857, 1877, 1885
and 1895 Blue Nickel Steel. All other eye bars
of Structural Steel.

Blackwell's Island Bridge.
Section Sheet
Island Span and East and West Cantilever Arms.
Date: Sept. 15, 1908

Roller and Hodge
Consulting Engineers
1 Nassau St. N.Y.C.

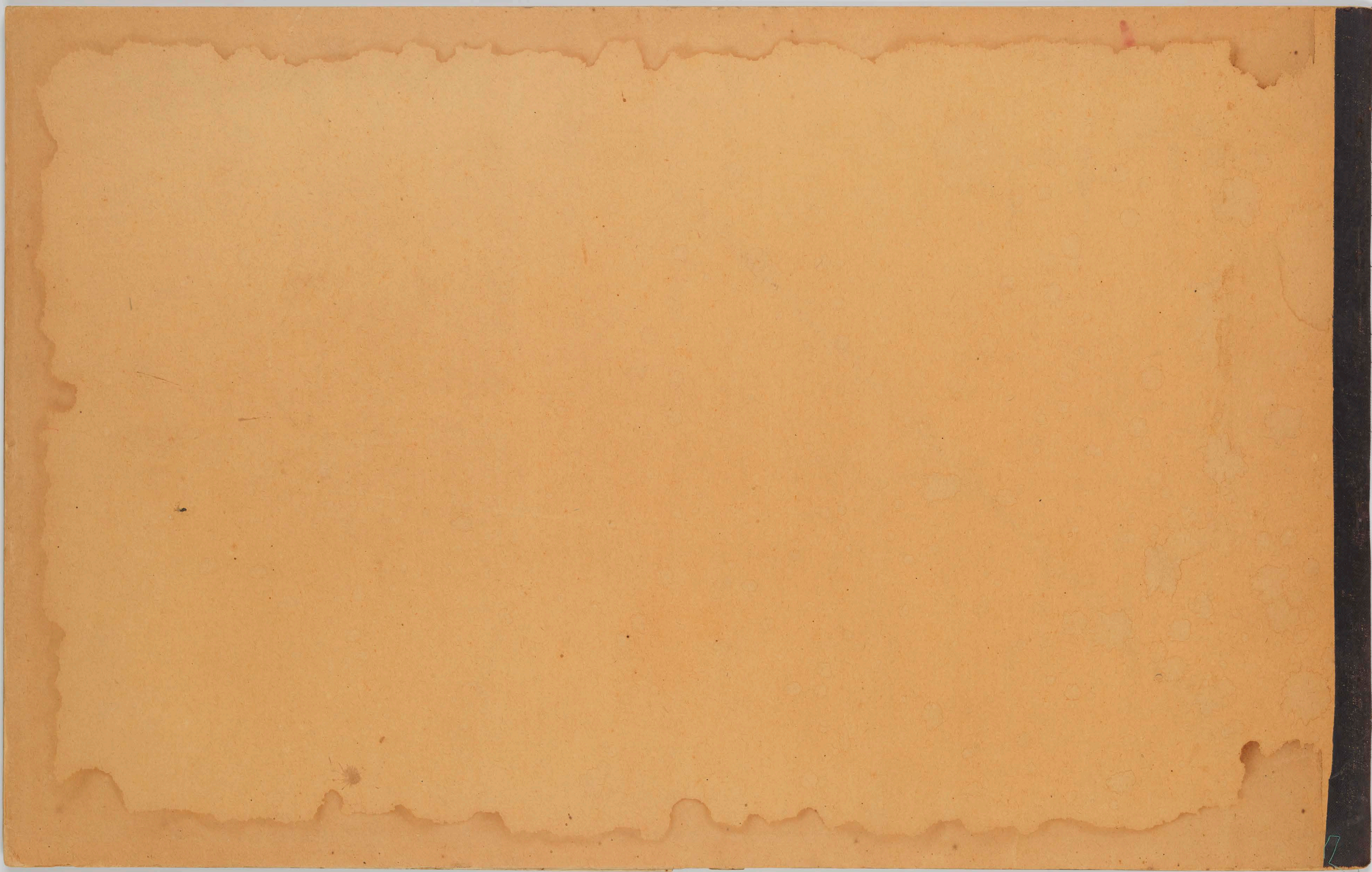


BLACKWELL'S ISLAND BRIDGE
OUTLINE SKETCH OF TRUSSES SHOWING ERECTION STRESSES

SEPT. 15 1908

THE CHORD STRESSES GIVEN WERE FOR THE FINAL POSITION OF THE TRAVELERS AS INDICATED.
THE WEB MEMBER STRESSES WERE THE MAXIMUM POSSIBLE AT ANY STAGE OF ERECTION.
STRESSES ARE IN THOUSANDS OF POUNDS.
+INDICATES TENSION, - INDICATES COMPRESSION.

BOLLER AND HODGE
CONSULTING ENGINEERS
*1 NASSAU ST. N. Y.



J.M.
624.09747
N5684
v.1
pt.1
c.2

DEPARTMENT OF BRIDGES,
NEW YORK CITY.

BLACKWELL'S ISLAND BRIDGE.

624.09747
N5684
v.1 pt.1 c.2

SCIENCE

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BLACKWELL'S ISLAND BRIDGE

IN

THE CITY OF NEW YORK

This bridge now under construction is located on a line between 59th and 60th Streets in Manhattan, crossing the East river at right angles. It will connect the Borough of Manhattan with the Borough of Queens, both boroughs in the City of Greater New York.

The East River, so-called, is an estuary, connecting Long Island Sound with Upper New York Bay, and at this point is divided by the long and narrow Blackwell's Island into two navigable arms, each about 1,000 feet wide and from 40 to 60 feet deep.

The height of the bridge above high-water over the navigable channels is fixed by the United States Government at 135 feet.

The length of spans of main structure is as follows, beginning at the Easterly end, which is on the Long Island side:

Queens Shore Arm - - - - -	459 feet
Easterly Cantilever River Span - - - - -	984 "
Connecting Span across Blackwell's Island - - - - -	630 "
Westerly Cantilever River Span - - - - -	1182 "
Manhattan Shore Arm - - - - -	459.5 " 469.5
Total Length of Main Structure between Centres at	
Anchorage Piers - - - - -	3714.5 " 3724.5

The total length of the bridge structure, including both approaches is 7449. "

The grade to the bridge is 3-4/10% rising from each end. 95

The Superstructure will pass between the tower bearings on the piers, which are 93 feet from center to center.

The trusses, supported on the towers, are 60 feet apart between centers; but the lower deck projects on each side beyond the trusses, to accommodate the outside trolley tracks. The space between the trusses will thus be free from obstructions by braces or other bridge members.

The capacity of the bridge is, as follows:

On the wide lower deck projecting beyond the trusses:

(1) One roadway in the center 36 feet wide between guard rails. The roadway will thus be wide enough to permit four three-horse teams to pass abreast.

(2) Four trolley tracks, two on each side of and separated from the roadway. One trolley track inside next to each truss, and the other track on the outside of each truss, carried on consoles or brackets.

On the upper deck between trusses:

(3) Two elevated railroad tracks in the middle, and

(4) Two Promenades each 11 feet wide, placed next to the elevated railroad tracks, to permit passengers in case of accident to disembark from the trains to the Promenades.

The six tracks across the bridge are estimated to have a capacity of 150 million passengers per year under ordinary conditions of traffic.

As it is necessary to reach Blackwell's Island, which is crossed by the bridge at a height of 125 feet, with teams and passengers, access will be provided by means of elevators located in the four towers of the two Island piers. Each tower will accommodate one elevator for teams, one for passengers, and a stairway, beside public comfort stations.

At each of the two anchorage piers will likewise be provided stairways for foot passengers and shelter rooms for the bridge employees. Space will also be left for the installation of passenger elevators when required by future traffic.

The bridge will therefore be accessible to Passengers also at First Avenue, in Manhattan, and at Vernon Avenue in Long Island City.

Further, a wagon approach will be provided on the Long Island side from Vernon Avenue up to and meeting the bridge viaduct at a point near Van Alst Avenue.

The structure will be fireproof throughout. The roadway will have a foundation of steel buckles; and the track foundations for the six lines of railroad, as well as the promenades to be likewise of non-combustible material.

The weight of the structure makes it advantageous to design the cantilever with only one hinge in each main span, as no reversal of stress will occur in the chords from one anchorage to the other from ordinary conditions of traffic; although under extreme loads assumed, very slight reversals may occur in the panels adjacent to the center hinge. The top chords can therefore be composed from end to end of a chain of eye-bar links, permitting of speedy erection. The trusses are also free from redundant members.

A prototype for center hinged cantilevers is to be found in the Mirabeau Bridge over the Seine at Paris. Although a much smaller structure, it is noted for its architectural beauty and for its rigidity under street traffic. The Mirabeau Bridge is, however, a deck structure (in which the roadway is carried on top) while the Blackwell's Island Bridge is classed as a "through" structure, in which the roadways are carried between the towers and trusses.

The pier foundations for the Blackwell's Island Bridge rest, at all points, upon rock. The masonry is of granite, and the superstructure throughout will be of steel.

The engineering work is in charge of Mr. Henry A. LaChicotte, Engineer, Department of Bridges. The architecture was designed by Mr. Henry H. Hornbostel, Consulting Architect. The arrangement and capacity of floor space and other details conform essentially to the recommendations of a Commission of Civil Engineers (Prof. W. H. Burr, of Columbia University; Prof. P. C. Ricketts, of the Rensselaer Polytechnic Institute, and H. W. Hodge, Consulting Engineer, all members of the American Society of Civil Engineers) appointed by his Honor, Seth Low, Mayor of the City of New York.

GUSTAV LINDENTHAL,

Commissioner of Bridges.

January 2nd, 1903.



DEPARTMENT OF BRIDGES
NEW YORK CITY
ELEVATION OF BLACKWELL'S ISLAND BRIDGE.



ELEVATION OF
NEW YORK ANCHORAGE PIER
LOOKING EAST.

SIDE ELEVATION

DEPARTMENT OF BRIDGES
NEW YORK CITY

ELEVATION OF ANCHOR PIER FOR BLACKWELL'S ISLAND BRIDGE.



DEPARTMENT OF BRIDGES
NEW YORK CITY

ELEVATION OF ENTRANCE TO MAIN STRUCTURE OF BLACKWELL'S ISLAND BRIDGE.



ELEVATION OF
BLACKWELL'S ISLAND PIER No 2
LOOKING EAST.

SIDE ELEVATION.

DEPARTMENT OF BRIDGES
NEW YORK CITY

ELEVATION OF TOWERS FOR BLACKWELL'S ISLAND BRIDGE.



DEPARTMENT OF BRIDGES
NEW YORK CITY

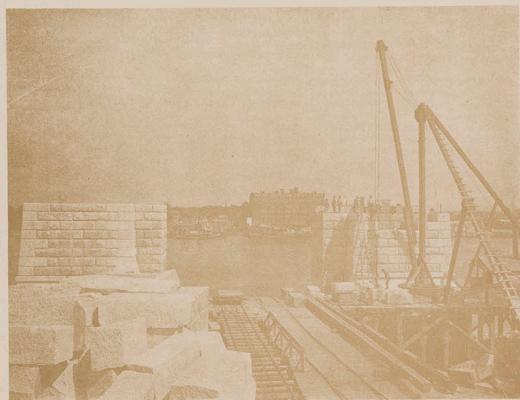
ELEVATION (looking from below) OF TOWERS AND PIERS OF BLACKWELL'S ISLAND BRIDGE.



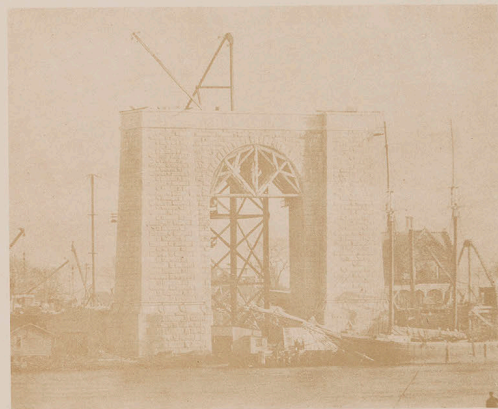
CORNICE COURSE FOR MAIN PIERS



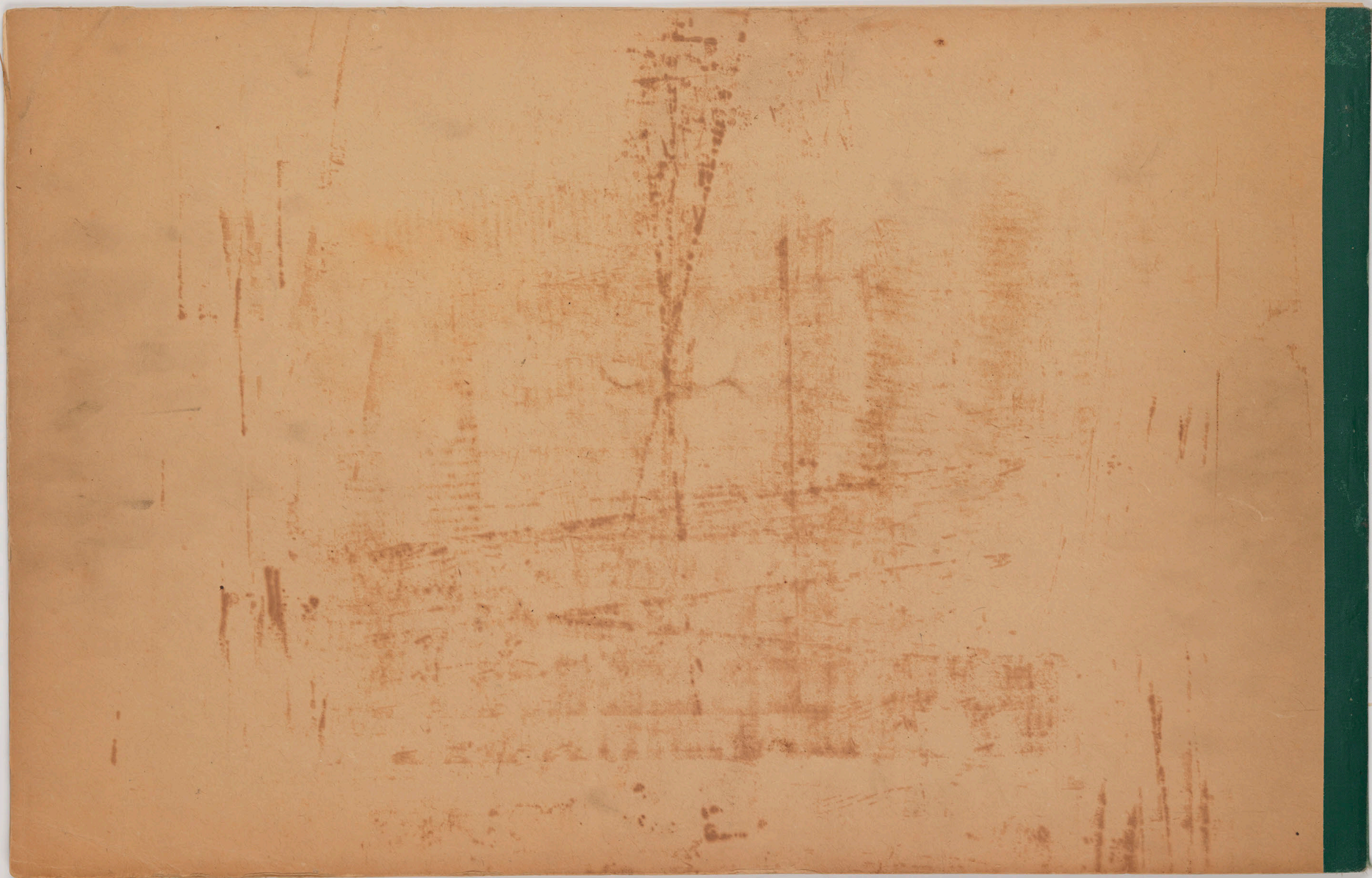
GENERAL VIEW FROM LONG ISLAND SHORE



VIEW OF PIER IV. JUNE 18, 1902



VIEW OF PIER II. FROM MANHATTAN SHORE



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v.1
pt.3

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1903.

CONTRACT DRAWINGS

FOR

THE CONSTRUCTION OF

The Steel Superstructure

OF THE

Blackwell's Island Bridge
(No. 4)

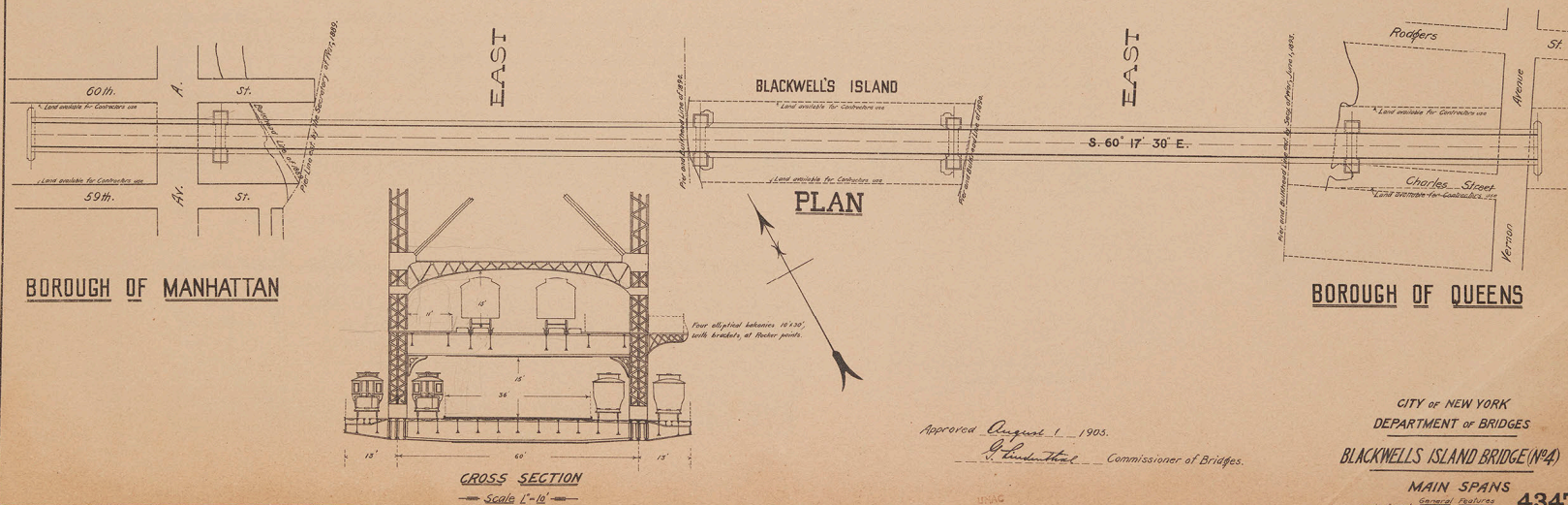
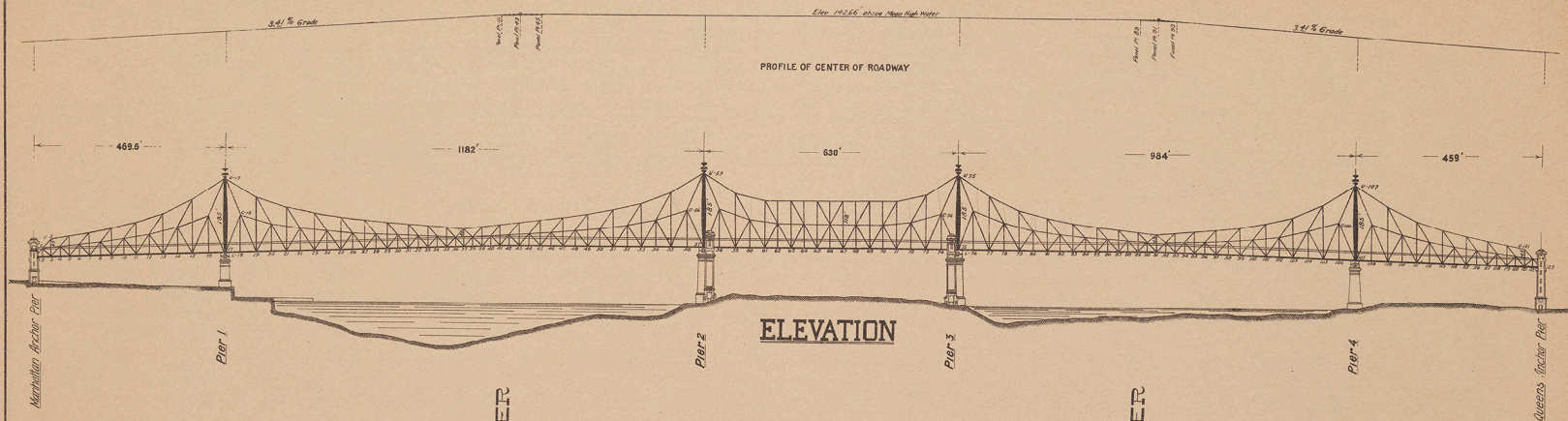
Over the East River, Between the Boroughs of
Manhattan and Queens.

MARTIN D. BROWN CO., Printers, 42 to 52 Park Place, N. Y.

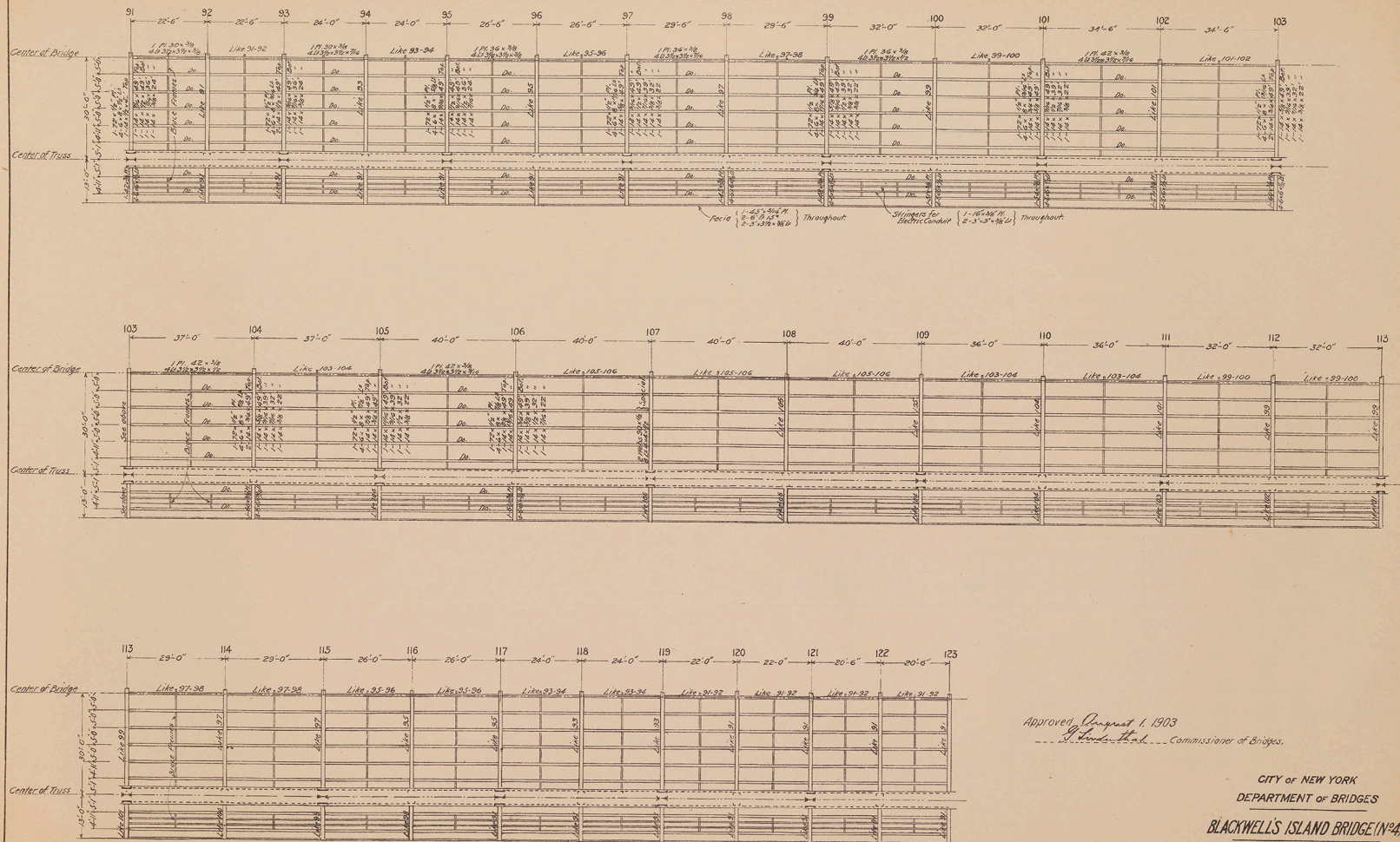
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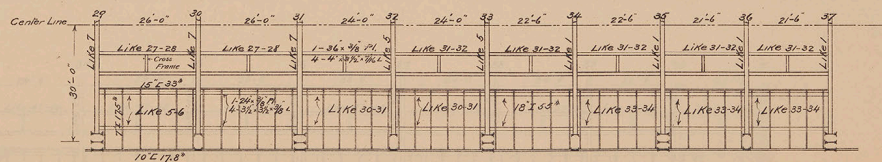
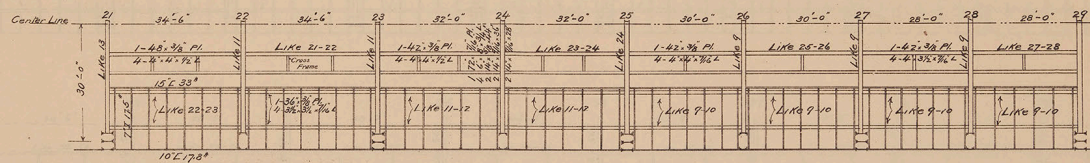
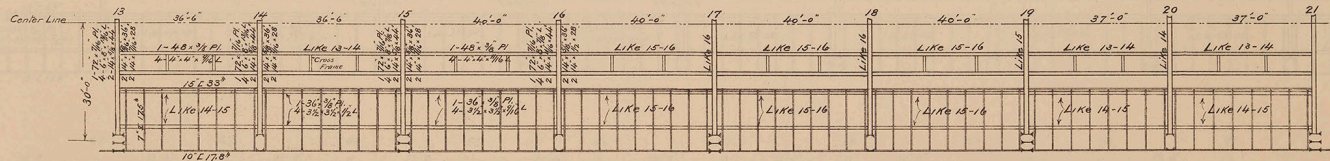
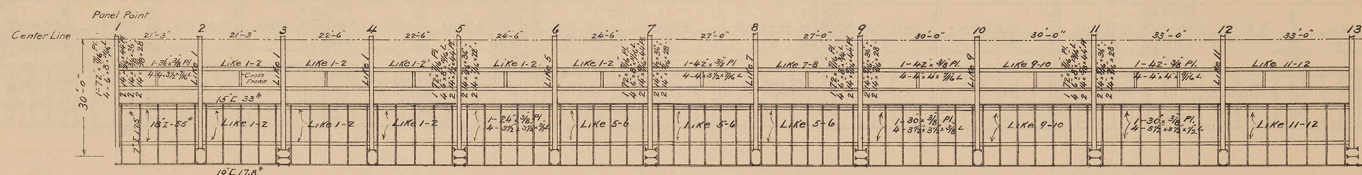


Approved August 1, 1903
Wm. H. ... Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (N4)
 FLOOR PLAN
 PANELS 91-123

Scale 1/8" = 1'

4350



Approved August 1, 1903
G. Lindenthal, Commissioner of Bridges.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (Nº 4)

Elevated Floor System

Scale $\frac{3}{64}'' = 1'$ Panels 1-37

Panels 1-37

4351



CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE (No. 4)

ELEVATED FLOOR SYSTEM

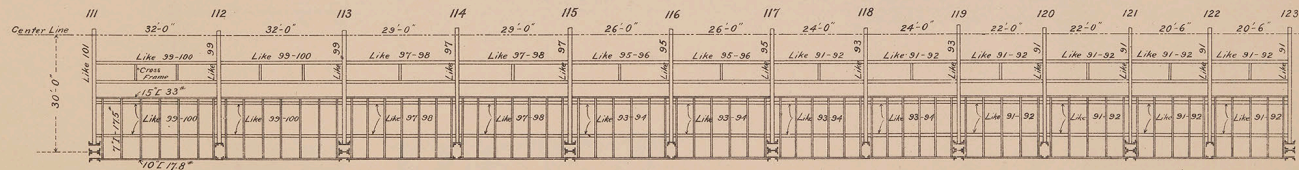
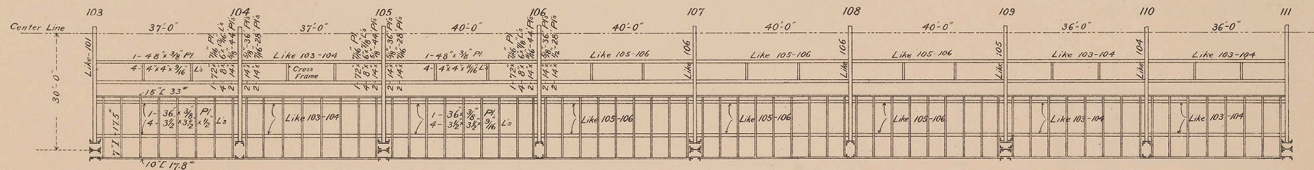
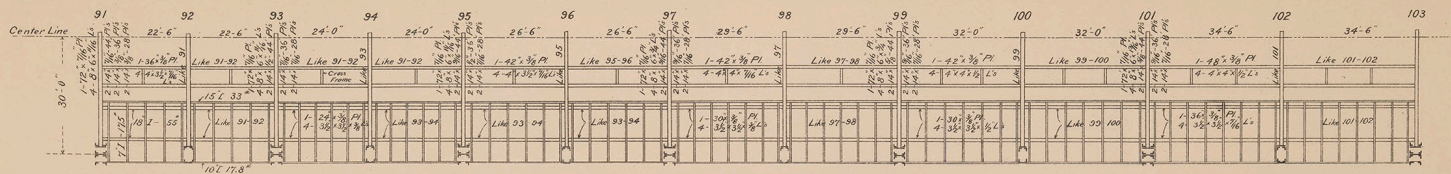
PANELS 37-91

SCALE 3/8" = 1'

Approved August 1, 1903

J. B. Thompson, Commissioner of Bridges.

4352



Approved August 1, 1903
G. Lindenthal Commissioner of Bridges

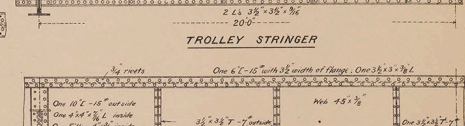
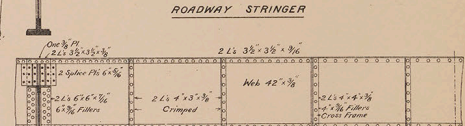
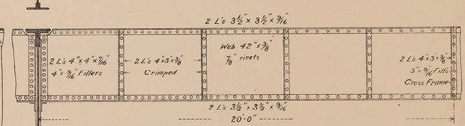
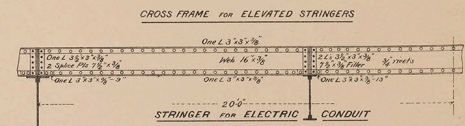
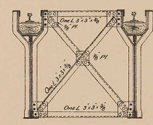
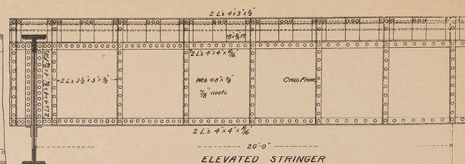
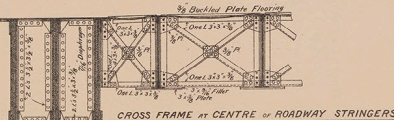
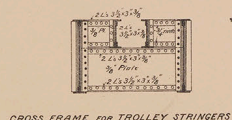
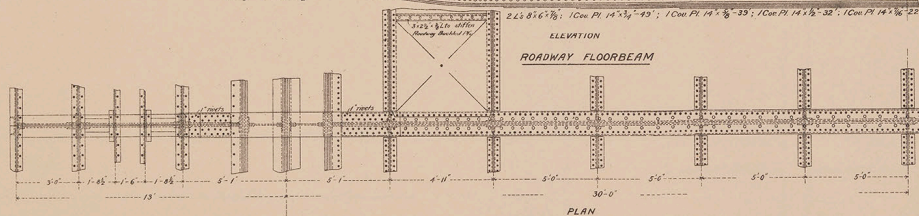
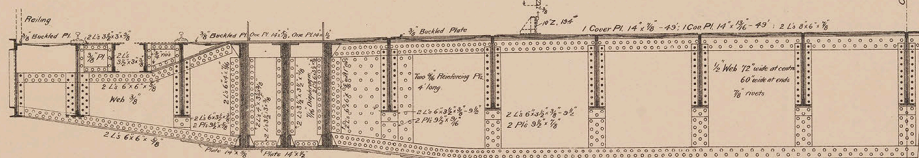
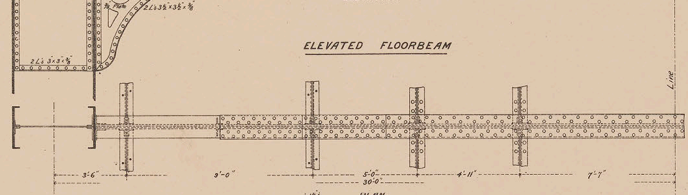
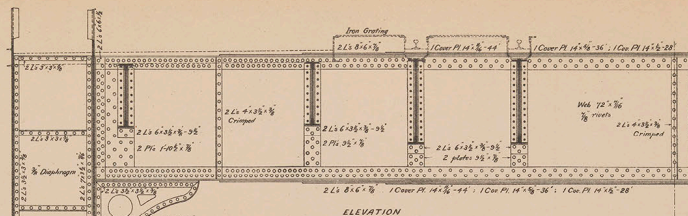
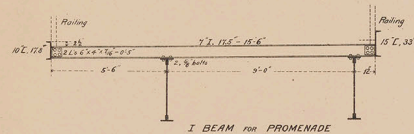
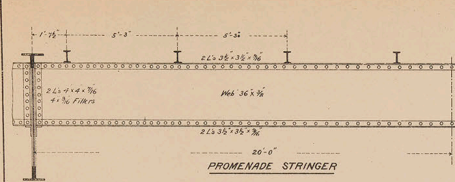
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (N^o 4)

ELEVATED FLOOR SYSTEM

PANELS 91-123

SCALE $\frac{3}{8}'' = 1'$

4353



Approved August 1, 1903.
John A. B. ... Commissioner of Bridges.

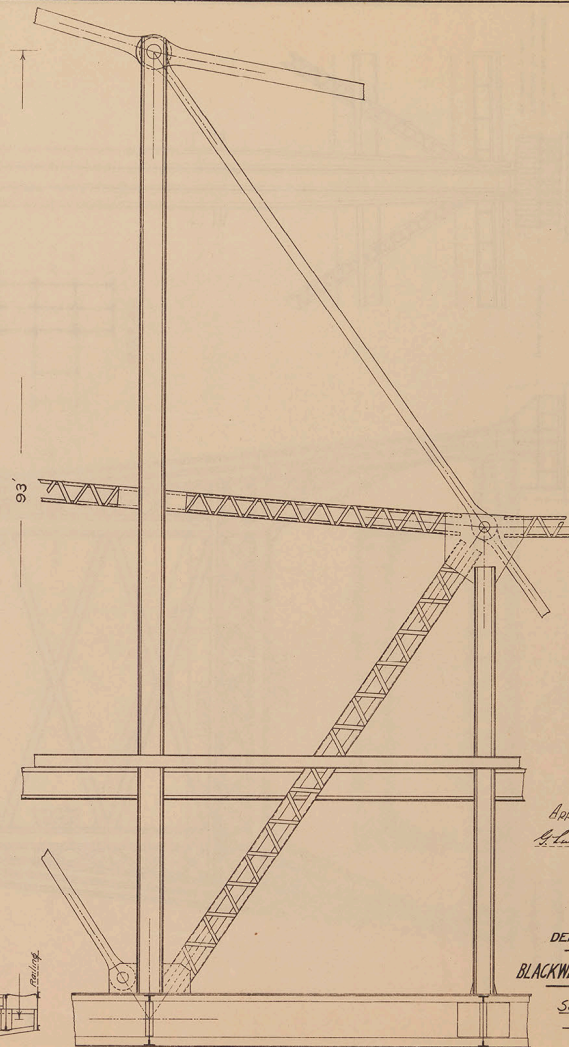
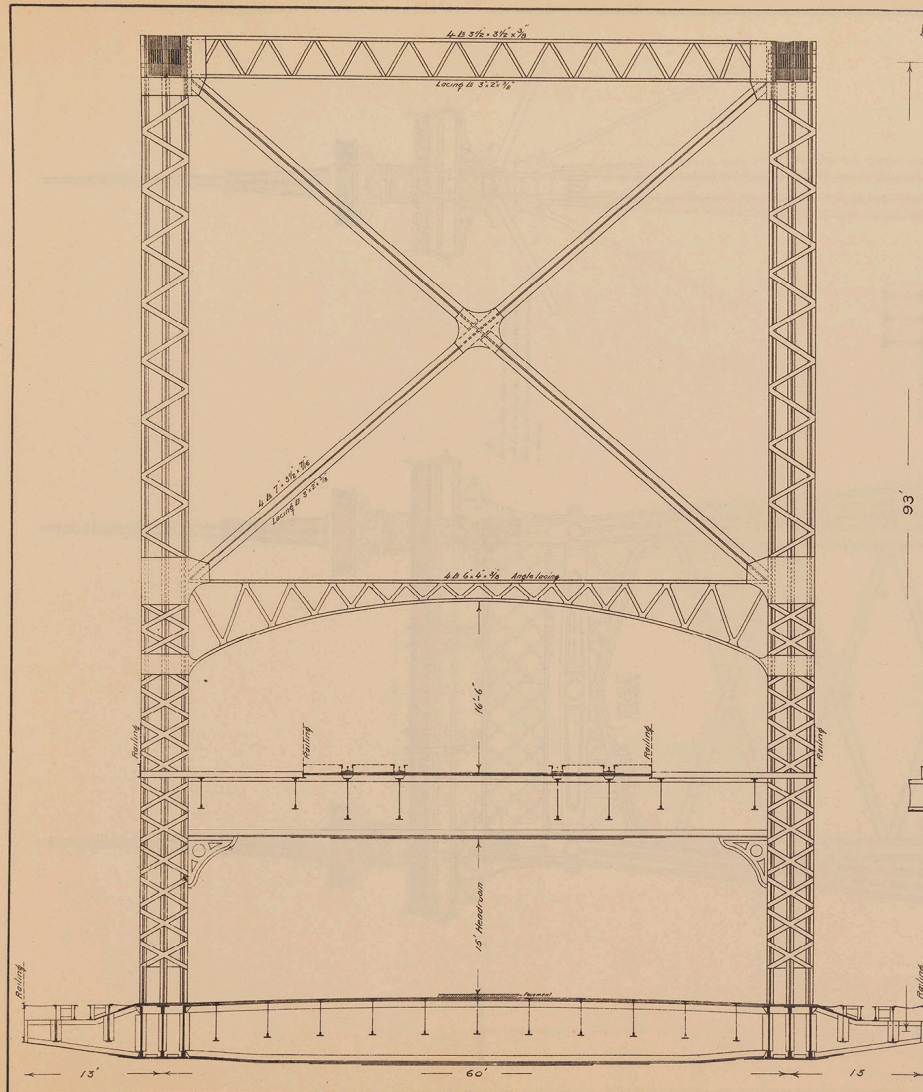
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE (N^o 4)

UPPER AND LOWER FLOOR SYSTEMS
 FOR PANELS 40' IN LENGTH

SCALE 1"=4'

4354



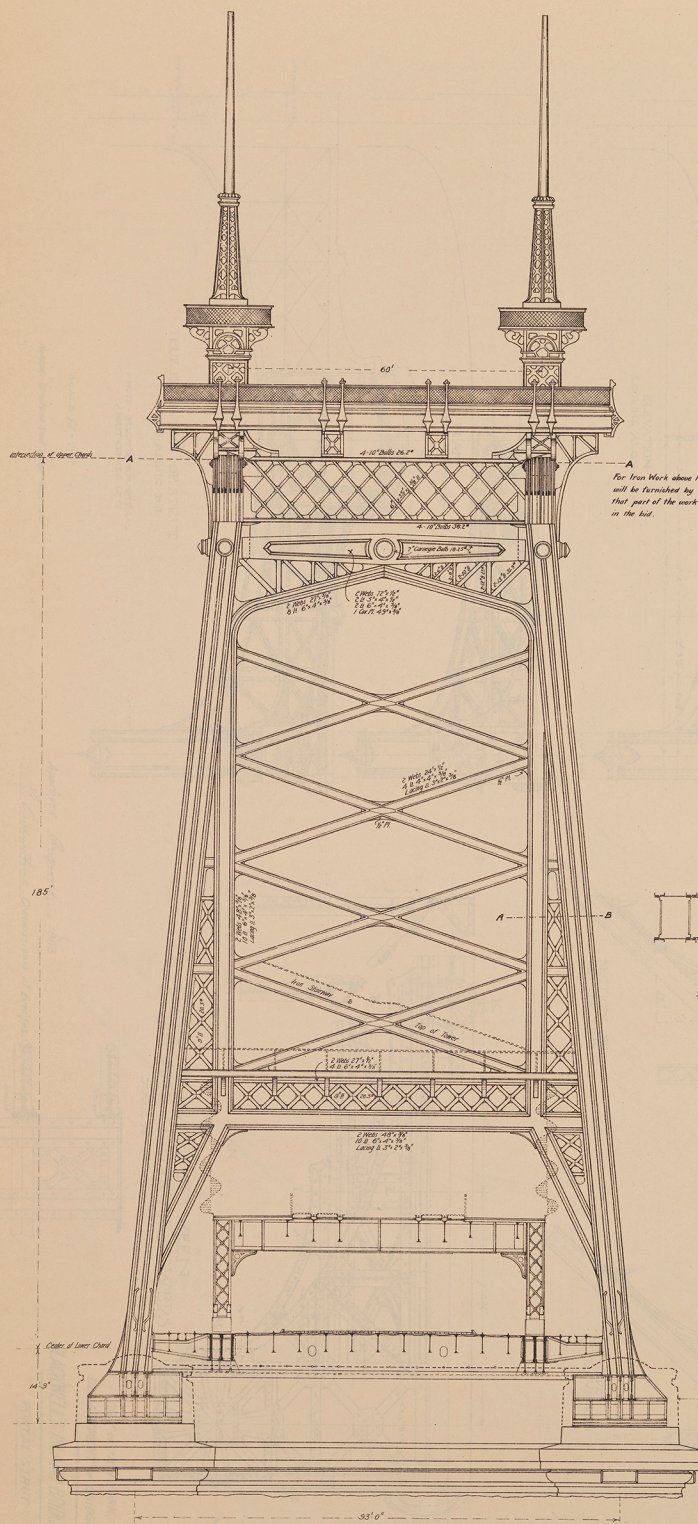
Approved August 1, 1903.
 S. J. Van Hook, Commissioner of Bridges

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)

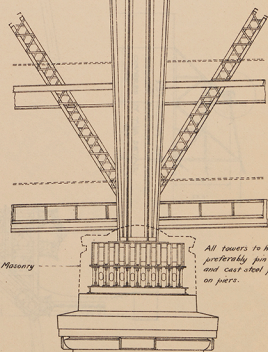
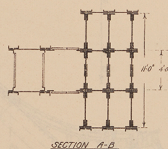
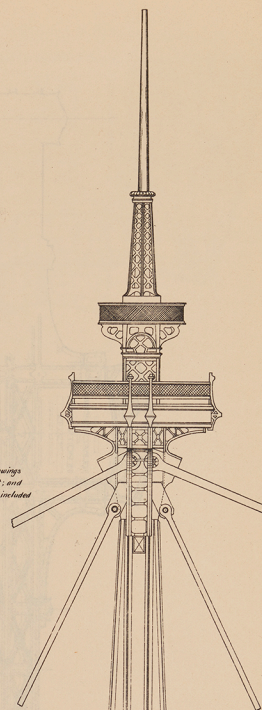
Section and Elevation
 — PANEL 23 —

Scale $\frac{1}{4}'' = 1'$

4356



For Iron Work above line "AA", drawings will be furnished by the Architect; and that part of the work is not to be included in the bid.



All towers to have preferably pin bearings and cast steel pedestals on pierz.

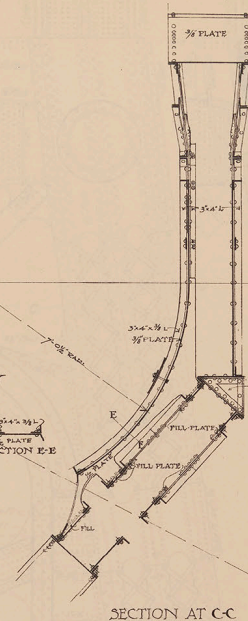
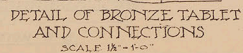
CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE (Nº 4)

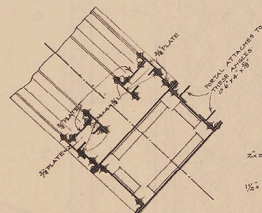
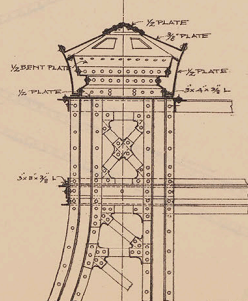
SECTION AND ELEVATION AT
PIERS

Approved August 1 1903

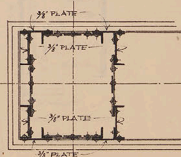
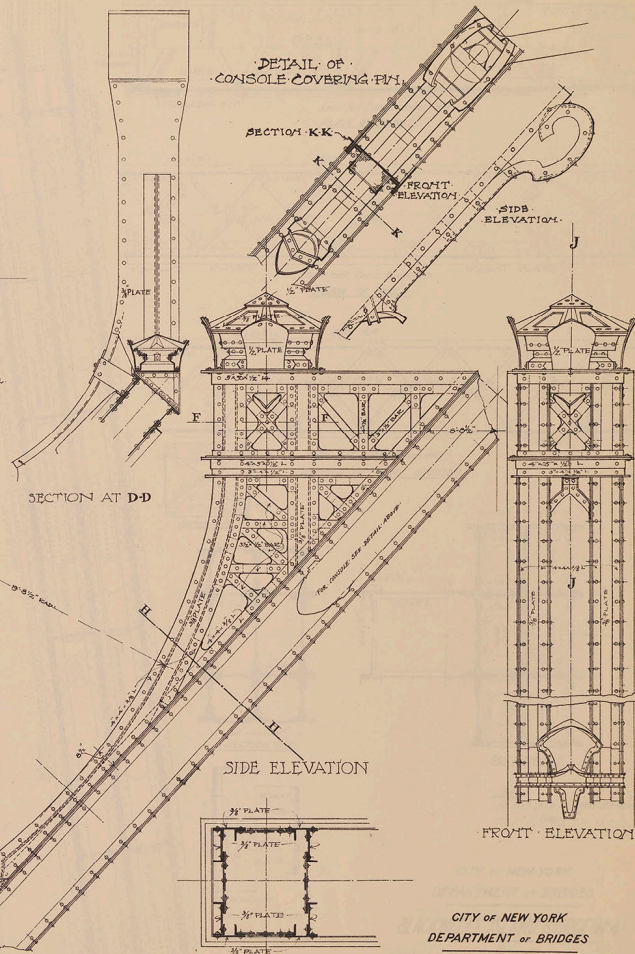
G. Lindenthal Commissioner of Bridges.



DETAIL OF BRONZE TABLET
AND FRAME
SCALE $\frac{3}{8}$ " = 1'-0"



SECTION AT H-H

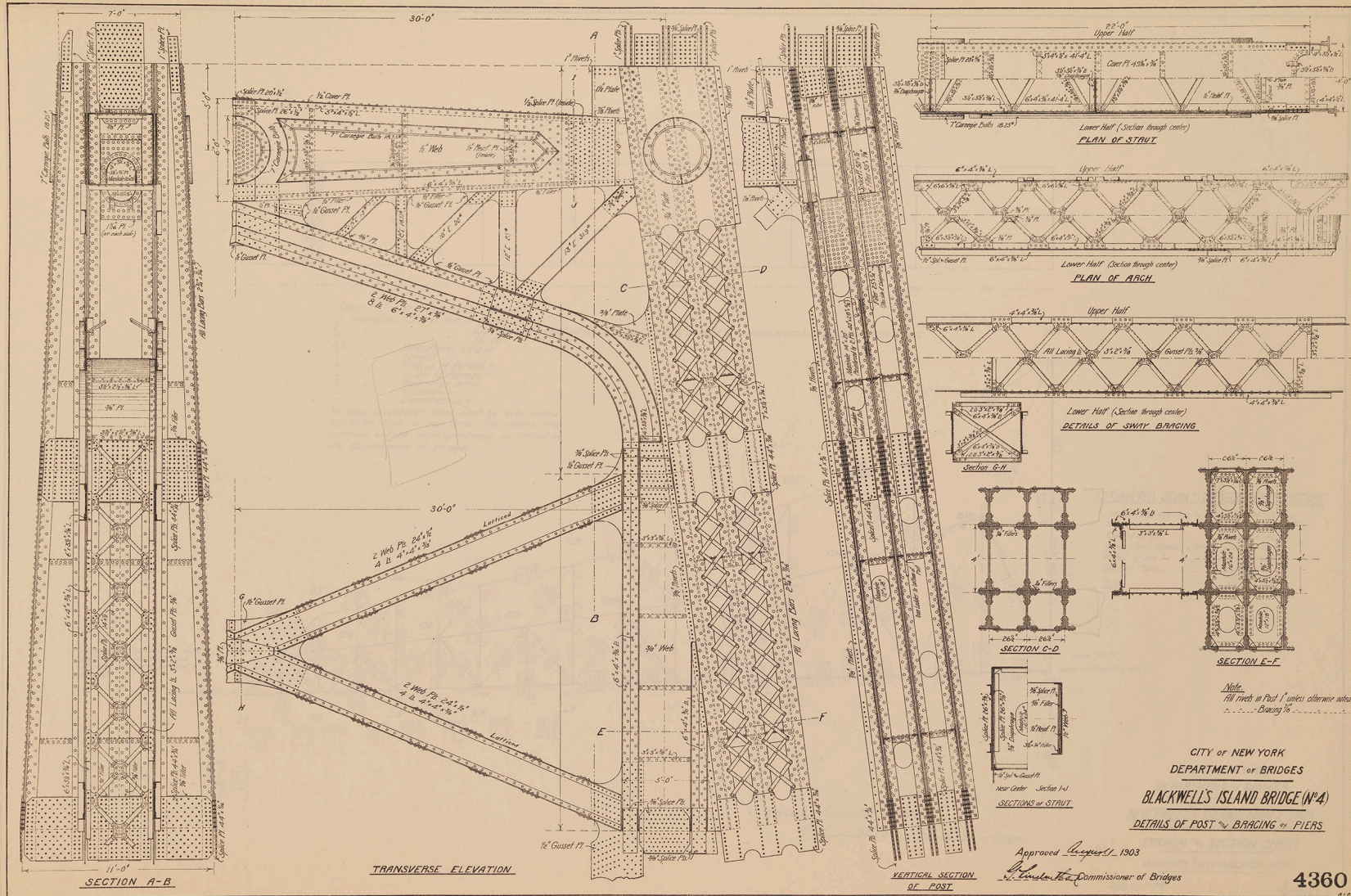


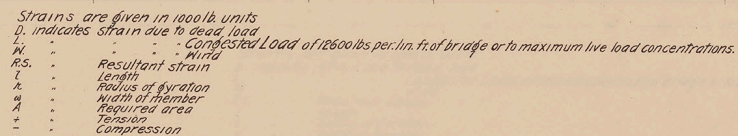
PLAN AT F-F

DETAIL OF FLANKING
TOWERS
SCALE $\frac{3}{8}$ " = 1'-0"

Material:- Structural Steel except where noted

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (Nº 4)
PORTAL STRUT





In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Nickel Steel Eye Bars & Pins.....	9 000 000	lbs.
Structural " " " "	6 390 000	"
Riveted Girders	23 024 000	"
Towers, Chords, Columns & Struts.....	41 777 000	"
Roll'd I's and B's	1 090 000	"
Buckled Plates	4 650 000	"
Total	85 931 000	"

Approved August 1 1903

G. Lindenthal Commissioner of Bridges.

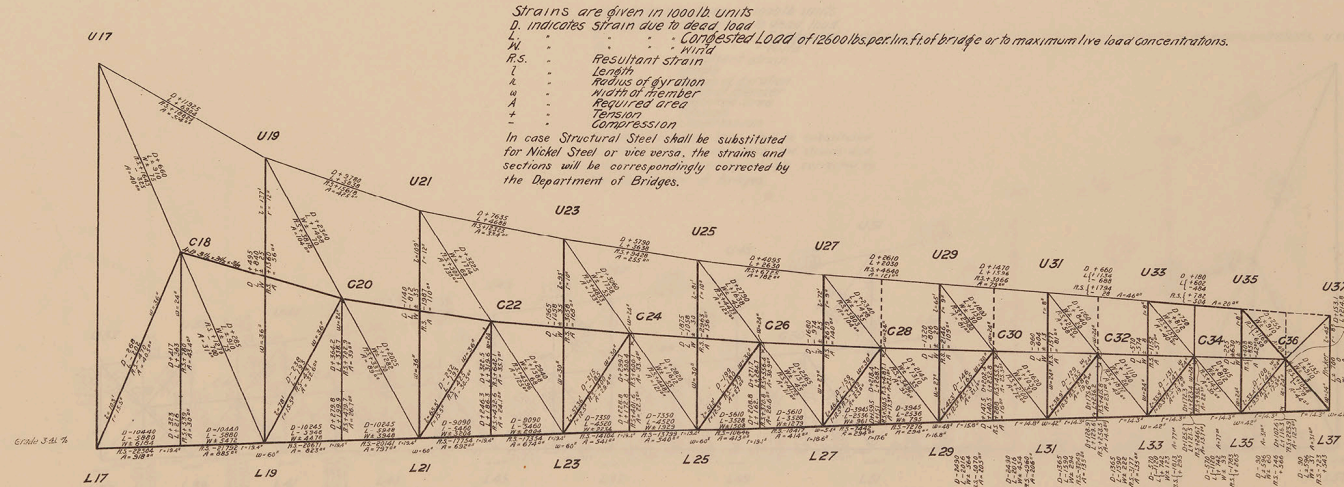
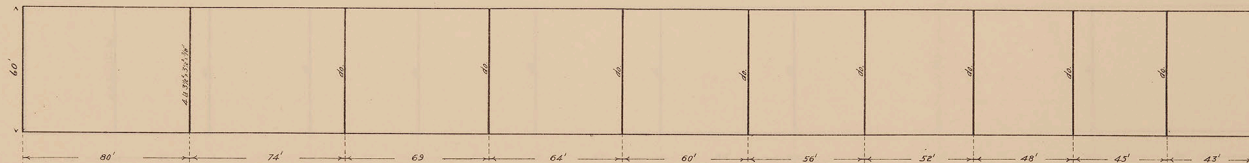
CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE (Nº 4)

STRAIN¹ No SECTION SHEET

MANHATTAN ANCHOR ARM

SCALE : 1"=40'

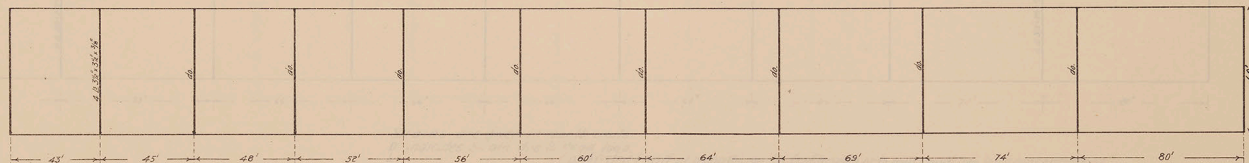


Flacker, subject to alternate tension and compression to have a detail making its depth adjustable to the extent of 1" total.

Approved August 1 1903
W. L. R. H. S. H. S. Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)
 STRAIN No SECTION SHEET
 MANHATTAN CANTILEVER ARM

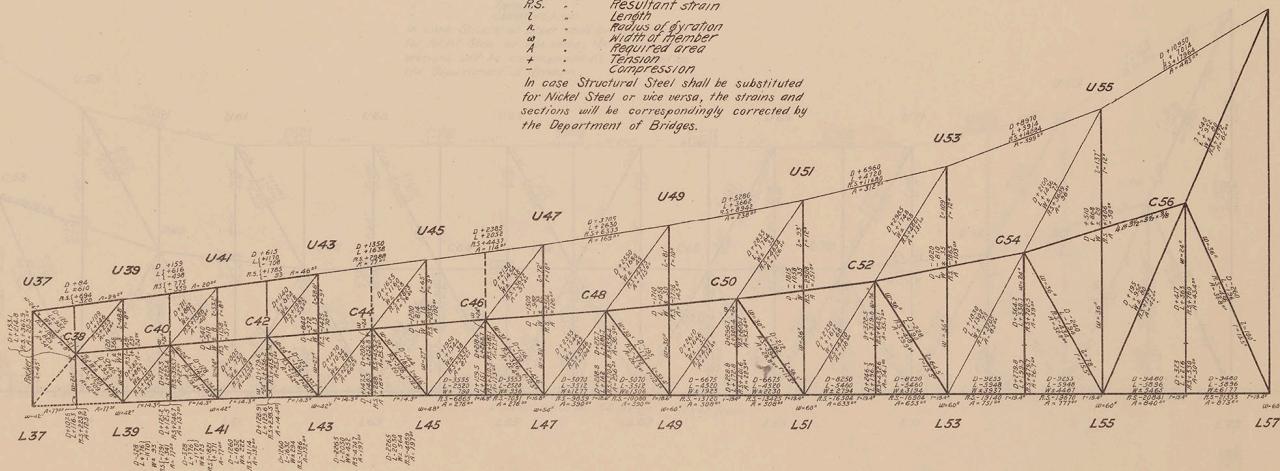
SCALE: 1"=40' 4458



Strains are given in 1000 lb. units
 p. indicates strain due to dead load
 W. Congested Load of 12600 lbs per lin. ft. of bridge or to maximum live load concentrations. u 57

R.S. . . . Resultant strain
 L. . . . Length
 R. . . . Radius of gyration
 W. . . . Width of member
 A. . . . Required area
 + . . . Tension
 - . . . Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Approved August 1 1903

John D. White Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

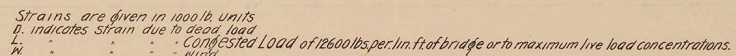
BLACKWELLS ISLAND BRIDGE (Nº 4)

STRAIN^{NO} SECTION SHEET

ISLAND CANTILEVER ARM - WEST.

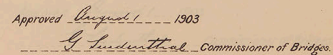
SCALE: 1"=40'

4459



R.S.	Resultant strain
l	Length
n	Radius of gyration
w	Width of member
A	Required area
T	Tension
C	Compression

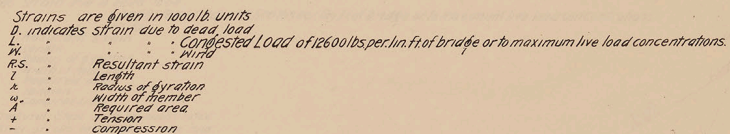
In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



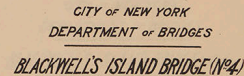
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (Nº 4)

STRAIN ϵ_{No} SECTION SHEET
ISLAND SPAN

SCALE : 1" = 40'



In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



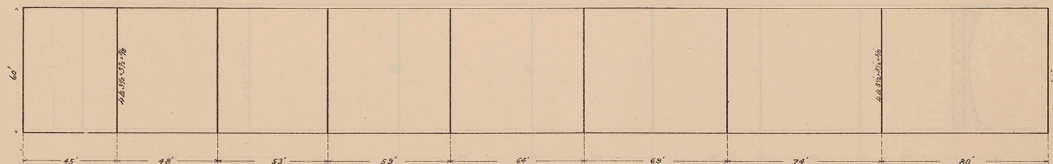
Approved August 1 1903

G. Lindenthal Commissioner of Bridges.

STRAIN AND SECTION SHEET

ISLAND CANTILEVER ARM - EAST.

SCALE: 1" = 40'



Strains are given in 1000 lb units

D. indicates strain due to dead load

L. indicates strain due to live load

R.S. - Resultant strain

L. - Length

R. - Radius of gyration

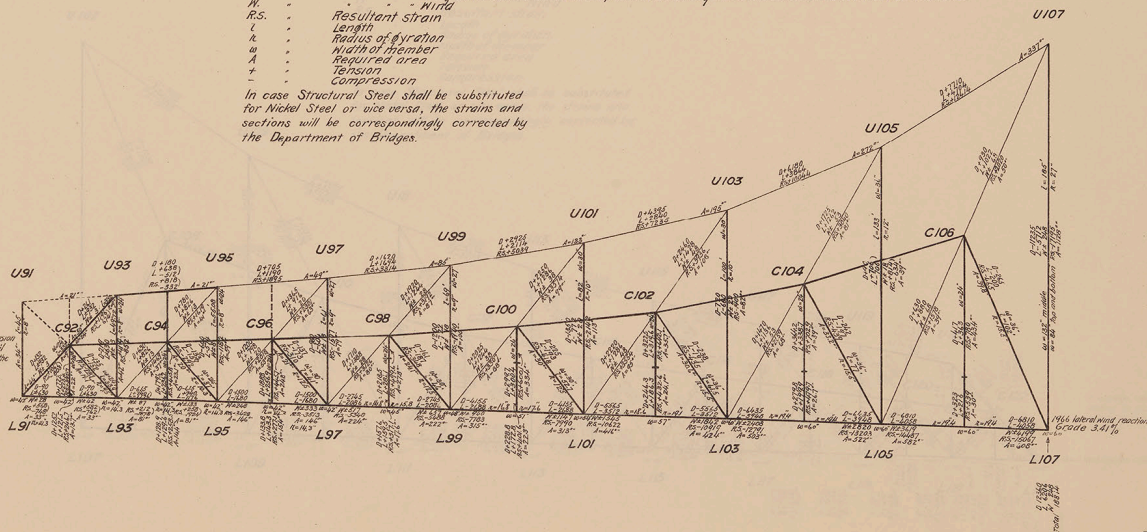
A. - Area of member

T. - Tension

C. - Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.

Rockers, subject to alternate tension and compression to their extent making its length adjustable to the extent of 1" total.



Approved, August 1, 1903

J. B. Thompson, Commissioner of Bridges.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES

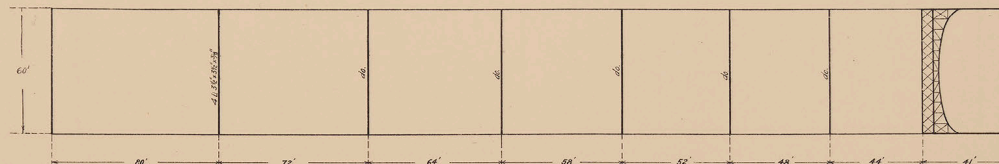
BLACKWELL'S ISLAND BRIDGE (No. 4)

STRAIN ANALYSIS SECTION SHEET

QUEENS CANTILEVER ARM

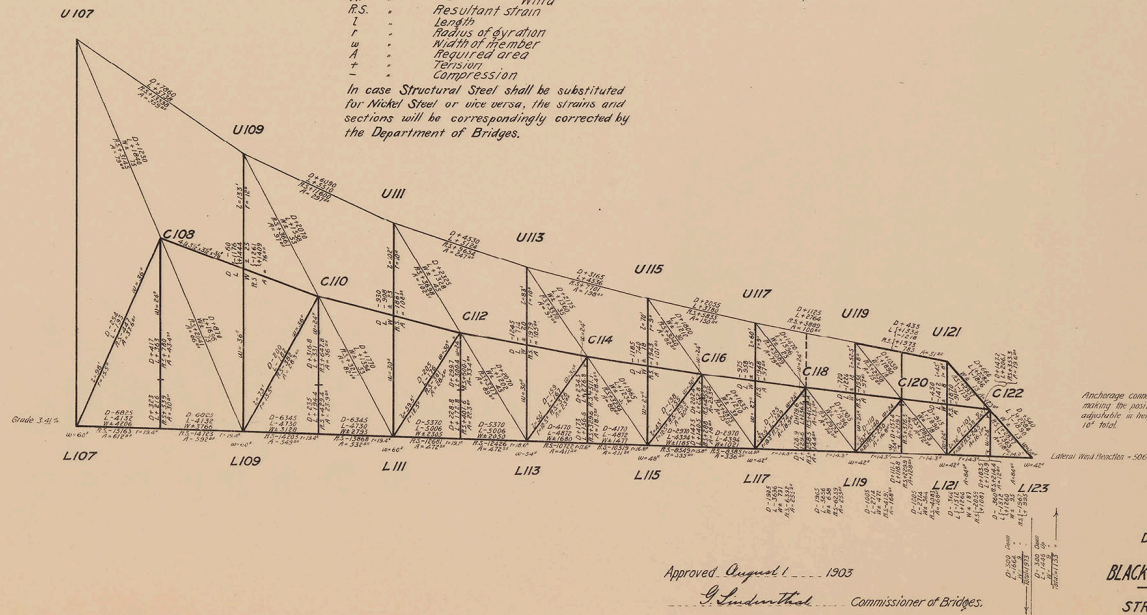
SCALE: 1"=40'

4462



Strains are given in 1000 lb. units
 D. indicates strain due to dead load
 W. " " " " Wind
 R.S. " " Resultant Strain
 L. " " Length
 r. " " Radius of gyration
 u. " " Width of member
 A. " " Required area
 + " " Tension
 - " " Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Approved August 1, 1903

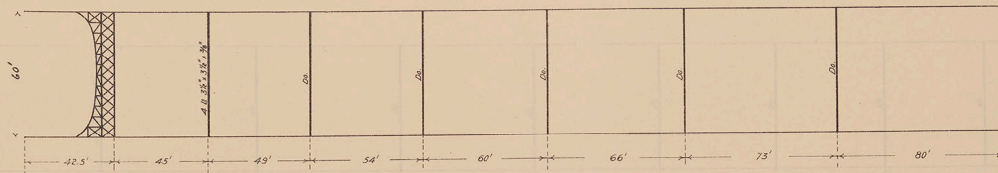
G. S. S. Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)

STRAIN 4th SECTION SHEET
 QUEENS ANCHOR ARM

SCALE: 1"=40'

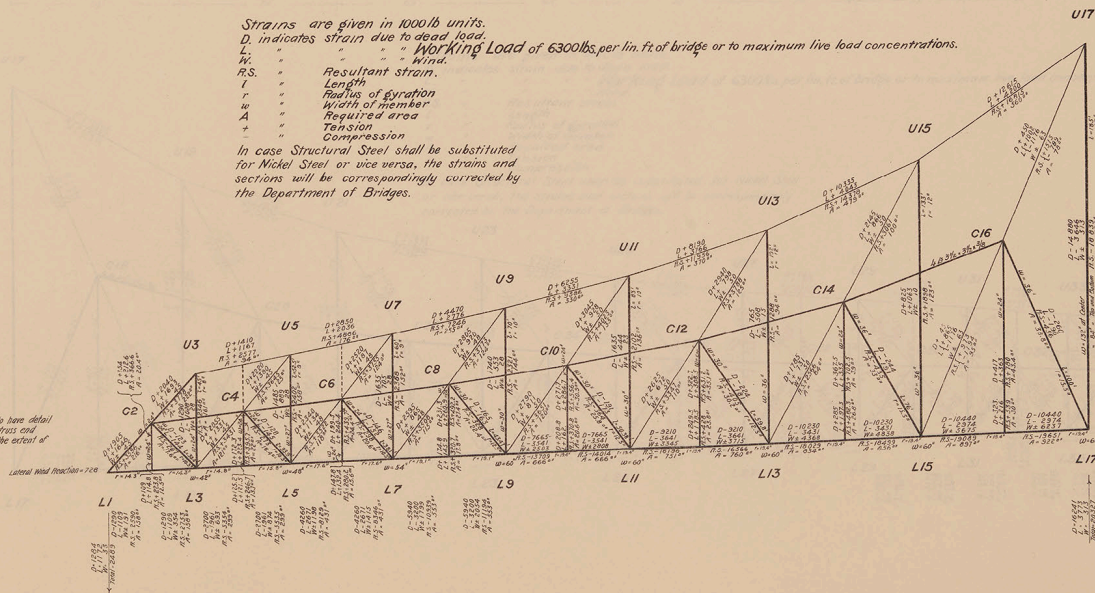
4463



Strains are given in 1000 lb units.
 D. indicates strain due to dead load.
 L. " " " " Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.
 W. " " " " Wind.
 R.S. " Resultant strain.
 l. " Length.
 r. " Radius of gyration.
 w. " Width of member.
 A. " Required area.
 T. " Tension.
 C. " Compression.

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.

Anchorages connection to have detail making the position of truss end adjustable in height to the extent of 10" total.



ESTIMATED QUANTITIES-SUPERSTRUCTURE

Nickel Steel Eye Bars & Pins	9 000 000 lbs.
Structural	6 390 000 "
Riveted Girders	23 024 000 "
Towers, Chords, Columns & Struts	41 777 000 "
Roller Truss	1 050 000 "
Buckled Plates	4 650 000 "
Total	85 931 000 "

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE (No. 4)

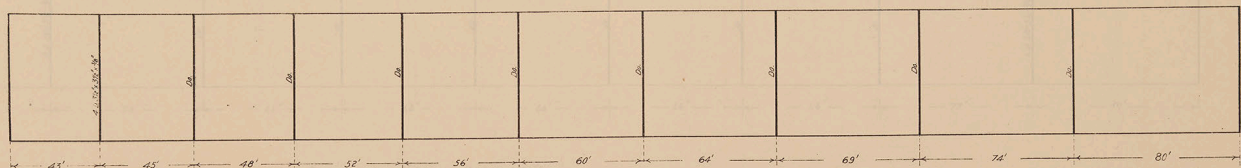
STRAIN "No SECTION SHEET
 MANHATTAN ANCHOR ARM

Approved August 1, 1903

J. R. ... Commissioner of Bridges.

SCALE: 1"=40'

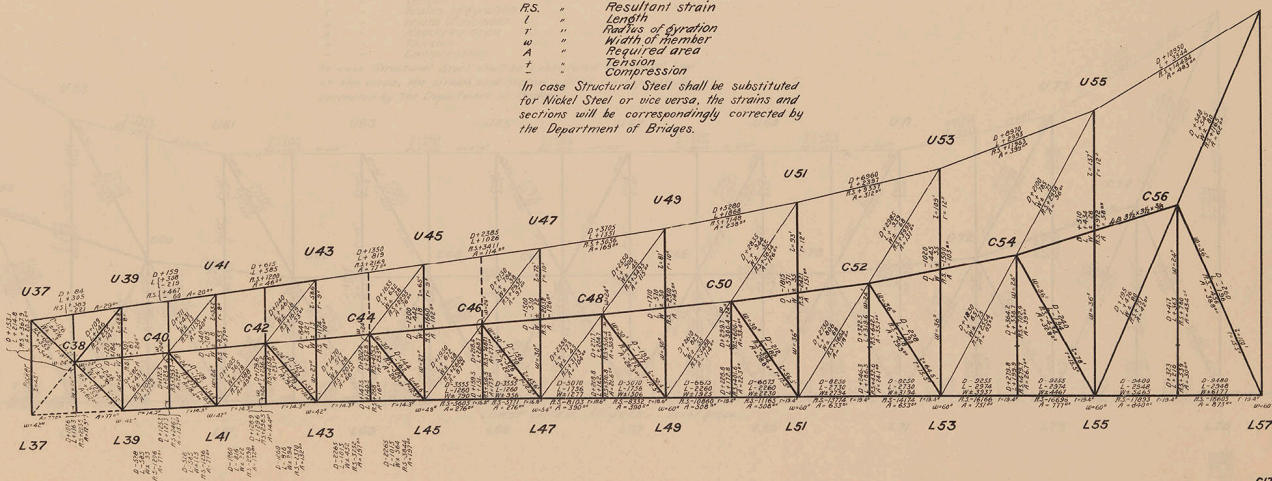
4464



Strains are given in 1000 lb units.
 D. indicates strain due to dead load.
 L. " " " " Working Load of 6300 lbs per lin. ft. of bridge or to maximum live load concentrations. U57
 W. " " " " Wind.
 RS. " Resultant strain

l " Length
 T " Radius of gyration
 W " Width of member
 A " Required area
 T " Tension
 C " Compression

In case Structural Steel shall be substituted
 for Nickel Steel or vice versa, the strains and
 sections will be correspondingly corrected by
 the Department of Bridges.



Approved August 1, 1903

G. Lindenthal Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

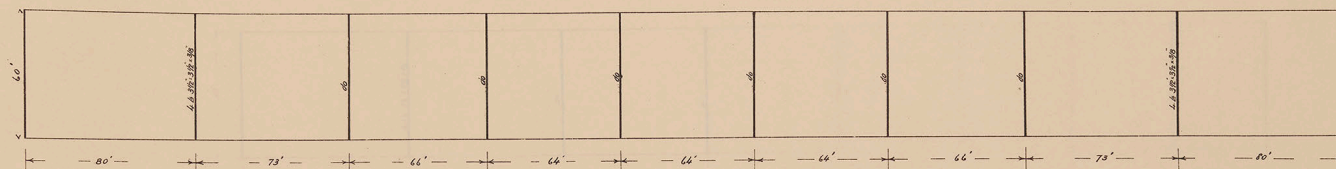
BLACKWELL'S ISLAND BRIDGE (Nº 4)

STRAIN "No SECTION SHEET

ISLAND CANTILEVER ARM - WEST.

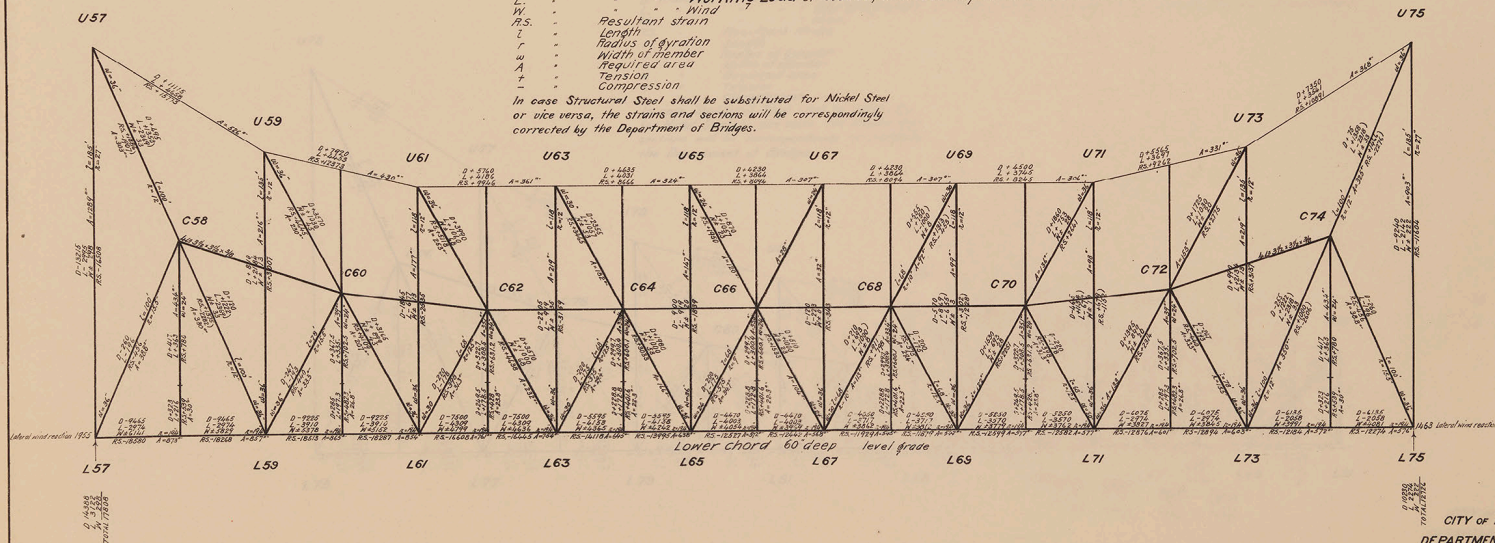
SCALE: 1"=40'

4466



Strains are given in 1000 lb. units.
 D. indicates strain due to dead load.
 L. Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.
 W. Wind
 R.S. . . . Resultant strain
 L. Length
 r. Radius of gyration
 w. Width of member
 A. Required area
 T. Tension
 C. Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.

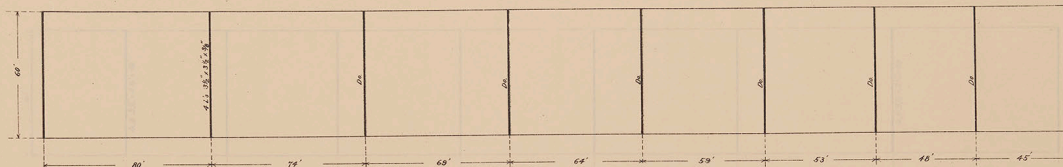


Approved August 1 1903
 G. L. ... Commissioner of Bridges

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)

STRAIN No. SECTION SHEET
 ISLAND SPAN

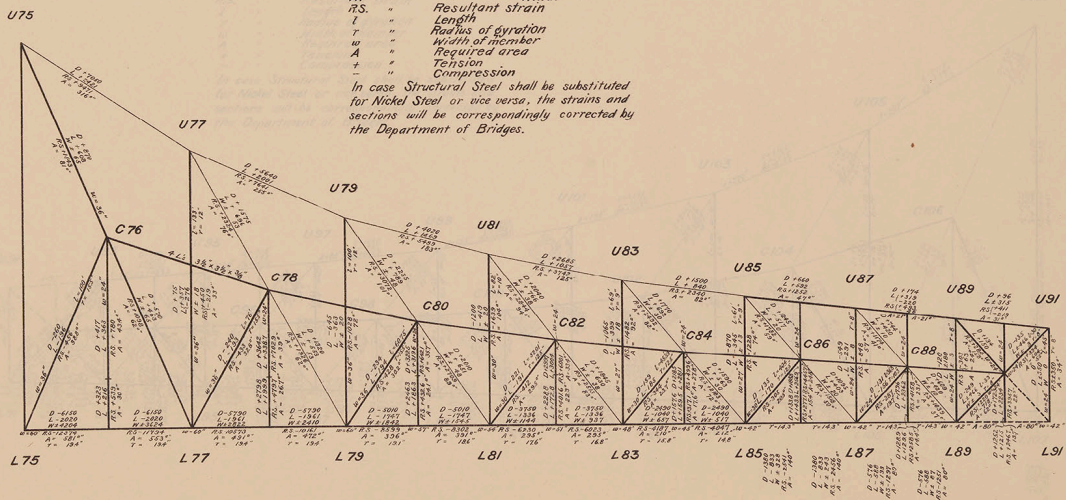
SCALE: 1"=40'



Strains are given in 1000 lb. units.
 D. indicates strain due to dead load.
 W. " " " " Wind.
 L. " " " " Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.

R.S. " Resultant Strain
 L " Length
 r " Radius of gyration
 w " Width of member
 A " Required area
 T " Tension
 C " Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Approved *August 1* 1903
Strom Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)
 STRAIN 4th SECTION SHEET
 ISLAND CANTILEVER ARM - EAST

SCALE: 1" = 40'

Small, faint, illegible text block in the lower-left corner.

Small, faint, illegible text block in the lower-left corner.

Small, faint, illegible text block in the lower-left corner.

624.09747
N5688
v.1
pt.5

J.D.W.

Queens I

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1904.

Contract Drawings

FOR

Constructing the Foundations, Abutment Core,
and Metal Work of the Steel Viaduct
of the Queens Approach of the
Blackwell's Island Bridge

Over the East River, Between the Boroughs of
Manhattan and Queens.

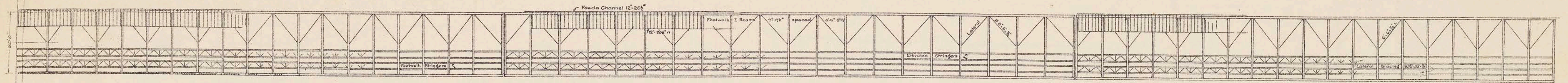
624.09747
N5688
v.1 pt.5

2535-06

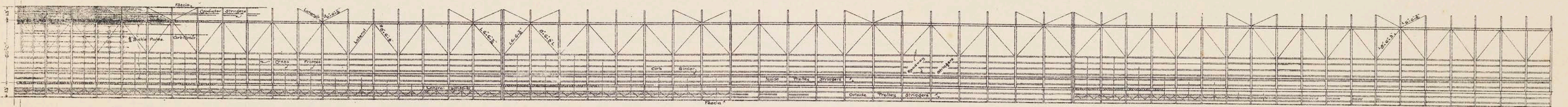
MARTIN B. BROWN Co., Printers, 49 to 57 Park Place, N. Y.

SCIENCE

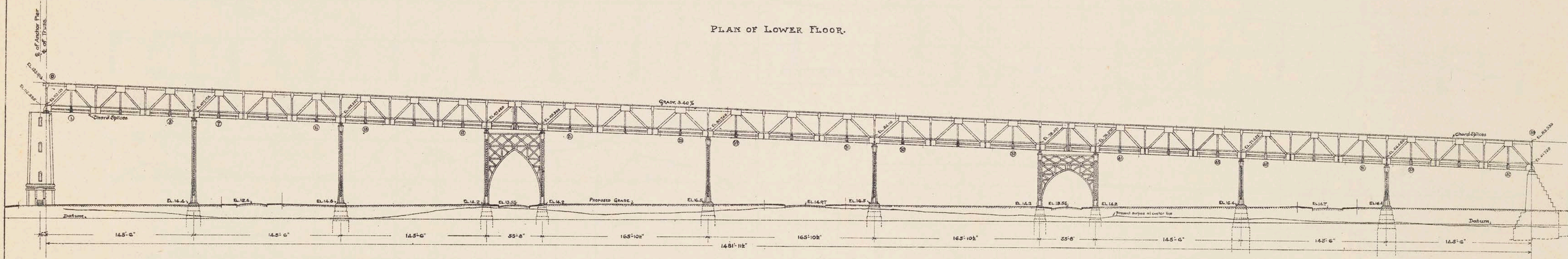
FONDREN LIBRARY
Southern Methodist University
DALLAS, TEXAS



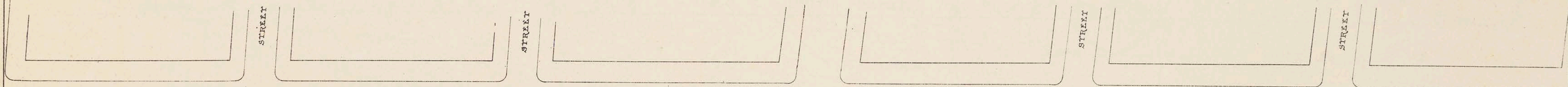
PLAN OF UPPER FLOOR.



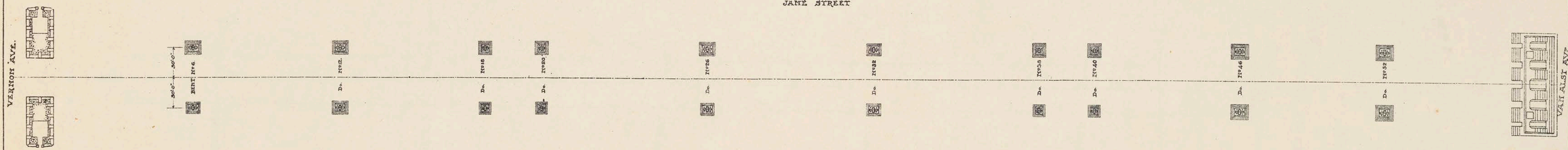
PLAN OF LOWER FLOOR.



ELEVATION.



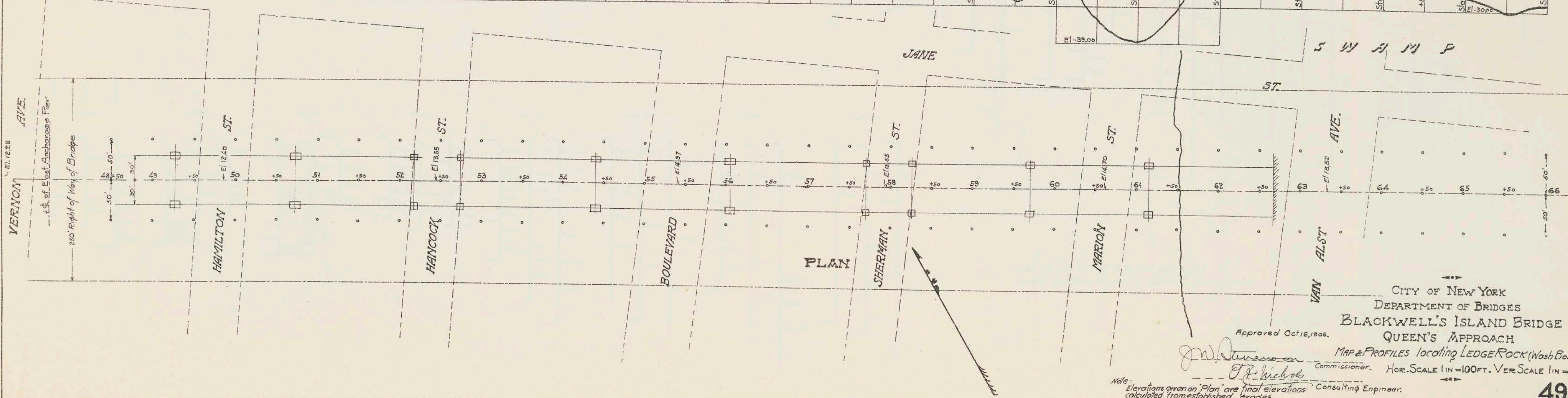
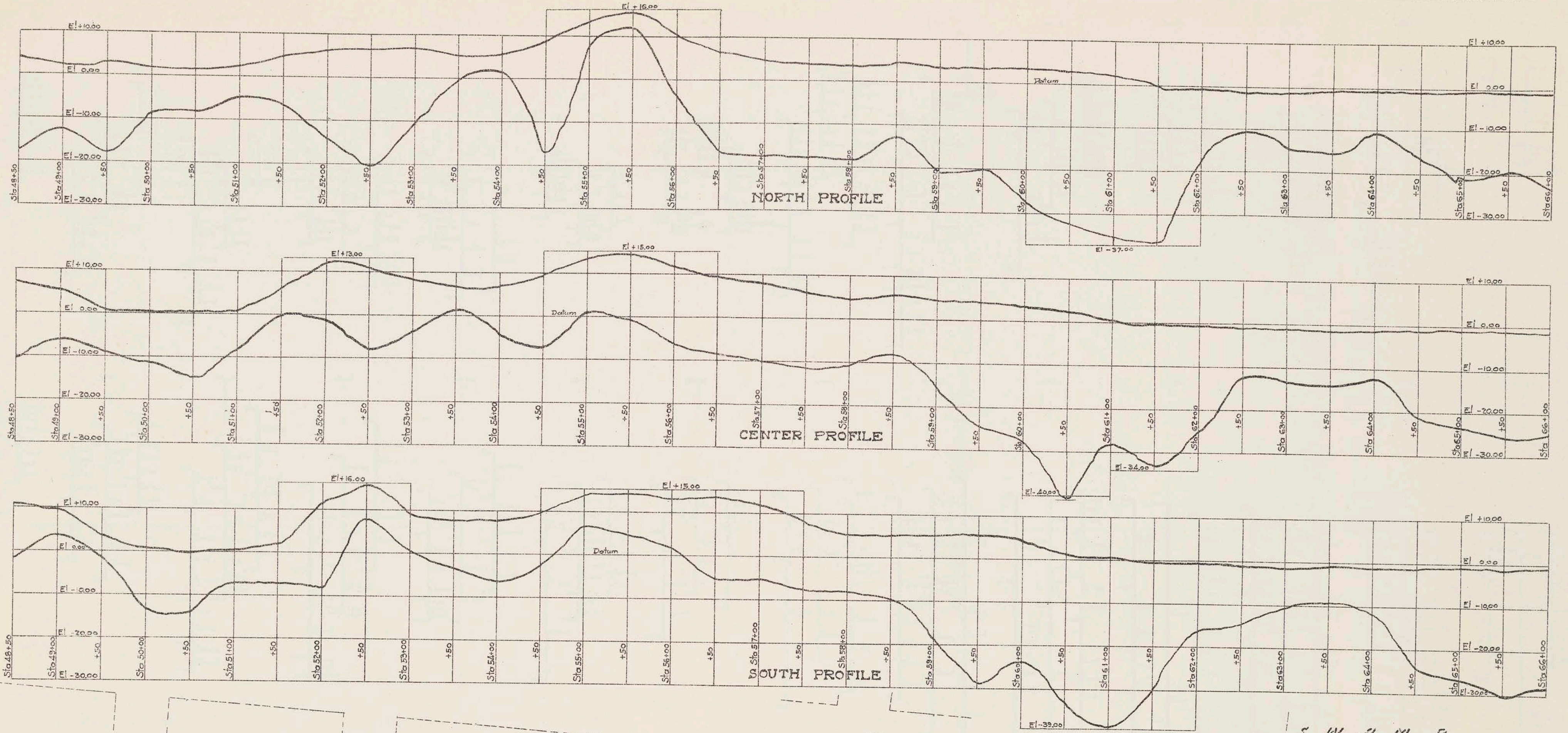
JANE STREET



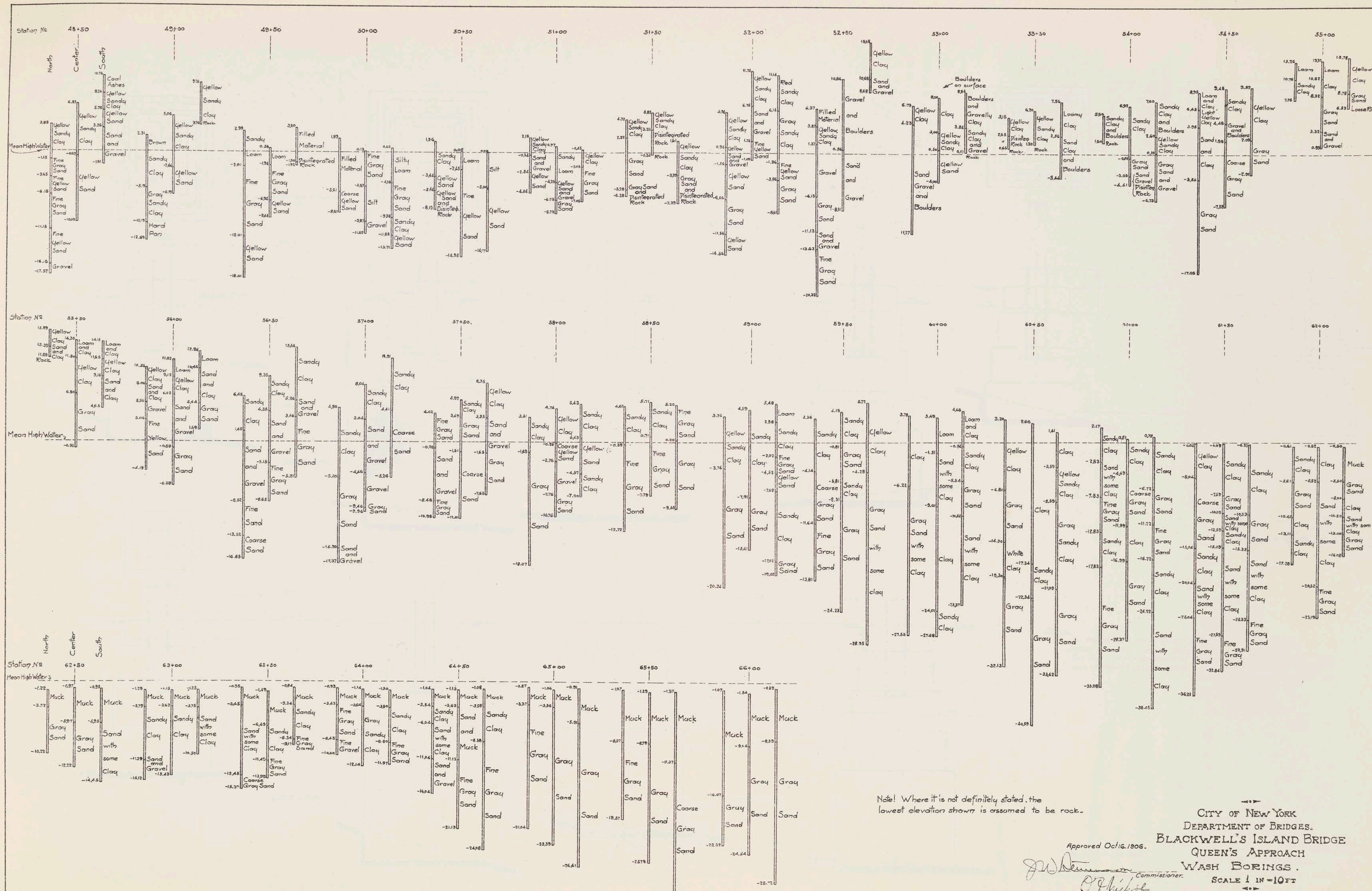
PLAN.

Approved Oct. 16, 1906
[Signature]
 Commissioner
[Signature]
 Consulting Engineer

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE
 QUEEN'S APPROACH
 SUPERSTRUCTURE - GENERAL
 SCALE 80 FT. = 1 IN.

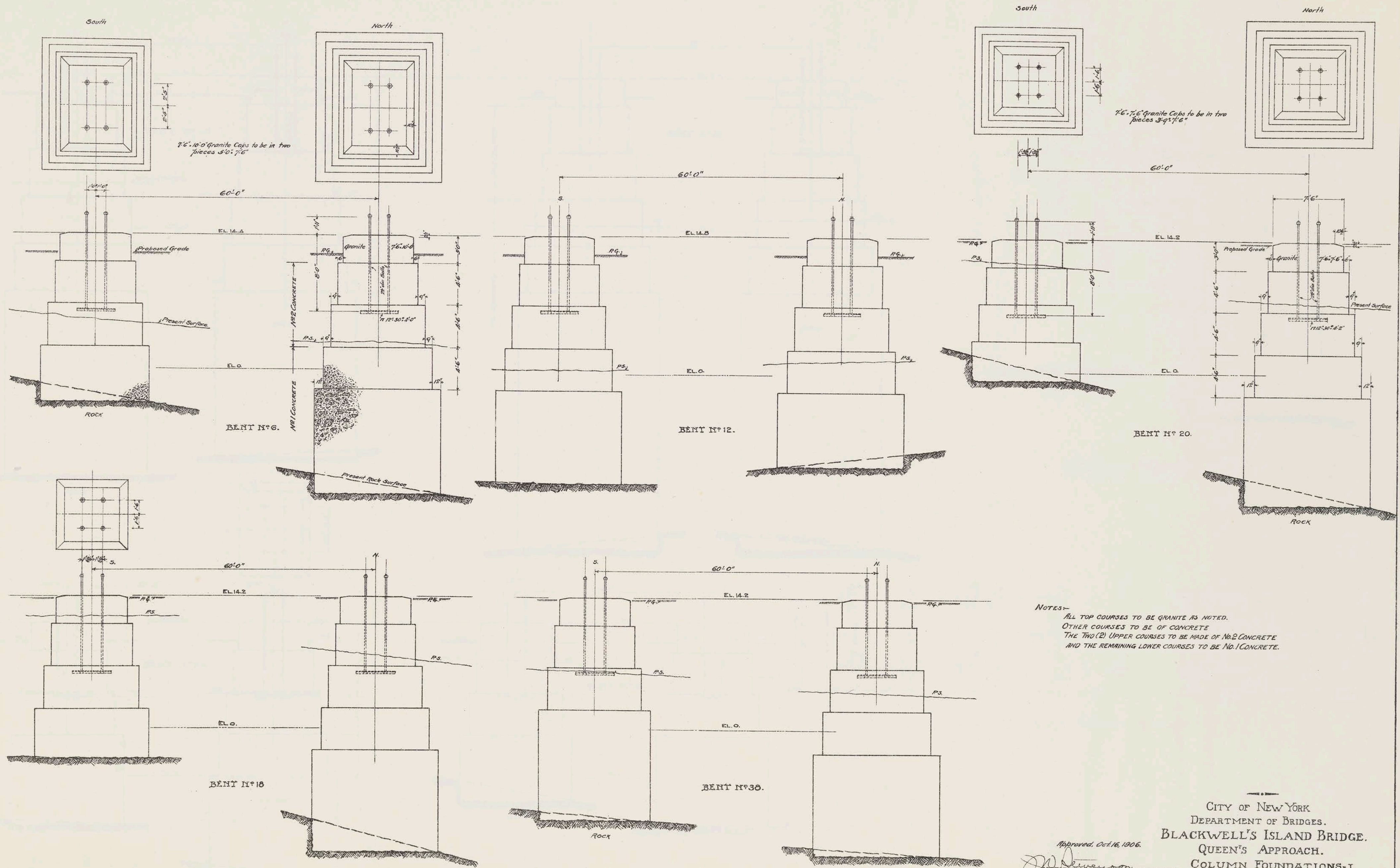


CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
MAP & PROFILES LOCATING LEDGE ROCK (WASH BORINGS)
Approved Oct 16, 1906.
Commissioner.
Note: Elevations given on 'Plan' are final elevations calculated from established grades.
HOR. SCALE 1 IN = 100 FT. VER. SCALE 1 IN = 20 FT.



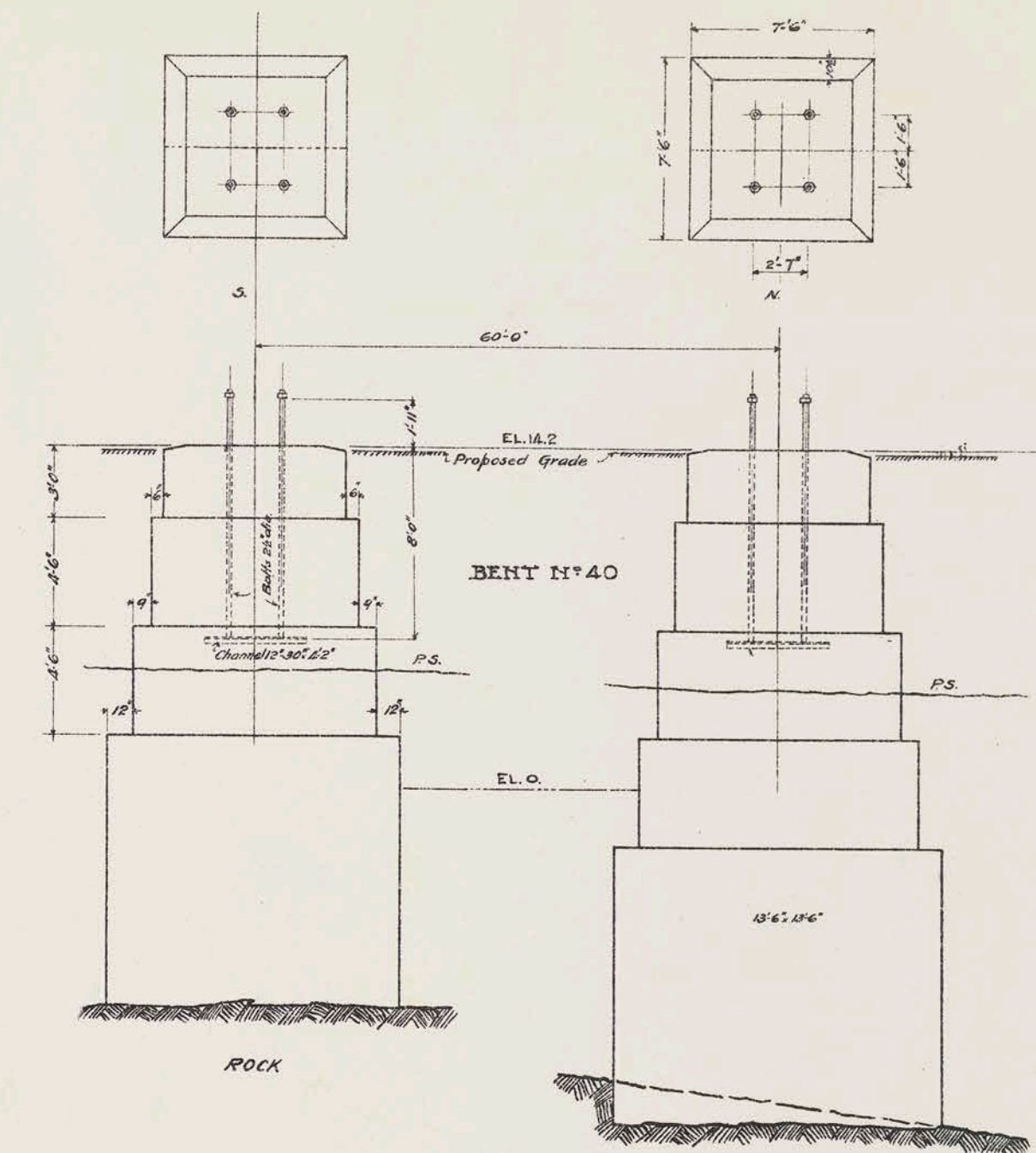
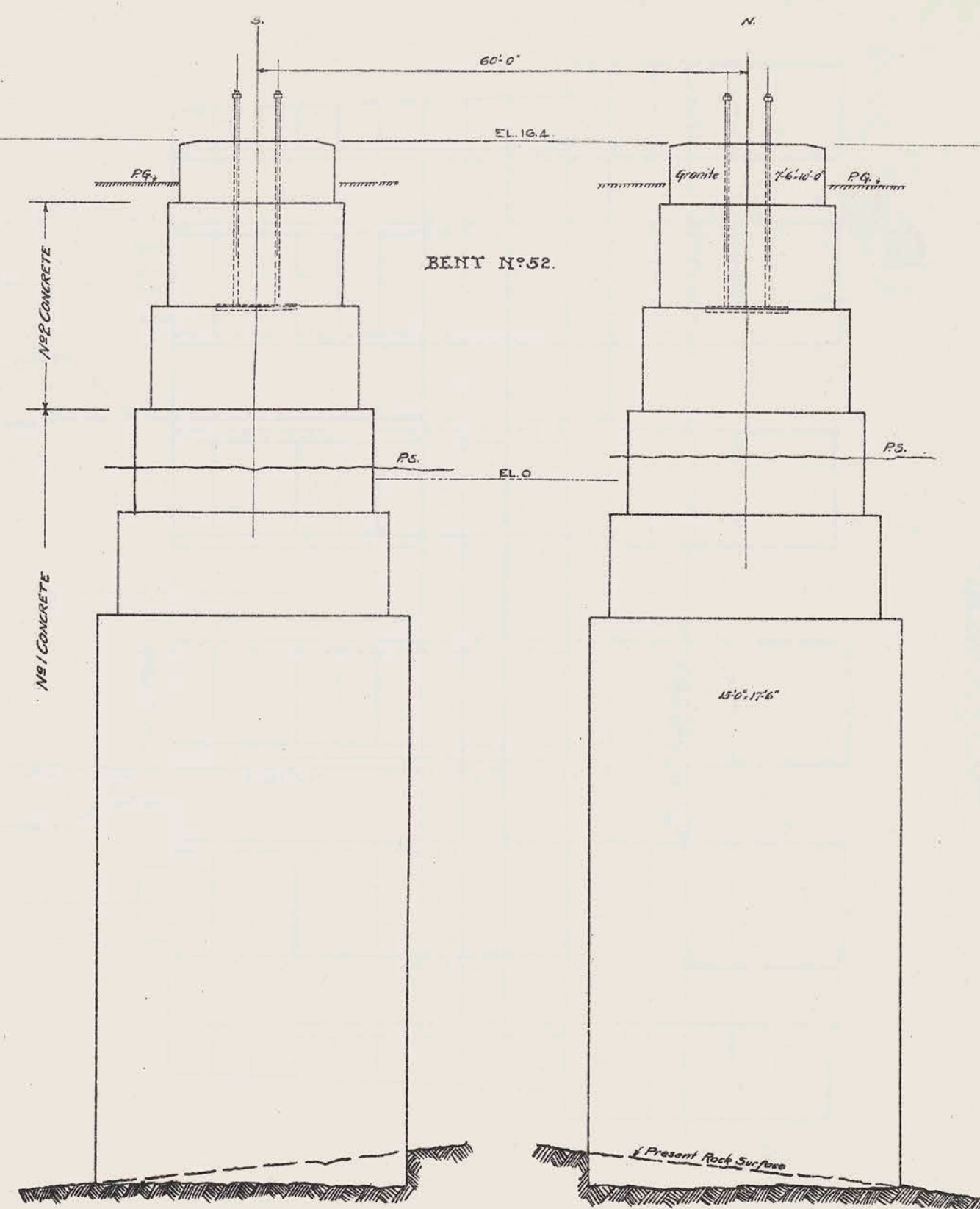
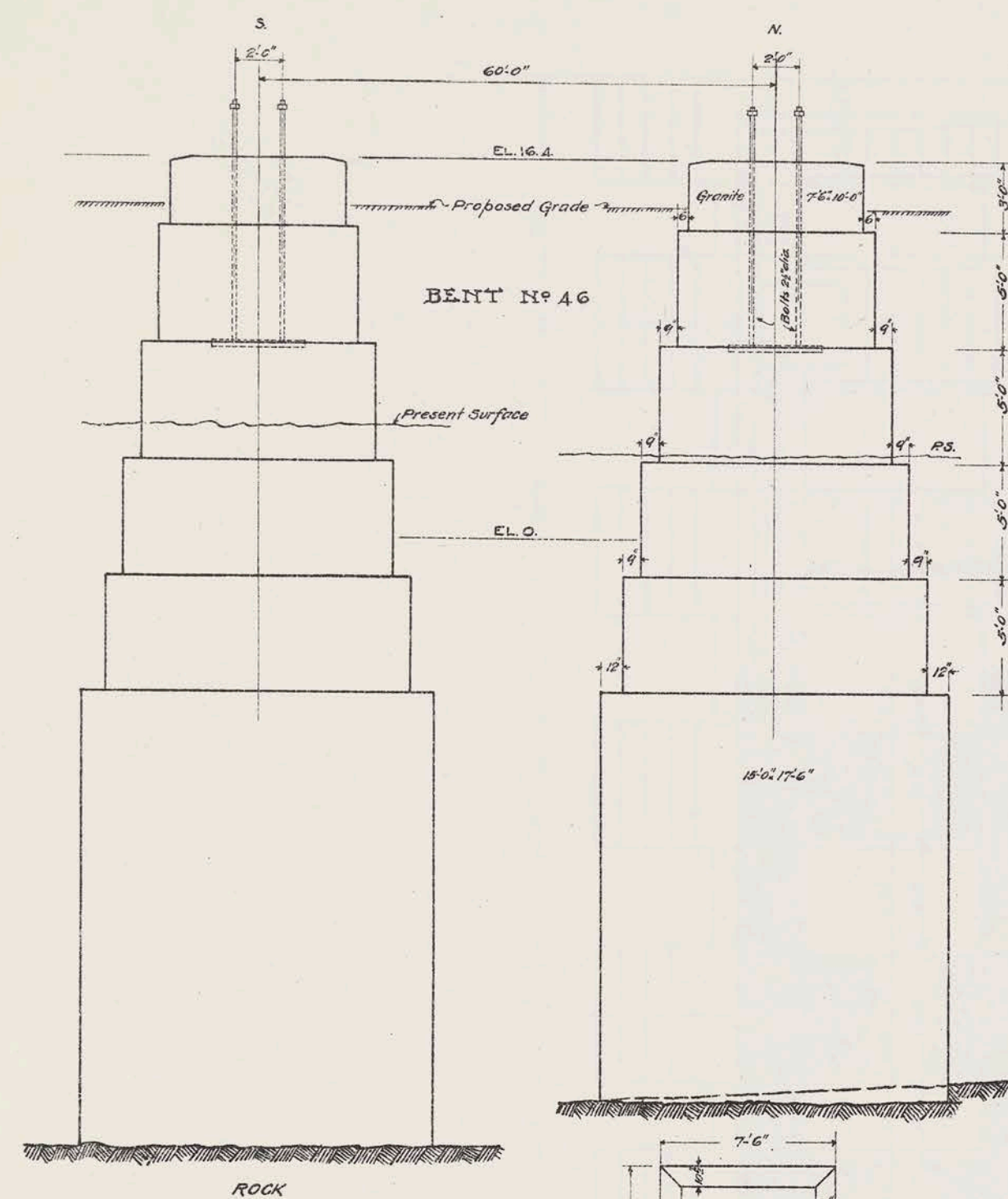
Note: Where it is not definitely stated, the lowest elevation shown is assumed to be rock.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
WASH BORINGS.
Approved Oct 16, 1906.
Commissioner.
Consulting Engineer.
SCALE 1 IN = 10 FT
4938

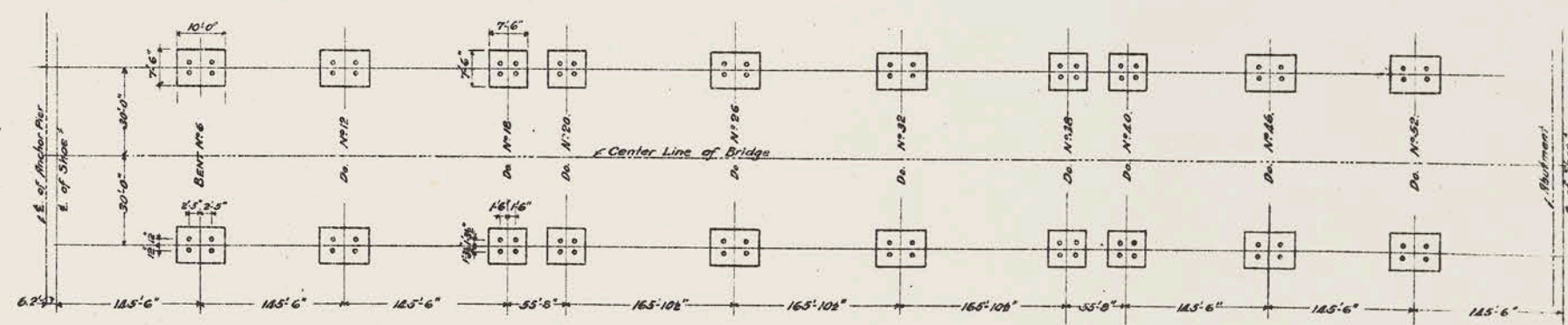
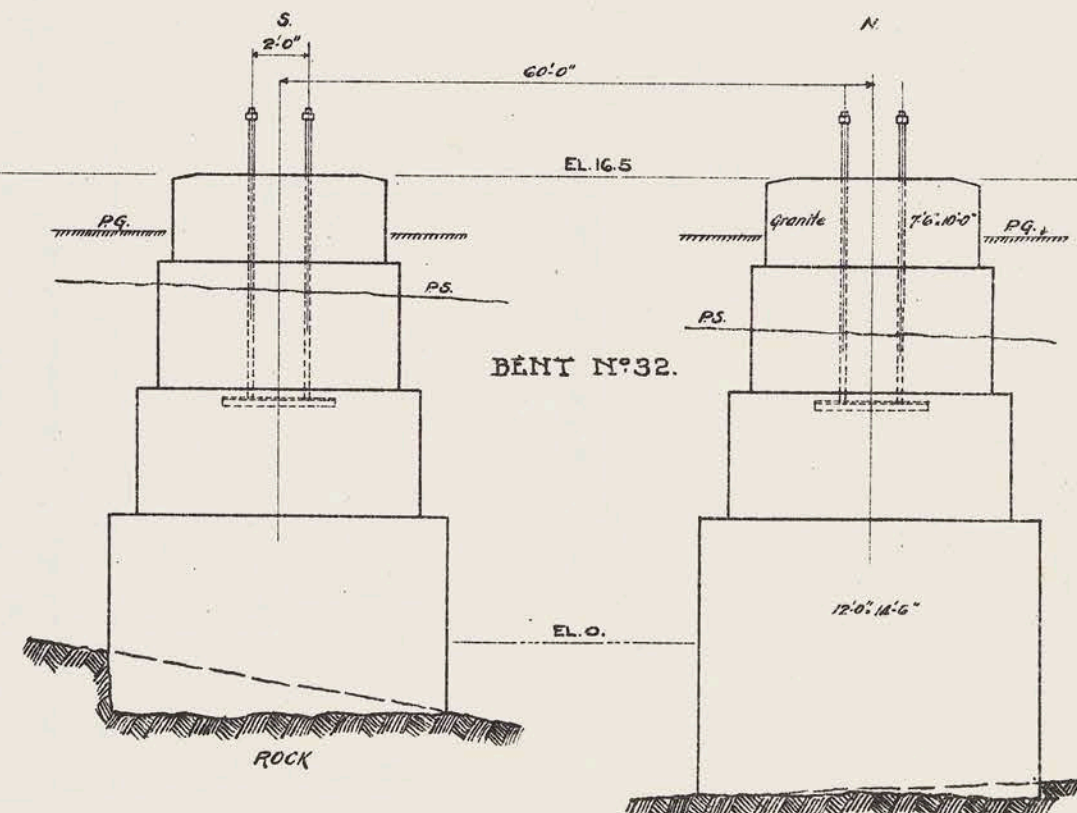
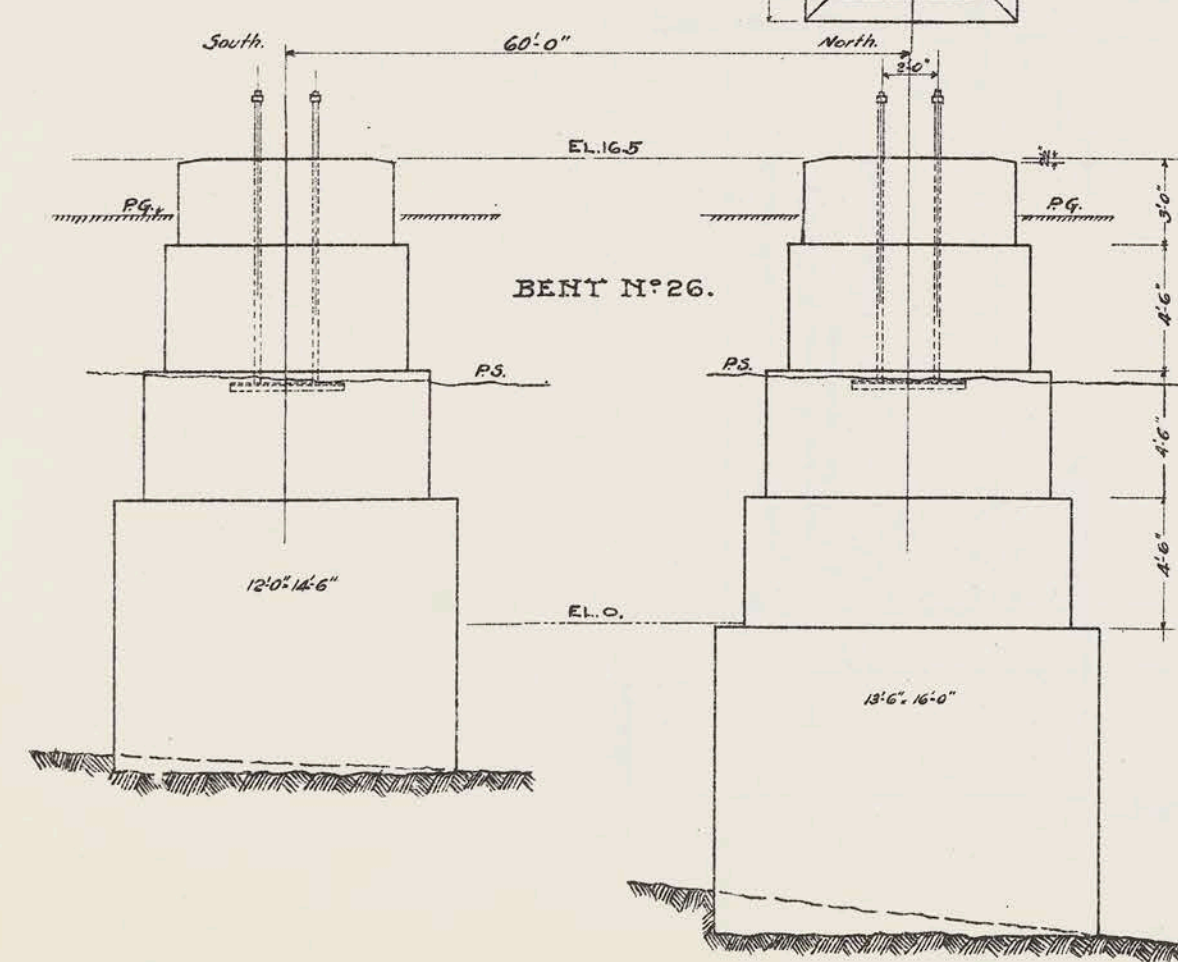


NOTES:-
 ALL TOP COURSES TO BE GRANITE AS NOTED.
 OTHER COURSES TO BE OF CONCRETE
 THE TWO (2) UPPER COURSES TO BE MADE OF NO. 2 CONCRETE
 AND THE REMAINING LOWER COURSES TO BE NO. 1 CONCRETE.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES.
 BLACKWELL'S ISLAND BRIDGE.
 QUEEN'S APPROACH.
 COLUMN FOUNDATIONS-I.
 SCALE 1/8" IN. = 1 FT.
 Approved, Oct. 16, 1906.
[Signature] Commissioner.
[Signature] Consulting Engineer.

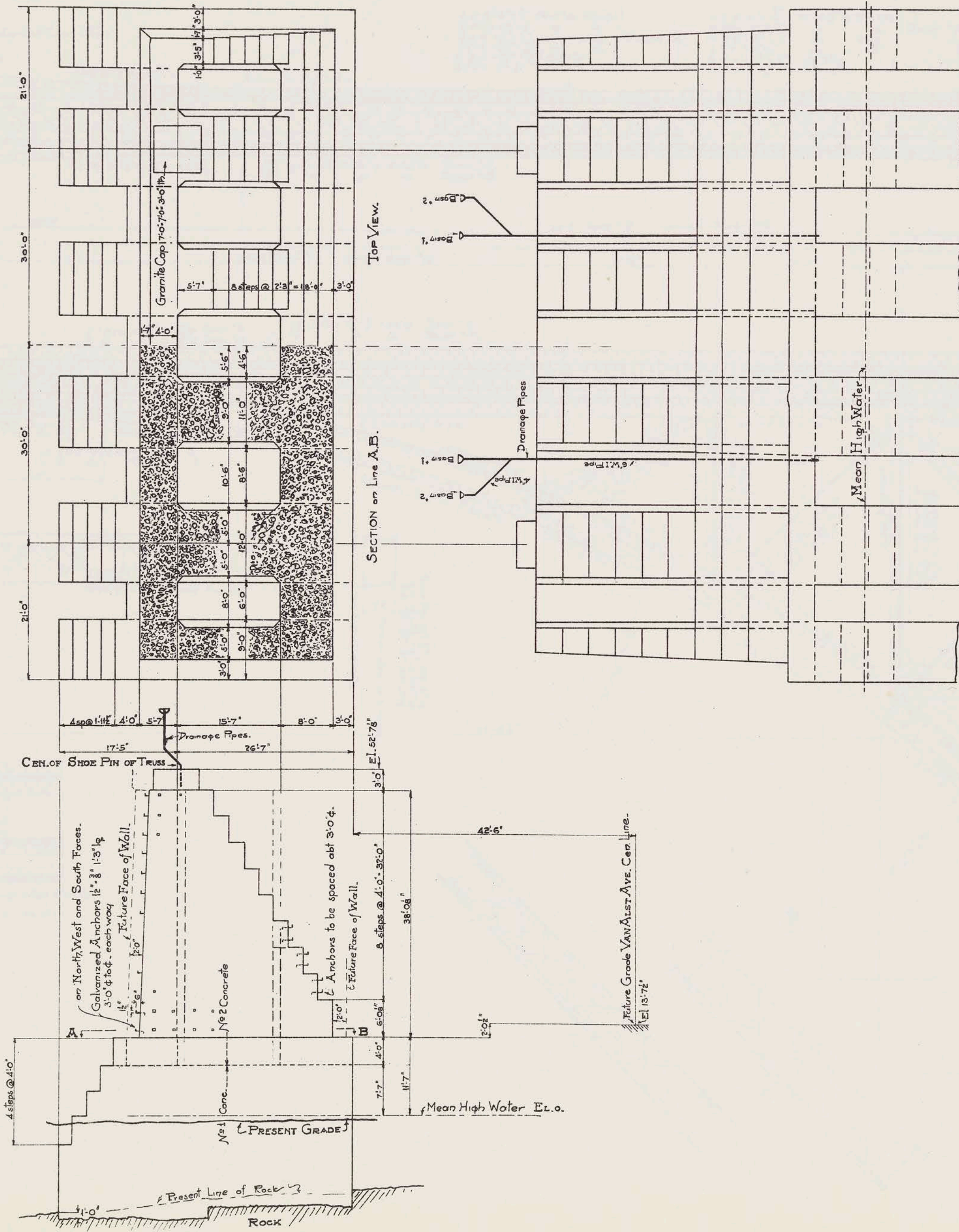


NOTES:— SAME AS SHEET 4939.

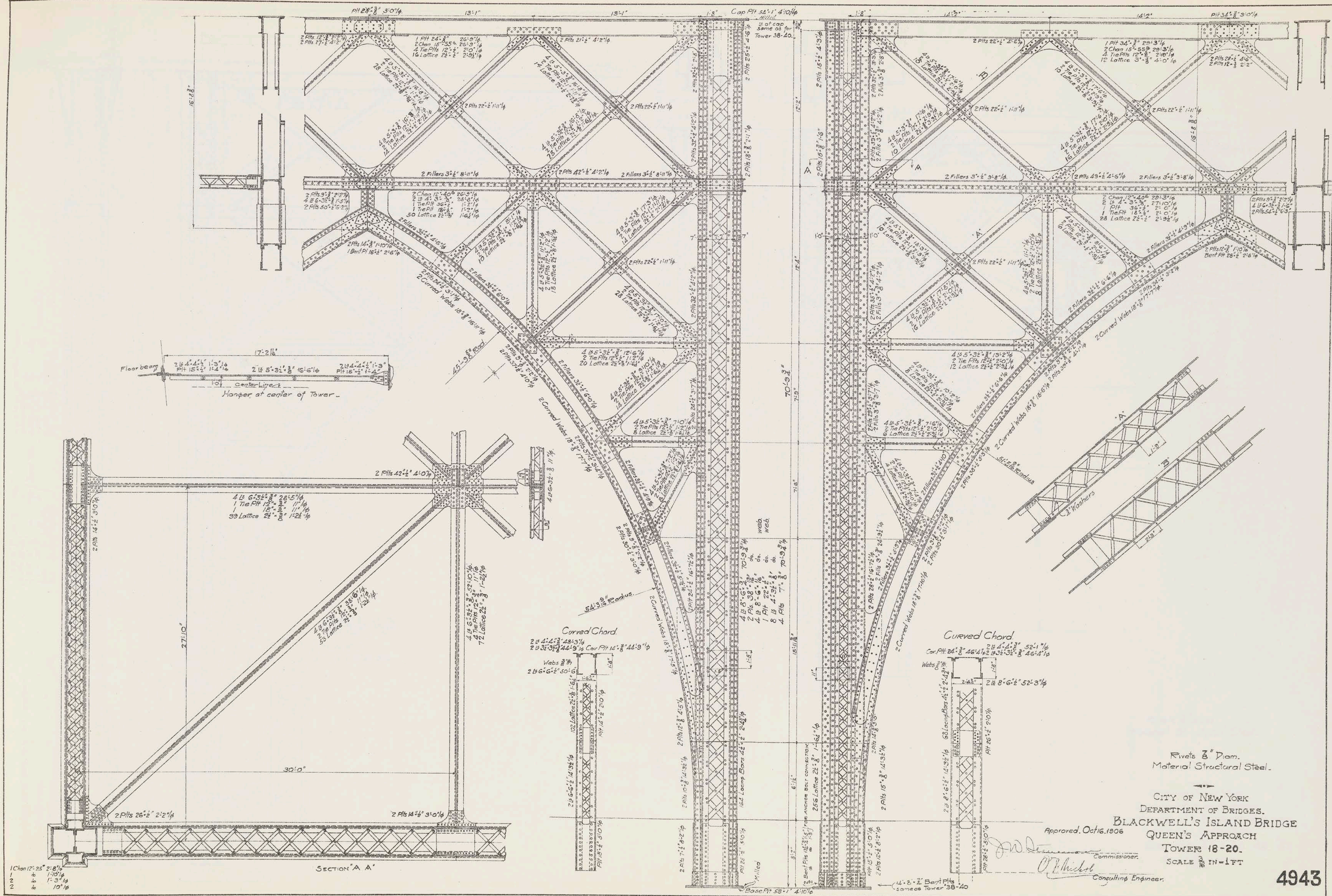


ANCHOR PLAN OF QUEEN'S APPROACH.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
COLUMN FOUNDATIONS-II.
SCALE 1/8" = 1'-0"
Approved, Oct. 16, 1906.
Commissioner
Consulting Engineer



CITY OF NEW YORK
 DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
 QUEEN'S APPROACH
 VAN ALST AVE. ABUTMENT
 Approved, Oct. 16, 1906.
 Commissioner.
 Consulting Engineer.
 SCALE 1/16 IN. = 1 FT.
4941



1 Chan 12" x 25" 2' 8" 1/4
 1 1/2" 1' 10" 1/4
 2 1" 3" 1/4
 2 10" 1/4

SECTION 'A-A'

Curved Chord
 2 1/2" 4" 1/2" x 25" 2' 8" 1/4
 2 1/2" 3" 3/4" x 25" 2' 8" 1/4
 2 1/2" 6" 3/4" x 25" 2' 8" 1/4
 Webs 3" 1/4
 2 1/2" 6" 3/4" x 25" 2' 8" 1/4

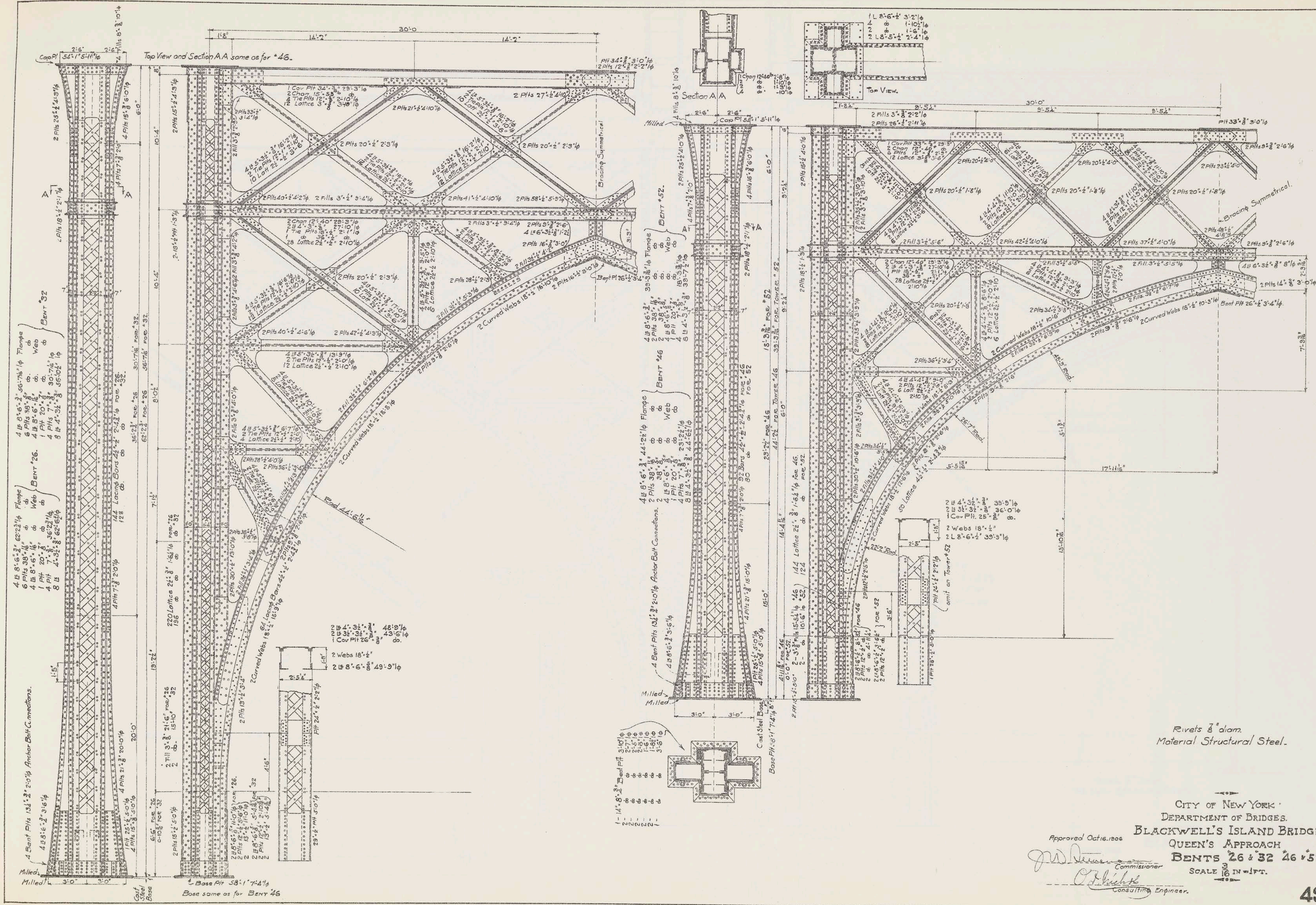
Curved Chord
 Cor. Pts 24" x 3" 46" 1/2" x 25" 2' 8" 1/4
 Webs 3" 1/4
 2 1/2" 6" 3/4" x 25" 2' 8" 1/4

Rivets 3" Diam.
 Material Structural Steel.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES.
 BLACKWELL'S ISLAND BRIDGE
 QUEEN'S APPROACH
 TOWER 18-20.
 SCALE 3/16" = 1'-0"

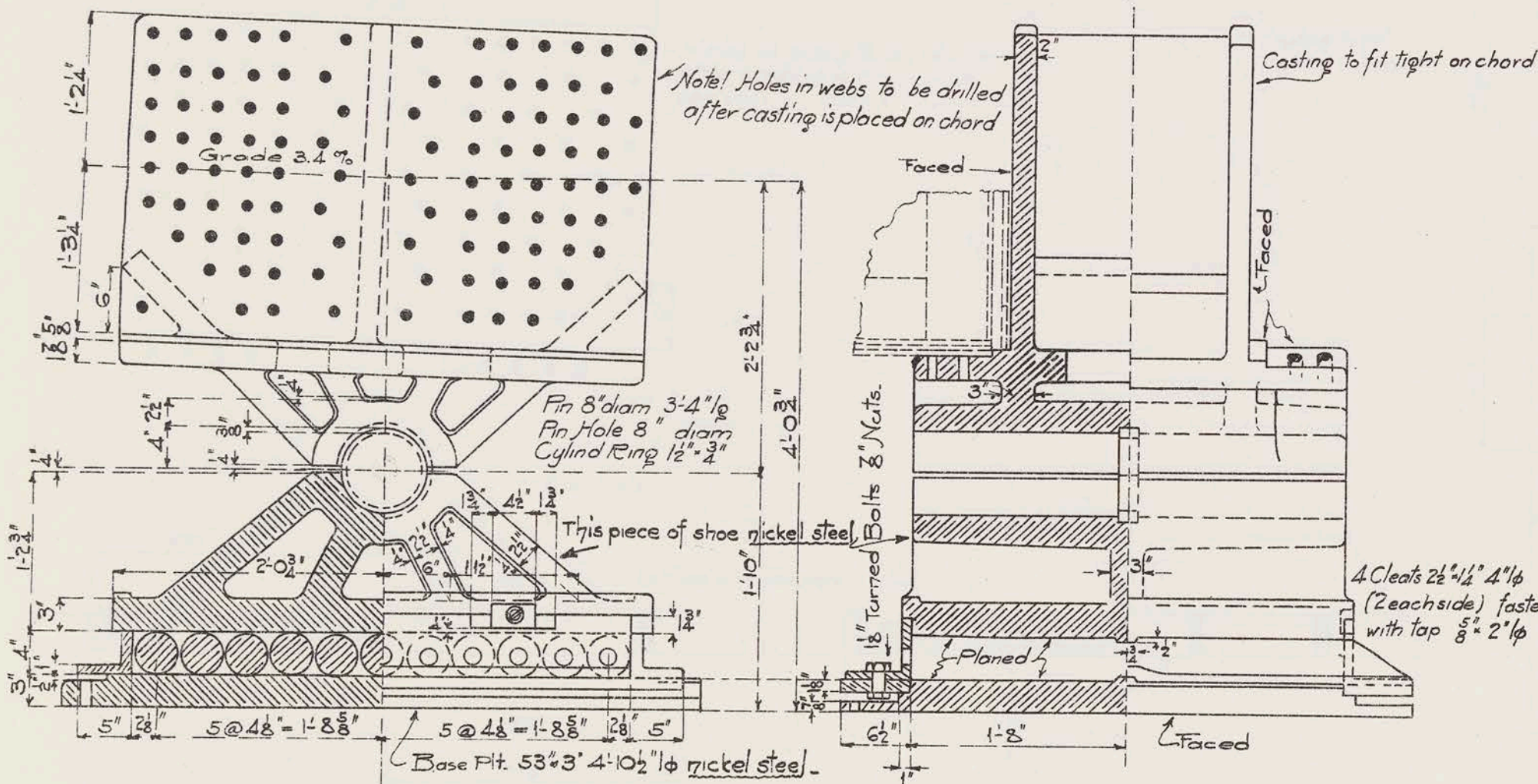
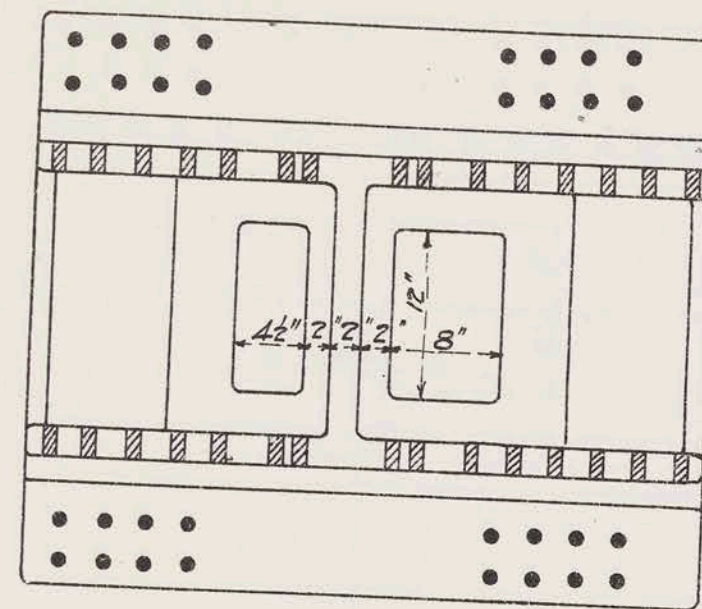
Approved, Oct. 16, 1906

Commissioner.
 Consulting Engineer.

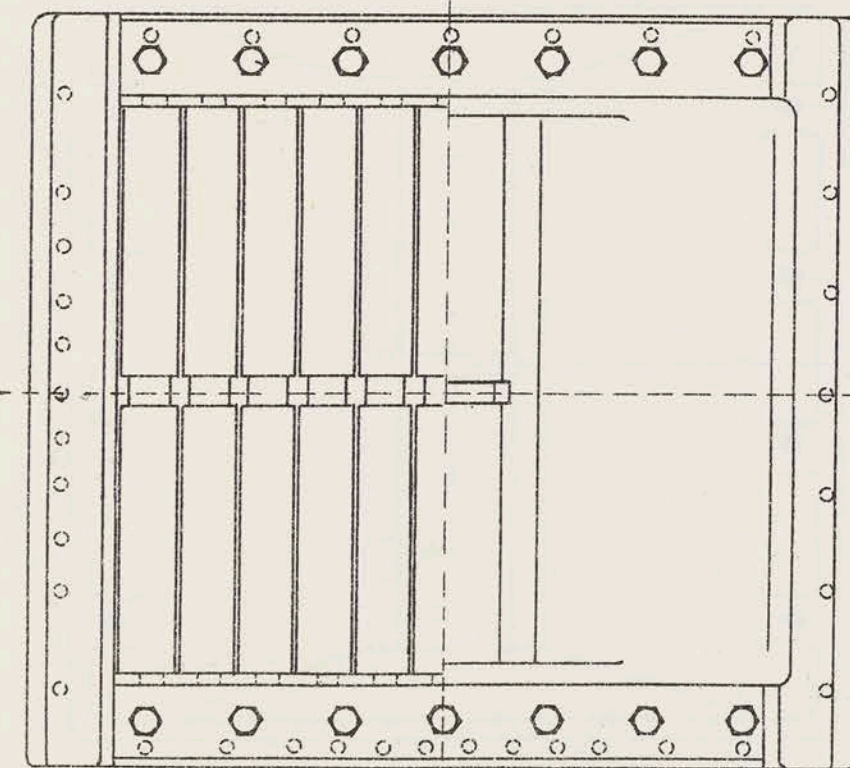
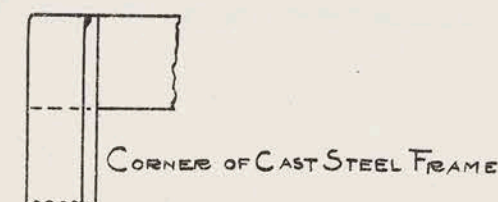


Approved Oct 18, 1906

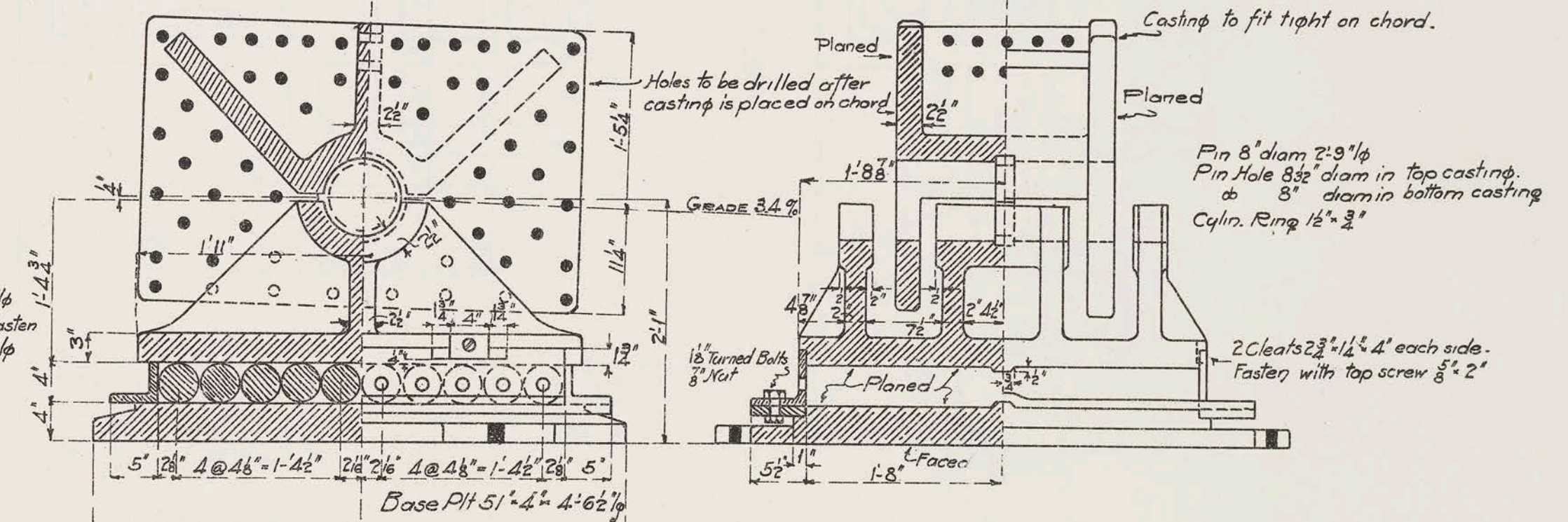
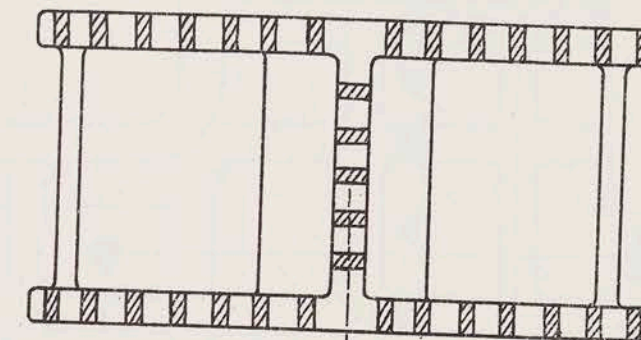
[Signature]
 Commissioner
[Signature]
 Consulting Engineer.



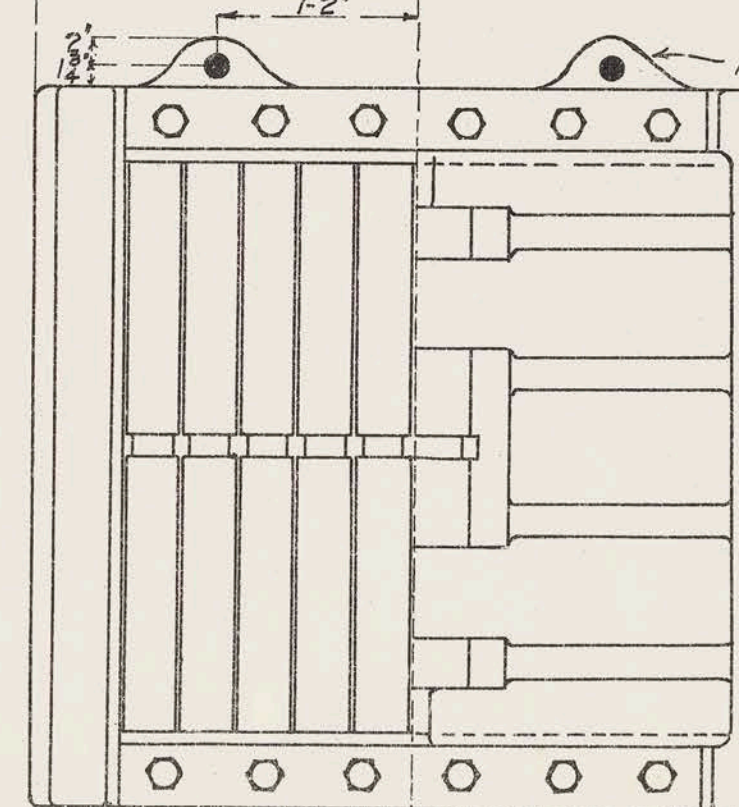
MAKE 4 SETS THUS MARK *3
for panels *20 & *20.



11 Nickel Steel Rollers 4" diam 3-4" face 3-5 3/8" l/p
Cast Steel Frame 4-5" x 4-7 1/2"
2 15 6" x 5 3/8" x 3-9 1/2" l/p



MAKE 2 SETS THUS MARK *4
for panel *0

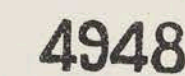


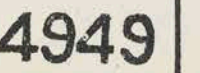
10 Rollers 4" diam. 3-4" face 3-5 3/8" l/p, Cast Steel Frame 4-5 3/8" x 4-3"
2 15 5 1/2" x 5 3/8" x 3-5 3/8" l/p

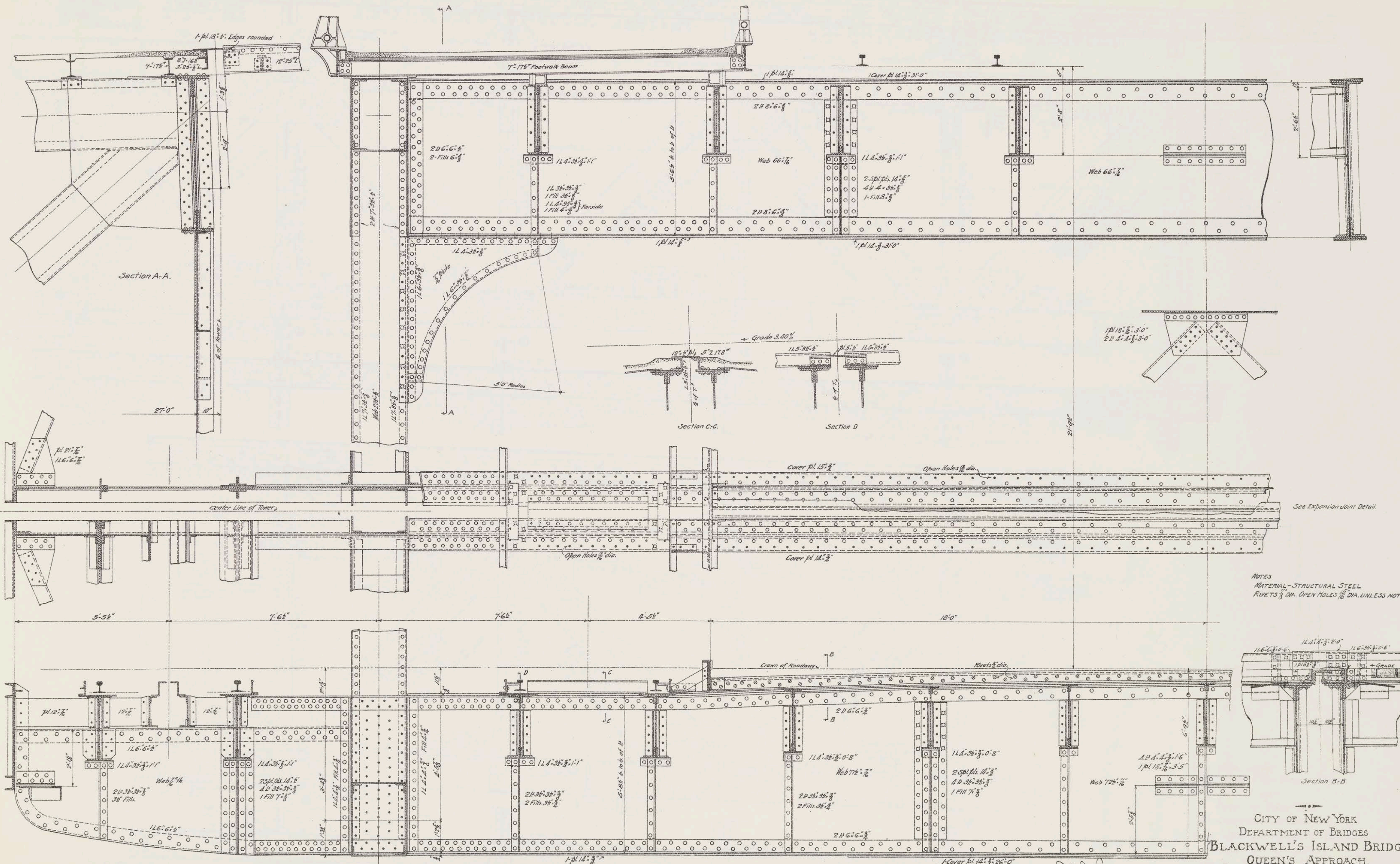
Hole for 1 1/2" Anchor Bolt 1-3" l/p
Holes to be spot faced.

1 1/8" Holes for Truss Connections -
Other Holes 1 1/8" except where noted.
Pins Rings Angles and Cleats, rolled structural steel
Use nickel steel for castings only where noted.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE.
QUEEN'S APPROACH;
CAST STEEL SHOES *3 & *4
Approved, Oct 16, 1906.
Commissioner
Consulting Engineer
SCALE 1/4" = 1 FT.



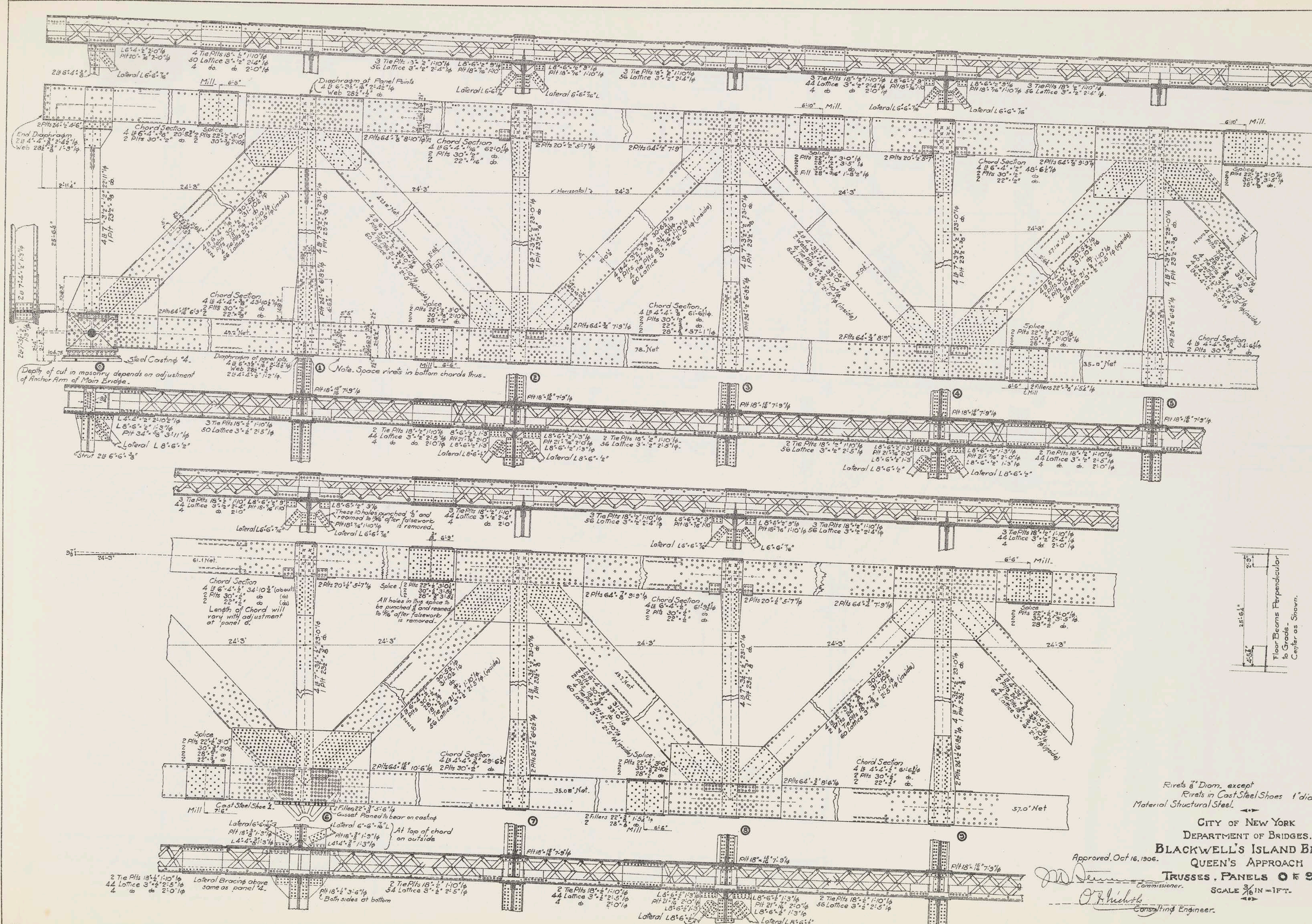




NOTES
 MATERIAL-STRUCTURAL STEEL
 RIVETS 3/4\"/>

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 QUEEN'S APPROACH.
 CROSS SECTION OF CANTILEVER END.
 SCALE 3/8\"/>

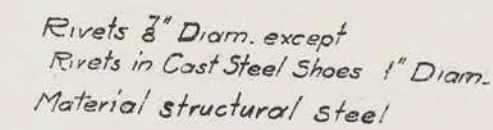
Approved, Oct. 16, 1906.
 Commissioner.
 Consulting Engineer.



Rivets 3/4" diam. except
Rivets in Cast Steel Shoes 1" diam.
Material Structural Steel.

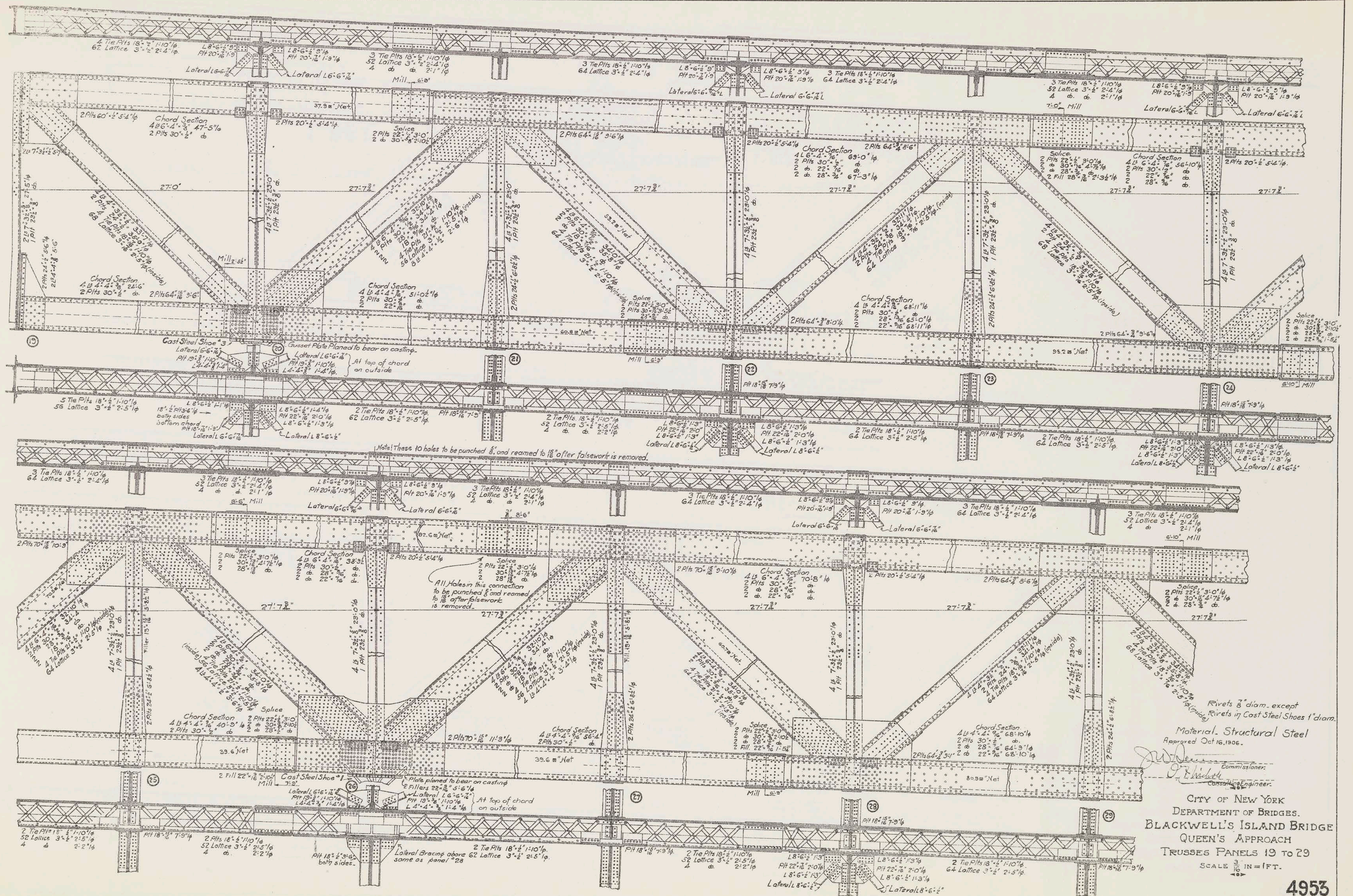
CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
TRUSSES, PANELS 0 & 9.
Approved, Oct 16, 1906.
Commissioner.
Consulting Engineer.

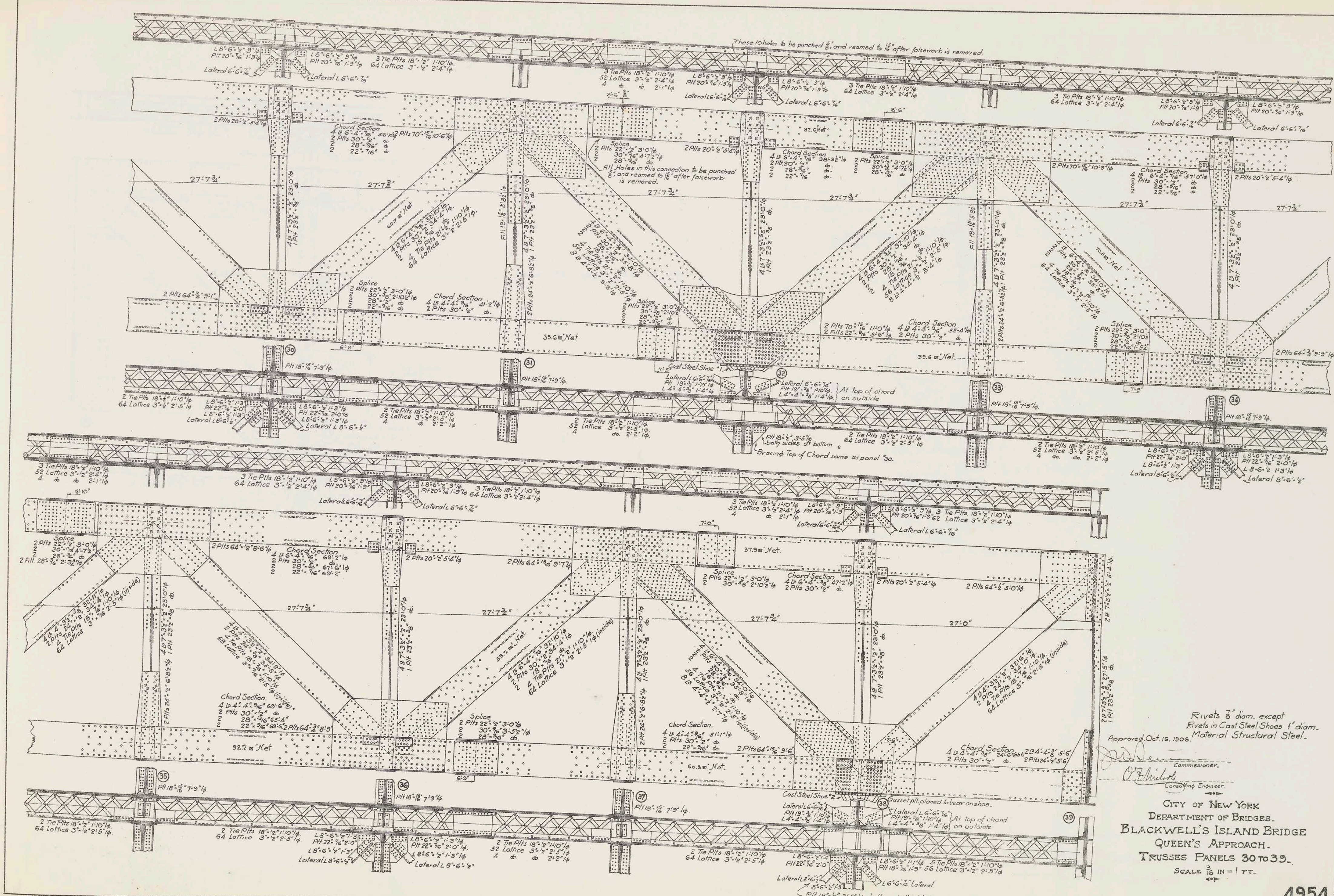
SCALE 3/16" = 1'-0".



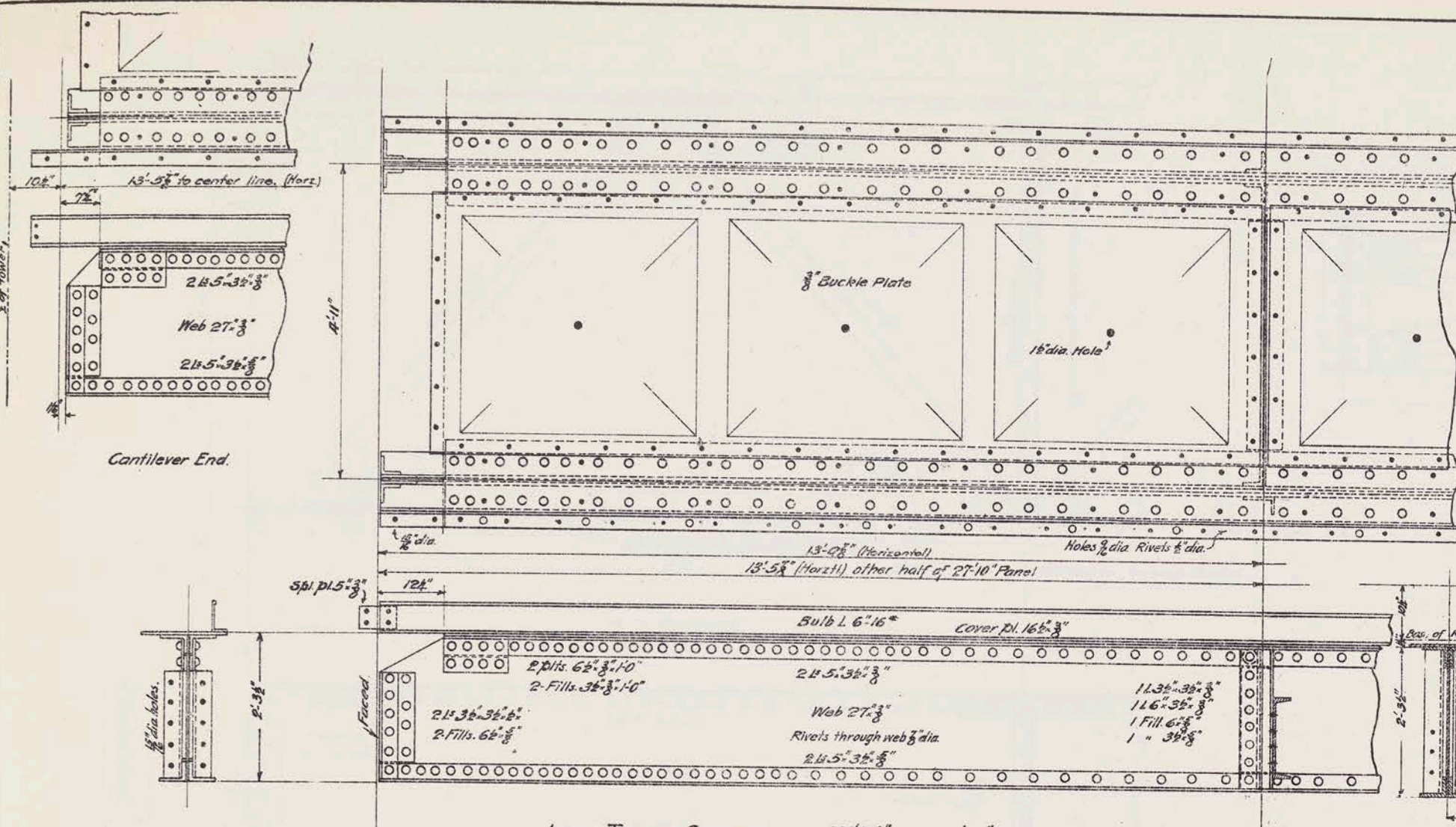
Approved. Oct. 16. 1906. ^b

Commissioner
Nichols
Consulting Engineer.

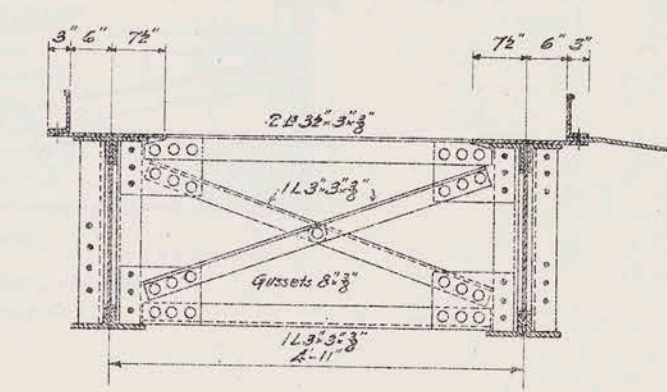




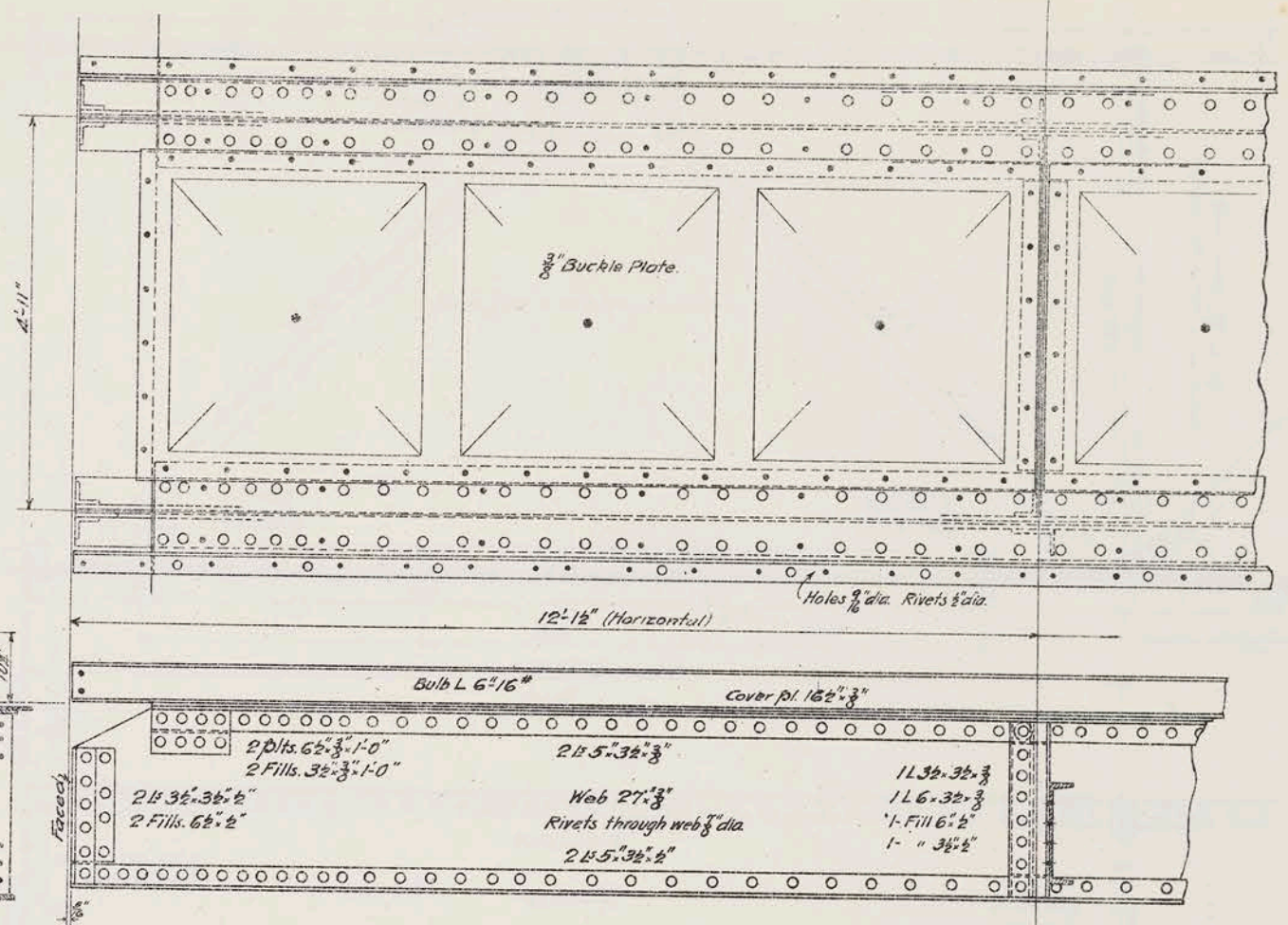
4955



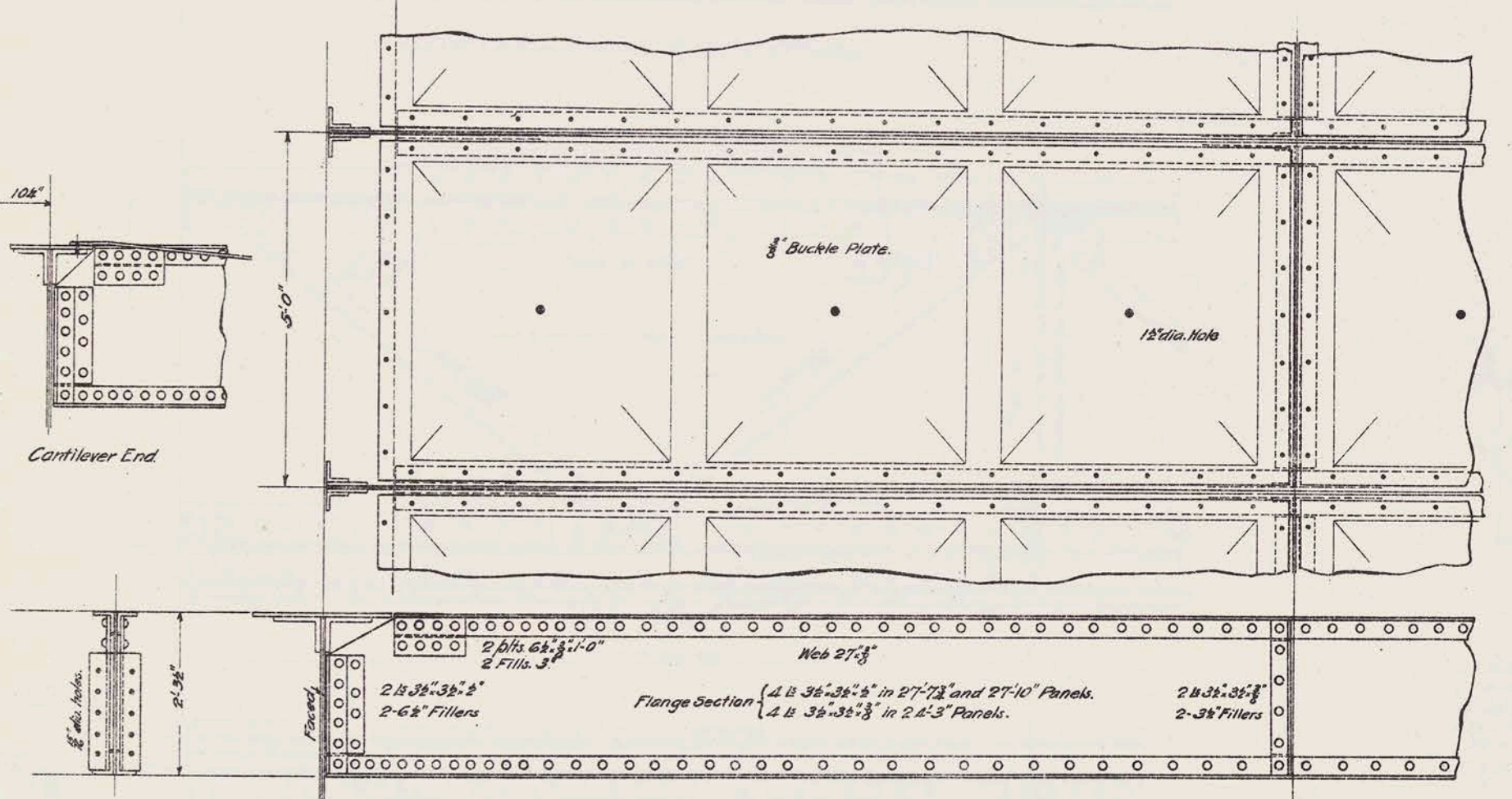
Cantilever End.



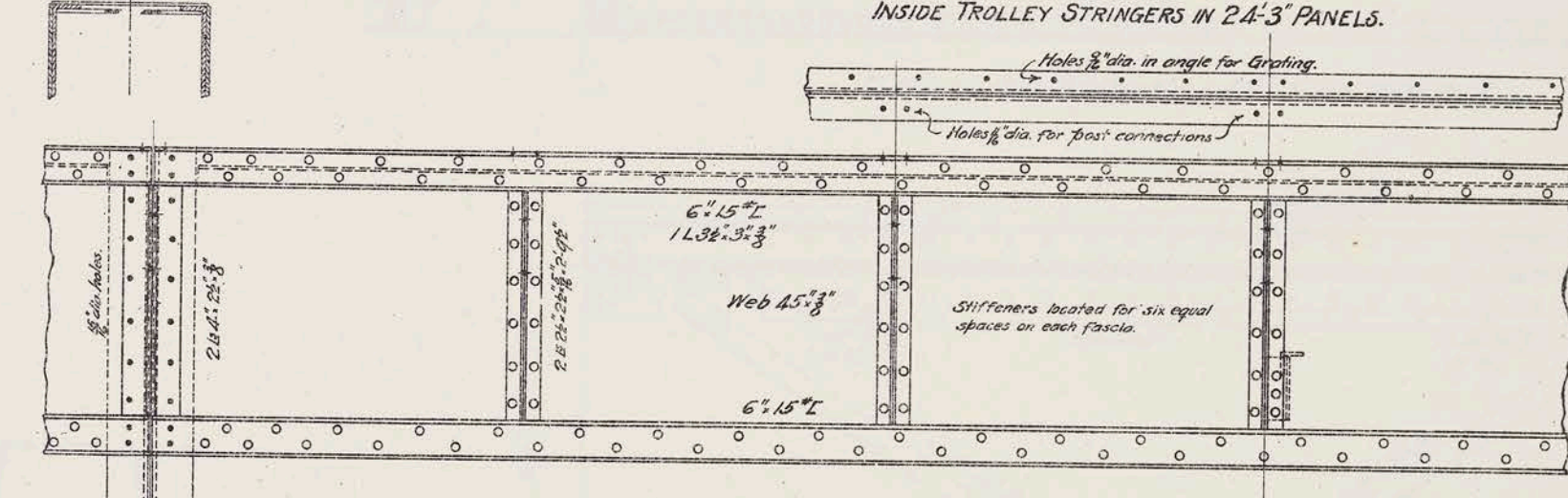
SECTION BETWEEN OUTSIDE AND INSIDE TROLLEY STRINGERS.



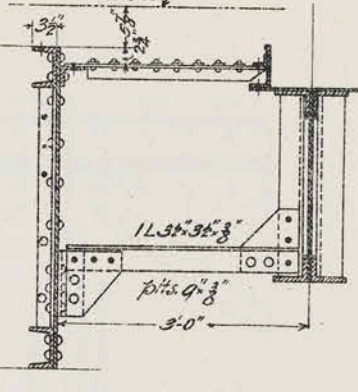
INSIDE TROLLEY STRINGERS IN 24.3 PANELS.



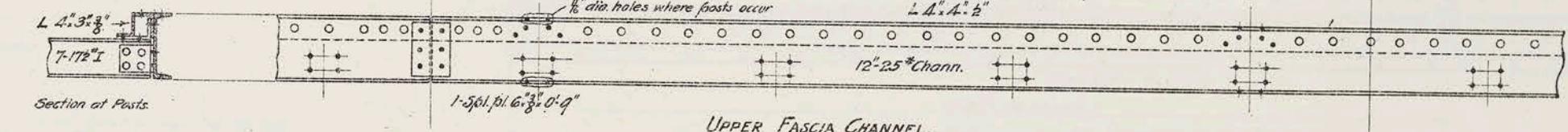
INSIDE TROLLEY STRINGERS IN 27.7 AND 27.10 PANELS.



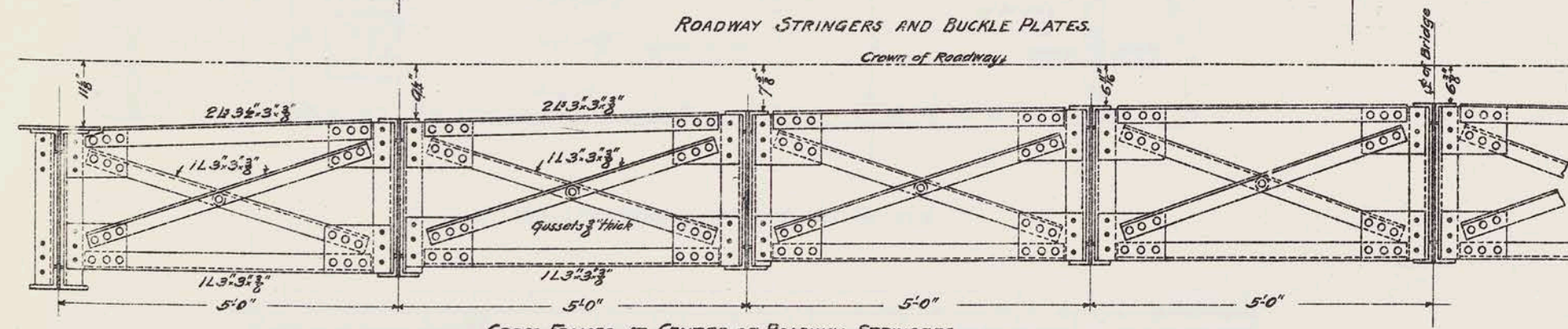
LOWER FASCIA STRINGER.



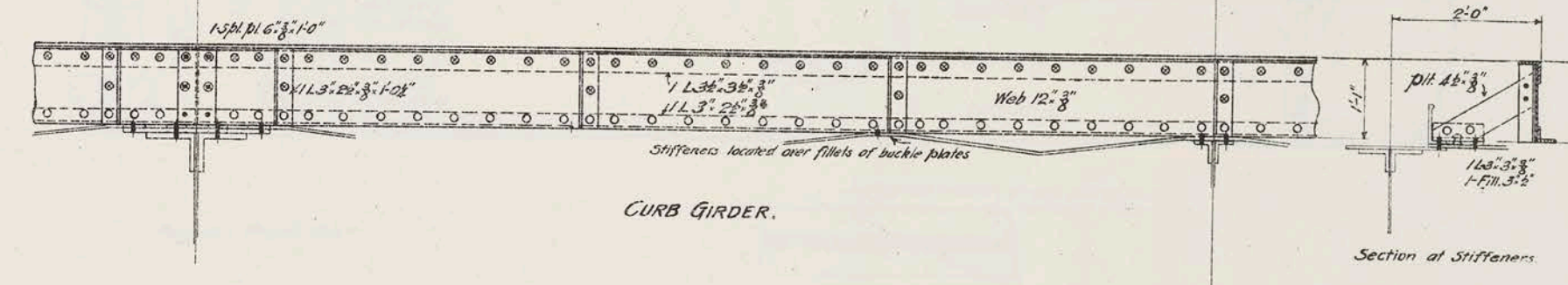
Section at Center.



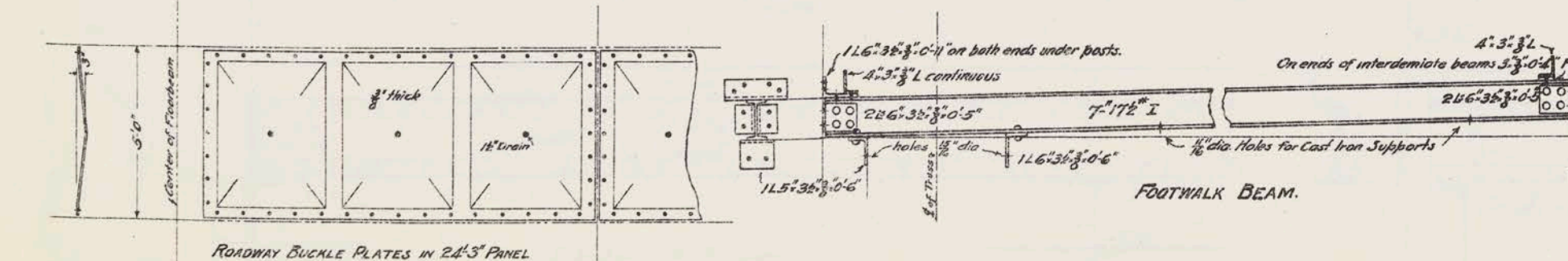
UPPER FASCIA CHANNEL.



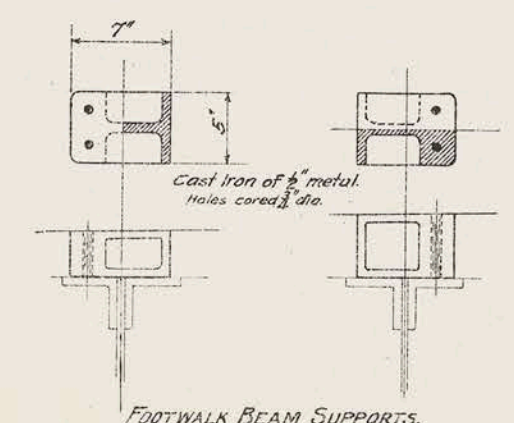
ROADWAY STRINGERS AND BUCKLE PLATES.



CURB GIRDER.



ROADWAY BUCKLE PLATES IN 24.5 PANEL

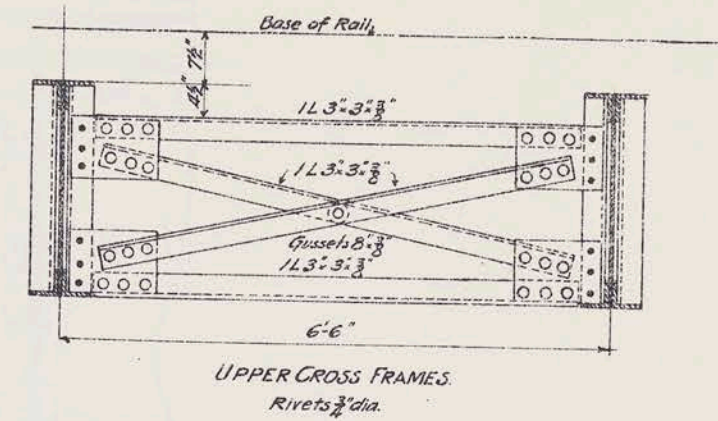


FOOTWALK BEAM SUPPORTS.

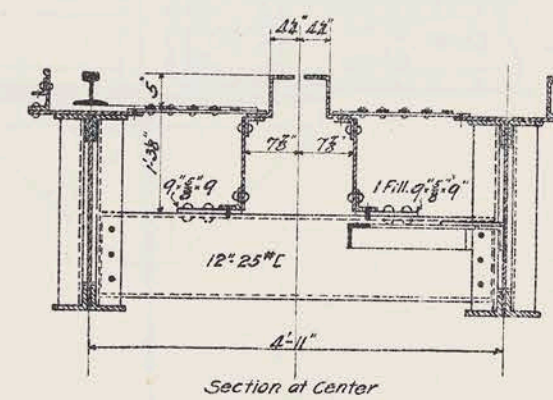
NOTES—
ALL MATERIAL STRUCTURAL STEEL EXCEPT AS NOTED.
RIVETS 3/4" DIA. OPEN HOLES 1/2" DIA. EXCEPT AS NOTED.

Approved Oct 16, 1906.
Commissioner
Consulting Engineer

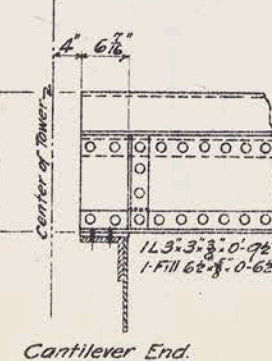
CITY OF NEW YORK.
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
STRINGERS, ETC.
SCALE 3/8 IN. = 1 FT.



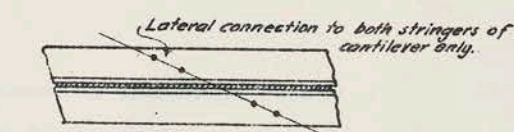
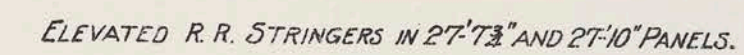
ELEVATED R. R. STRINGERS IN 24'-3" PANELS.



OUTSIDE TROLLEY STRINGERS IN 24'-3" PANELS.



CONDUCTOR STRINGER
Rivets $\frac{3}{4}$ " dia.



OUTSIDE TROLLEY STRINGERS IN 27'-7 $\frac{1}{2}$ " AND 27'-10" PANELS.

NOTES
MATERIAL-STRUCTURAL STEEL.
RIVETS $\frac{7}{8}$ " DIA. OPEN HOLES $\frac{15}{16}$ " DIA. EXCEPT AS NOTED.

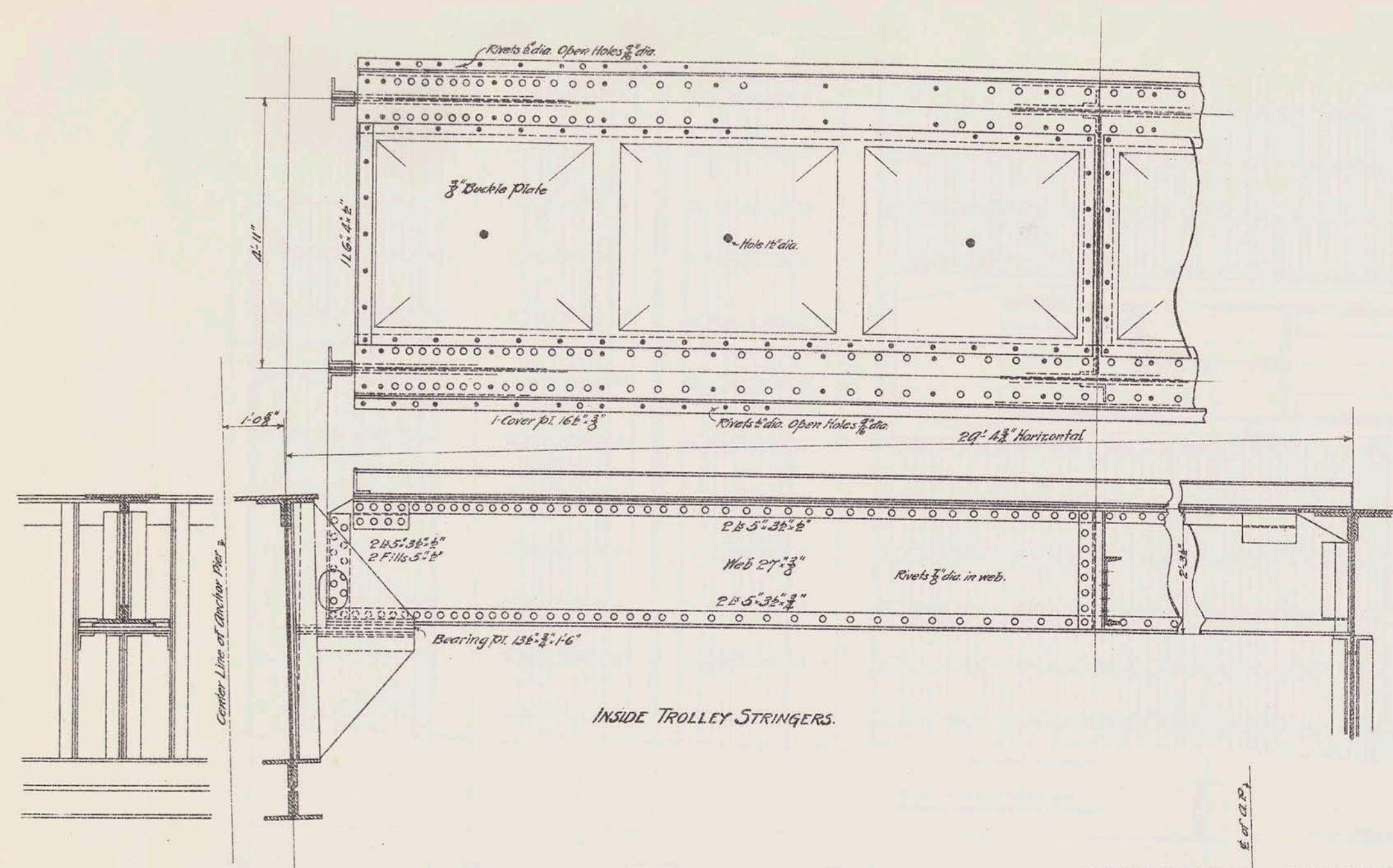
Approved Oct. 16, 1906.

W. B. Jones
Commissioner

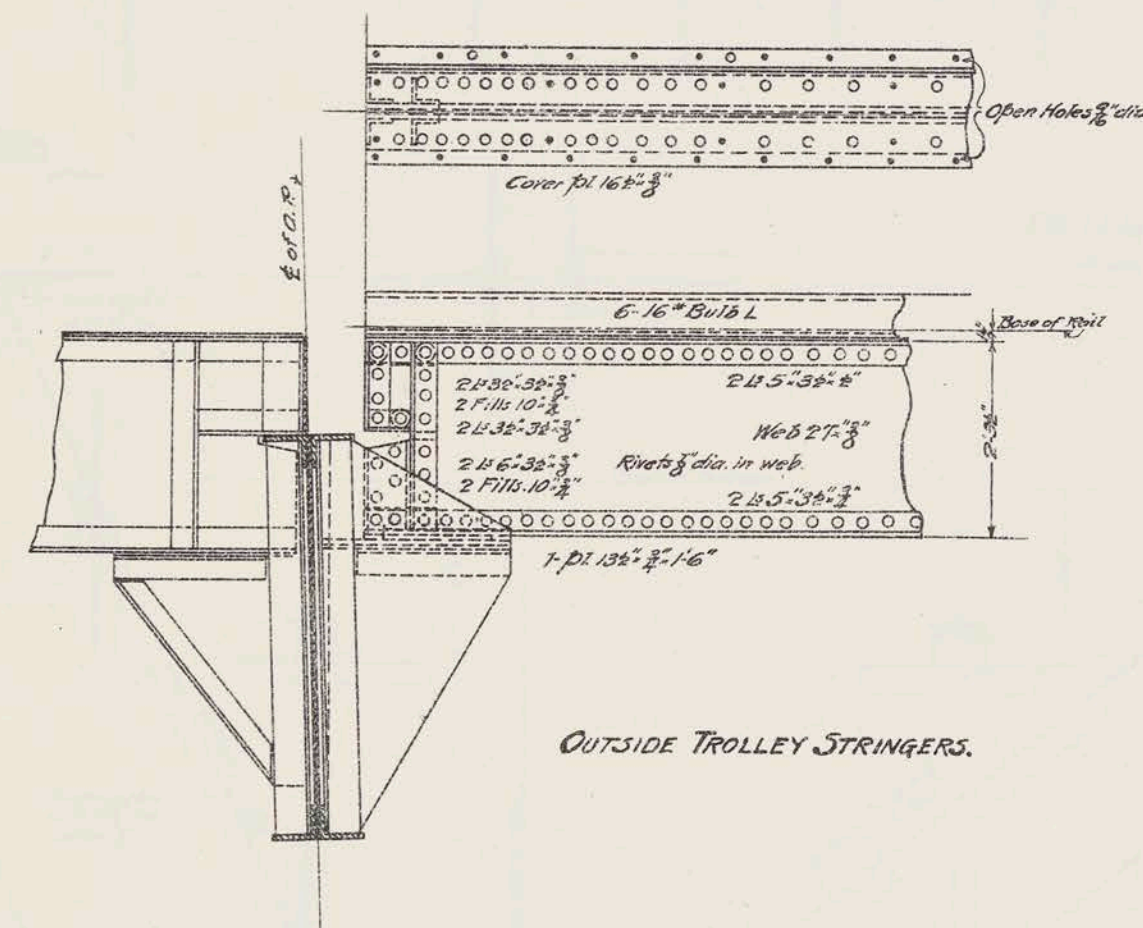
O. F. Nichols
Consulting Engineer

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
STRINGERS, ETC.
SCALE $\frac{3}{8}$ IN. = 1 FT.

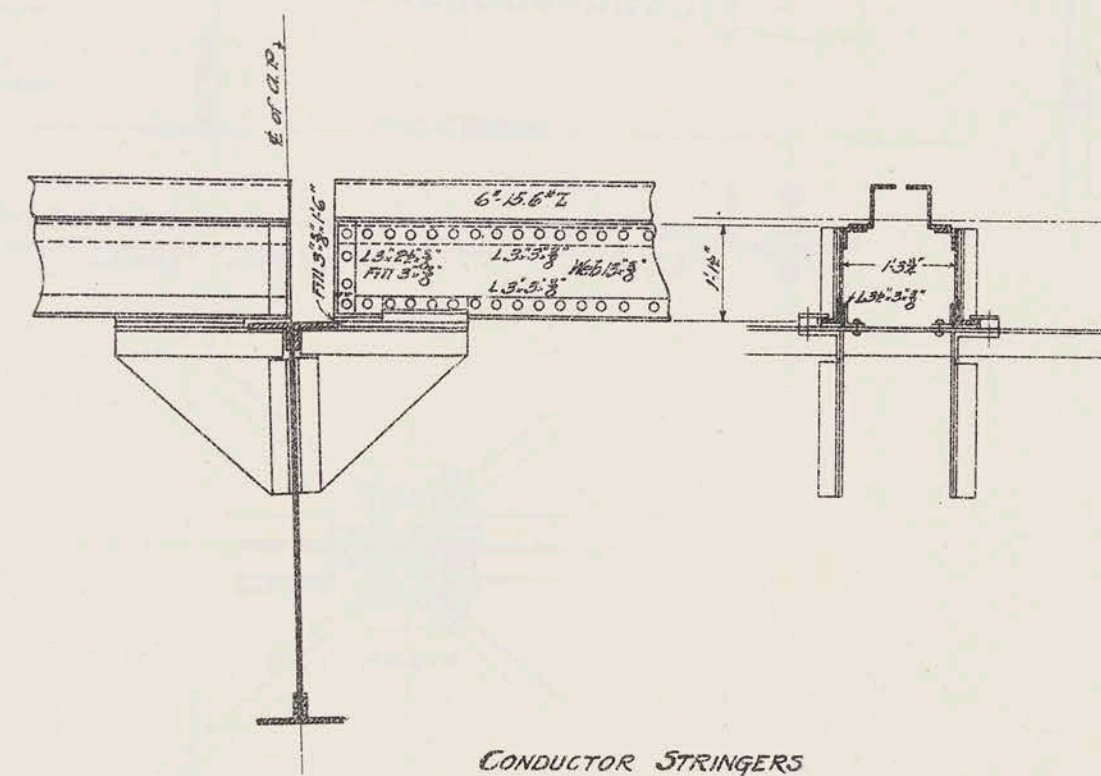
4957



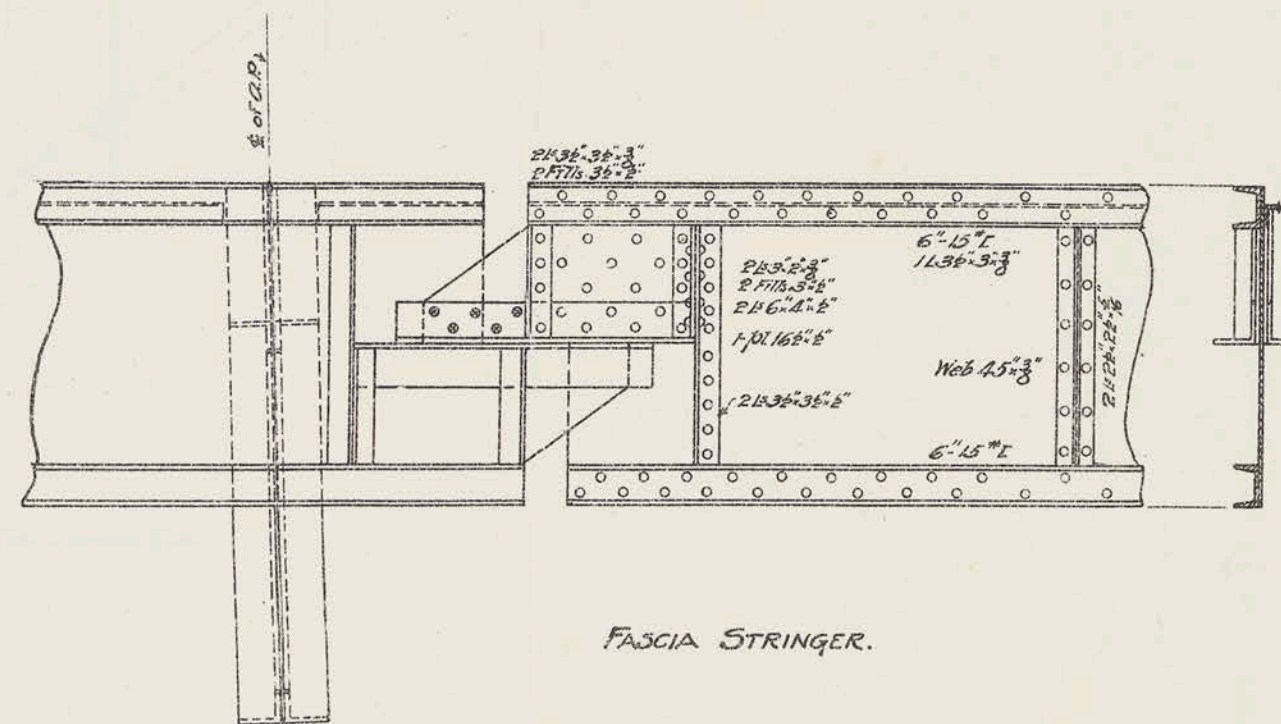
INSIDE TROLLEY STRINGERS.



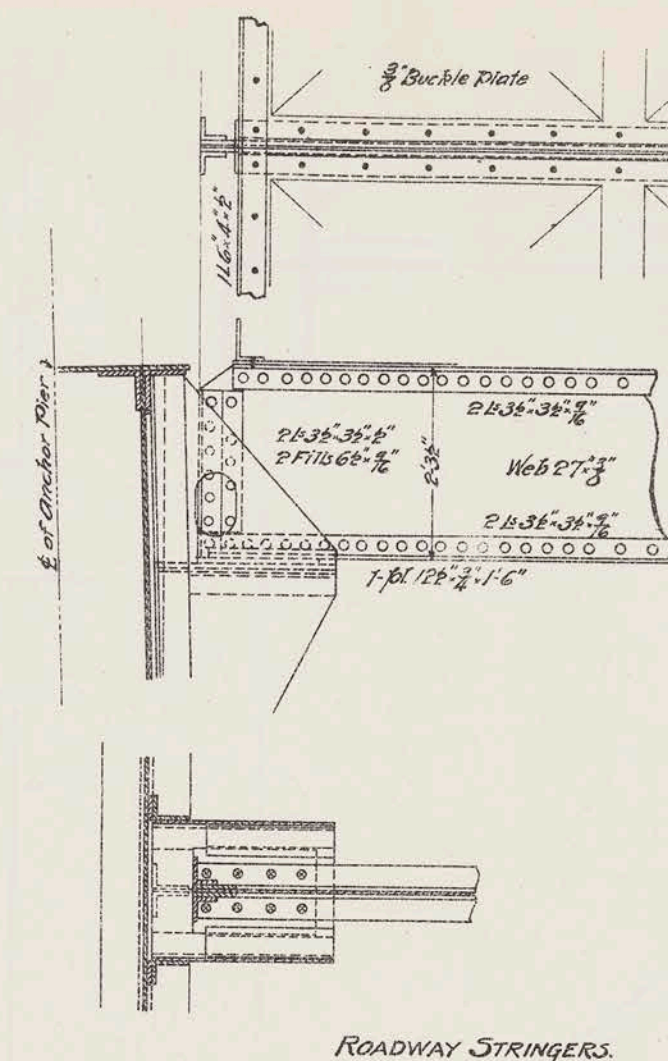
OUTSIDE TROLLEY STRINGERS.



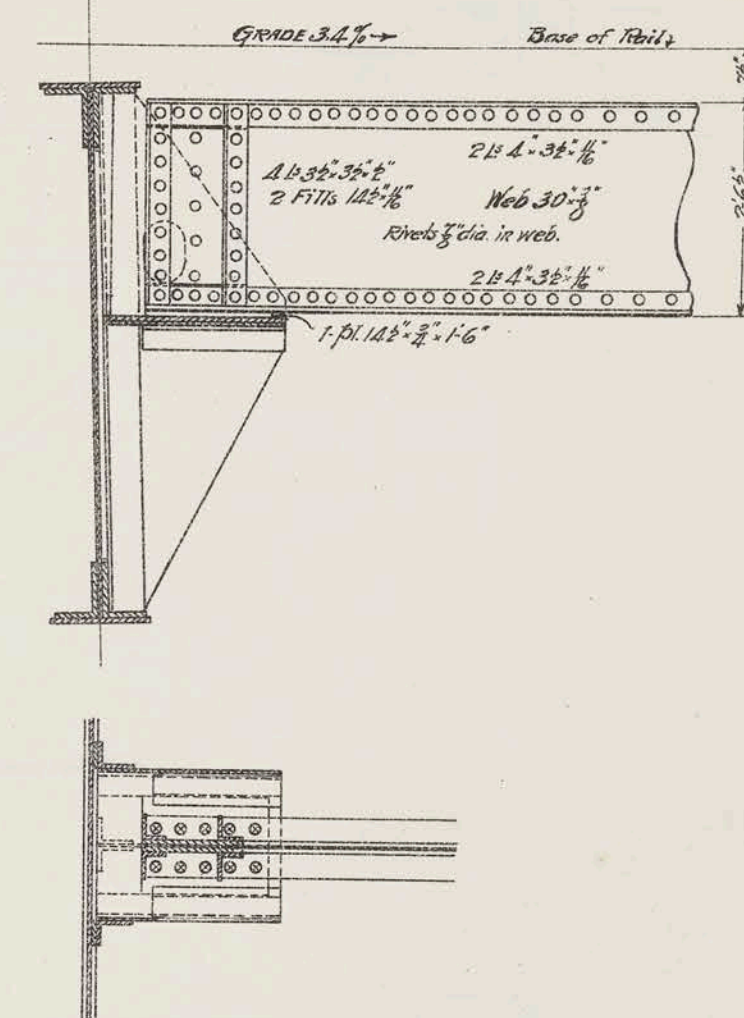
CONDUCTOR STRINGERS



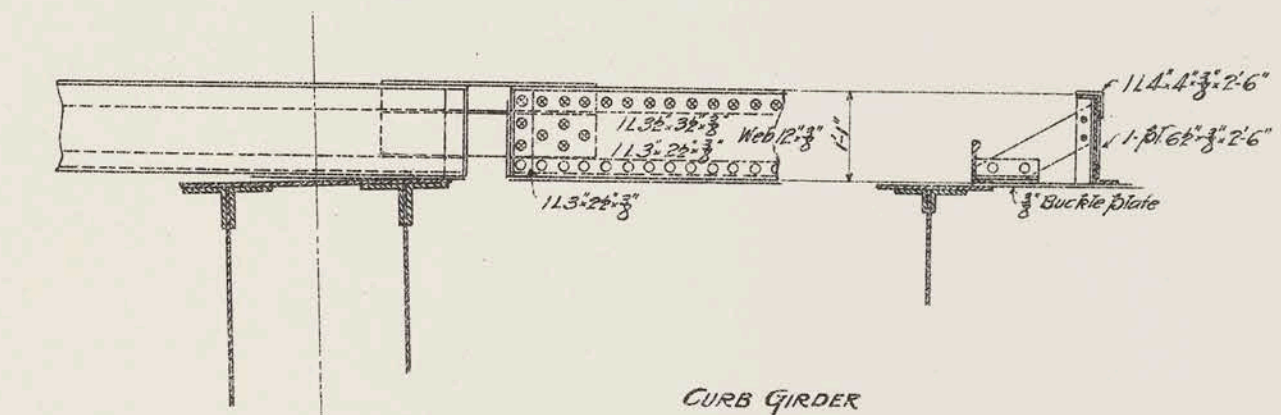
FASCIA STRINGER.



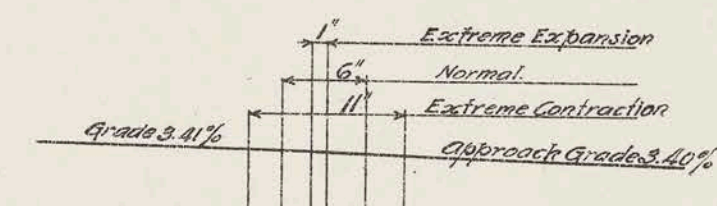
ROADWAY STRINGERS.



ELEVATED R.R. STRINGERS.



CURB GIRDER

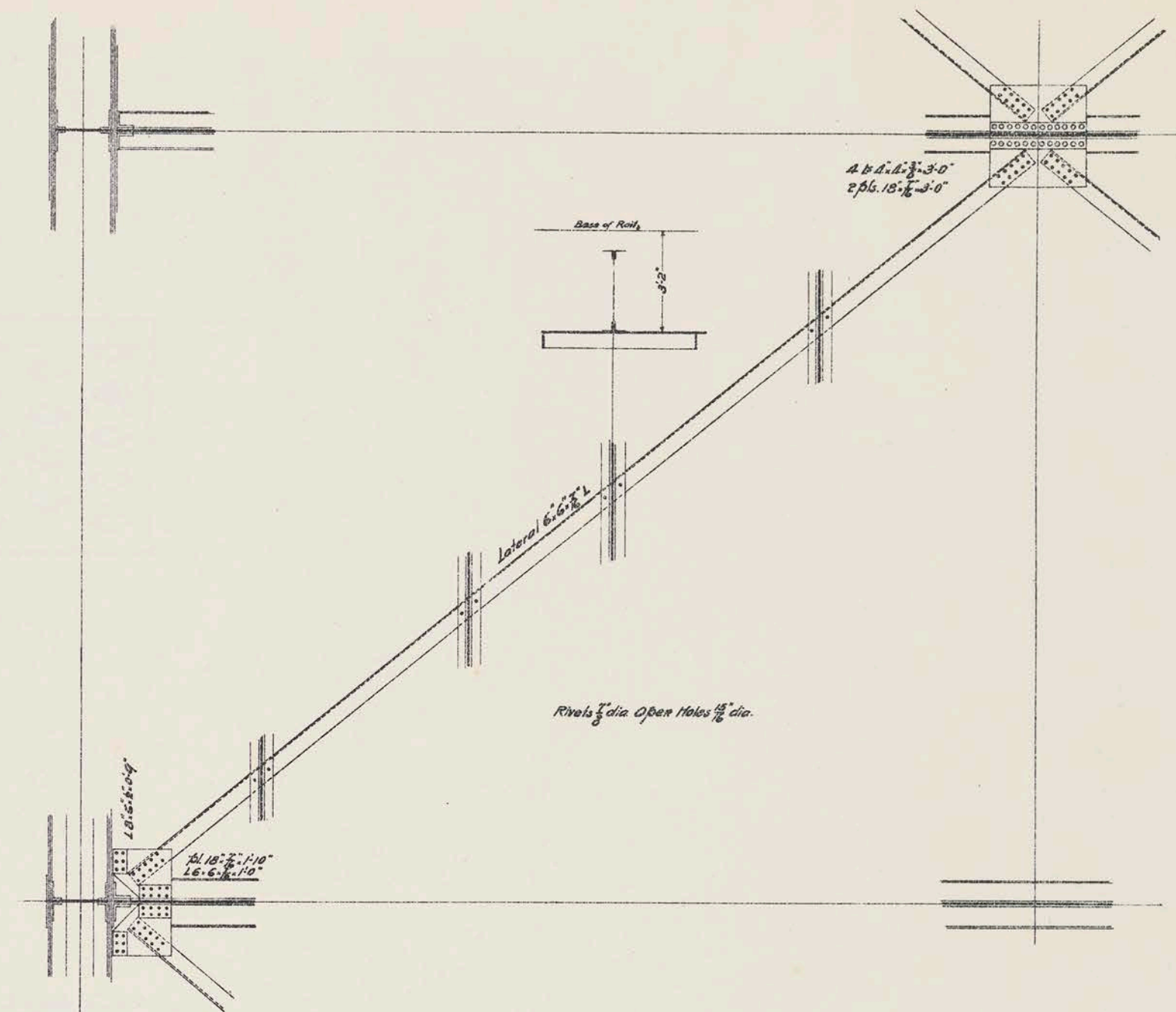
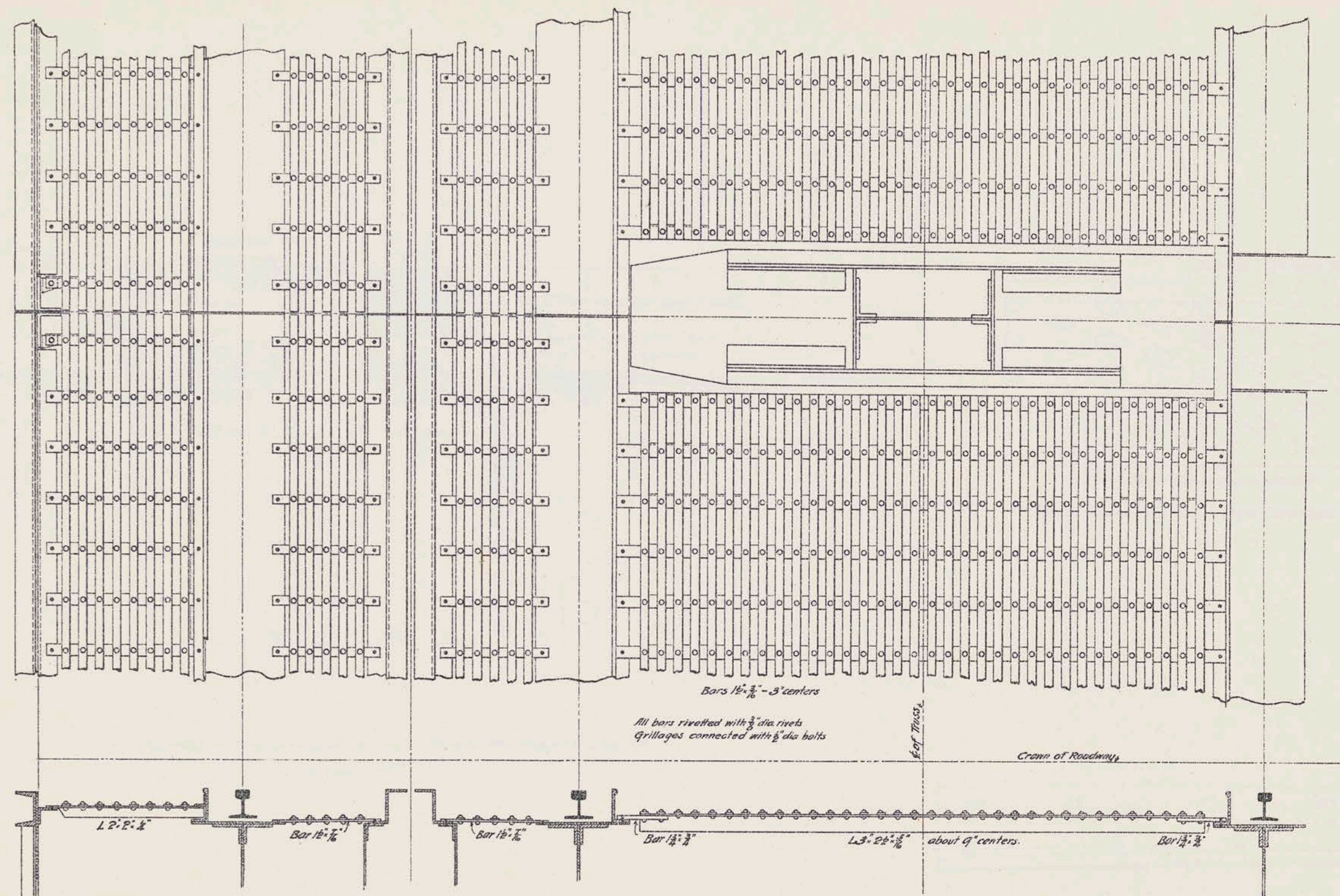


Clearances to be observed for Expansion Joint at Queens Anchor Pier. Details shown at Normal temperature. All dimensions and details to be verified by measurements at the bridge site.

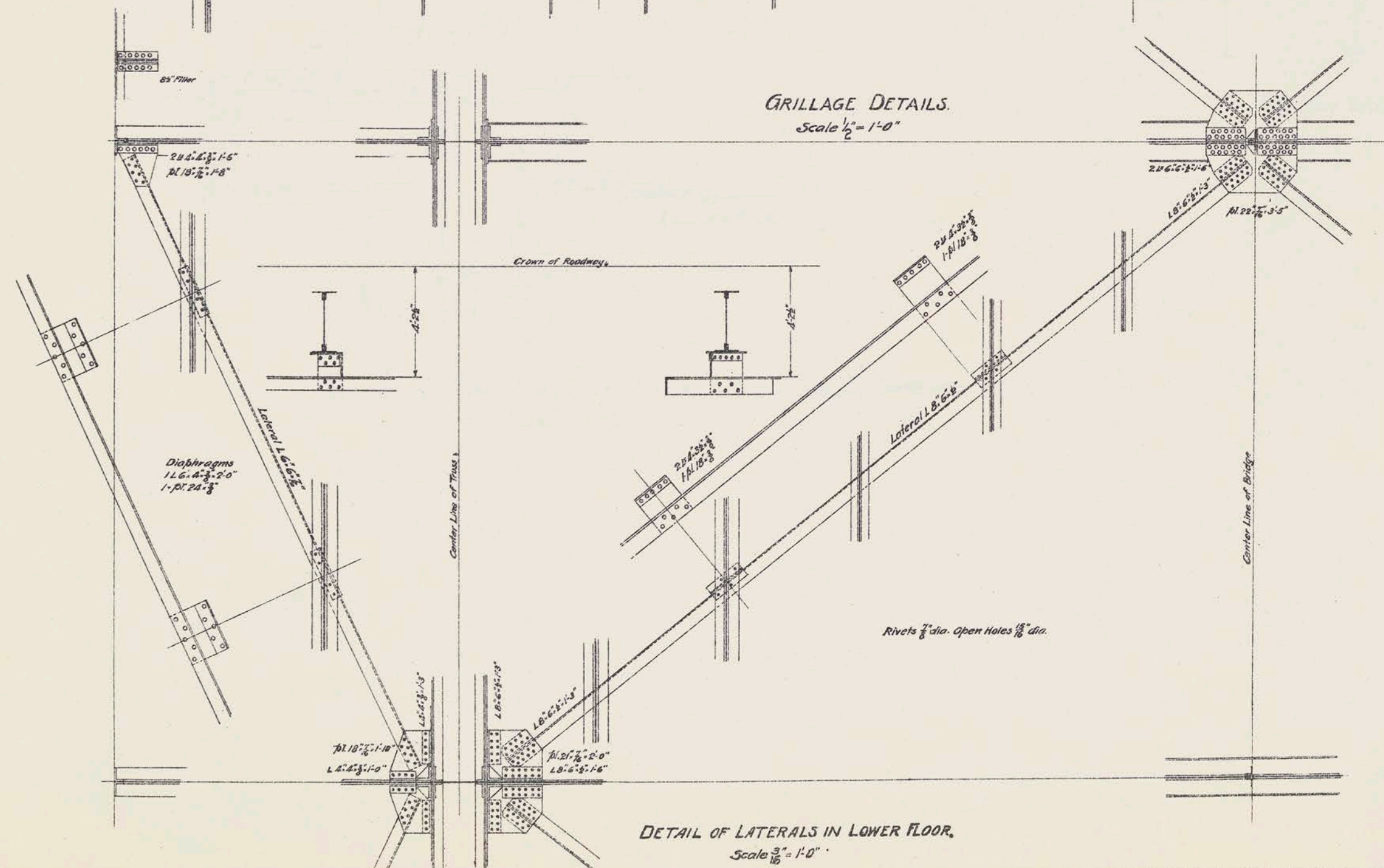
ALL MATERIAL STRUCTURAL STEEL. RIVETS 3/4" DIA. OPEN HOLES 5/8" DIA. UNLESS NOTED.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
DETAILS OF PANEL O. TO 1.
SCALE 3/8" = 1'-0"

Approved, Oct. 16, 1906.
J. H. Nichols
Commissioner
Consulting Engineer



TYPICAL DETAIL OF LATERAL IN UPPER FLOOR.
Scale 3/8" = 1'-0"

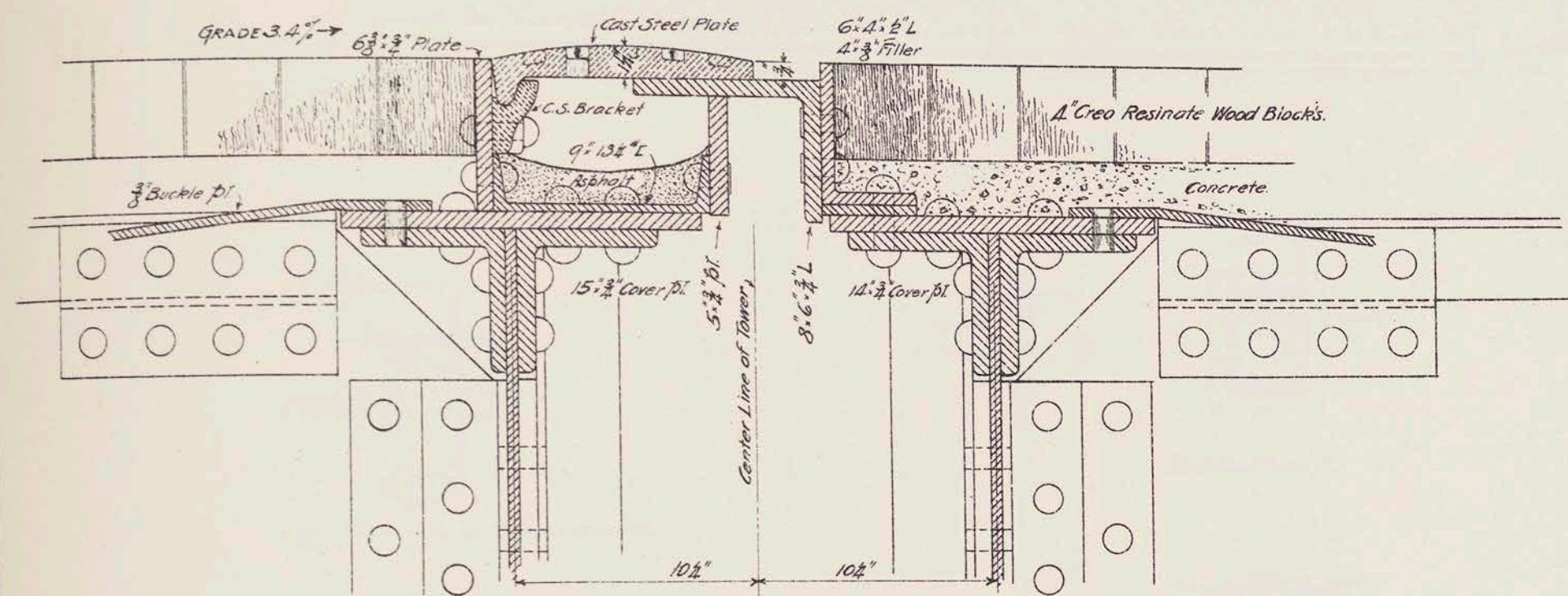


Approved Oct. 16, 1906.

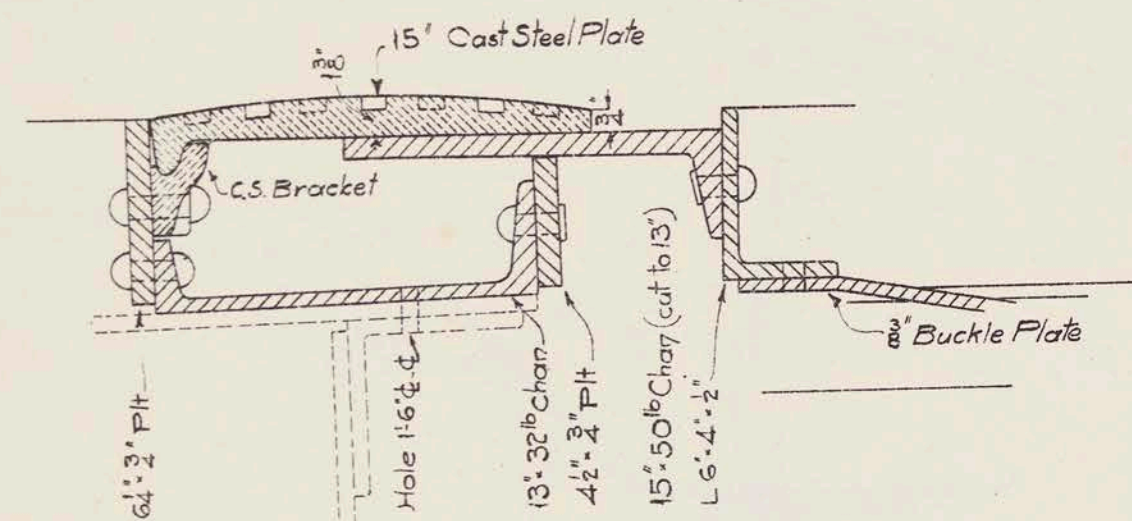
J. M. Deane
Commissioner

O. F. Nichols
Consulting Engineer

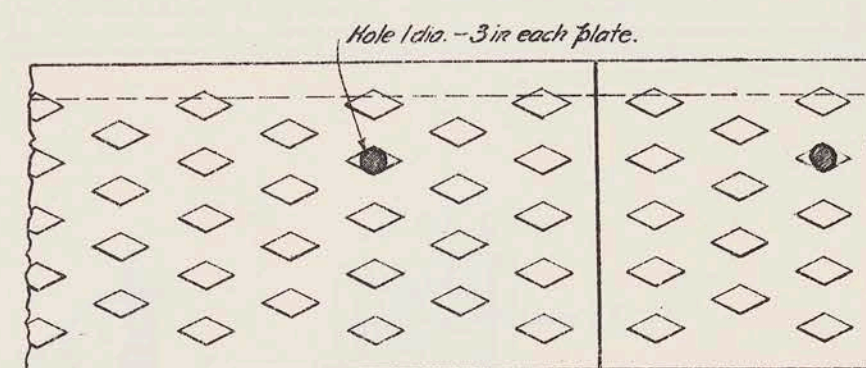
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
GRILLAGE - LATERALS
SCALE 3/8" & 1/2" = 1 FT



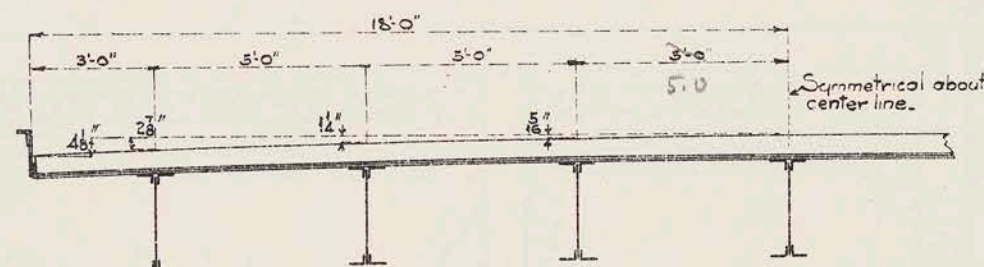
SECTION OF EXPANSION JOINT BETWEEN TOWERS Nos. 18 AND 20; 38 AND 40.
Scale $\frac{1}{2}'' = 1'-0''$



SECTION OF EXPANSION JOINT BETWEEN MAIN SPAN AND APPROACH.
Scale $\frac{1}{2}'' = 1'-0''$



11" Cast Steel Plate in lengths about 5'-0"
TOP OF ROADWAY C.S. PLATE OVER EXPANSION JOINTS.
Scale $\frac{1}{2}'' = 1'-0''$

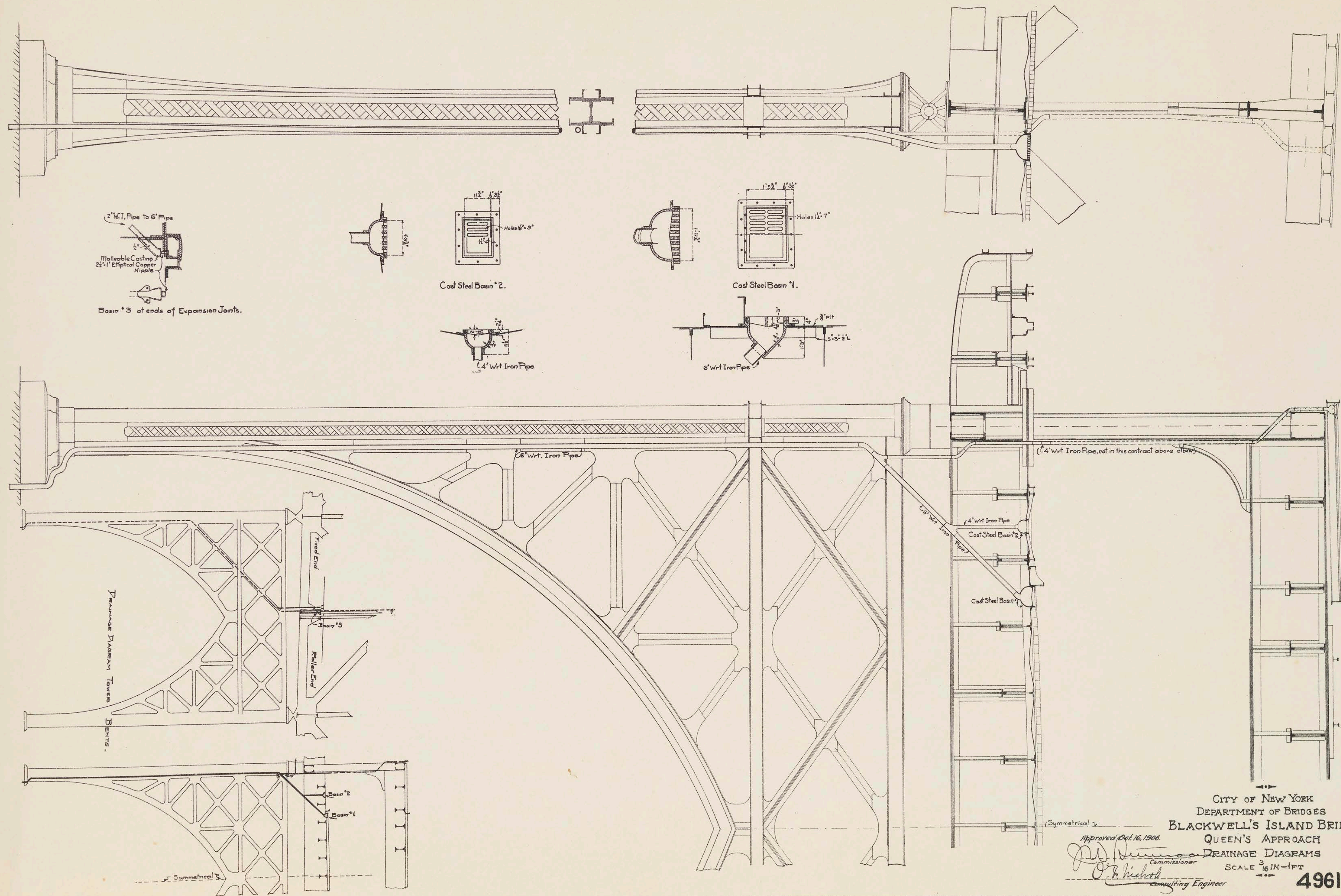


SECTION SHOWING CROWN OF ROADWAY.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
EXPANSION JOINTS.

Approved Oct. 16, 1906.
Commissioner
Consulting Engineer.

4960



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
DRAINAGE DIAGRAMS

Approved Oct. 16, 1906.

[Signature]
Commissioner
[Signature]
Consulting Engineer

SCALE 3/16 IN = 1 FT

4961



624.09747
N568d
v.1
pt.8
c.2

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1907.

CONTRACT DRAWINGS

FOR

Constructing the Steel and Masonry Approach in
the Borough of Manhattan of the
Blackwell's Island Bridge

Over East River, Between the Boroughs of
Manhattan and Queens.

624.09747
N568d
v.1 pt.8 c.2

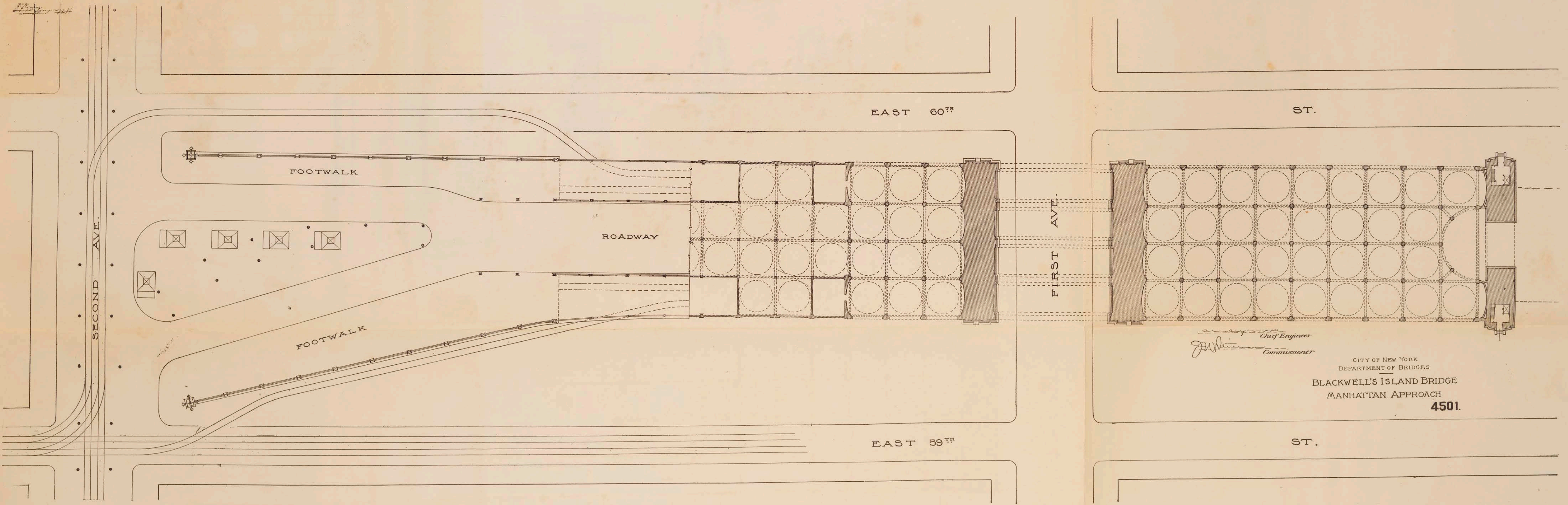
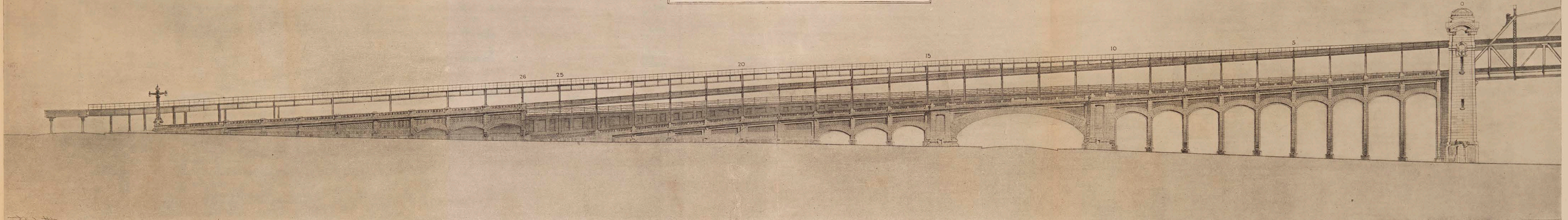
1980-07

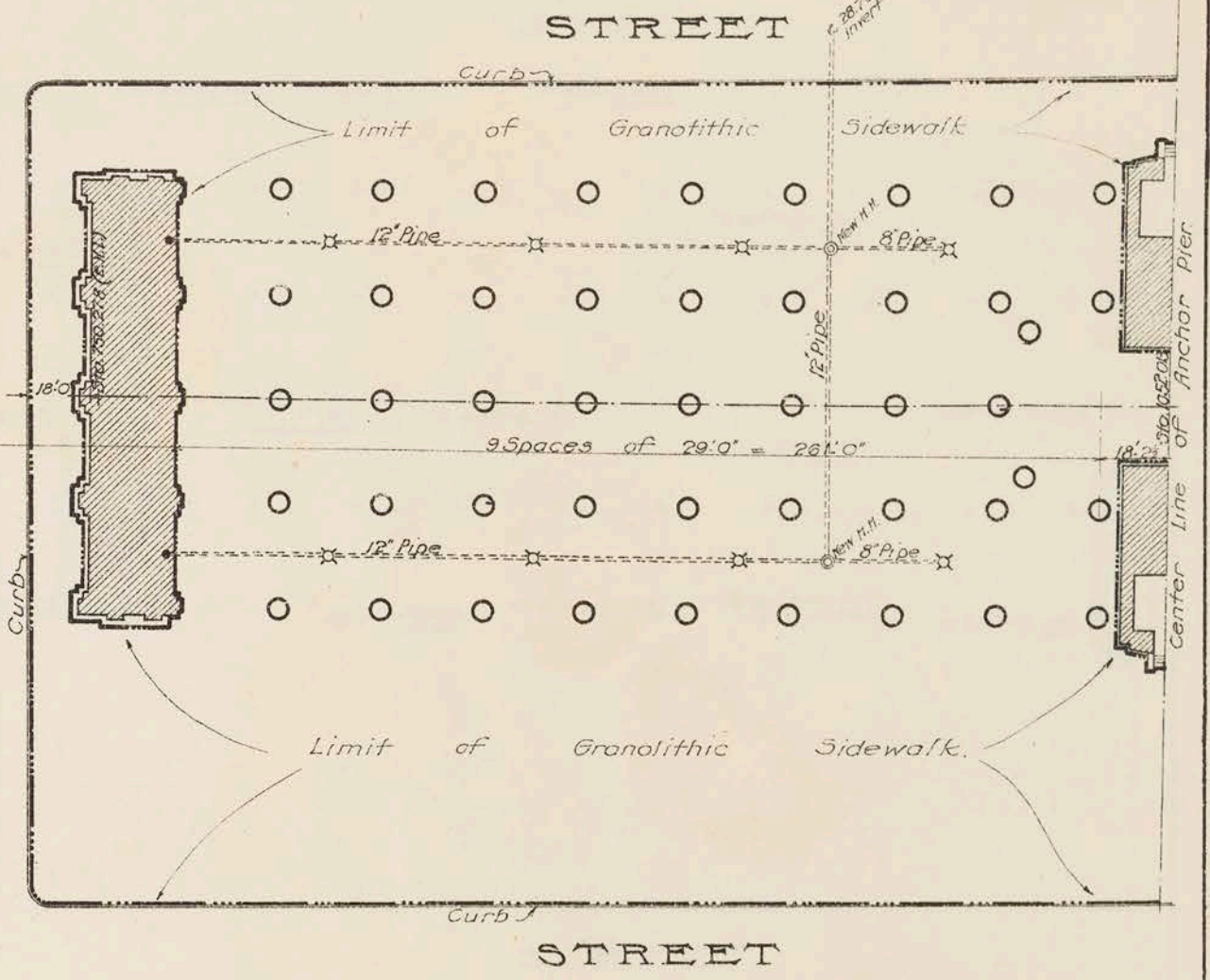
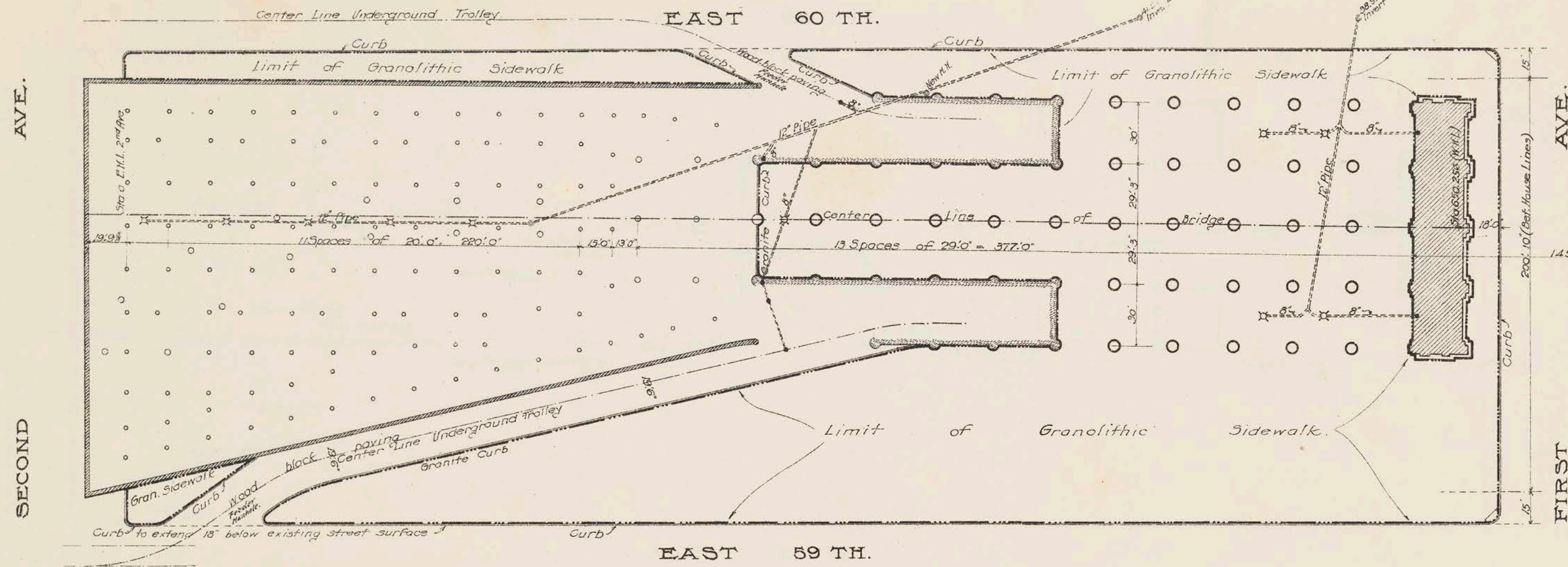
MARTIN B. BROWN CO., Printers, 49-57 Park Pl., N. Y.

SCIENCE

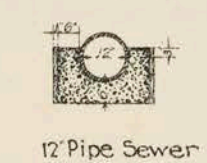
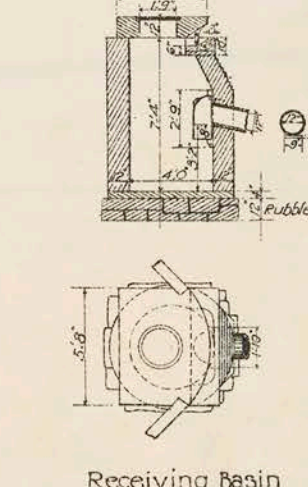
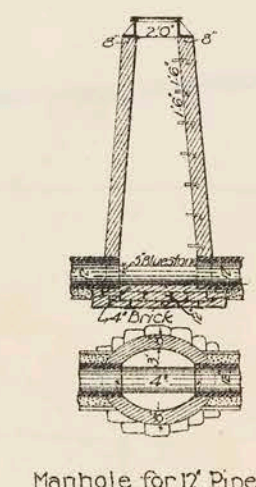
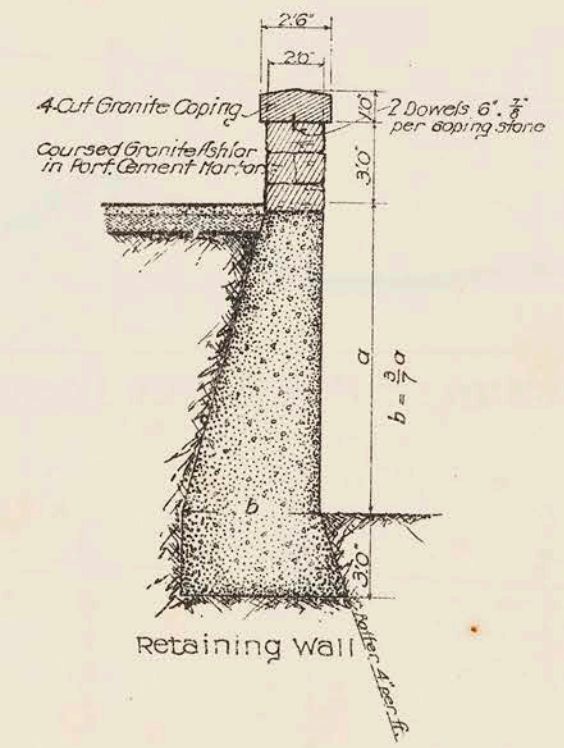
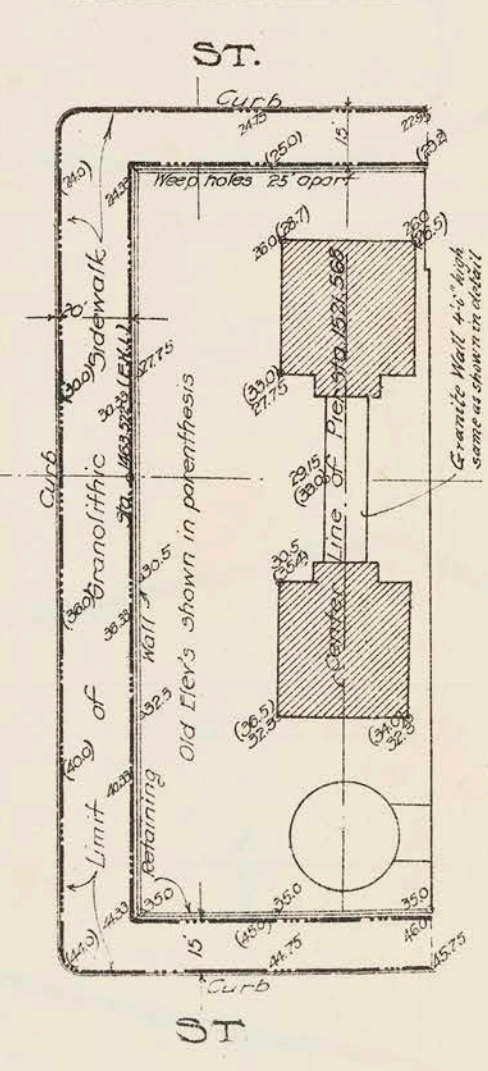
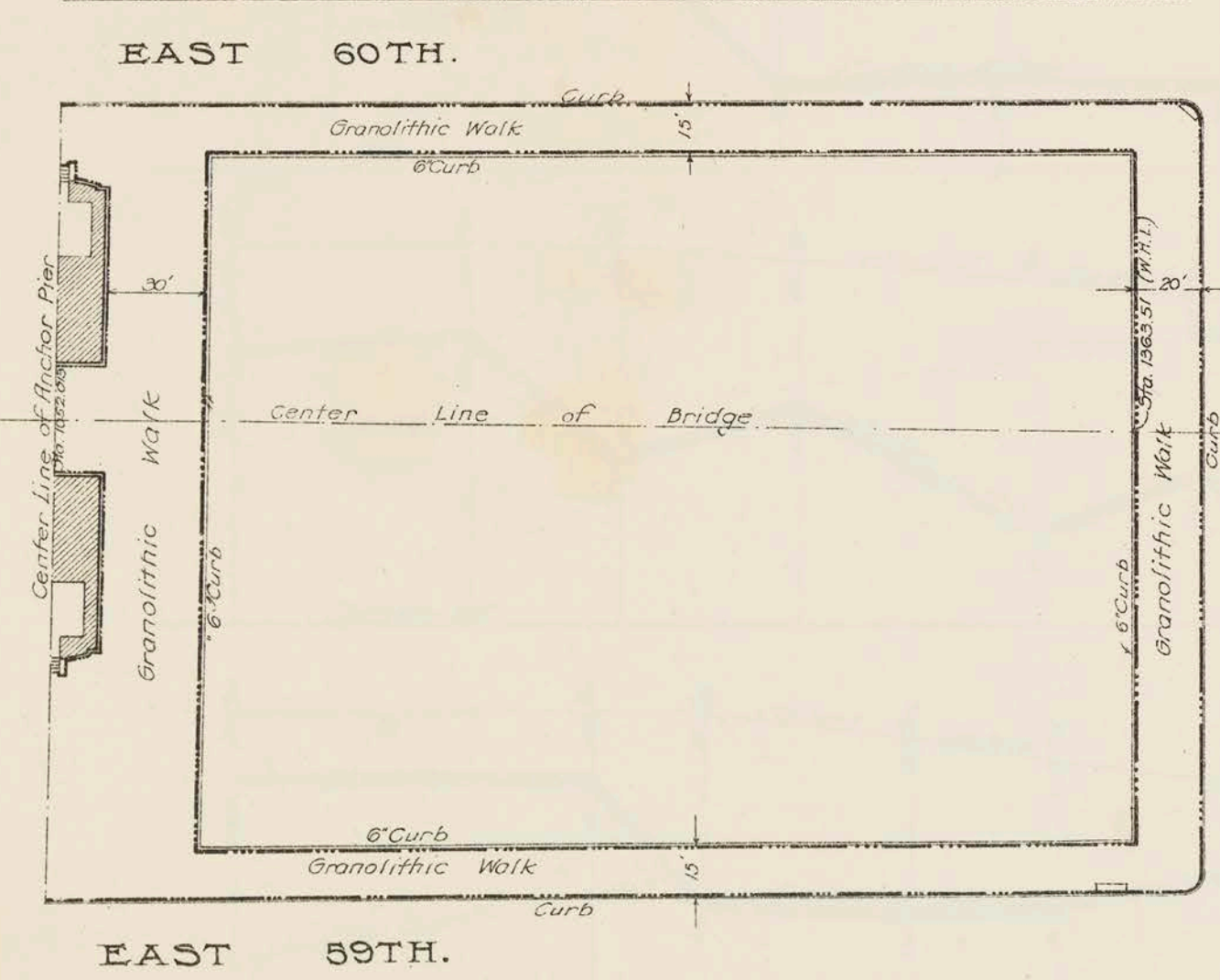
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Southern Methodist University
DALLAS, TEXAS

BLACKWELLS ISLAND BRIDGE
MANHATTAN APPROACH





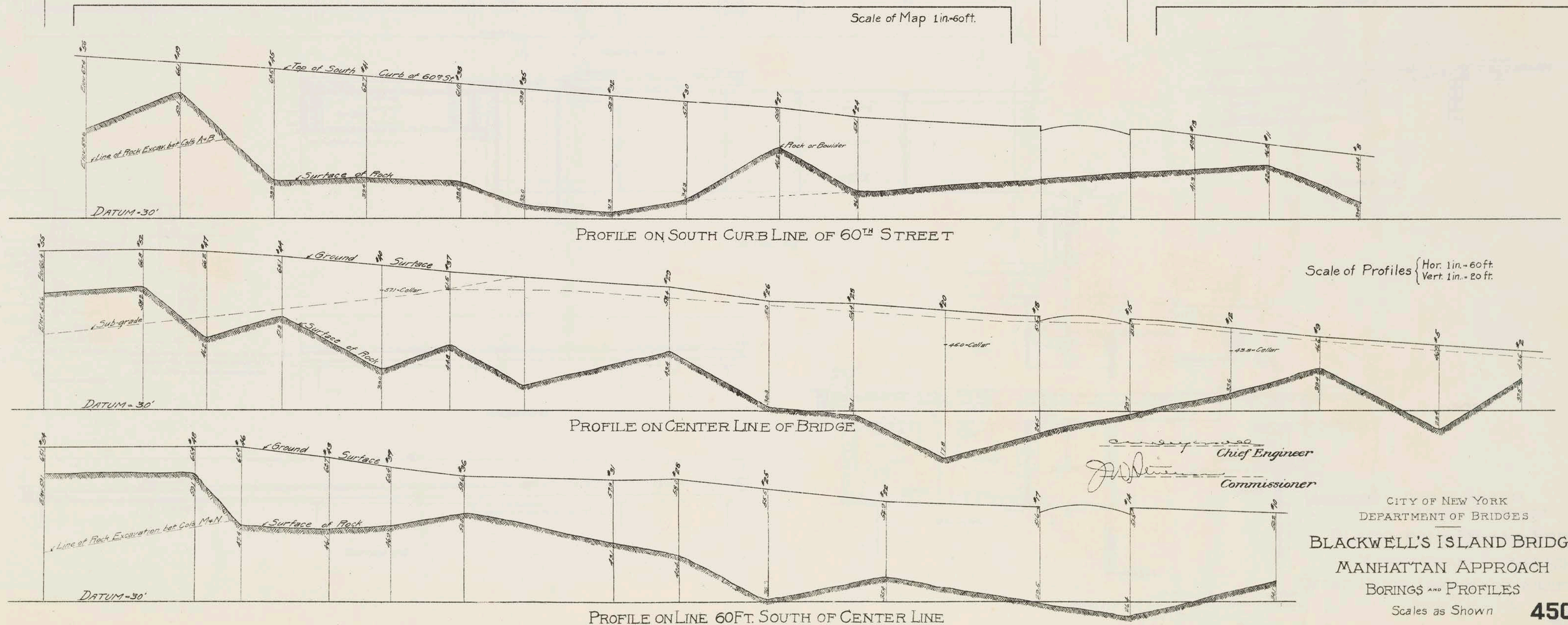
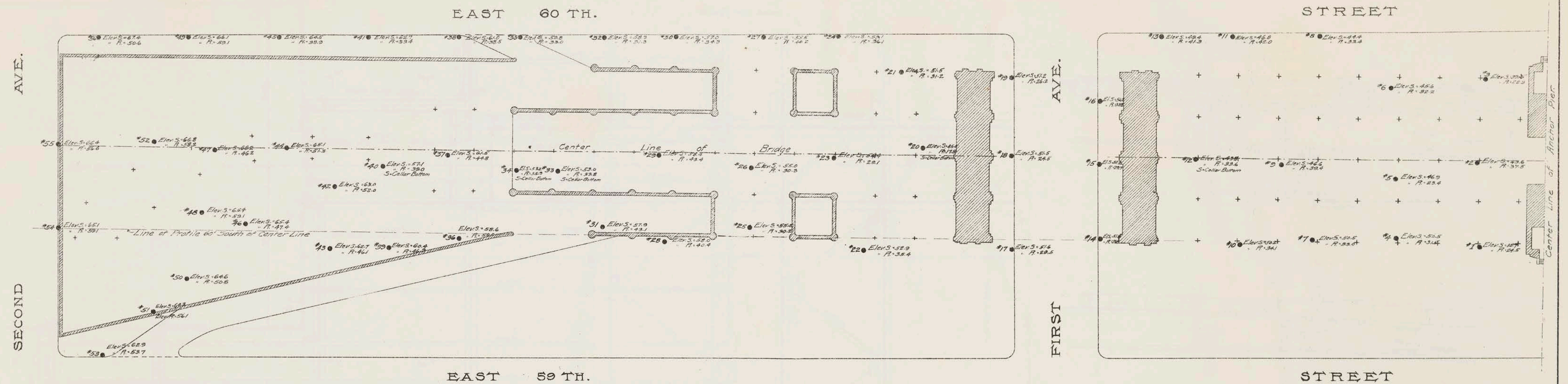
All Curbs except as noted otherwise are Concrete Steel bound with granolithic surface.
 Old Catch basins to be brought to new grade and heads redressed.
 Ground to be graded approx. to existing curb with provision for surface drainage to curb.
 Cast Iron drainage basins shown thus



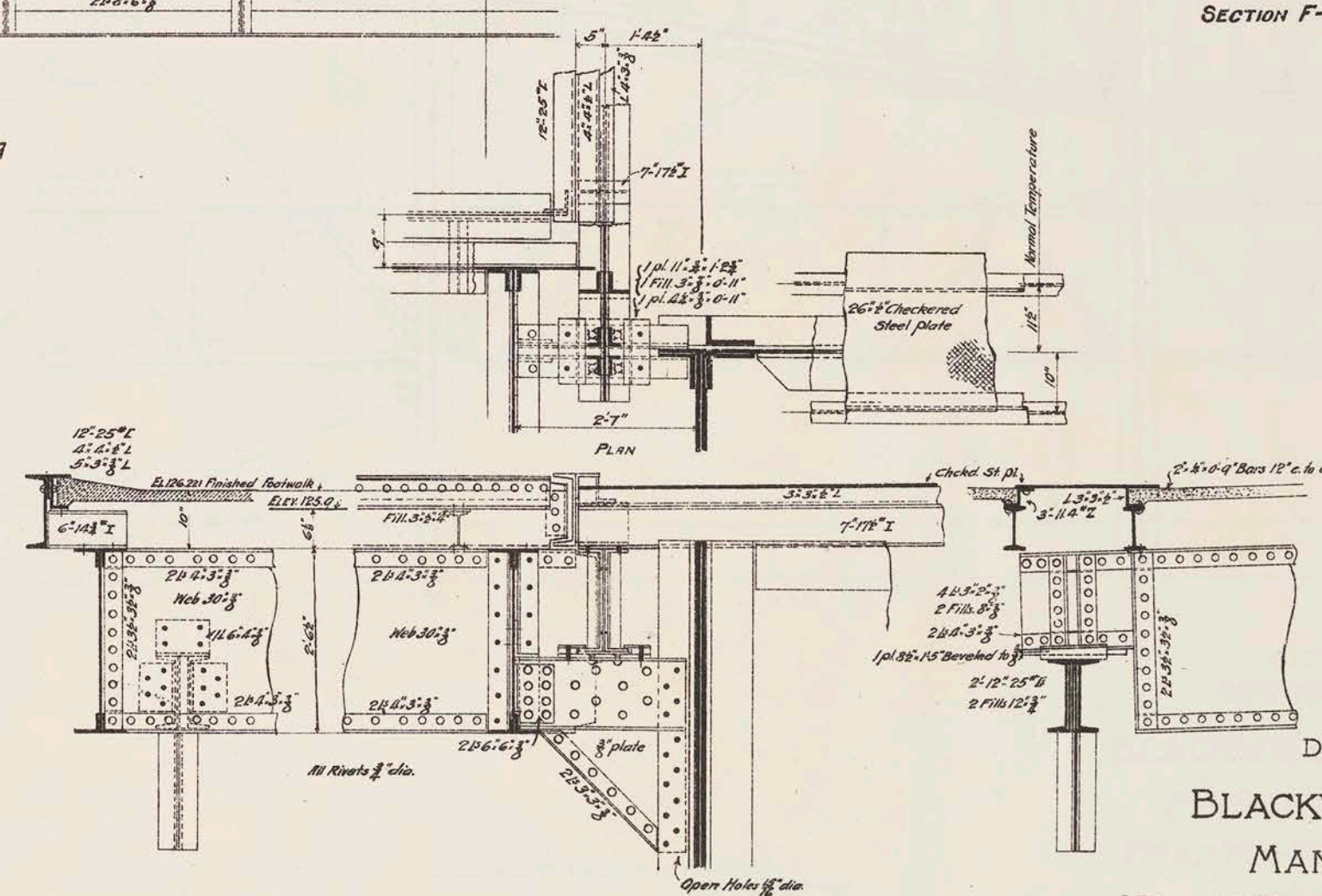
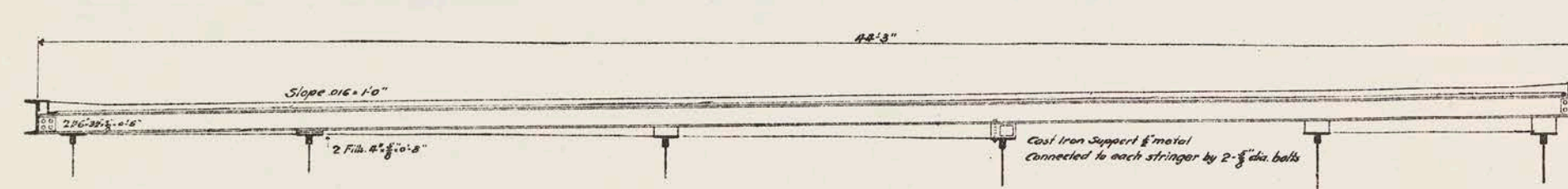
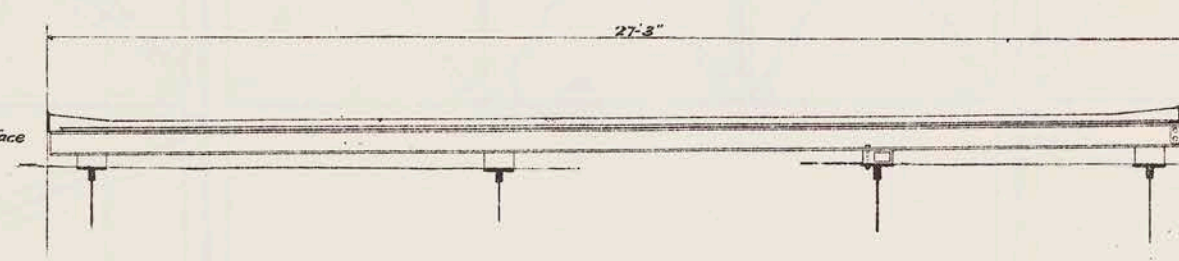
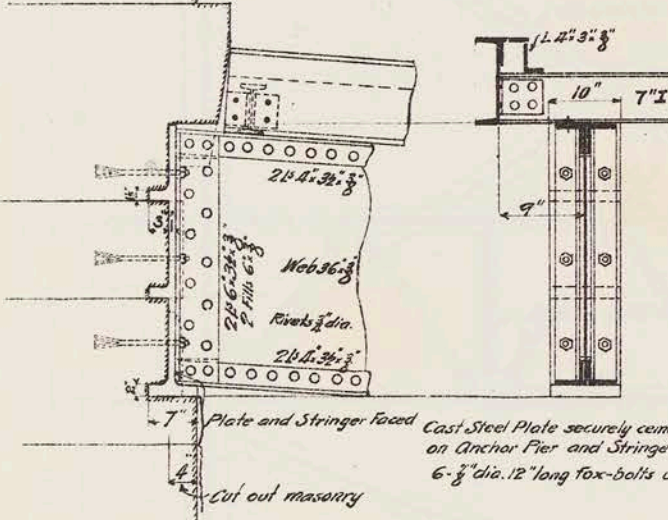
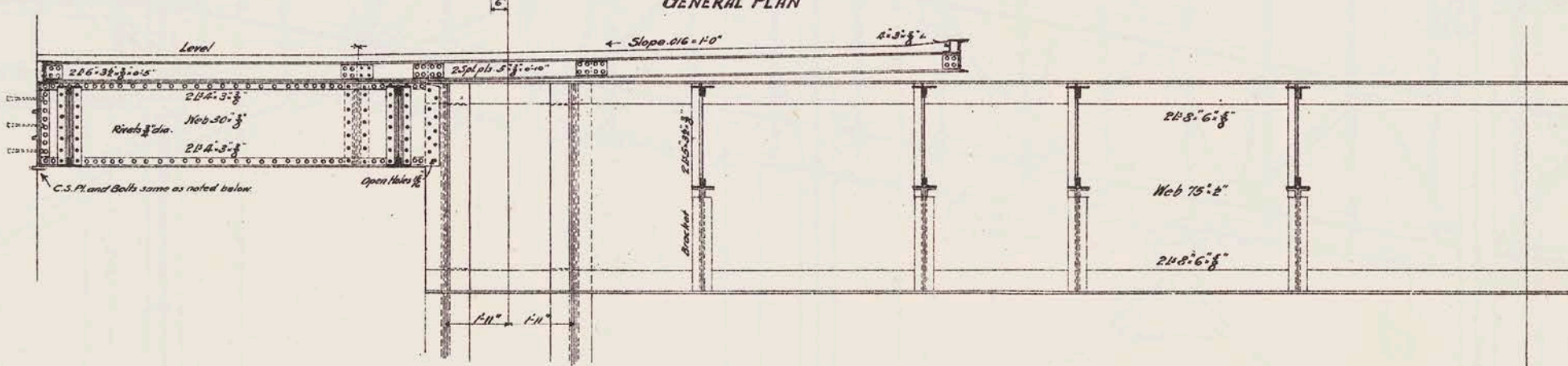
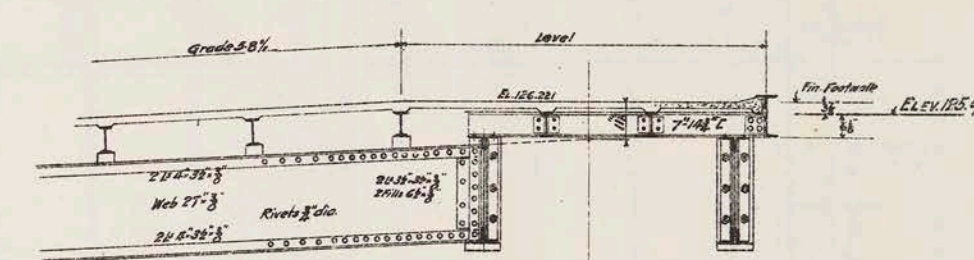
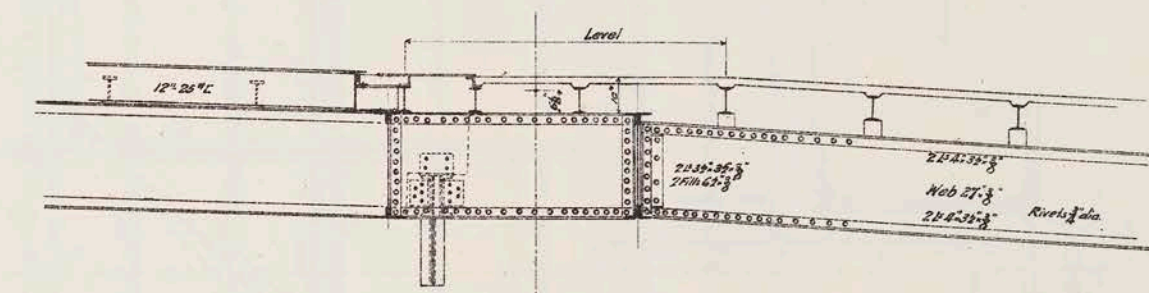
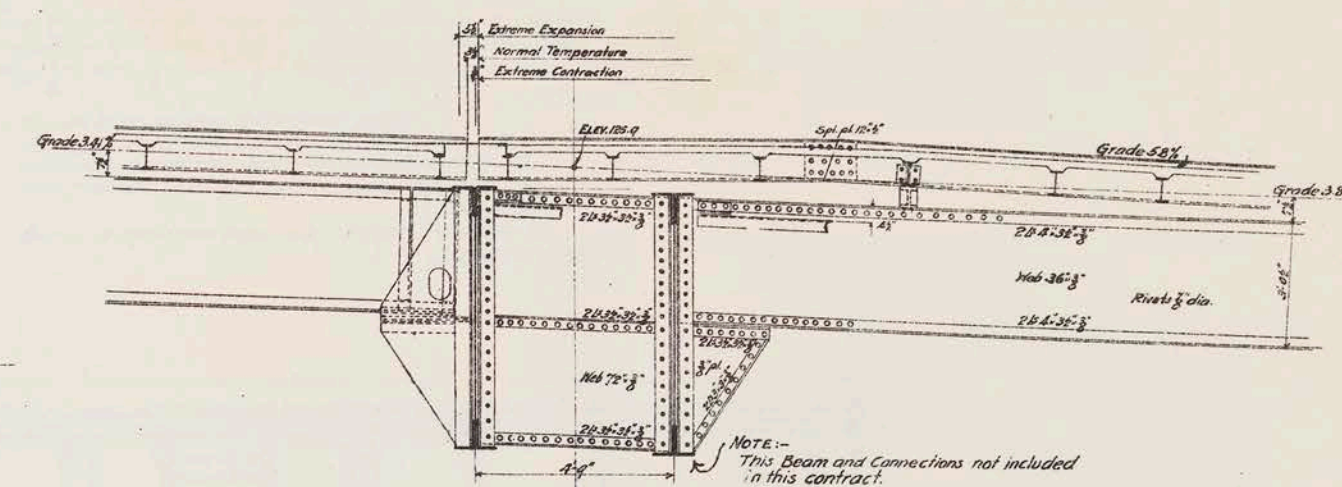
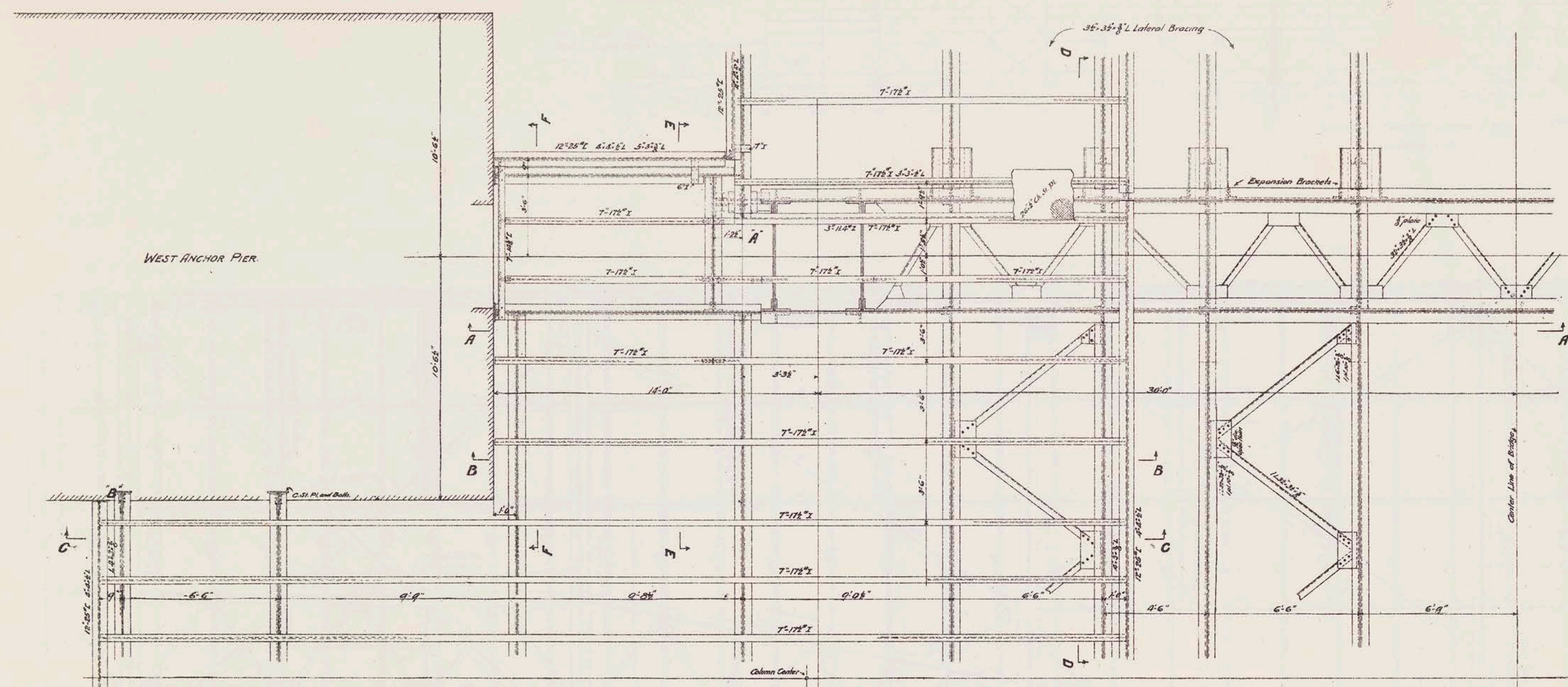
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 MANHATTAN APPROACH
 SEWERS, SIDEWALKS, ETC.
 Scale 1 in. = 60 ft.

Chief Engineer

 Commissioner



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
BORINGS AND PROFILES
Scales as Shown **4504**

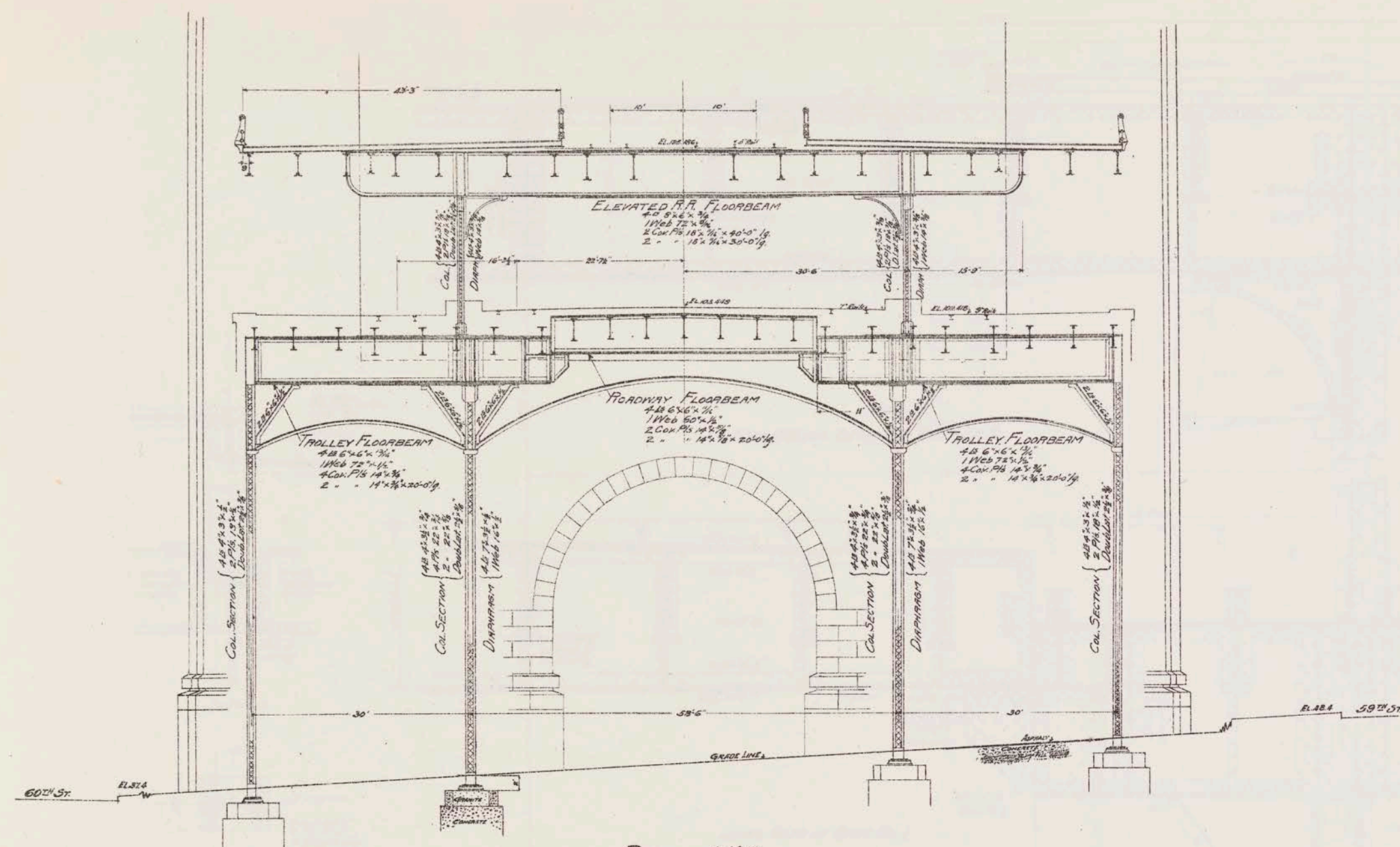


CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
UPPER FLOOR FRAMING TO ANCHOR PIER
Scale 3/16 in. = 1 ft.
4507

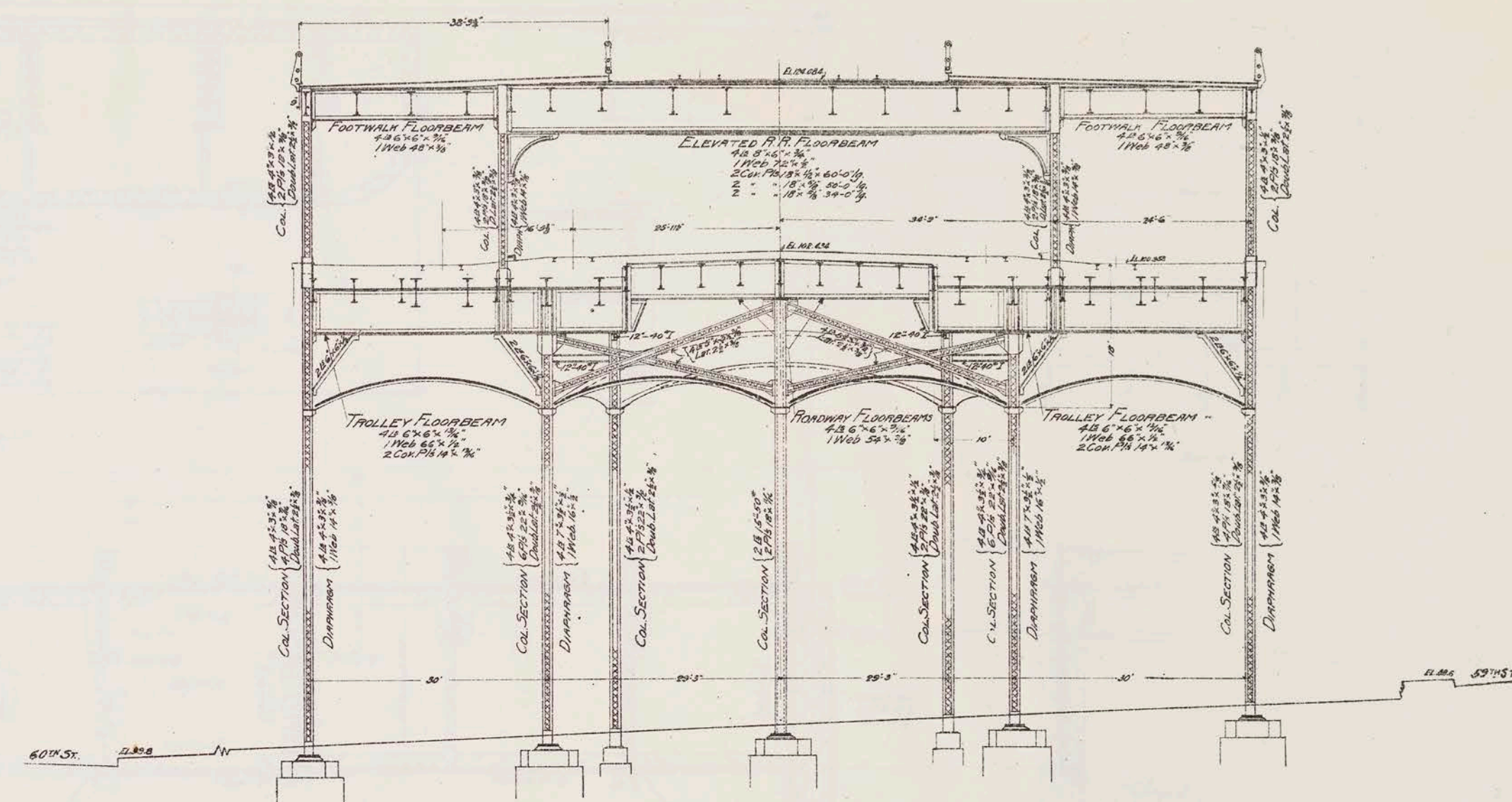


as per memo Chief Eng'r

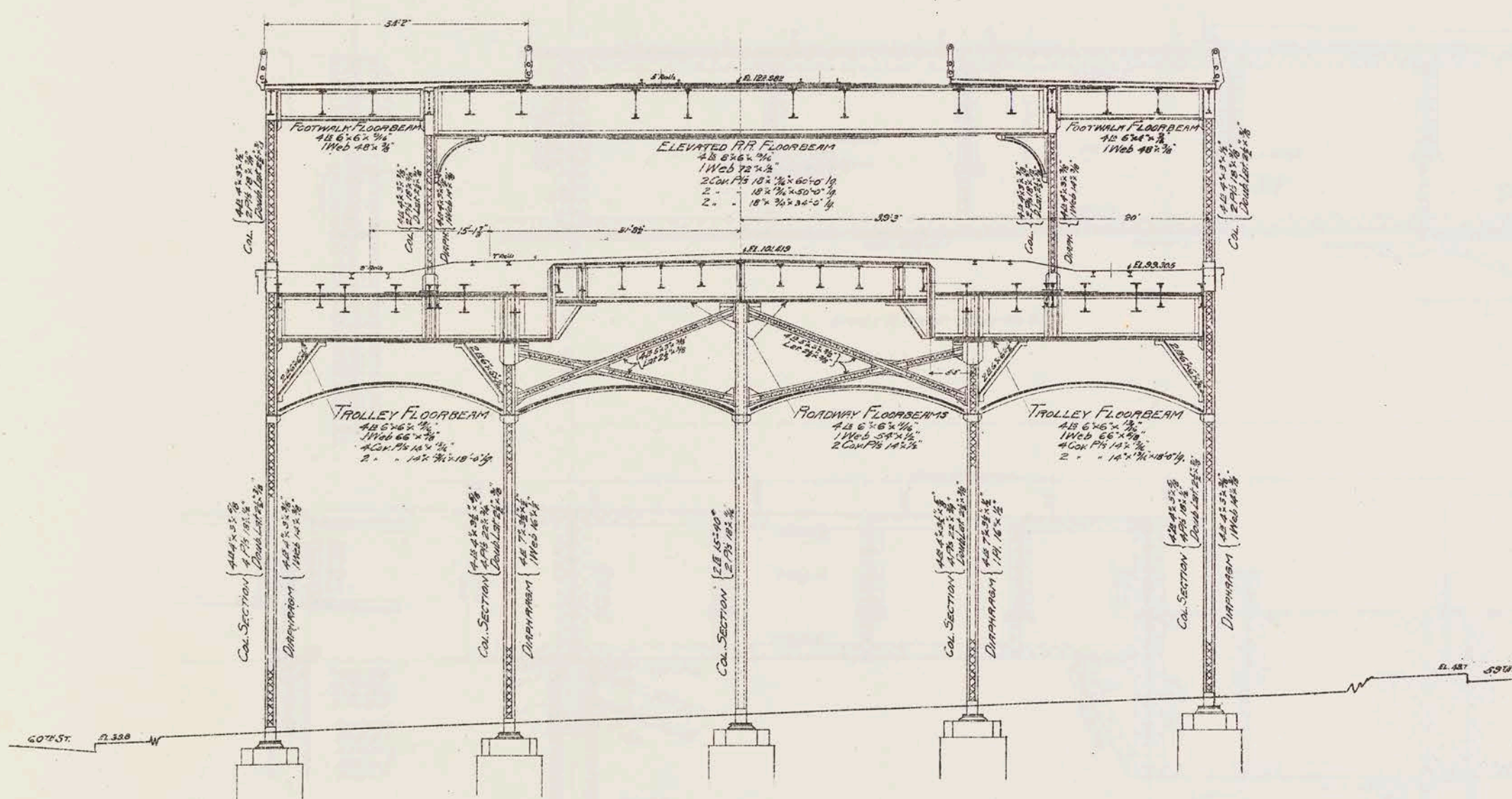
J. Williams Commissioner



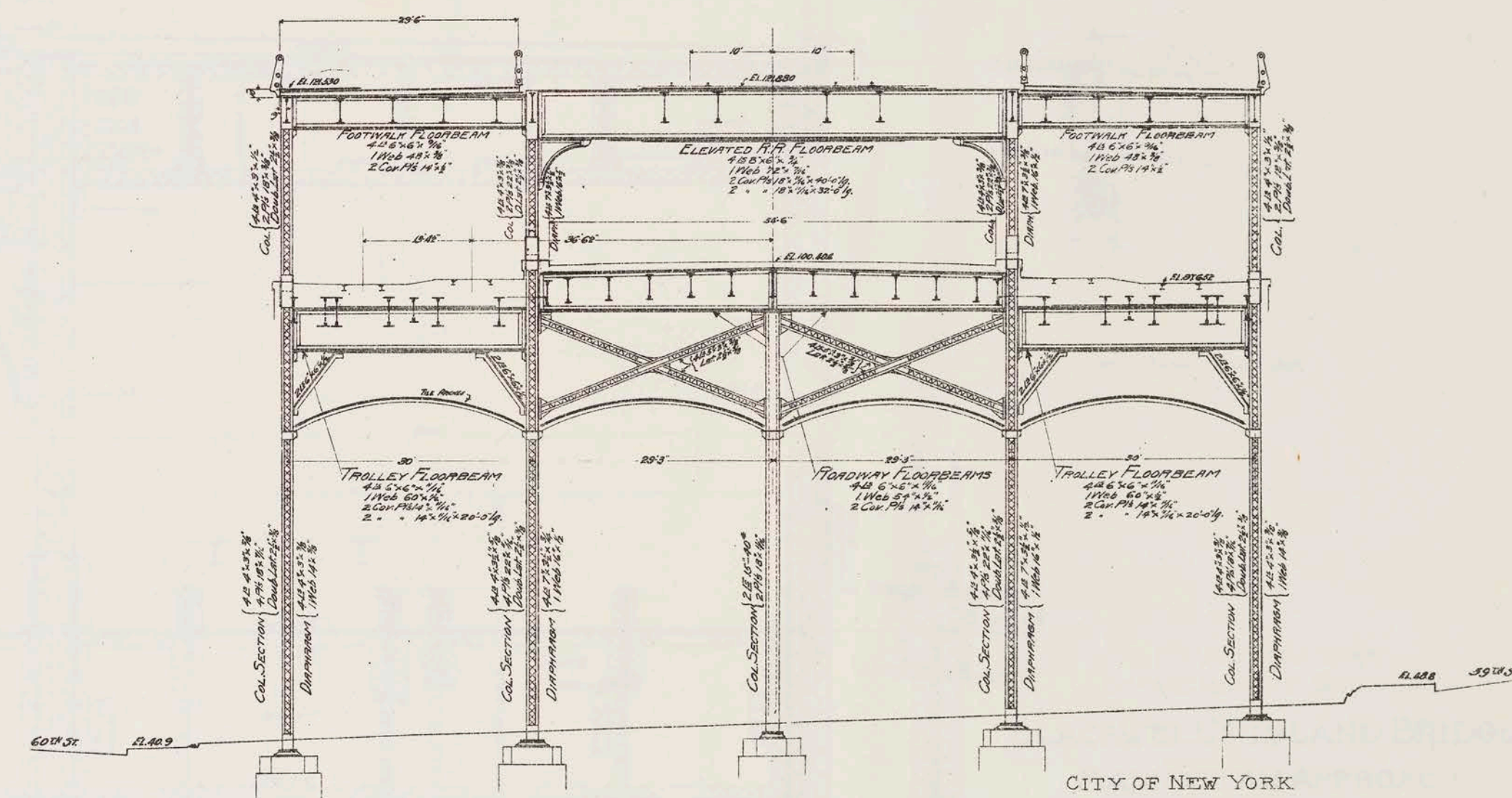
BENT N^o1



BENT N^o2



BENT N^o3



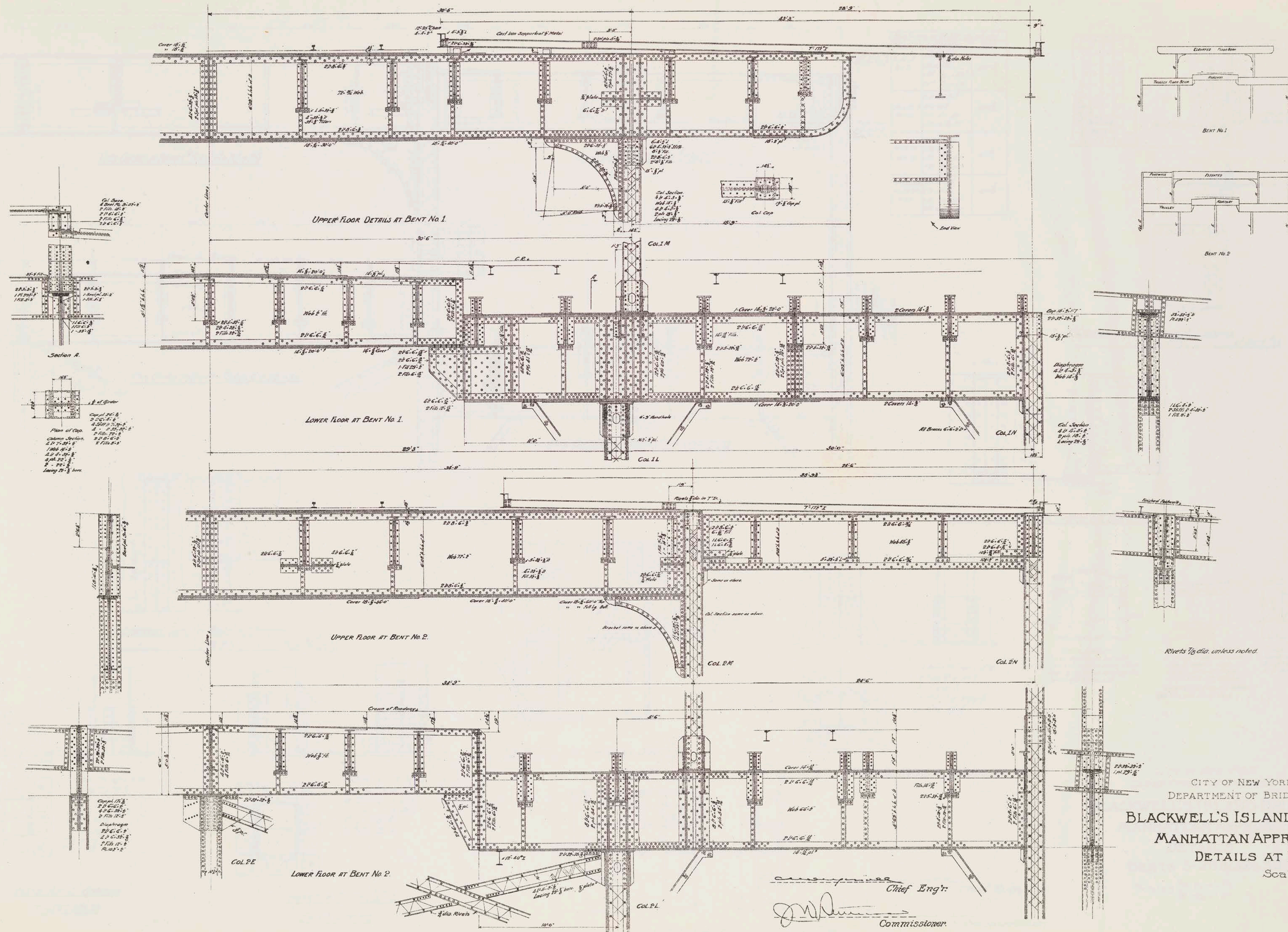
BENT N^o4

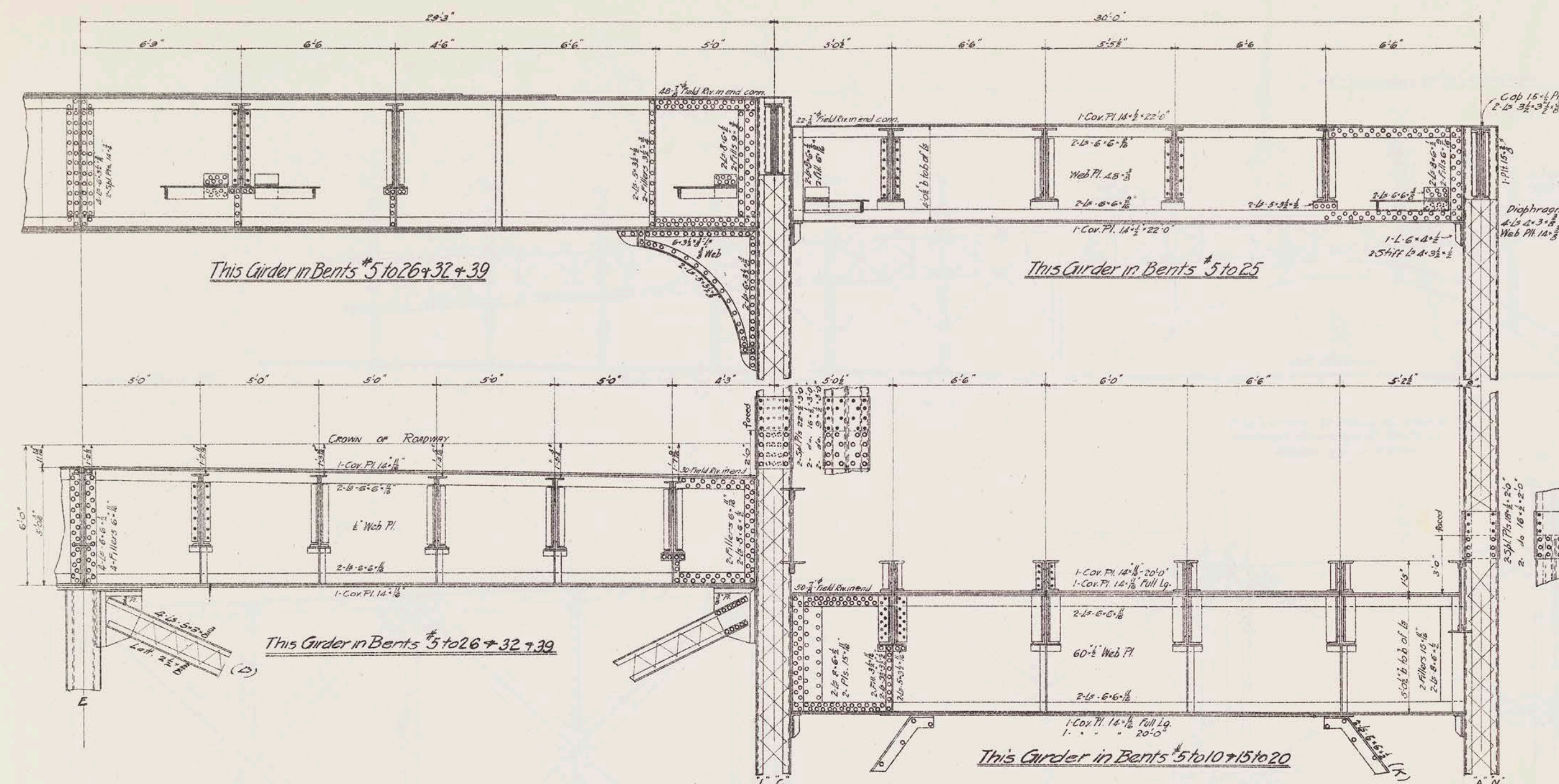
CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
SECTIONS AT BENTS N^{os} 1-4

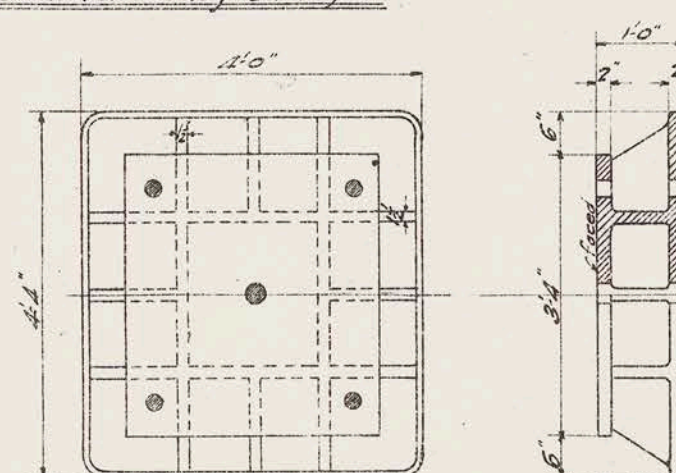
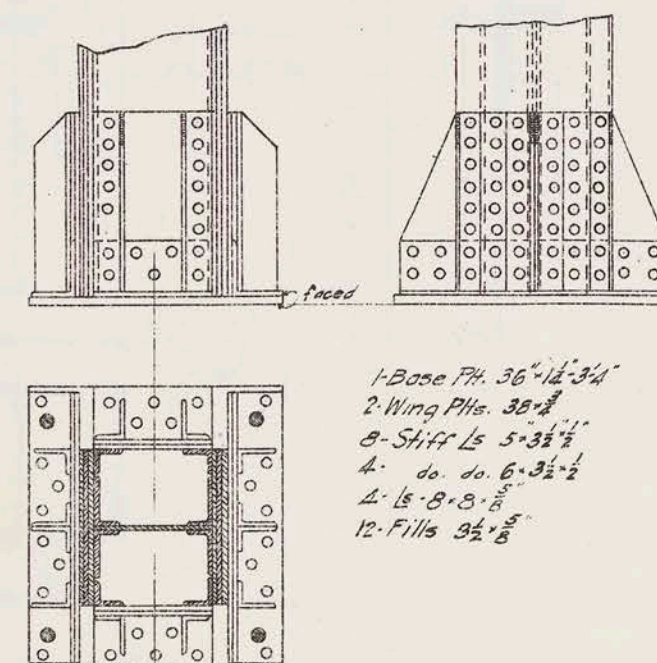
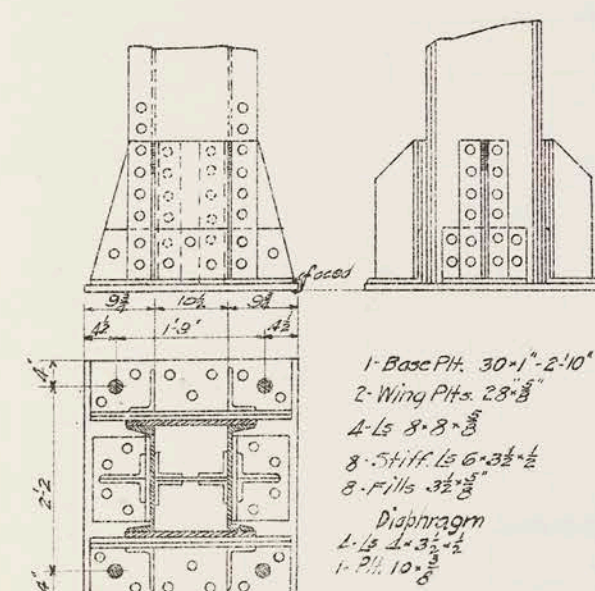
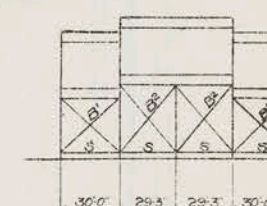
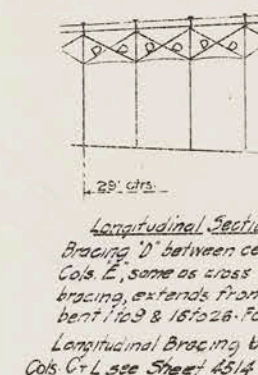
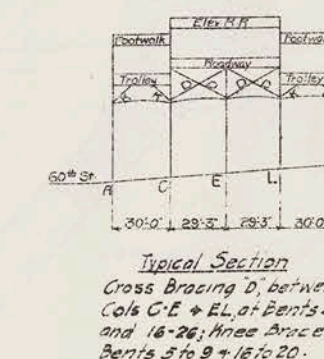
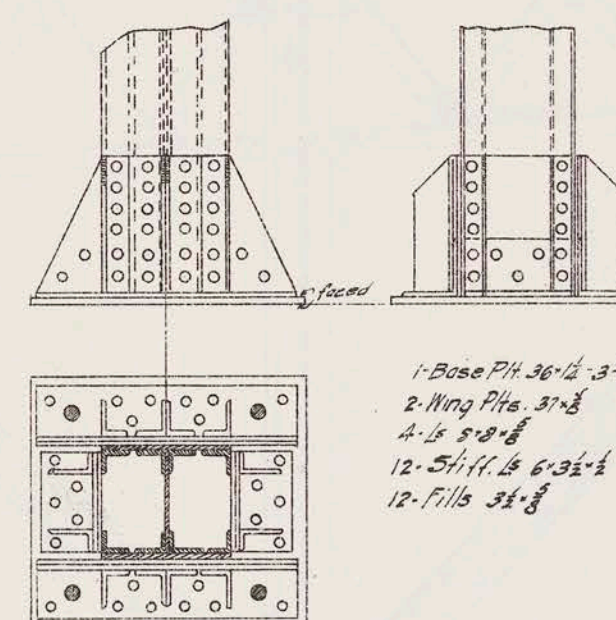
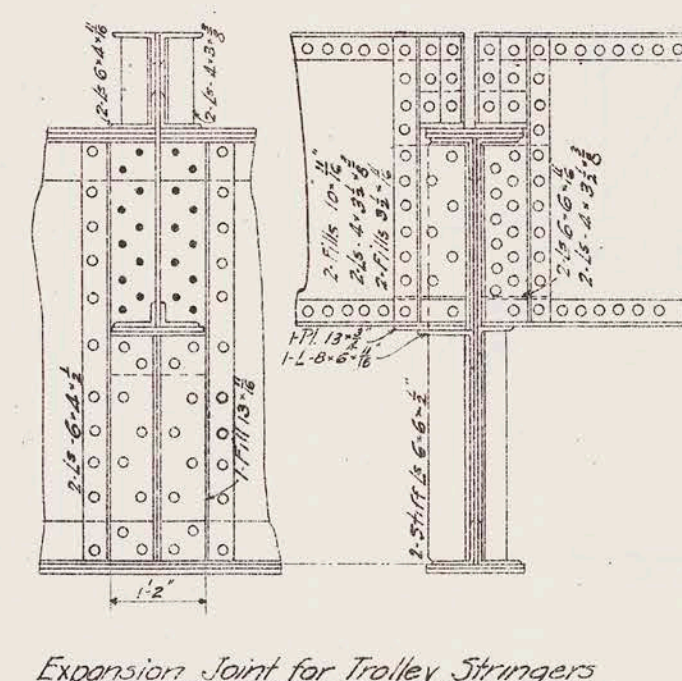
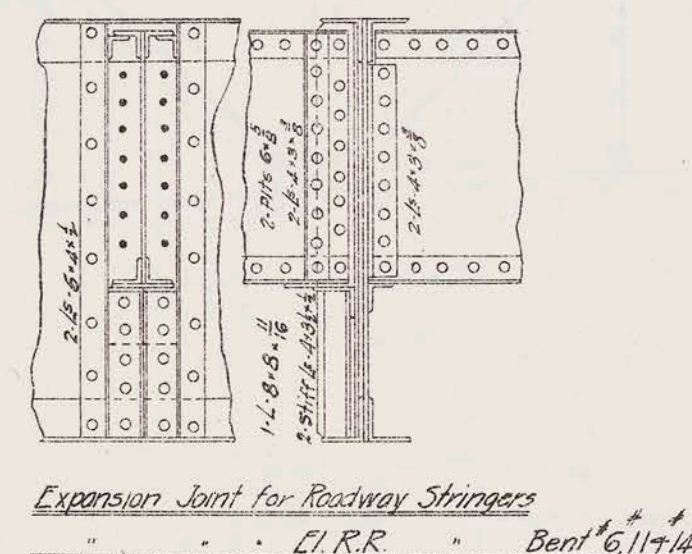
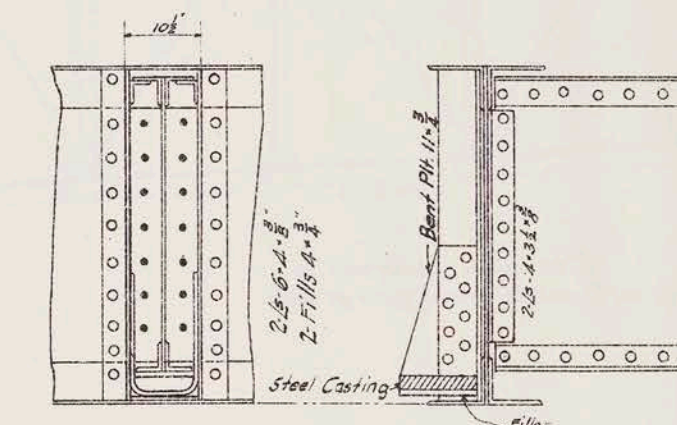
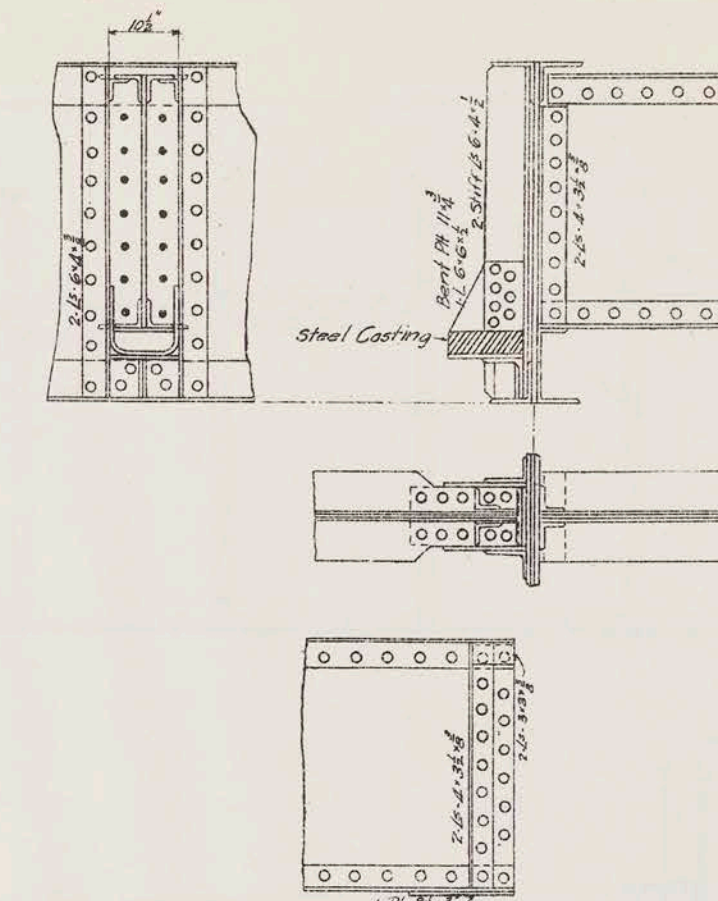
[Signature] Chief Eng'r
Commissioner.

Scale 1 in. = 20 ft.





Sections of L.I.R.R. Girders		
Sec No's	Flange	Web
1/2 3/4	2-5-9-6-2 ¹ 1-11-18-6 ¹	66-1 ¹
5, 6, 7 8, 9	1-11-18-6 ¹ 1-11-18-6 ¹	66-1 ¹
10, 11, 12, 13 14, 15	2-5-9-6-2 ¹ 1-11-18-6 ¹	60-1 ¹
16, 17, 18 19, 20	1-11-18-6 ¹ 1-11-18-6 ¹	58-1 ¹
21, 22, 23, 24 25, 26, 32 + 39	2-5-9-6-2 ¹ 1-11-18-6 ¹ 1-11-18-6 ¹	48-1 ¹

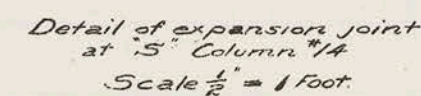
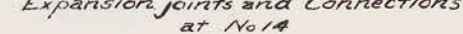
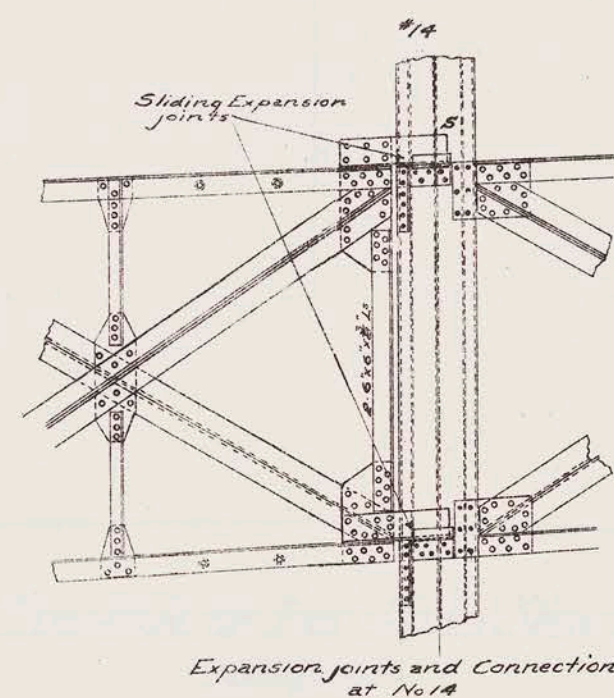
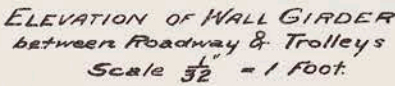


Chief Engineer.

Commissioner

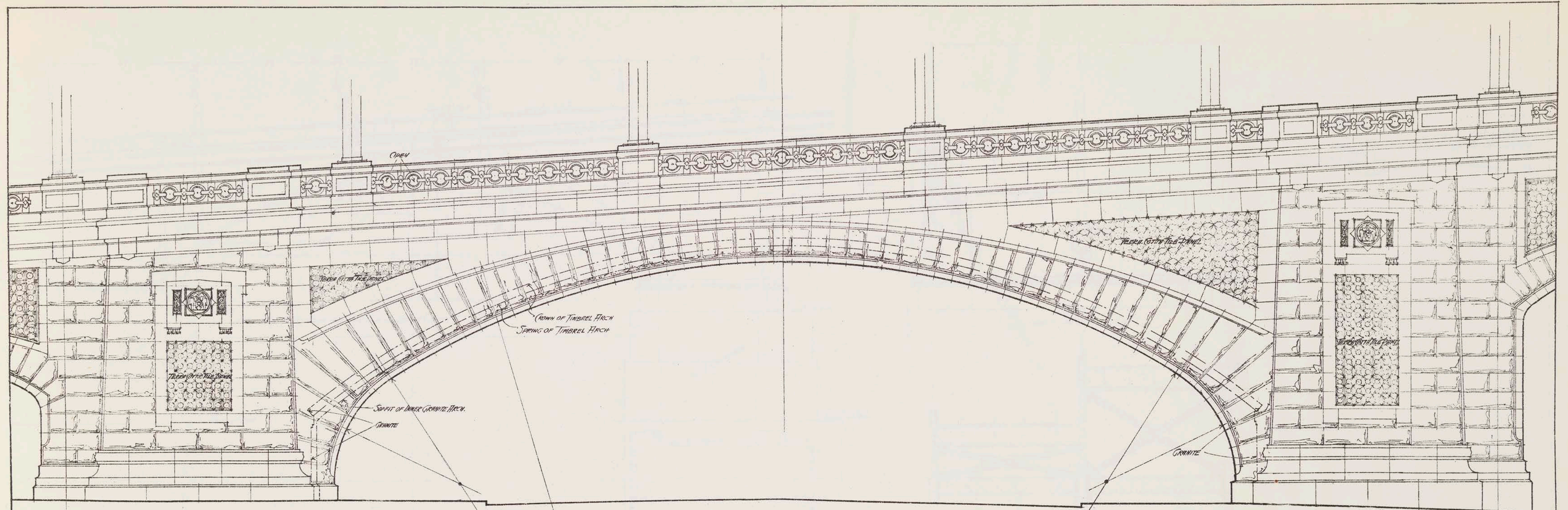
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
DETAILS
BENTS 5-26&32&39

Scales $\frac{3}{8}$ in. = 1 ft.
 $\frac{3}{8}$ in. = 1 ft.

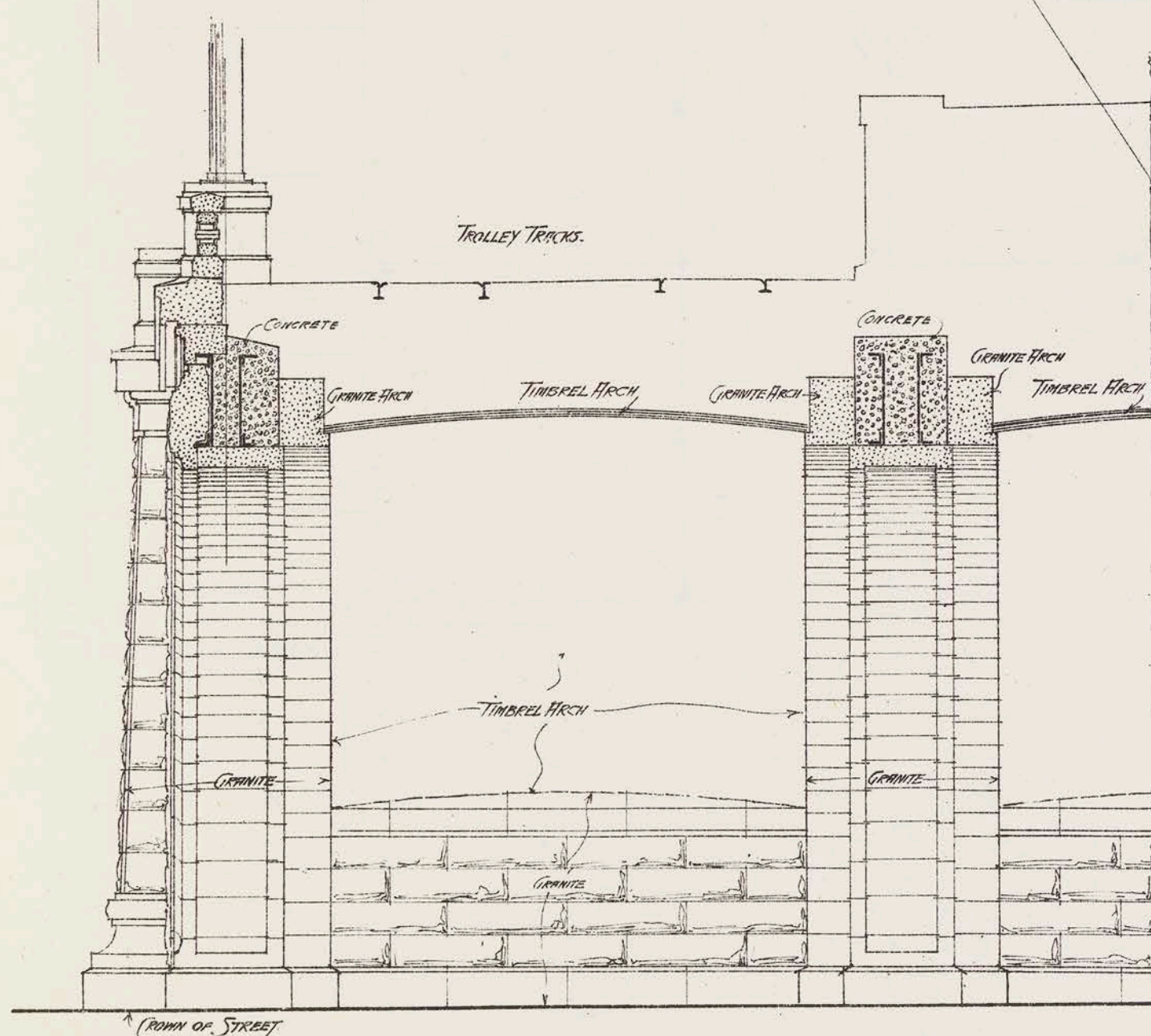


Chief Engineer

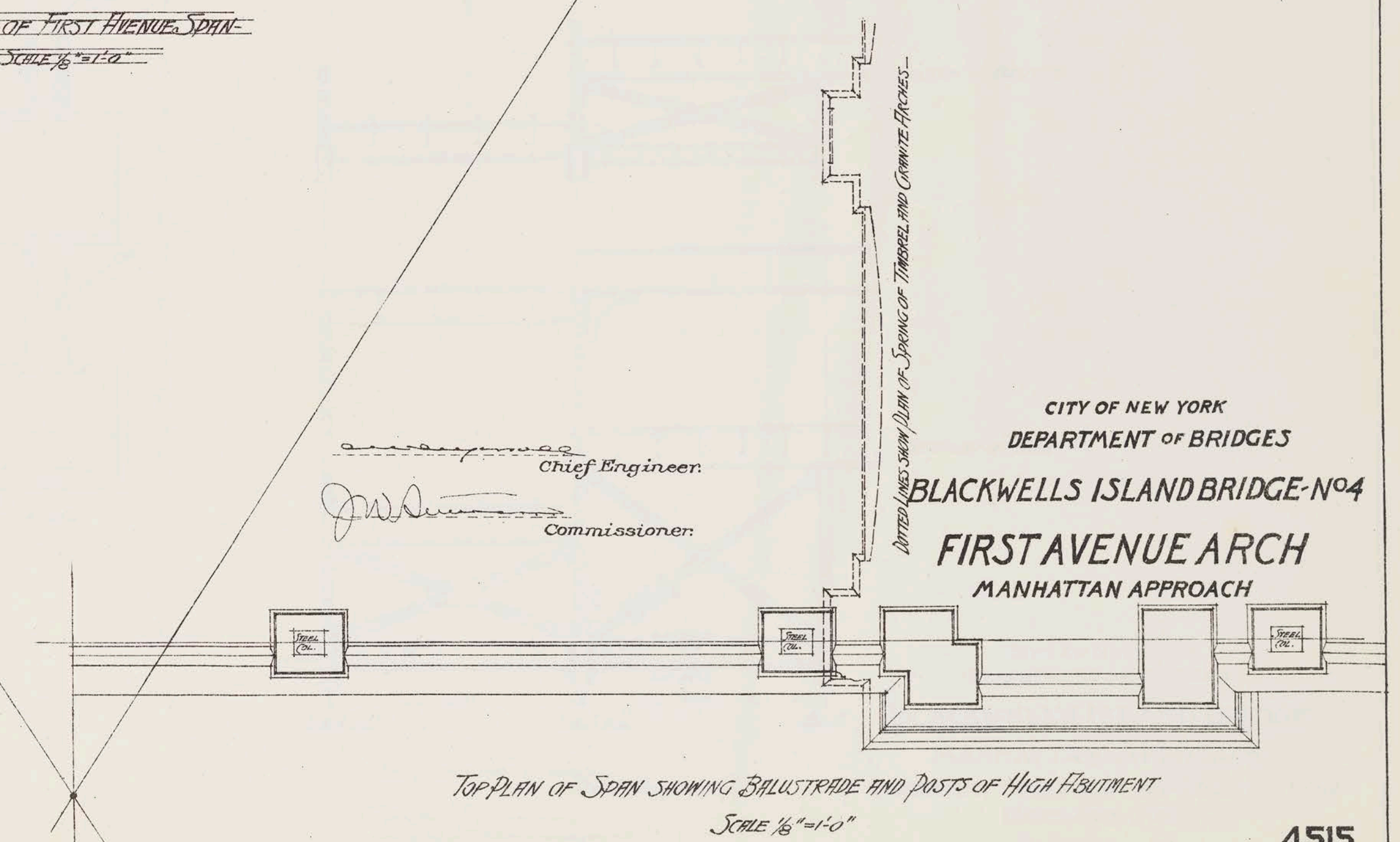
Commissioner



ELEVATION OF FIRST AVENUE SPAN
SCALE $\frac{1}{8}" = 1'-0"$



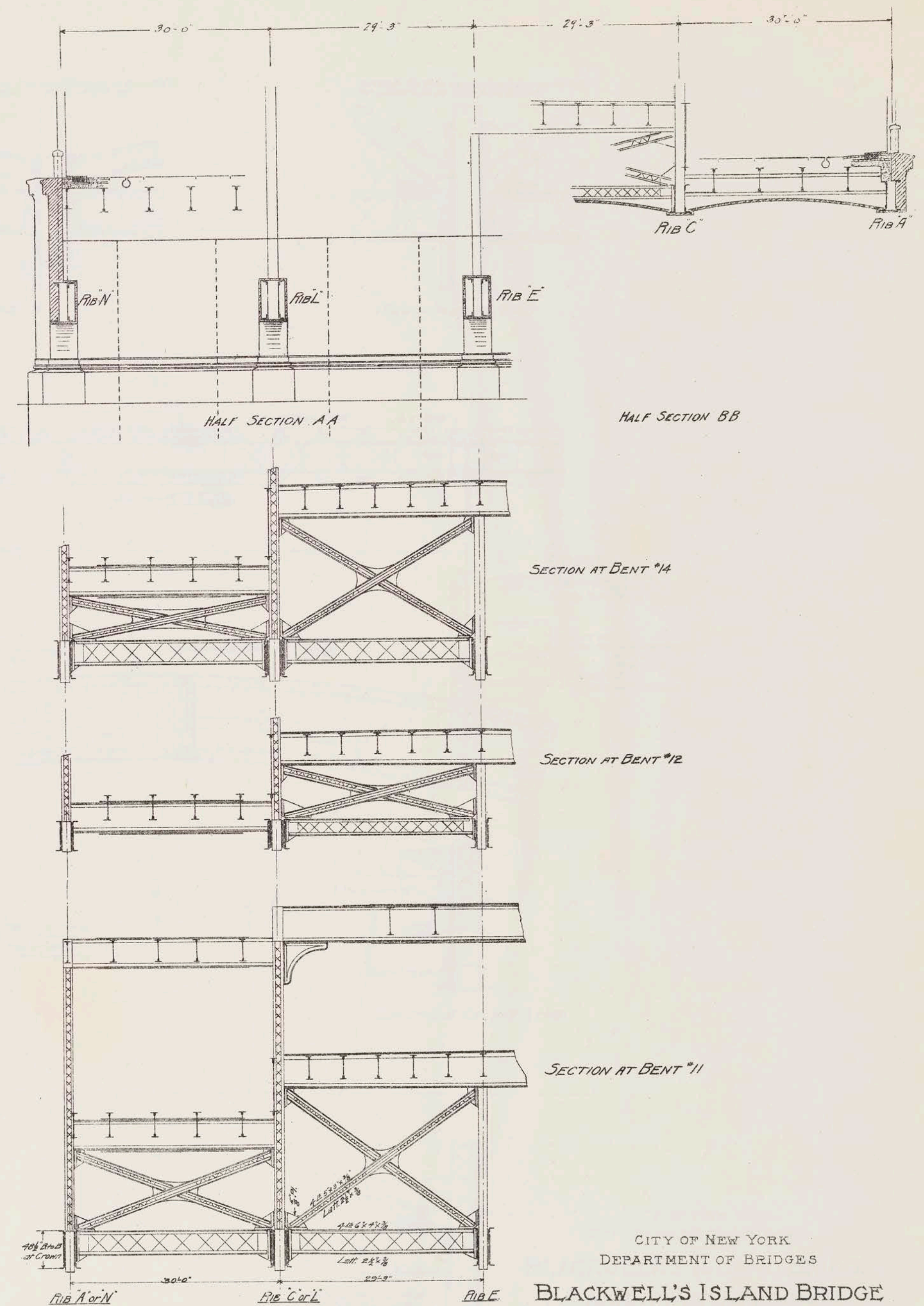
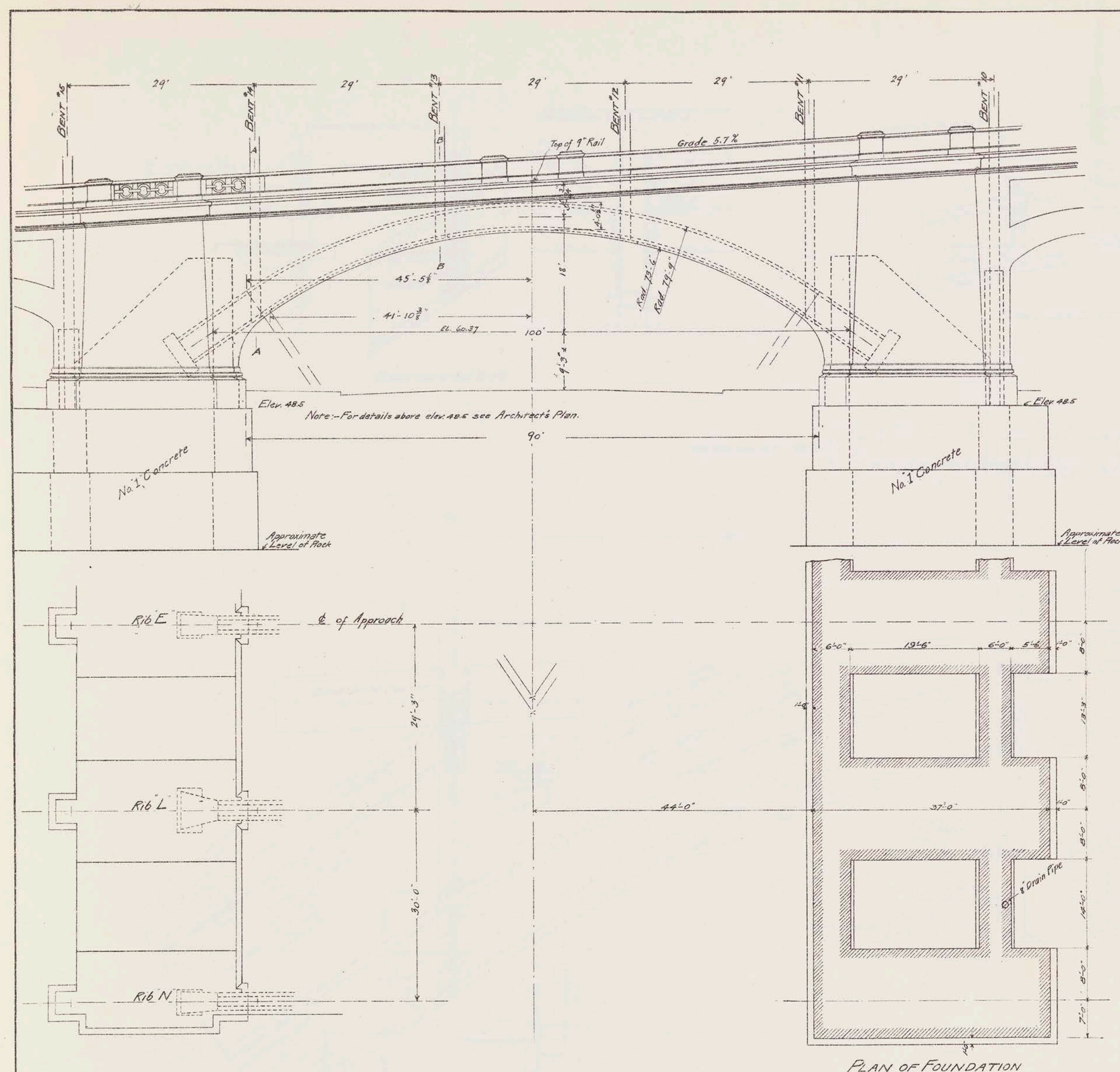
SECTION ON MIDDLE LINE OF FIRST AVE. LOOKING TOWARD LOW ABUTMENT
SCALE $\frac{1}{8}" = 1'-0"$



TOP PLAN OF SPAN SHOWING BALUSTRADE AND POSTS OF HIGH ABUTMENT
SCALE $\frac{1}{8}" = 1'-0"$

Chief Engineer.
Commissioner.

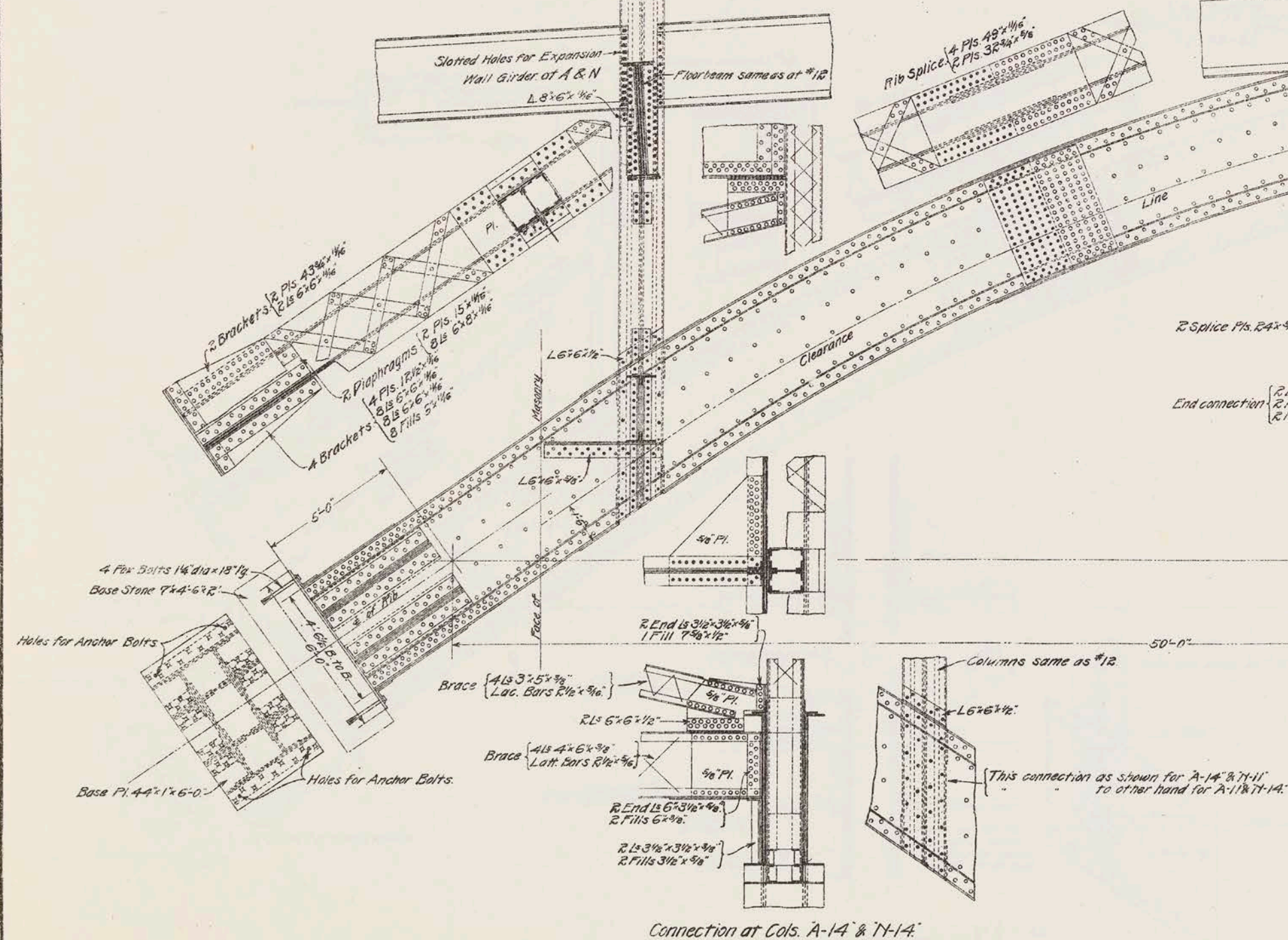
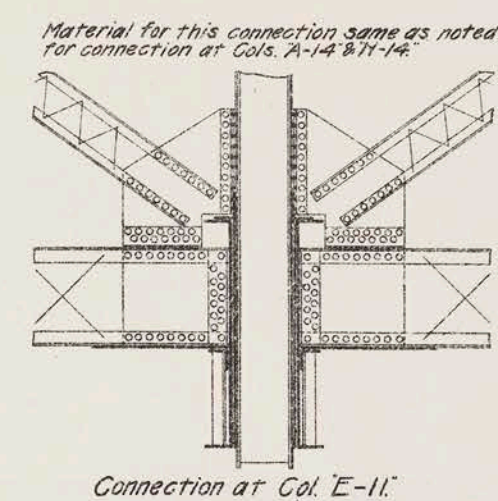
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELLS ISLAND BRIDGE NO. 4
FIRST AVENUE ARCH
MANHATTAN APPROACH



Chief Engineer
Commissioner

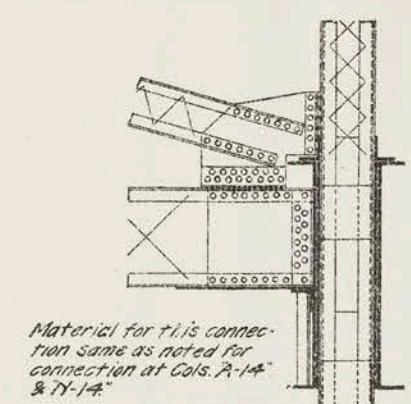
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 MANHATTAN APPROACH
 ABUTMENT FOUNDATIONS AND CROSS SECTIONS
 FIRST AVE. ARCH
 Scale $\frac{1}{16}$ in. = 1 ft.

4516

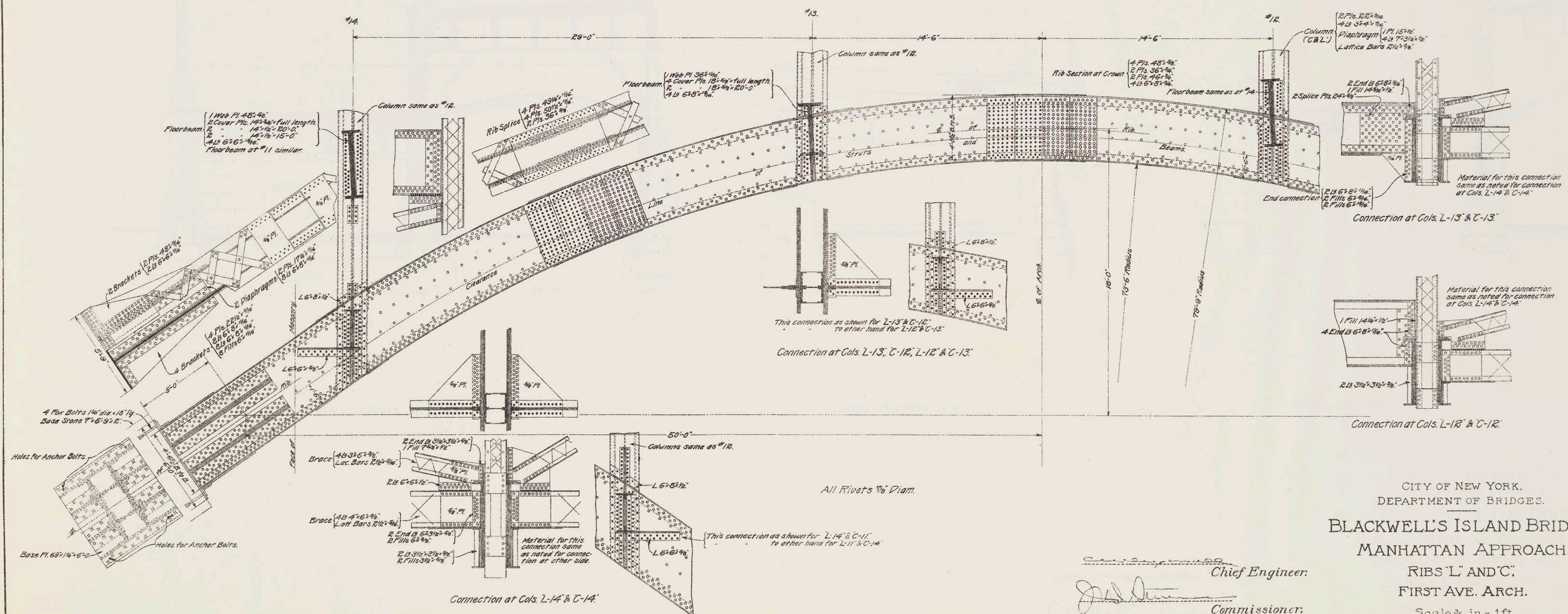


[Signature] Chief Engineer.

[Signature] Commissioner.

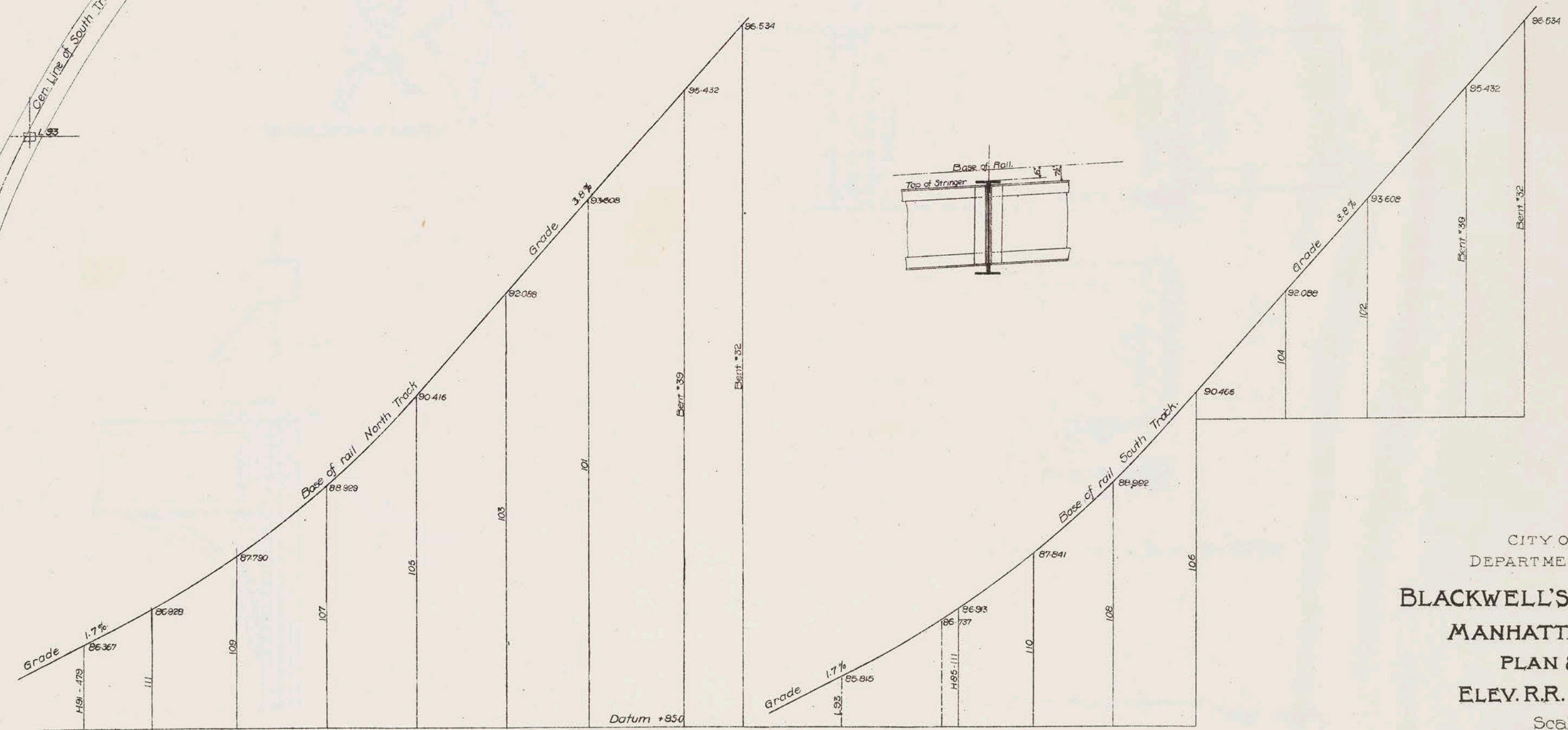
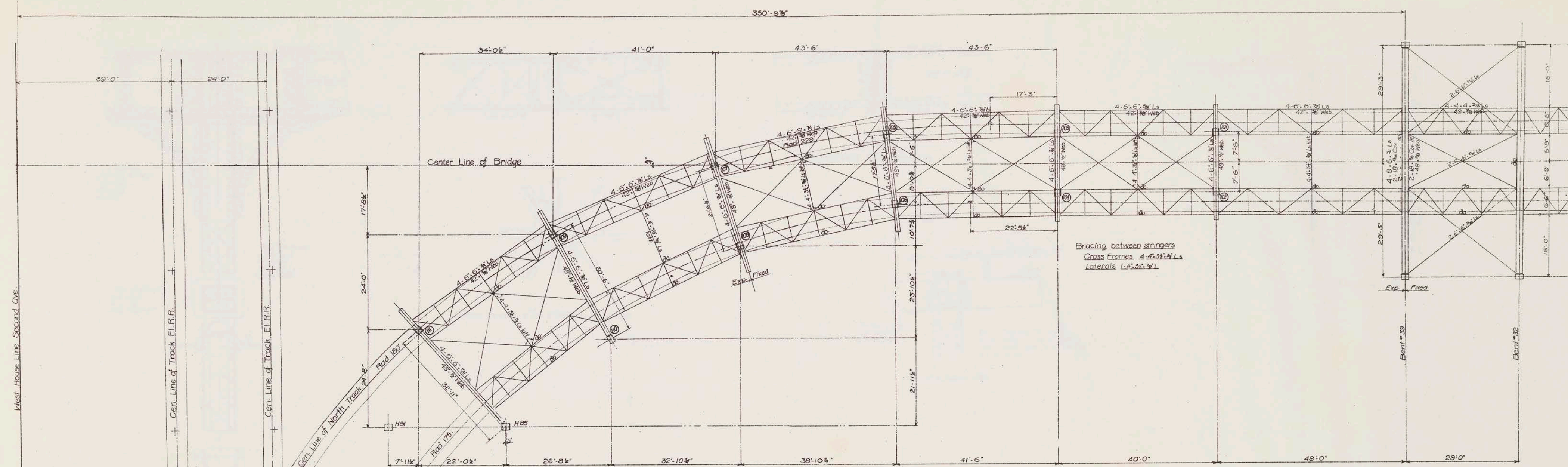


4517.



Chief Engineer:
Commissioner:

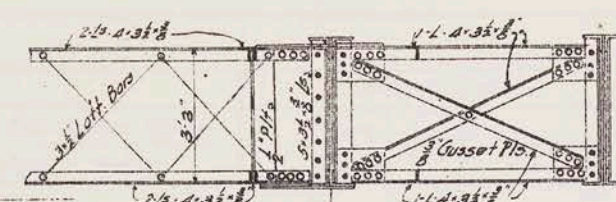
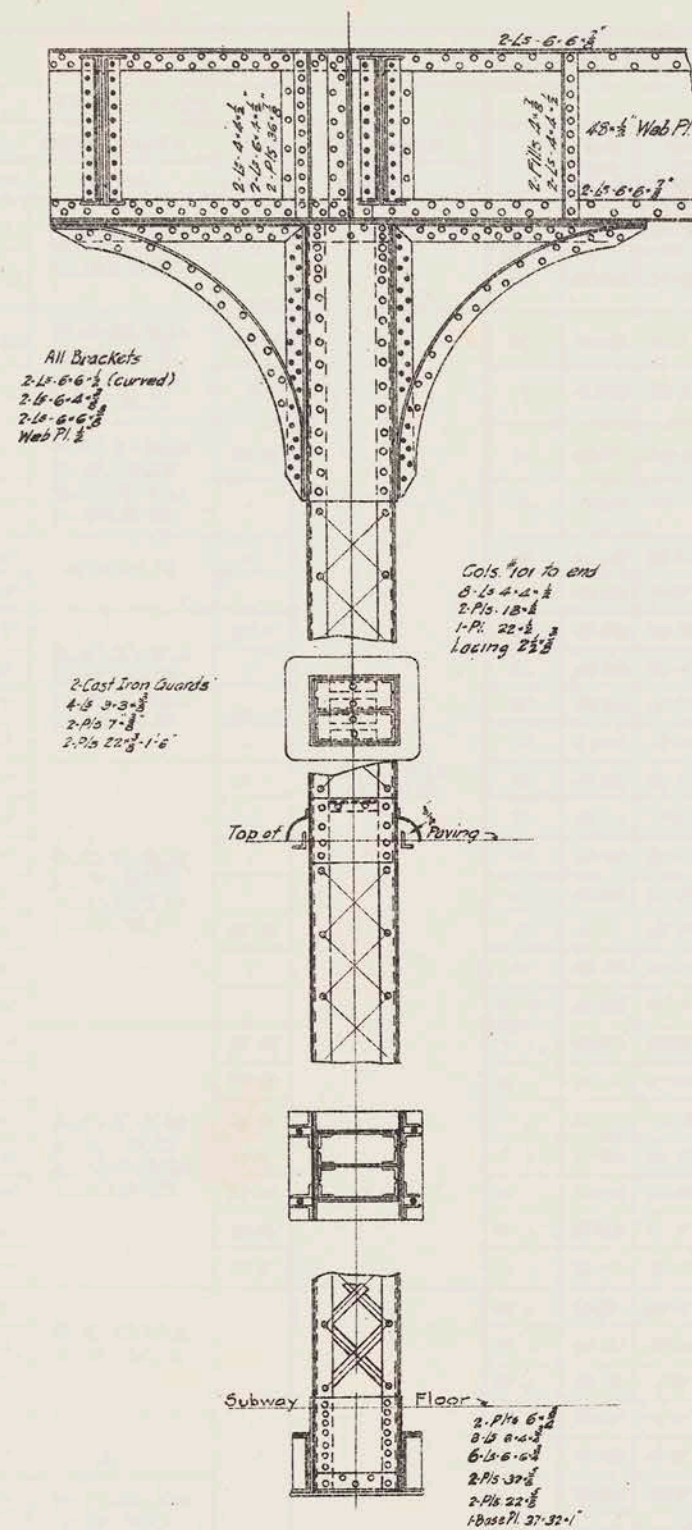
West House Line Second Ave.



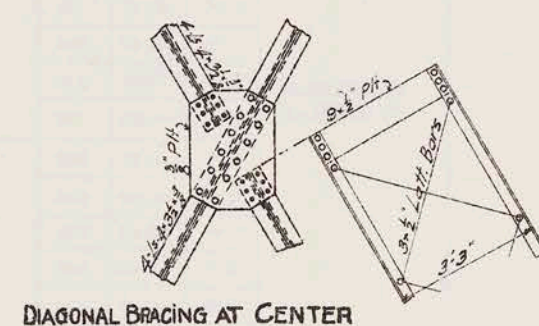
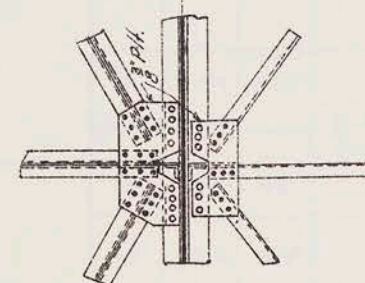
PROFILES ON C. L. OF TRACKS
Scale Hor. 1/8" in = 1 ft.
Vert. 1/4" in = 1 ft.

Chief Eng'r
Commissioner

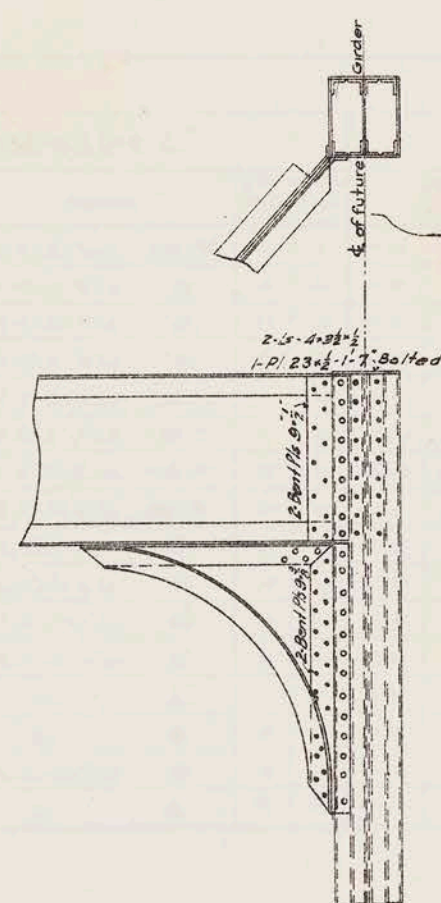
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
PLAN & PROFILE
ELEV. R.R. OVER SUBWAY
Scale 3/64" in. = 1 ft.



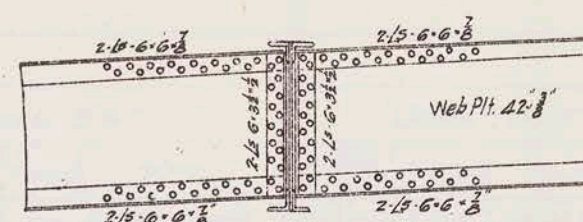
CROSS FRAMES & TOP & BOTTOM LATERALS



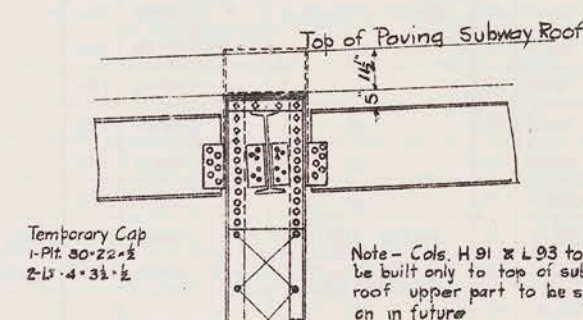
DIAGONAL BRACING AT CENTER



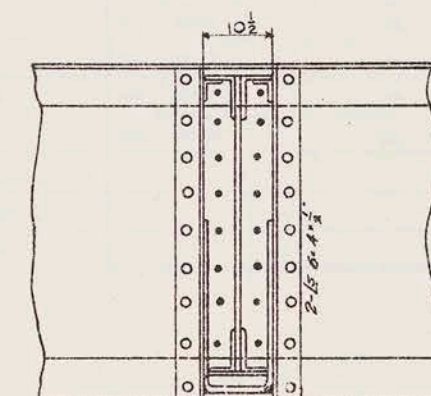
COLUMN H85



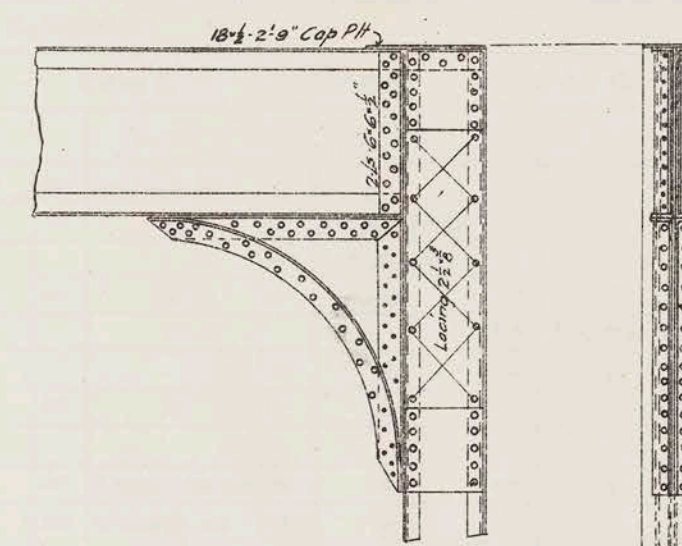
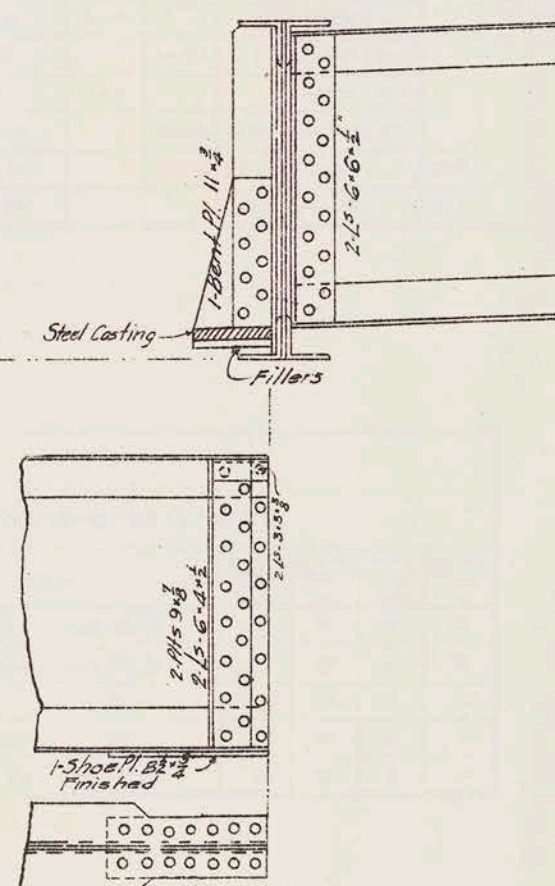
CONNECTION FOR STRINGERS



TOP OF COLUMN H91



EXPANSION JOINT AT BENT #39+107-108



COLUMN 110

Chief Eng'r.
Commissioner.

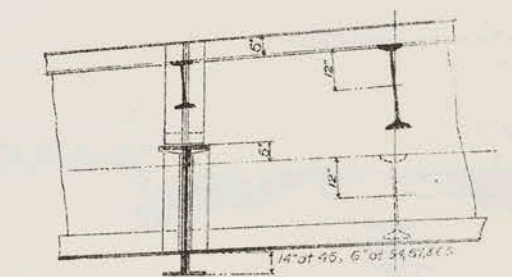
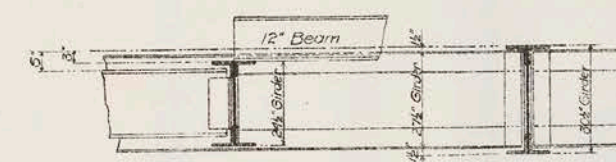
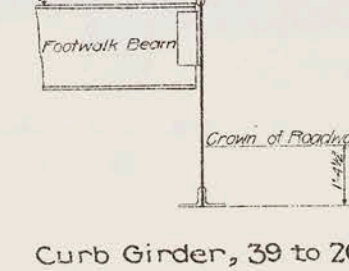
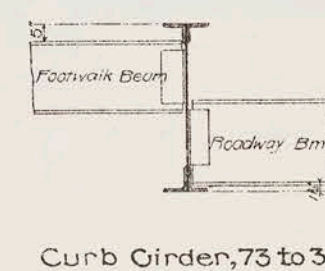
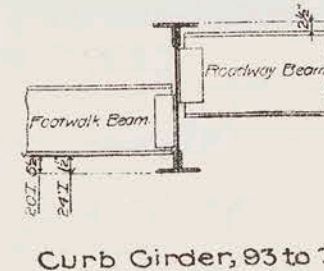
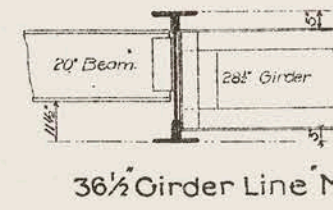
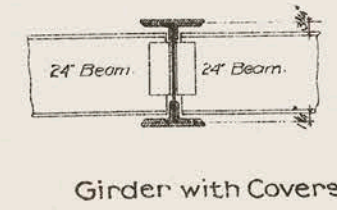
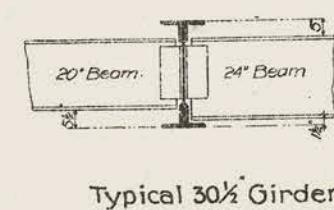
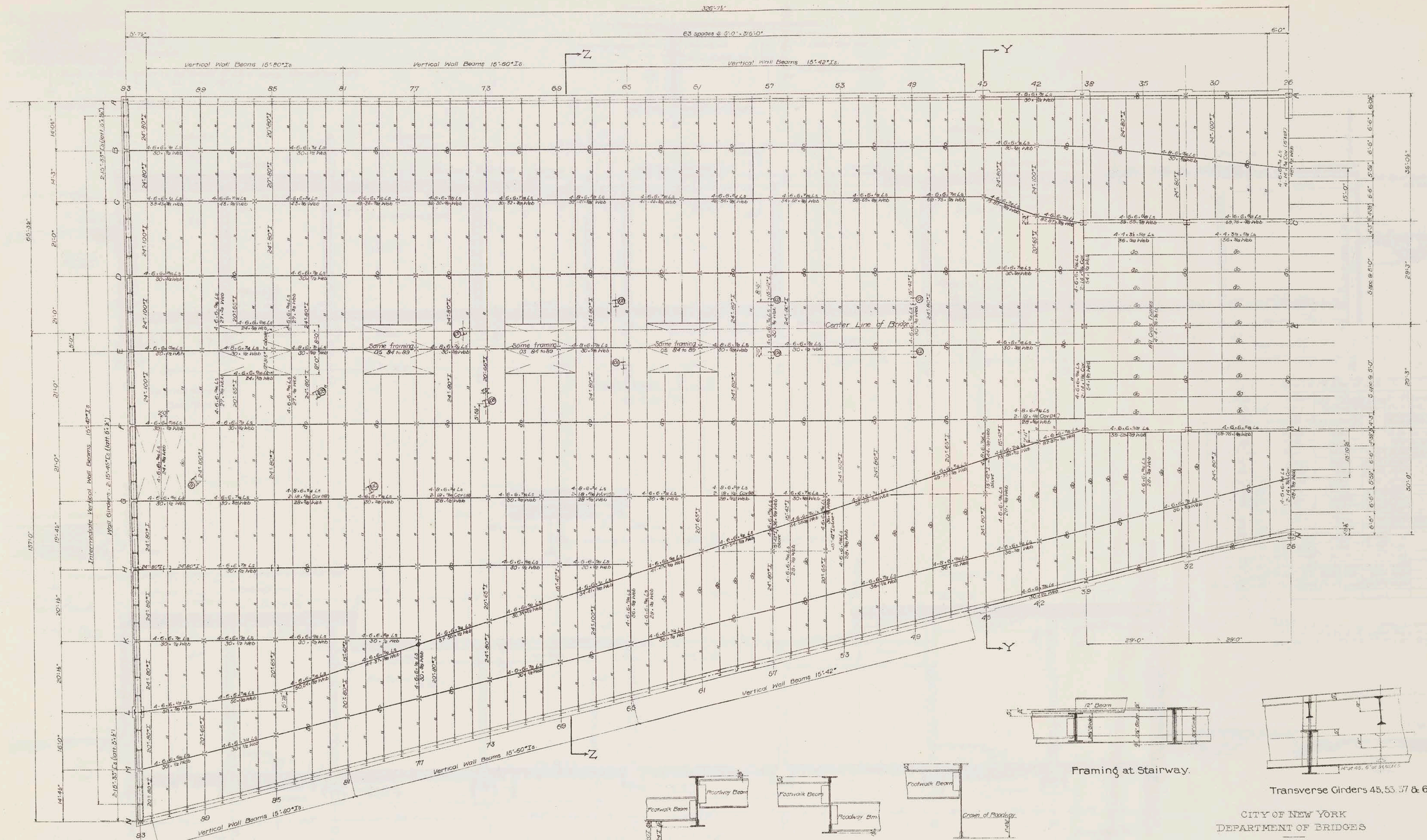
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
DETAILS OF
ELEV. R.R. OVER SUBWAY
Scale $\frac{3}{8}$ in. = 1 ft.

Columns above Subway											
Outer Cols.				Inner Cols.				Center Cols.			
Elev. of Top of Base Stone	Col. below splice	Col. above splice		Elev. of Top of Base Stone	Col. below splice	Col. above splice		Elev. of Top of Base Stone	Length	Section	
Length	Section	Length	Section	Length	Section	Length	Section	Length	Section	Length	Section
1A 37.333	62'-1"	4'-4 1/2" x 3'-3 1/2" Ls 2-18" x 3'-3 1/2" PL		1C 38.864	53'-7 1/2"	4'-4 1/2" x 3'-3 1/2" Ls 4-22" x 3'-3 1/2" PL 4-22" x 3'-3 1/2" PL 4-7 1/2" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL		2E 40.642	55'-0 1/2"	2-15" x 30" Cs 2-18" x 1 1/2" PL	
1N 42.376	57'-0 1/2"			1L 40.814	51'-4 1/2"						
2A 32.333	62'-6 1/2"	4'-4 1/2" x 3'-3 1/2" Ls 2-18" x 3'-3 1/2" PL 4-22" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL	22'-9"	2C 39.433	51'-11"	4'-4 1/2" x 3'-3 1/2" Ls 2-22" x 3'-3 1/2" PL 4-7 1/2" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL		3E 41.371	54'-0"		
2N 42.836	58'-0"			2L 41.849	49'-5"						
3A 39.367	55'-11"	4'-4 1/2" x 3'-3 1/2" Ls 4-18" x 3'-3 1/2" PL 4-4 1/2" x 3'-3 1/2" Ls 1-14" x 3'-3 1/2" PL	23'-2 1/2"	3C 40.061	49'-6"	4'-4 1/2" x 3'-3 1/2" Ls 4-22" x 3'-3 1/2" PL 4-7 1/2" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL		4E 42.171	52'-2"		
3N 43.294	55'-0"			3L 42.645	46'-11"						
4A 40.455	57'-2"	60" x 65" x 2		4C 41.287	58'-7 1/2"		20'-7"	5E 43.096	50'-3"		
4N 43.955	53'-8"			4L 42.322	57'-0"	4'-4 1/2" x 3'-3 1/2" Ls 4-22" x 3'-3 1/2" PL 4-7 1/2" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL		6E 43.887	48'-5"		
5A 41.552	54'-5"		23'-2"	5C 42.293	56'-7 1/2"		20'-6"	7E 44.548	46'-9"		
5N 44.552	51'-5"	4'-4 1/2" x 3'-3 1/2" Ls 2-18" x 3'-3 1/2" PL 4-4 1/2" x 3'-3 1/2" Ls 1-14" x 3'-3 1/2" PL		5L 43.782	55'-4 1/2"		20'-5"	8E 45.451	44'-10"		
6A 42.733	51'-7"		23'-1 1/2"	6C 43.305	54'-7"		20'-5"	9E 46.478	42'-9 1/2"		
6N 45.149	49'-2"			6L 44.517	53'-4 1/2"		20'-4"	10E 48.600	40'-9"		
7A 43.486	49'-2"		23'-1"	7C 43.360	52'-11"	4'-4 1/2" x 3'-3 1/2" Ls 4-22" x 3'-3 1/2" PL 4-7 1/2" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL		11E 48.600	34'-8"		
7N 45.653	47'-0"			7L 45.127	51'-3"		20'-3"	12E 50.183	32'-0 1/2"		
8A 44.342	46'-8"	4'-4 1/2" x 3'-3 1/2" Ls 2-18" x 3'-3 1/2" PL 4-4 1/2" x 3'-3 1/2" Ls 1-14" x 3'-3 1/2" PL		8C 44.780	51'-1"		20'-3"	13E 51.551	28'-7"		
8N 45.942	45'-3"			8L 45.446	50'-5"		20'-2"	14E 52.036	27'-1"		
9A 45.340	43'-5"		23'-0 1/2"	9C 46.151	49'-8"		20'-2"	15E 52.036	25'-3 1/2"		
9N 47.180	42'-2"			9L 46.765	48'-1"		20'-1"	16E 53.173	23'-11"		
10 (N&N) 48.500	39'-2 1/2"			10 (C&L) 48.500	45'-4"		20'-1"	17E 53.173	22'-3"		
15 " 42.500	30'-1 1/2"		22'-10 1/2"	15 " 48.500	40'-3"		19'-7 1/2"	18E 54.333	20'-8"		
16 " 50.118	27'-6"		22'-10"	16 " 50.118	37'-7 1/2"		19'-6 1/2"	19E 55.128	18'-11"		
17 " 60.800	25'-4"	4'-4 1/2" x 3'-3 1/2" Ls 2-18" x 3'-3 1/2" PL 4-4 1/2" x 3'-3 1/2" Ls 1-14" x 3'-3 1/2" PL	22'-9 1/2"	17 " 50.811	35'-11"		19'-5 1/2"	20E 55.613	17'-5"		
18 " 51.555	22'-11"		22'-8"	18 " 51.546	34'-2"		19'-4 1/2"	21E 56.000	15'-0"		
19 " 52.033	20'-9 1/2"		22'-8"	19 " 52.032	32'-4"		19'-3 1/2"	22E 56.000	14'-0"		
20 " 52.633	18'-5 1/2"		22'-8 1/2"	20 " 52.600	31'-1"		19'-2 1/2"	23E 56.000	14'-0"		
21 " 53.187	15'-4"		22'-8"	21 " 53.186	28'-6"		19'-1 1/2"	24E 56.000	14'-0"		
22 " 53.790	36'-3"			22 " 53.280	46'-11"			25E 56.000	14'-0"		
23 " 54.441	34'-6"	4'-4 1/2" x 3'-3 1/2" Ls 2-18" x 3'-3 1/2" PL		23 " 54.437	45'-2 1/2"			26E 56.000	14'-0"		
24 " 55.053	32'-1"			24 " 55.116	37'-5"	4'-4 1/2" x 3'-3 1/2" Ls 2-22" x 3'-3 1/2" PL 4-7 1/2" x 3'-3 1/2" Ls 1-16" x 3'-3 1/2" PL		27E 56.000	14'-0"		
25 " 55.681	41'-9"			25 " 55.681	41'-9"			28E 56.000	14'-0"		
26 " 56.062	27'-8"			26 " 56.030	40'-3"			29E 56.000	14'-0"		
27 " 56.062	27'-8"			27 " 56.030	39'-2"			30E 56.000	14'-0"		
28 " 56.062	27'-8"			28 " 56.030	38'-1"			31E 56.000	14'-0"		
29 " 56.062	27'-8"			29 " 56.030	38'-1"			32E 56.000	14'-0"		
30 " 56.062	27'-8"			30 " 56.030	38'-1"			33E 56.000	14'-0"		

Subway Columns																	
Lines 'B' & 'C'			Lines 'M' & 'N'			Line 'D'			Line 'E'			Line 'F'			Line 'G'		
Elev. of Top of Base Stone	Length	Section	Elev. of Top of Base Stone	Length	Section	Elev. of Top of Base Stone	Length	Section	Elev. of Top of Base Stone	Length	Section	Elev. of Top of Base Stone	Length	Section	Elev. of Top of Base Stone	Length	Section
35B 56.255	24'-6"	2-12" x 30" C, latticed	35M 56.235	24'-6"	2-12" x 30" C, 2-14" x 30" D	42 54.524	20'-0"	2-12" x 30" C, latt	42E 54.524	20'-0"	2-12" x 30" C, latt	42F 54.524	20'-0"	2-12" x 30" C, latt			
36B 55.305	"	do	36M 55.305	"	do	43 54.107	"	45D do	43E do	"	45F do	43F do	"	45H do			
42B 54.375	"	do	42M 54.375	"	do	49 53.402	"	48D do	49E do	"	48F do	49F do	"	48H do			
45B 53.383	"	do	45M 53.383	"	do	53 52.672	"	53D do	53E do	"	53F do	53F do	"	53H do			
49B 52.581	24'-0"	do	49M 52.581	24'-0"	do	54 52.492	"	"	"	"	"	"	"	54G 2-12" x 30" C, latt			
53B 51.279	"	do	53M 51.279	"	do	57 51.937	"	57D do	57E do	"	57F do	57F do	"	57H do			
57B 49.977	"	do	57M 49.977	"	do	61 51.202	"	61D do	61E do	"	61F do	61F do	"	61H do			
61B 49.175	23'-6"	do	61M 49.175	23'-6"	do	62 51.021	"	"	"	"	"	"	"	62G do			
65B 47.873	"	do	65M 47.873	"	do	65 50.467	"	65D do	65E 2-12" x 30" C, 2-14" x 30" D	65F do	65G do	65G do	"	65H do			
69B 46.571	"	do	69M 46.571	"	2-12" x 30" C, latticed	69 49.732	"	69D do	69E 2-12" x 30" C, latt	69F do	69G do	69G do	"	69H 2-12" x 30" C, latt			
73B 45.769	23'-0"	do	73M 45.769	23'-0"	do	70 49.552	"	"	"	"	"	"	"	70G do			
77B 44.467	"	do	77M 44.467	"	do	73 48.897	"	73D do	73E 2-12" x 30" C, 2-14" x 30" D	73F do	73G do	73H do	73H do	73H do			
81B 43.165	"	do	81M 43.165	"	do	77 48.262	"	77D do	77E 2-12" x 30" C, latt	77F do	77G do	77H do	77H do	77H do			
85B 41.969	23'-6"	do	85M 41.969	"	do	78 48.082	"	"	"	"	"	"	"	78G do			
89B 41.269	"	do	89M 41.269	"	do	81 47.827	"	81D do	81E 2-12" x 30" C, 2-14" x 30" D	81F do	81G do	81H do	81H do	81H do			
93B 40.119	24'-3"	2-12" x 30" C, latticed	93M 40.009	23'-6"	2-12" x 30" C, latticed	85 46.792	"	85D do	85E 2-12" x 30" C, latt	85F do	85G do	85H do	85H do	85H do			
97B 37.478	24'-6"	2-12" x 30" C, 2-14" x 30" D	97M 37.475	24'-6"	2-12" x 30" C, latticed	86 46.602	"	"	"	"	"	"	"	86G do			
42C 54.625	24'-3"	2-12" x 30" C, latticed	42L 54.625	24'-3"	2-12" x 30" C, latticed	93 45.342	"	93D 2-12" x 30" C, latt	93E 2-12" x 30" C, latt	93F 2-12" x 30" C, latt	93G 2-12" x 30" C, latt	93H 2-12" x 30" C, latt	93H 2-12" x 30" C, latt	93H 2-12" x 30" C, latt			
45C 54.133	23'-9"	do	45G 54.133	23'-9"	do												
49C 53.331	23'-3"	2-12" x 30" C, 2-14" x 30" D	49L 53.331	23'-3"	2-12" x 30" C, 2-14" x 30" D												
54C 52.354	22'-6"	2-12" x 30" C, latticed	54H 52.354	22'-0"	2-12" x 30" C, latticed												
57C 51.977	22'-0"	do	57H 51.977	"	do												
62C 50.850	21'-6"	do	61L 51.175	21'-6"	do	101 49.006		72.985	53.316	35'-3"							
66C 50.373	21'-0"	do	65H 50.217	20'-3"	2-12" x 30" C, 2-14" x 30" D	103 48.104		87.546	71.520	51.786	"						
70C 49.496	20'-3"	do	69L 49.861	"	2-12" x 30" C, latticed	105 46.105		85.876	50.122	"							
73C 48.769	20'-0"	do	73L 48.769	20'-0"	do	107 45.387		84.387	48.637	"							
77C 47.973	"	do	77K 48.262	"	do	108 84.387		69.580	48.637	"							
81C 47.318	"	do	81L 47.318	"	do	109 83.818		47.498	"								
85C 46.583	"	do	85L 46.583	"	do	110 87.206		47.546	39'-9"								
89C 45.849	"	do	89L 45.849	"	do	111 82.386		45.986	36'-6"								
93C 45.133	"	2-12" x 30" C, latticed				H85		66.375	45.708	40'-5"							
97C 40.119	24'-6"	do				H91		65.282	45.532	20'-3"							
99C 40.119	"	do				L93		64.825	45.082	20'-3"							

Subway Roof Beams																							
Long'd'l Girders				Curb Girders Line C				Curb Girders Line L				Transverse Beams				Transverse Girders							
Section		8 Riv and conn Shop (feet)		On to top of Ls if col Lower end Upper end		Section	8 Riv and conn Field (feet)	Shop (feet)	On to top of Ls if col Lower end Upper end		Section	8 Riv and conn Field (feet)	Shop (feet)	8 Field Riv Trupper end (feet)	Section	8 Riv and conn Shop (feet)	Shop (feet)	8 Field Riv Trupper end (feet)	Section	8 Riv North end Shop (feet)	8 Riv South end Shop (feet)		
445-42, 40-38, 40-36, 40-34, 40-32, 40-30, 40-28, 40-26, 40-24, 40-22, 40-20, 40-18, 40-16, 40-14, 40-12, 40-10, 40-8, 40-6, 40-4, 40-2, 40-0	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	12 10	93-39	3'-2 1/2" x 3'-7 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	12 10	93-39	4'-2" x 4'-3"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	12 10		15'-42" I	4 6			40 F-G	4'-8" x 6" x 1/2" Ls	Web 44" x 3/4"	22 26	22 26
445-42, 40-38, 40-36, 40-34, 40-32, 40-30, 40-28, 40-26, 40-24, 40-22, 40-20, 40-18, 40-16, 40-14, 40-12, 40-10, 40-8, 40-6, 40-4, 40-2, 40-0	4'-6" x 6" x 1/2" Ls	do	14 10	99-65	3'-7 1/2" x 3'-7 1/2"	4'-6" x 6" x 1/2" Ls	do	12 10	69-25	4'-3" x 4'-3"	4'-6" x 6" x 1/2" Ls	do	14 12		20'-65" I	5 8			54 G-H	4'-6" x 6" x 1/2" Ls	Web 36" x 3/4"	18 34	10 18
445-42, 40-38, 40-36, 40-34, 40-32, 40-30, 40-28, 40-26, 40-24, 40-22, 40-20, 40-18, 40-16, 40-14, 40-12, 40-10, 40-8, 40-6, 40-4, 40-2, 40-0	4'-6" x 6" x 1/2" Ls	do	14 9	86-61	3'-7 1/2" x 3'-8 1/2"	4'-6" x 6" x 1/2" Ls	do	24 19	95-81	4'-3" x 3'-8 1/2"	do	do	12 10						57 G-H	do	do	11 22	11 21
M193-69	do	do	18 12	81-79	3'-8 1/2" x 3'-14"	4'-6" x 6" x 1/2" Ls	do	12 10	81-77	3'-8 1/2" x 3'-14"	do	do	10 8		20'-80" I	5 8			65 H-M	4'-6" x 6" x 1/2" Ls	do	18 34	8 14
H 73-69, K 69-61	4'-6" x 6" x 1/2" Ls	do	16 10	78-73	3'-14" x 2'-6 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	24 14	77-73	3'-14" x 2'-6 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	18 12	14					77 K-M	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	18 34	8 14
E 89-85, 81-77, 73-69, 65-61	4'-6" x 6" x 1/2" Ls	do	22 14	73-70	2'-6 1/2" x 2'-8 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	12 10	73-69	2'-6 1/2" x 2'-8 1/2"	4'-6" x 6" x 1/2" Ls	do	16 10		24'-80" I	6 10							
B 25-81 to 49-45 inc M 89-85 to 77-73 inc	do	do	16 10	70-65	2'-8 1/2" x 3'-5 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	24 14	68-65	2'-10 1/2" x 3'-5 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	14 12	18									
D 85-81 to 49-45 inc E 87-83 to 49-45 inc F 85-81 to 49-45 inc H 69-65 to 77-73 inc K 83-89 M 89-85	4'-6" x 6" x 1/2" Ls	do	20 18	65-62	3'-6 1/2" x 3'-10 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	12 10	65-61	3'-6 1/2" x 3'-10 1/2"	4'-6" x 6" x 1/2" Ls	Web 30" x 3/4"	20 17		24'-100" I	6 10							
A 25-32, 32-30, 30-28, 28-26, 26-24, 24-22, 22-20, 20-18, 18-16, 16-14, 14-12, 12-10, 10-8, 8-6, 6-4, 4-2, 2-0	do	do	16 10	62-57	3'-10 1/2" x 4'-7"	4'-6" x 6" x 1/2" Ls	do	24 19	61-57	4'-0 1/2" x 4'-7"	4'-6" x 6" x 1/2" Ls	do	20 17	16									
D 61 53-69, 69-65, F 63-69, 69-65	4'-6" x 6" x 1/2" Ls	do	20 13	57-54	4'-7" x 4'-11"	4'-6" x 6" x 1/2" Ls	do	14 11	57-54	4'-7" x 4'-11"	4'-6" x 6" x 1/2" Ls	do	12	22	4'-6" x 6" x 1/2" Ls 24" x 3" Web	9 12							
G 34-32, 32-28	4'-6" x 6" x 1/2" Ls	do	20 10	54-48	4'-11" x 5'-10"	4'-6" x 6" x 1/2" Ls	do	26 20	54-48	4'-11" x 5'-10"	4'-6" x 6" x 1/2" Ls	do	32 26										
E 45-41, 77-73, 69-65, 61-57	4'-6" x 6" x 1/2" Ls	do	26 13	49-45	5'-10" x 6'-3 1/2"	4'-6" x 6" x 1/2" Ls	do	18 15	49-45	5'-10" x 6'-3 1/2"	do	do	24 20	32	4'-6" x 6" x 1/2" Ls 28" x 3" Web	5 12							
G 62-57	4'-6" x 6" x 1/2" Ls	do	20 10	45-42	6'-3 1/2" x 6'-10 1/2"	do	do	14 11	45-42	6'-3 1/2" x 6'-10 1/2"	do	do	16 13										
F 45-39, G 62-61, 78-73, 70-65	4'-6" x 6" x 1/2" Ls	do	24 12	42-39	6'-10 1/2" x 7'-5 1/2"	do	do	16 15	42-39	6'-10 1/2" x 7'-5 1/2"	do	do	16 15										
M 45-42, 42-38, 38-36	4'-6" x 6" x 1/2" Ls	do	16 14	39-32	5'-0 1/2" x 5'-9 1/2"	4'-6" x 6" x 1/2" Ls	do	30 24	39-32	5'-0 1/2" x 5'-9 1/2"	4'-6" x 6" x 1/2" Ls	do	30 24		4'-6" x 6" x 1/2" Ls 27" x 3" Web	10 14							
M 65-61, 61-57, 57-53	4'-6" x 6" x 1/2" Ls	do	18 15	32-26	5'-9 1/2" x 6'-6 1/2"	do	do	30 24	32-26	5'-9 1/2" x 6'-6 1/2"	do	do	30 24		4'-6" x 6" x 1/2" Ls 28" x 3" Web	10 14							
M 36-32, 32-28	4'-6" x 6" x 1/2" Ls	do	20 16																				
M 53-49	do	do	22 14																				
M 49-45	4'-6" x 6" x 1/2" Ls	do	24 16																				
Spur Girds 28-34, 34-40, 40-46, 46-52	4'-6" x 6" x 1/2" Ls	do	10 8																				
																		Chief					

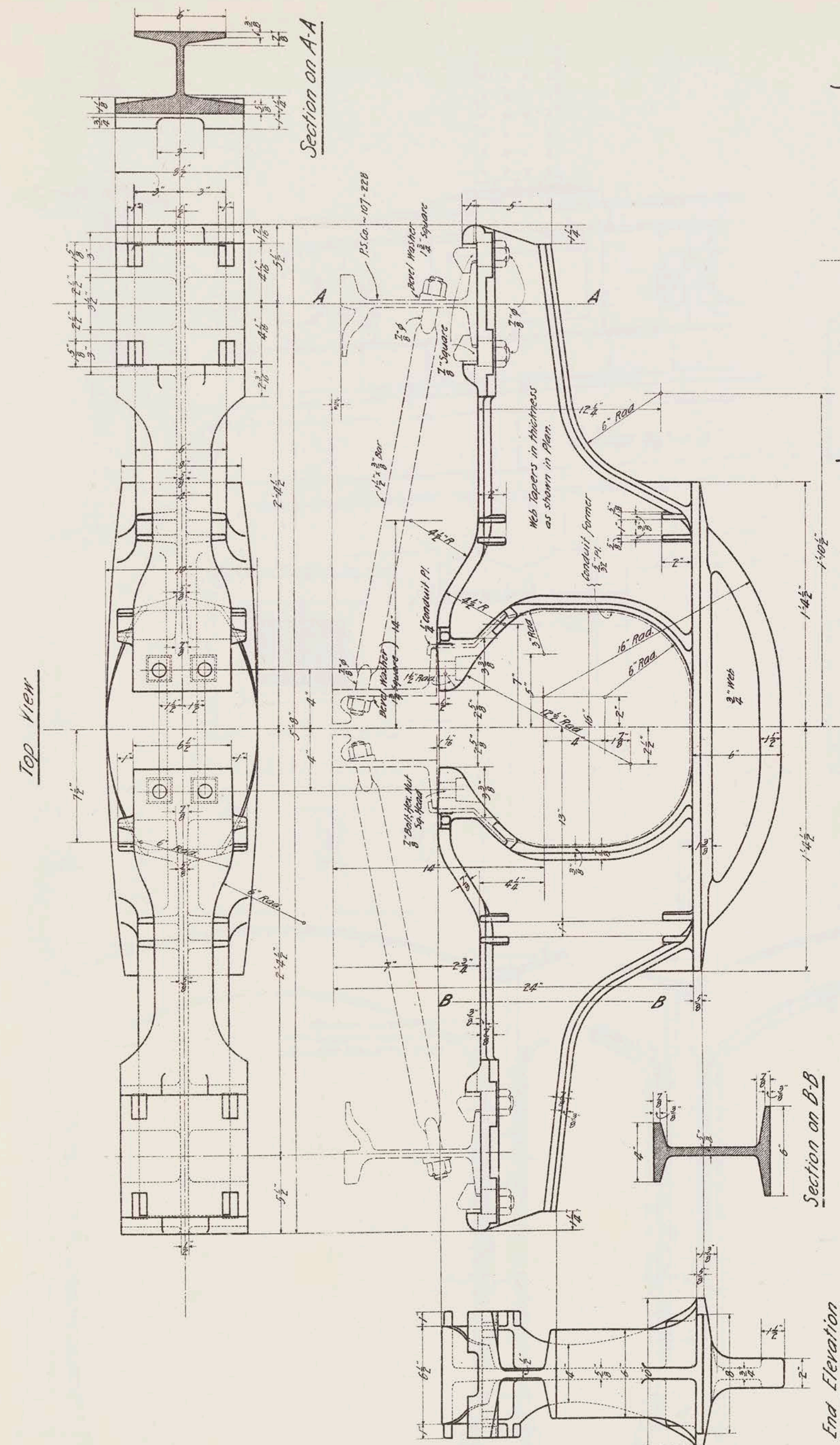


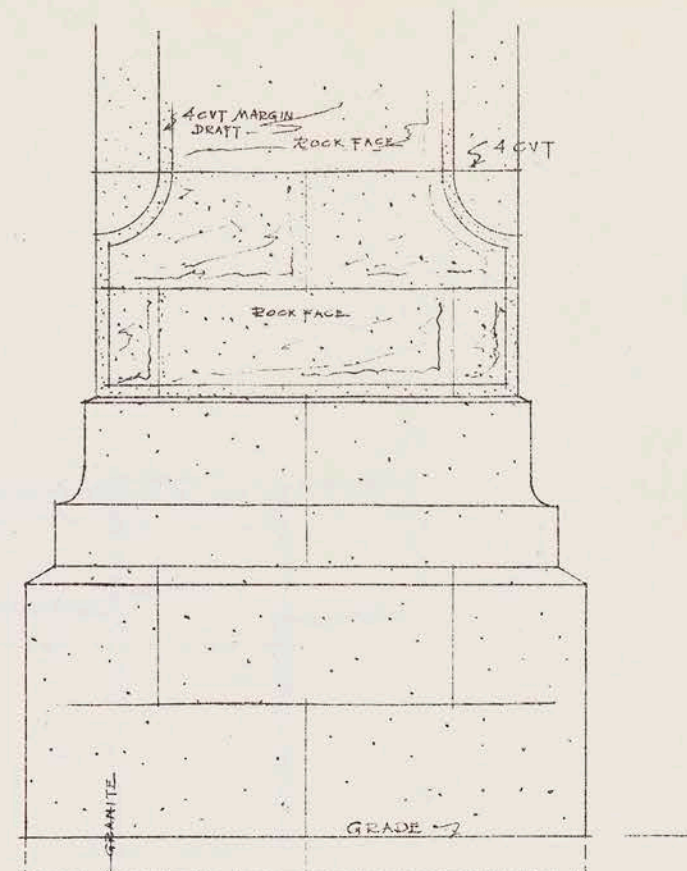
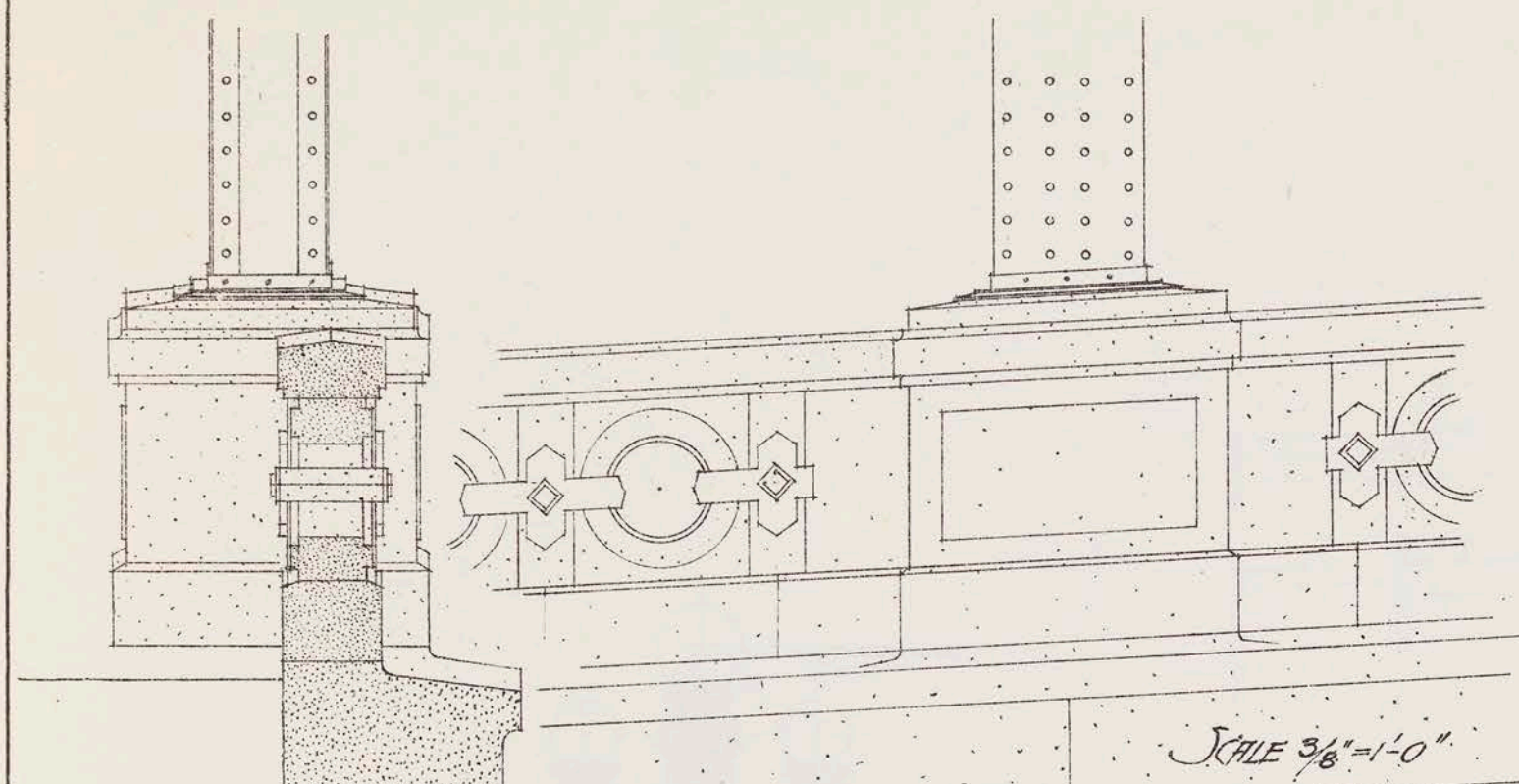


CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN SUBWAY STATION
ROOF FRAMING PLAN

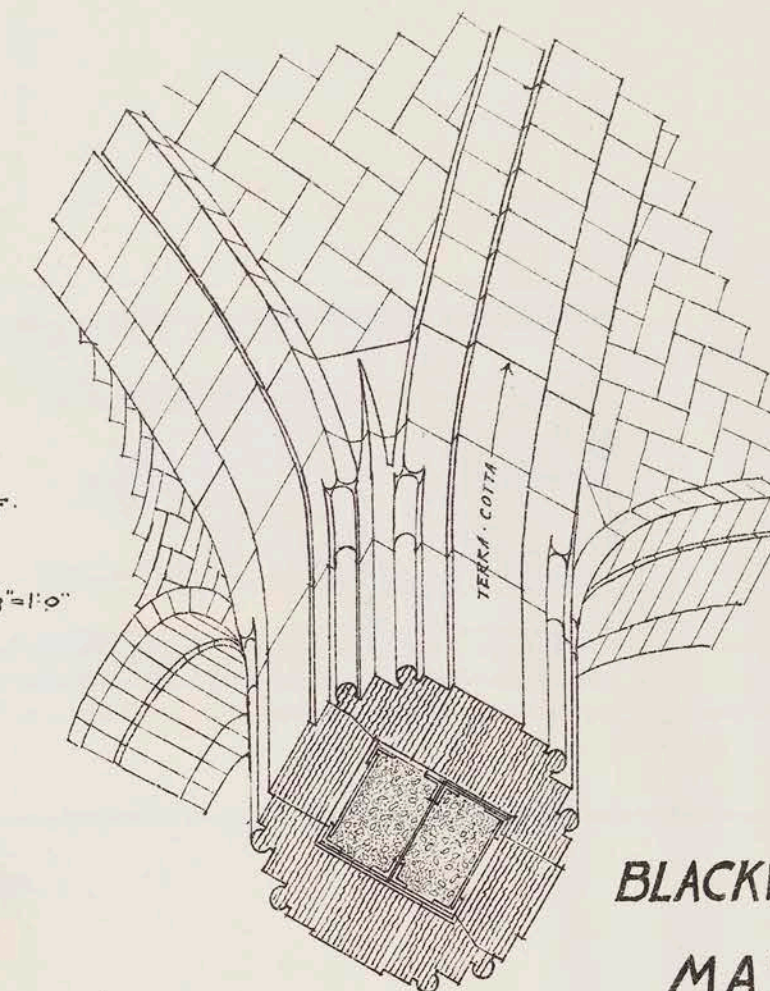
Scale $\frac{3}{64}$ in. = 1 ft.

[Signature] Chief Eng'r
[Signature] Commissioner

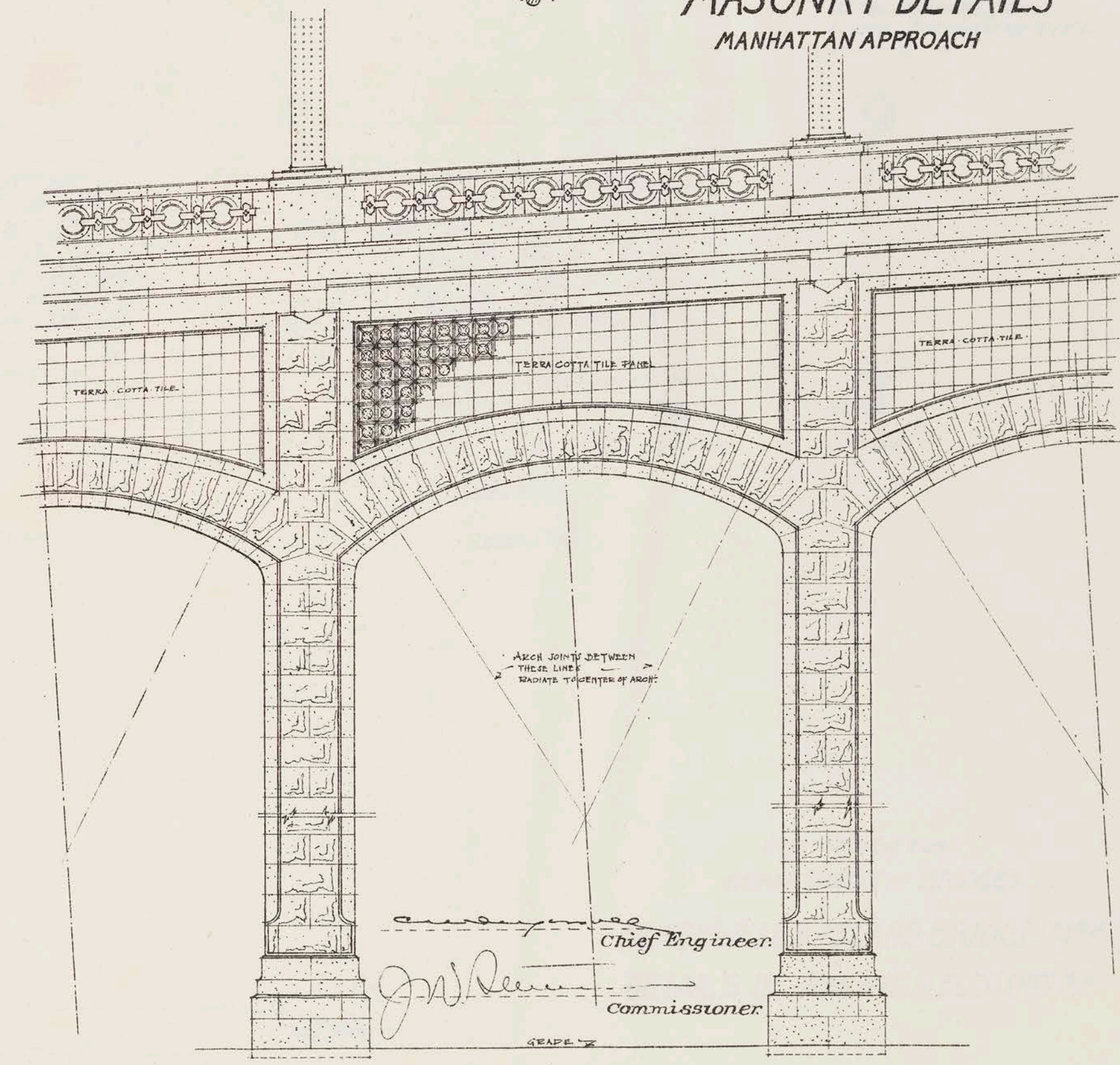
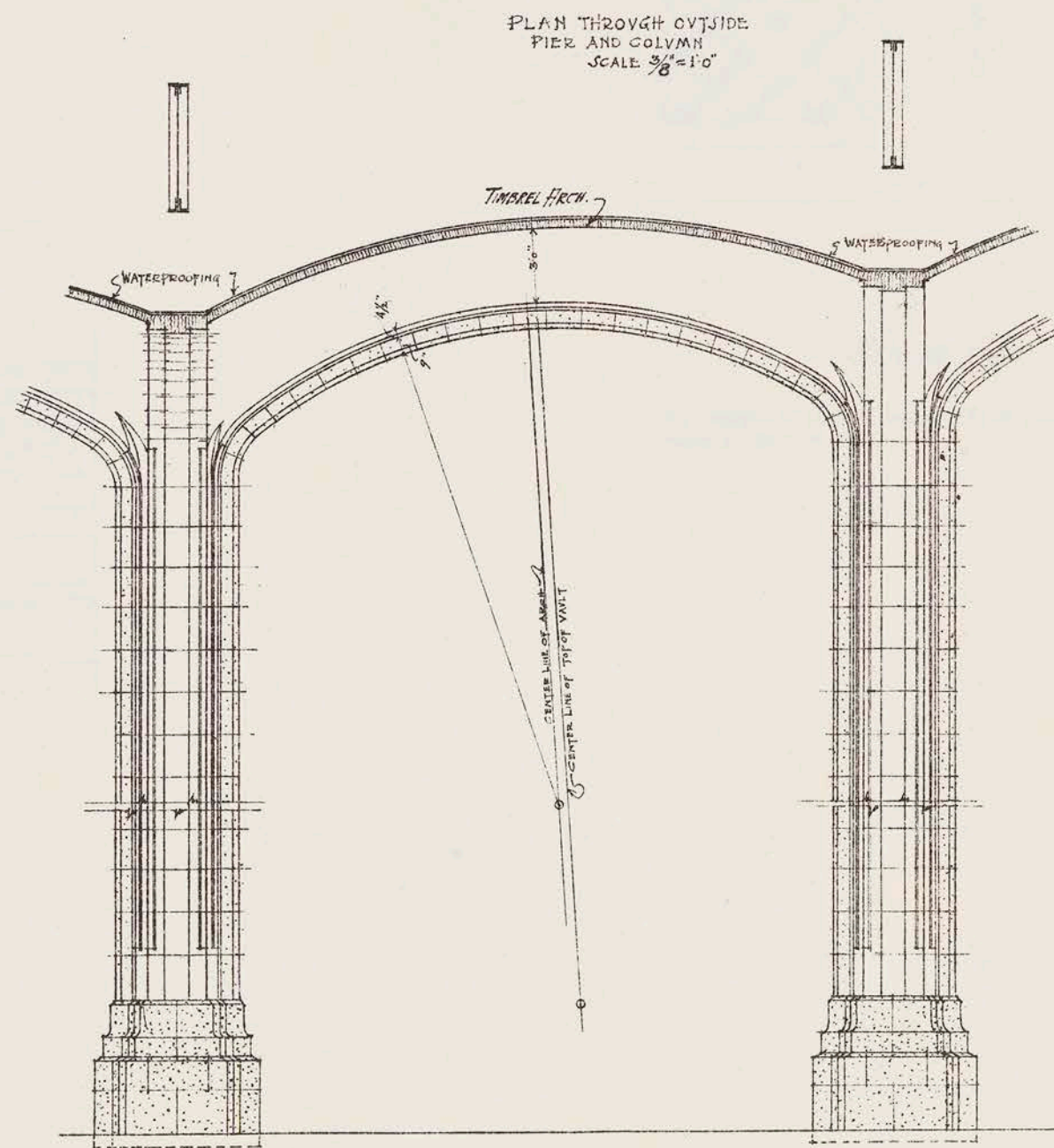
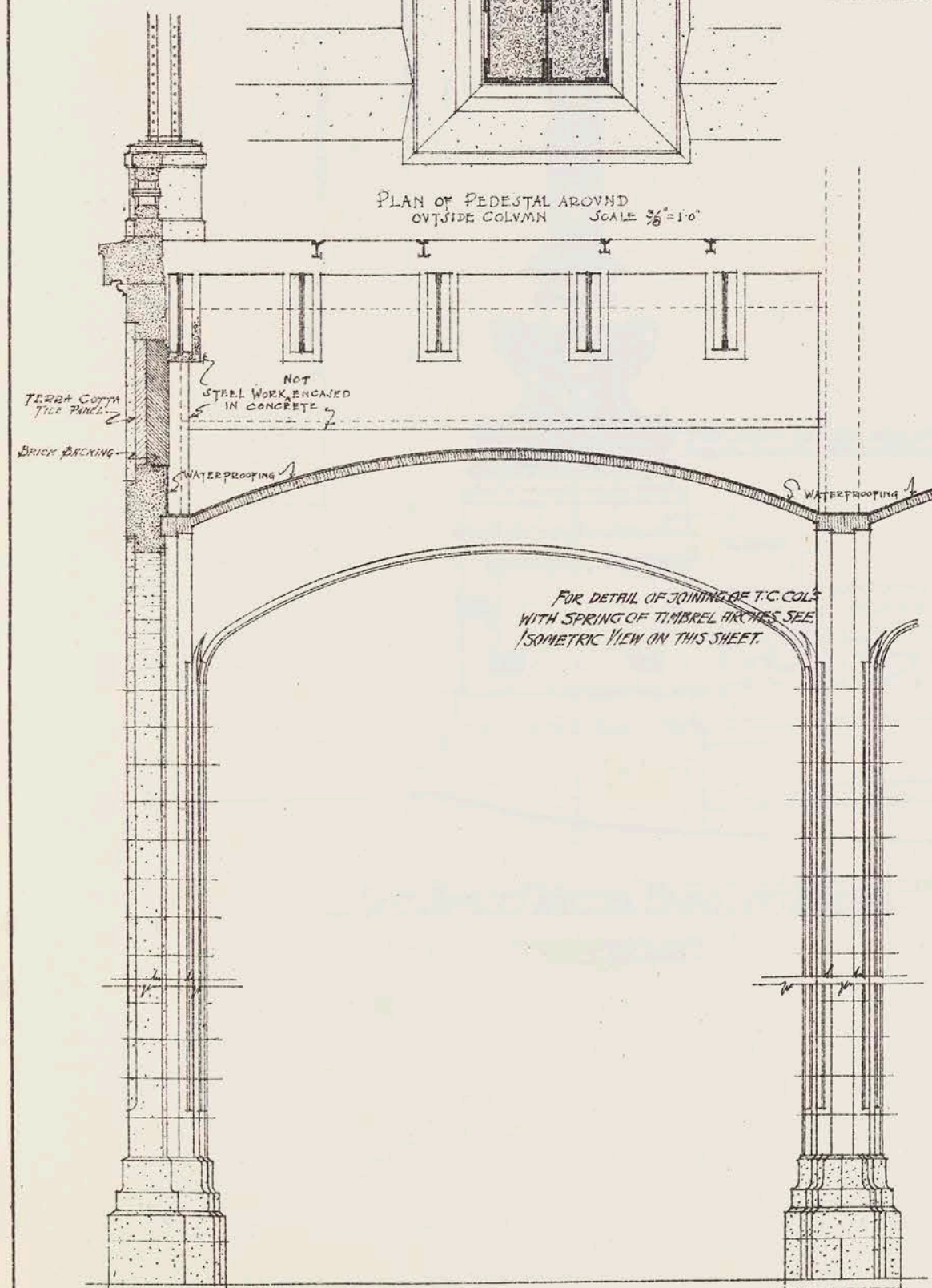
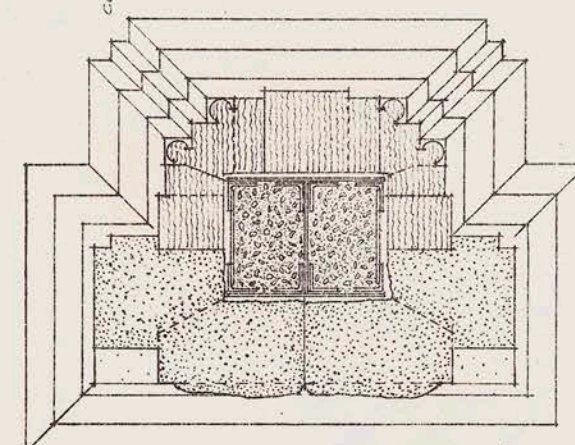
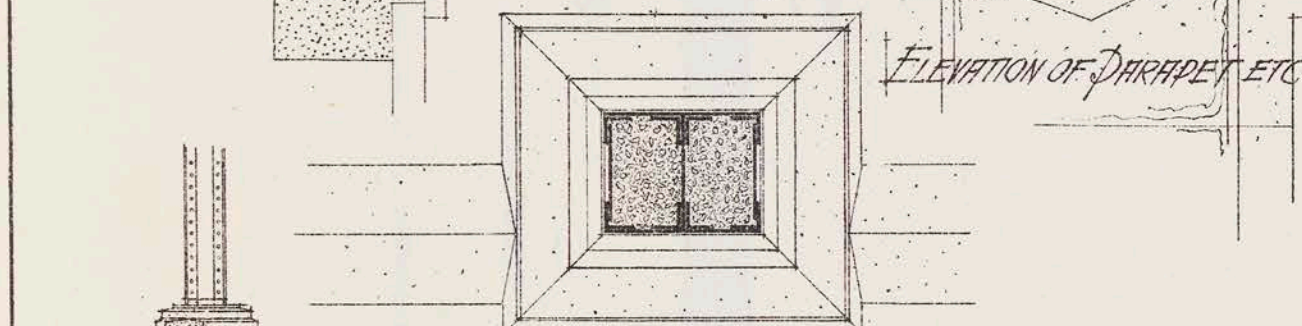




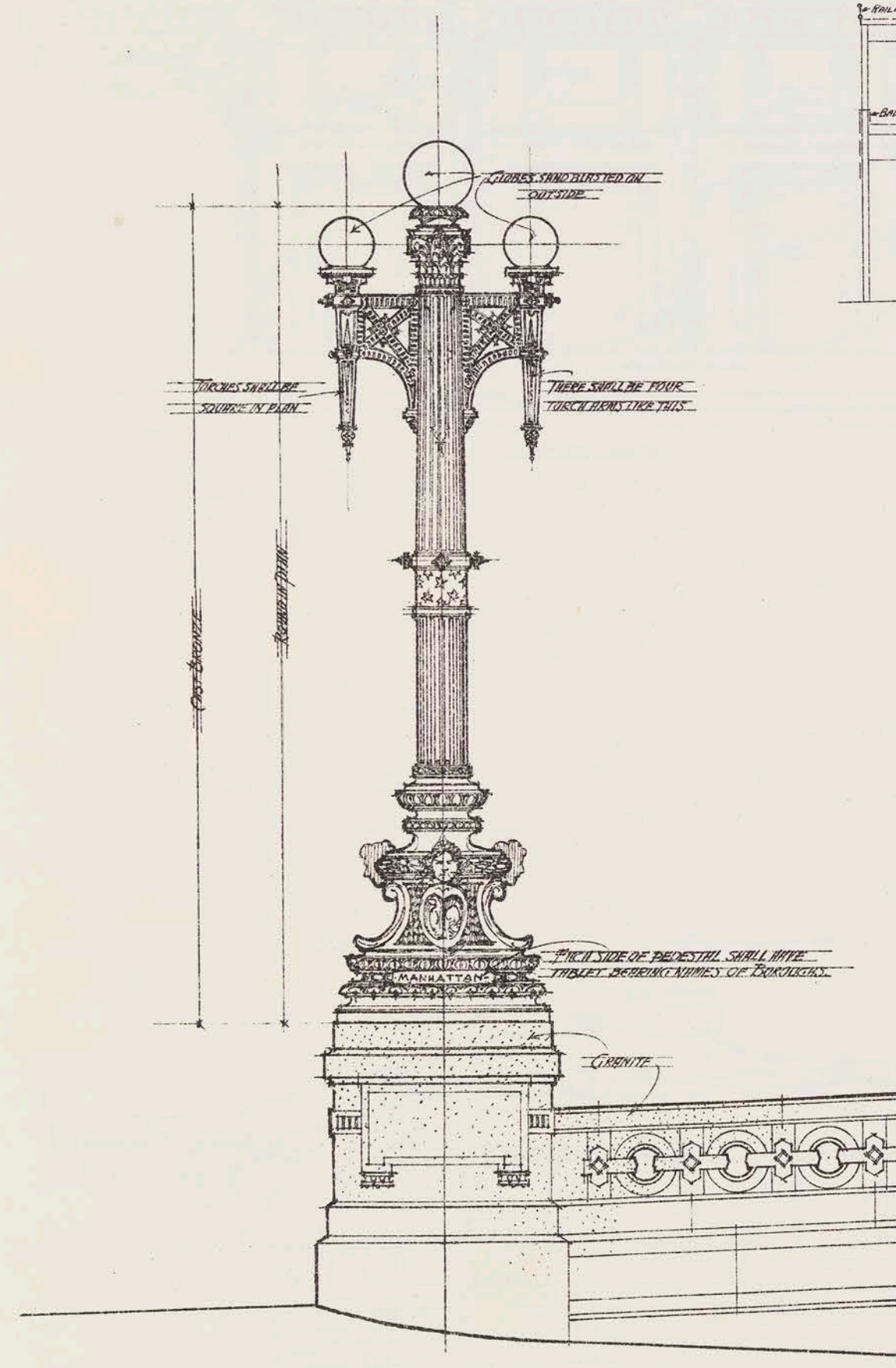
ISOMETRIC VIEW OF
T.C. COLUMN
SCALE $\frac{3}{8}"=1'-0"$



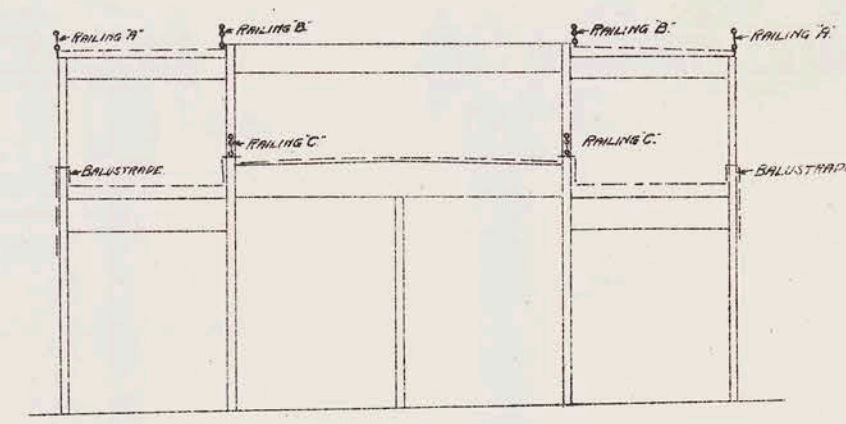
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELLS ISLAND BRIDGE-Nº4
MASONRY DETAILS
MANHATTAN APPROACH



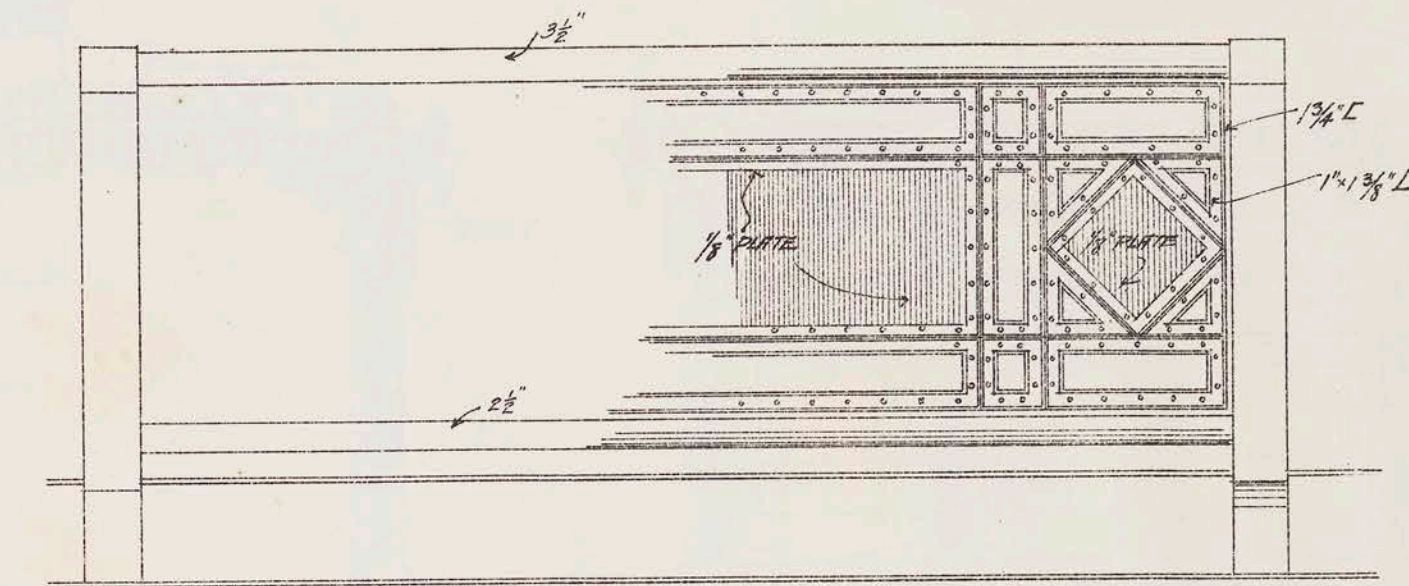
Chief Engineer.
Commissioner.



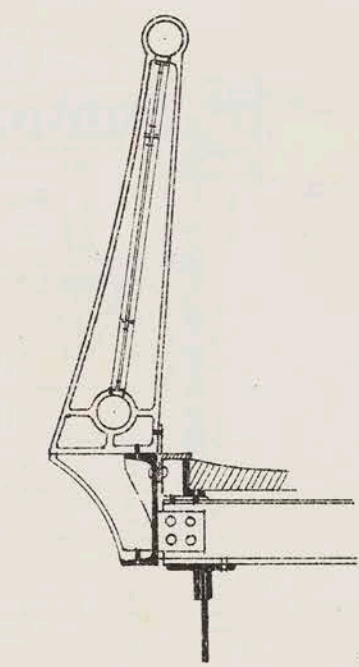
CAST BRONZE LAMP POST FOR MANHATTAN APPROACH
SCALE 3/16" = 1'-0"



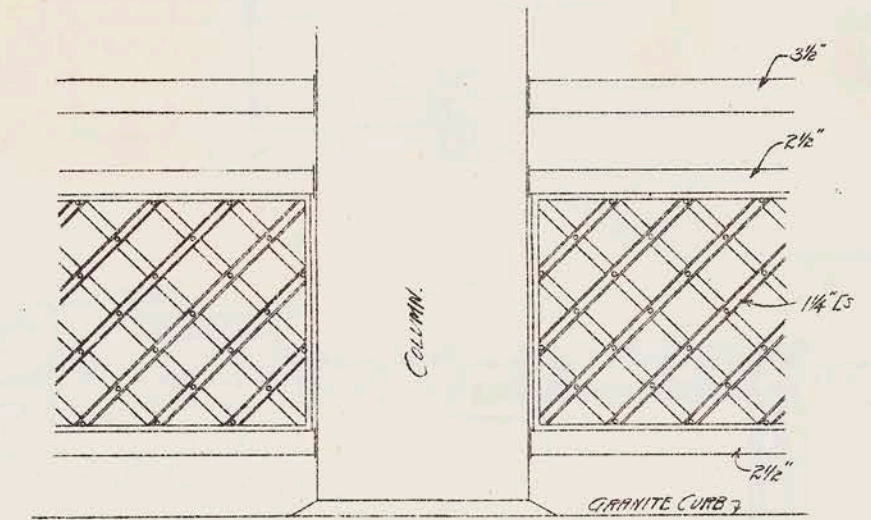
SECTION SHOWING LOCATION OF RAILINGS.
SCALE 1/4" = 1'-0"



RAILING "H"

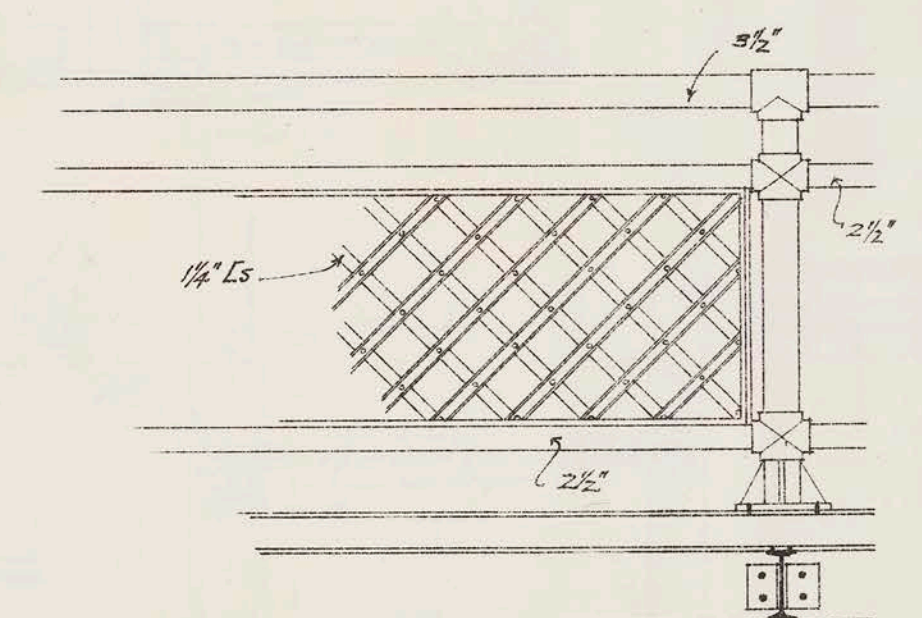


CAST IRON POST FOR RAILING "H"
ALL RISERS AND FLANGES 1/2" EXCEPT
AS NOTED. POST CONNECTED TO 12" L
WITH 4 - 3/8" BOLTS



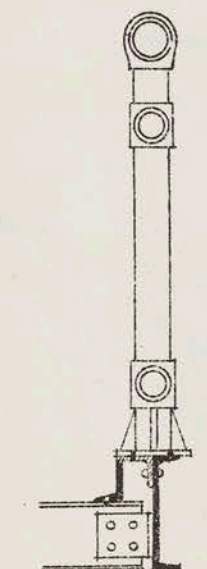
RAILING "C"

INTERMEDIATE POSTS SAME AS POSTS SHOWN FOR RAILING B.
PANELS ABOUT 5'-5"



RAILING "B"

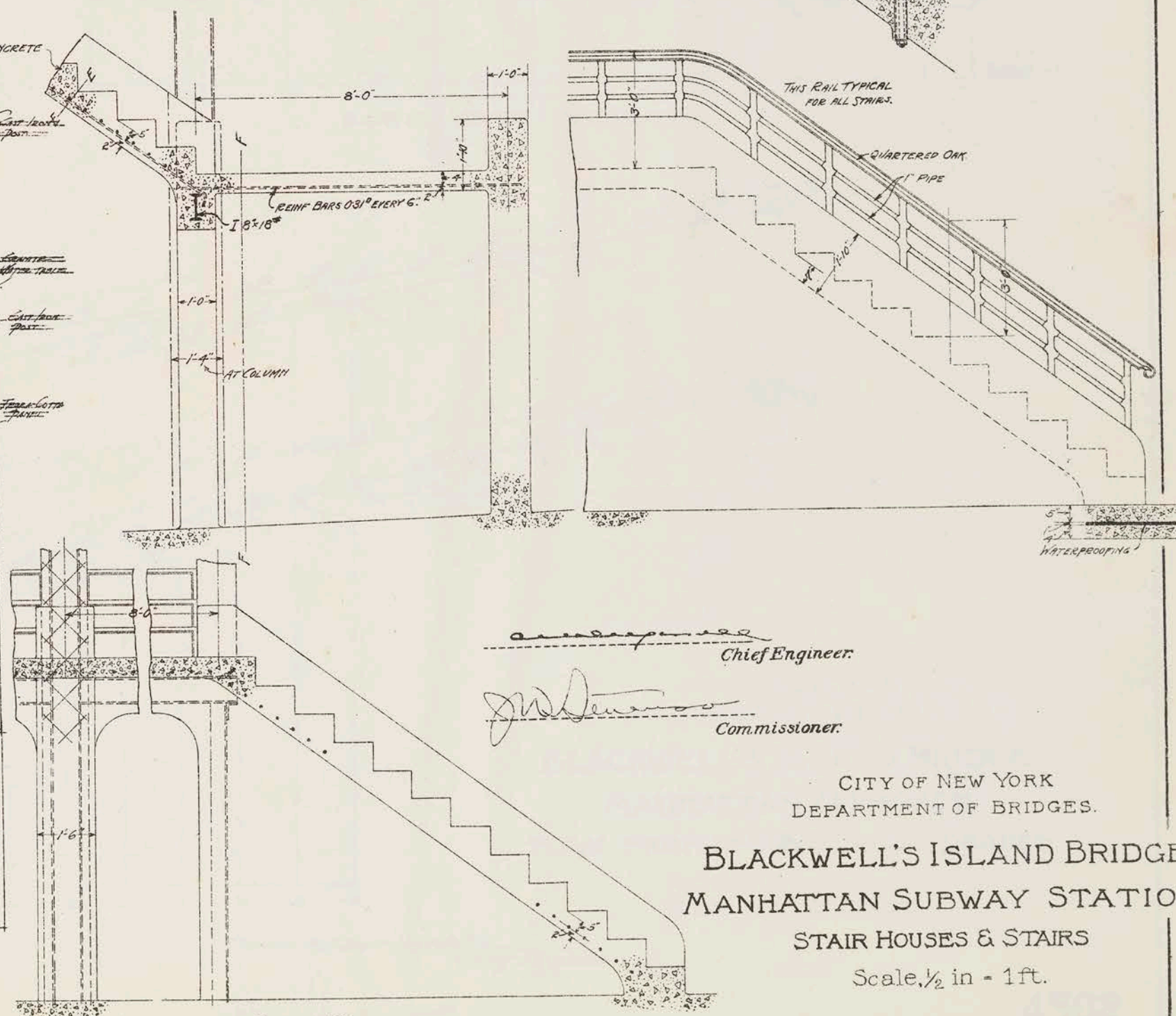
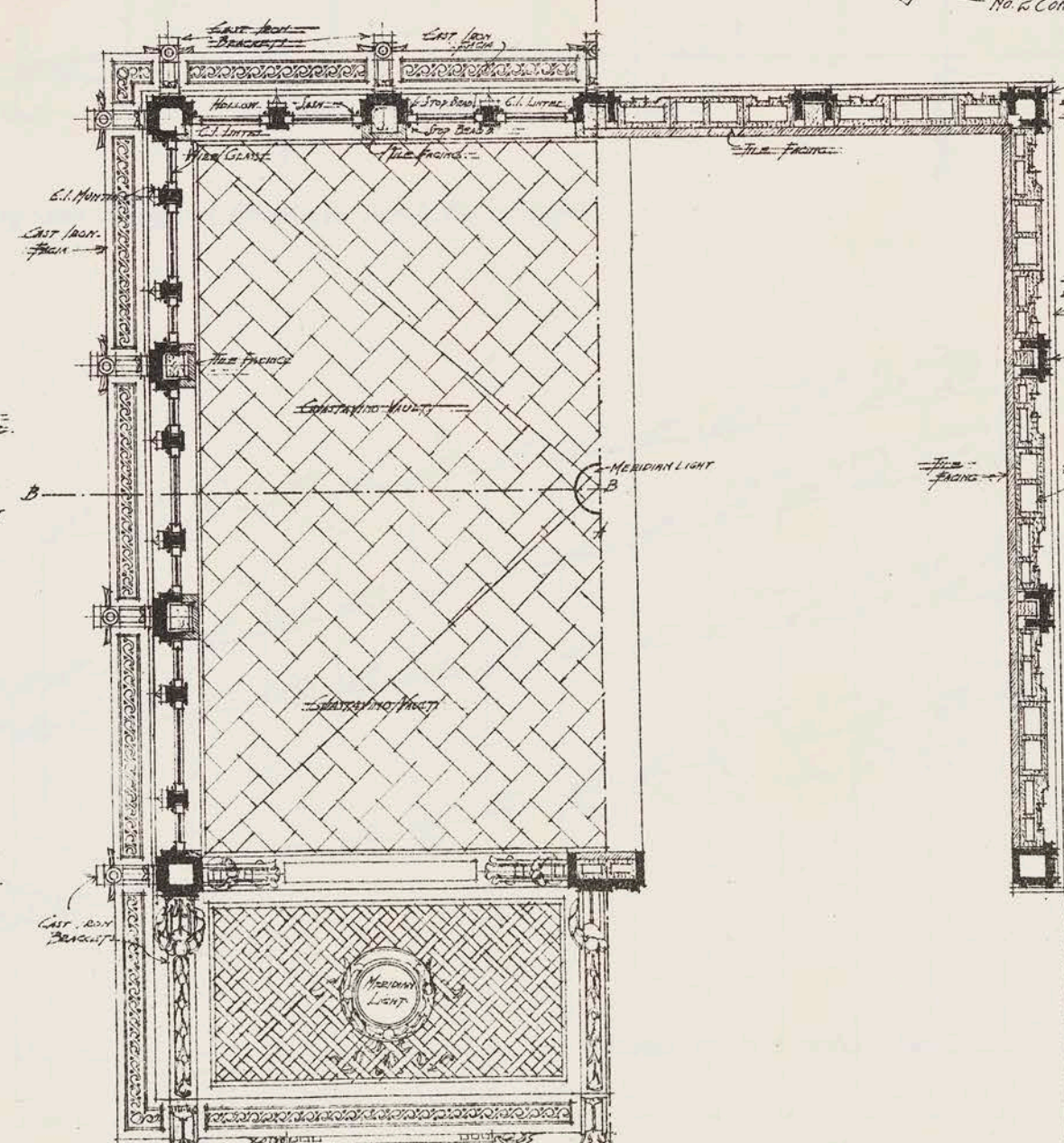
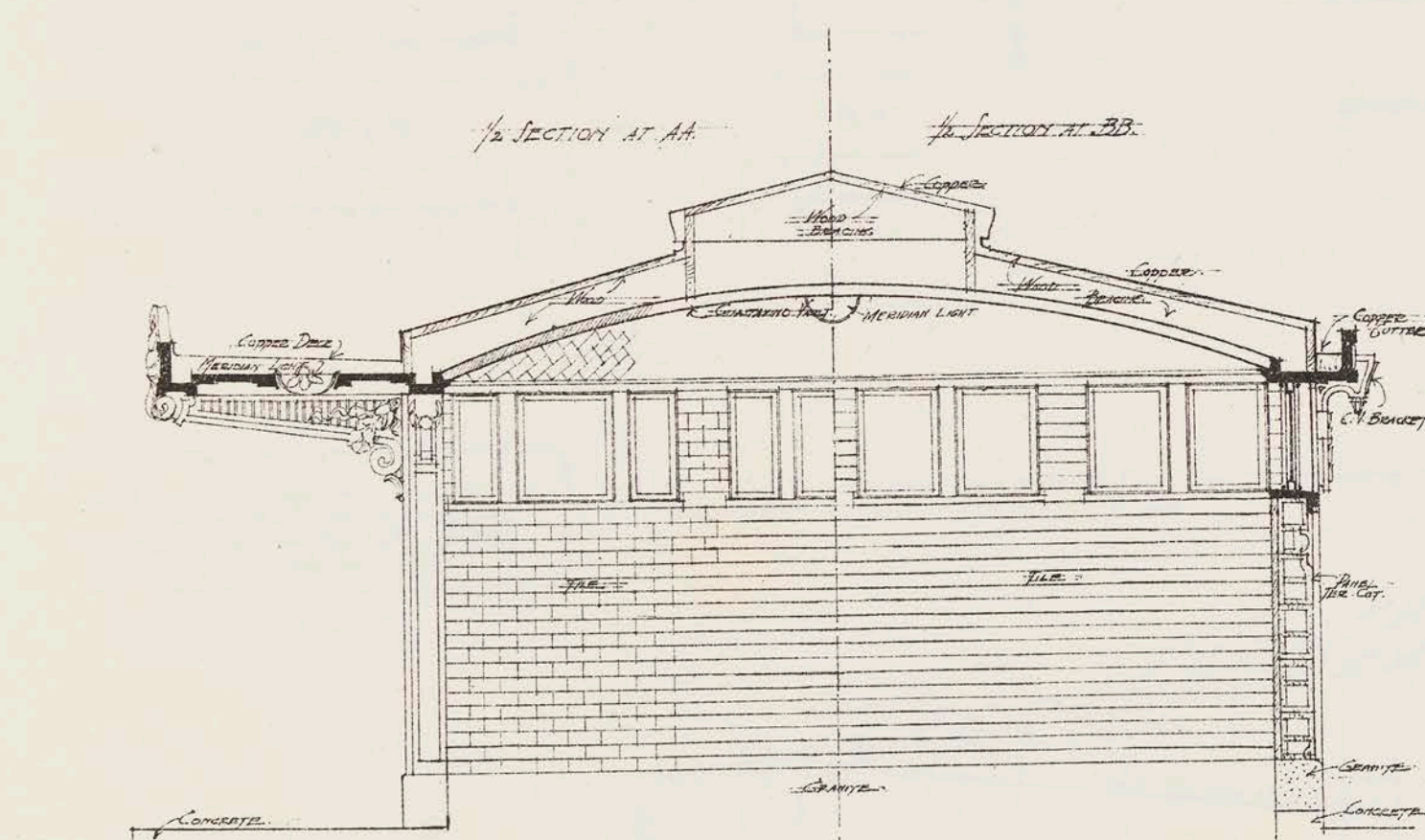
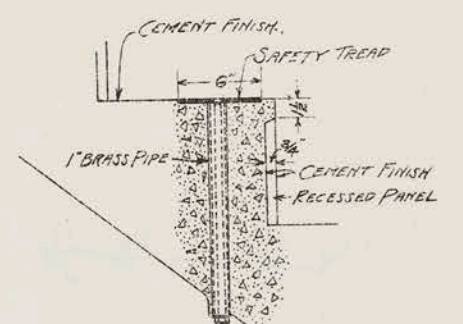
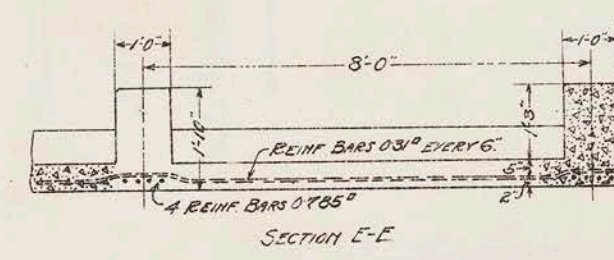
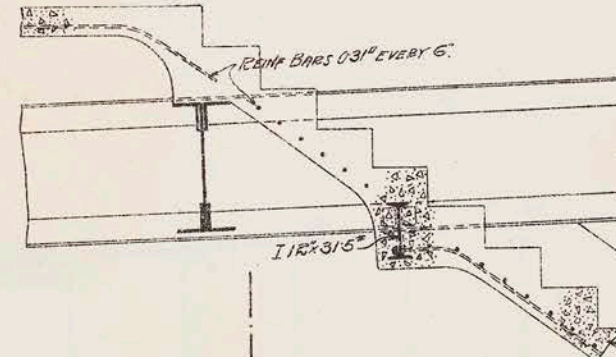
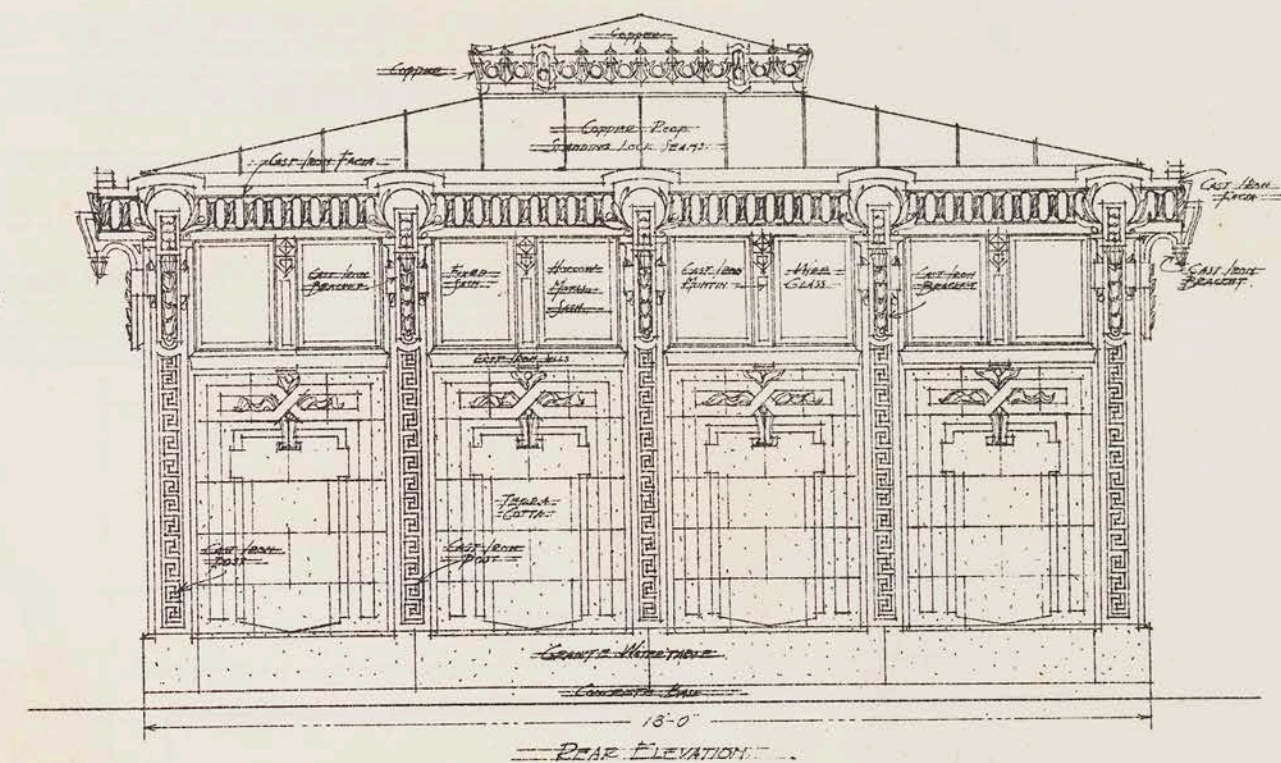
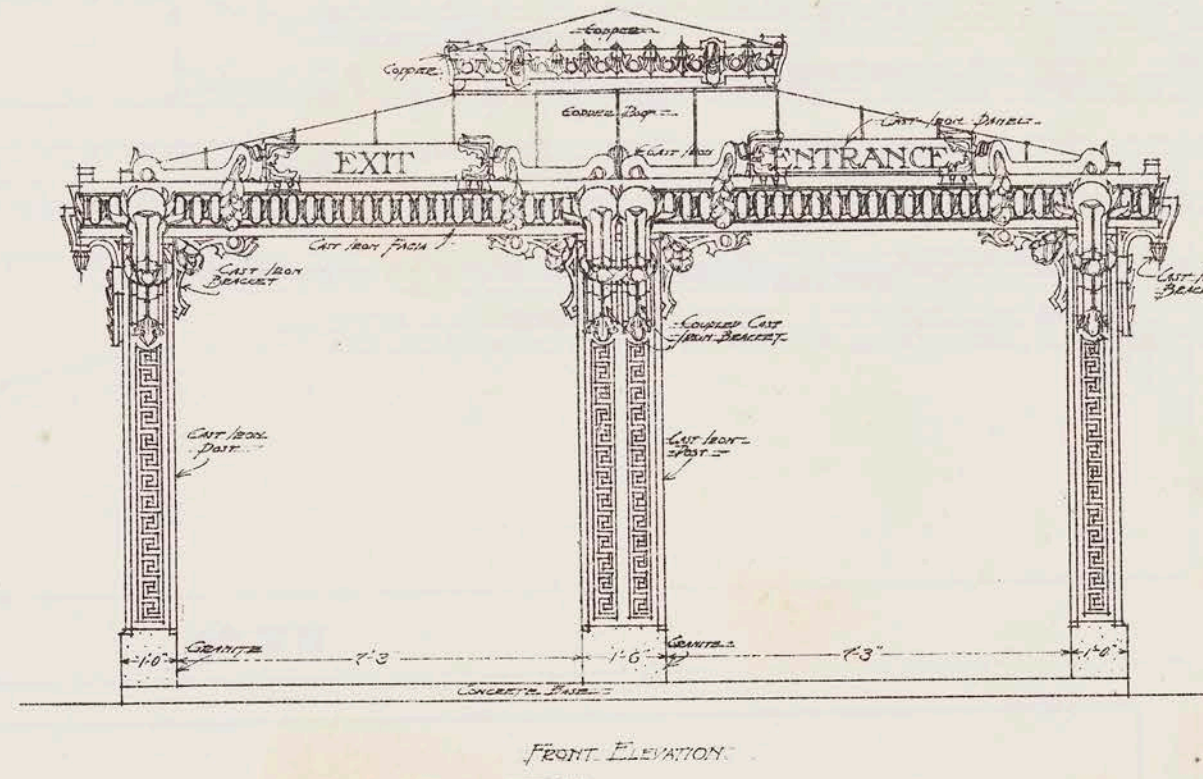
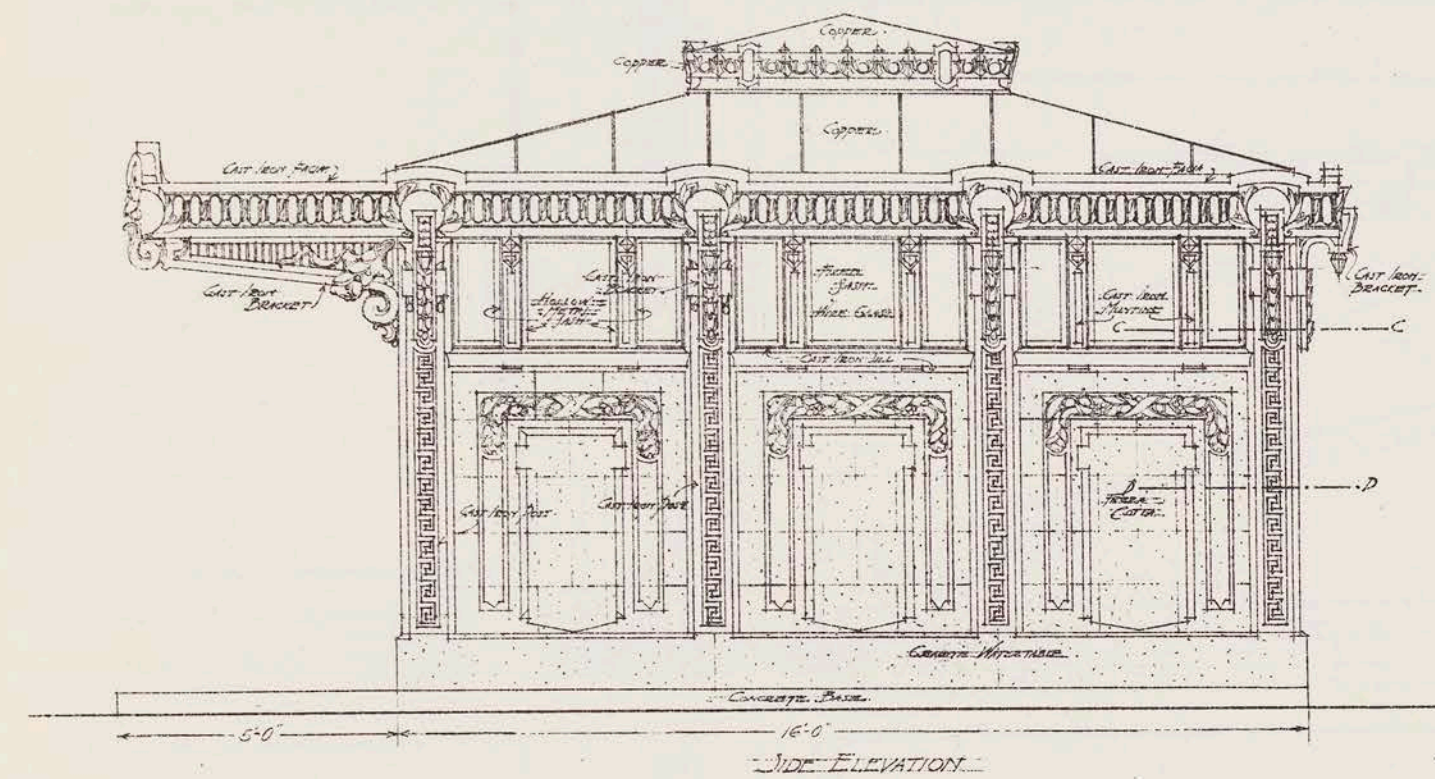
Scale 1/2" = 1'-0"



CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELLS ISLAND BRIDGE - N^o 4
DETAILS OF RAILING & ELECTROLIER

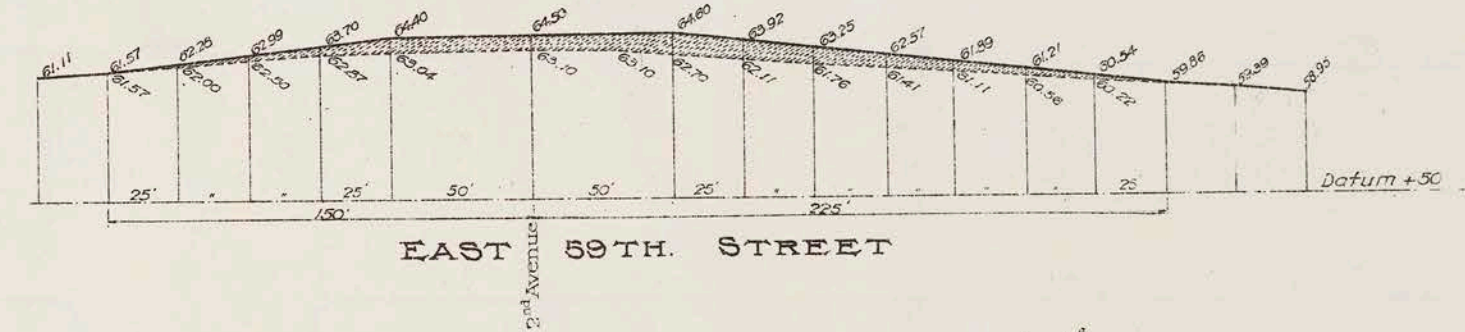
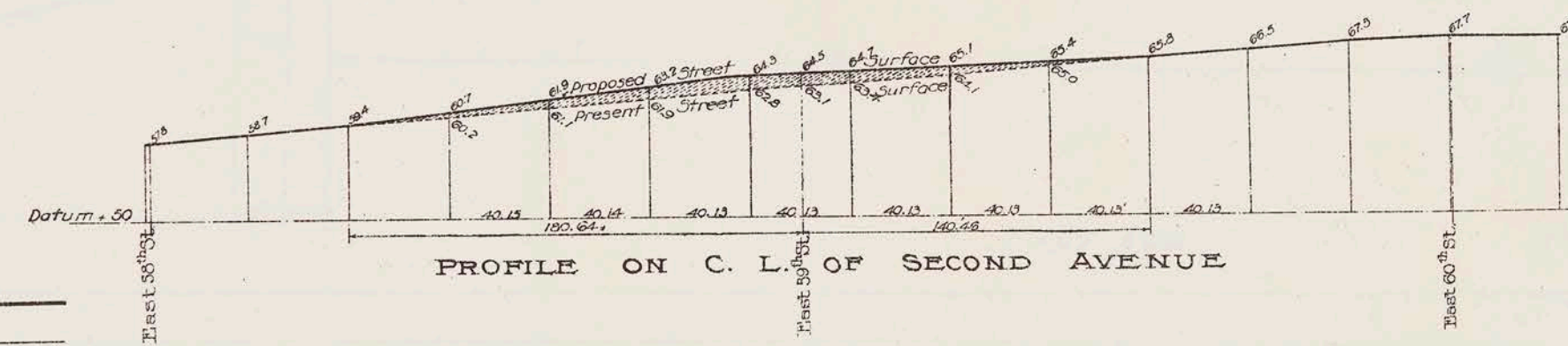
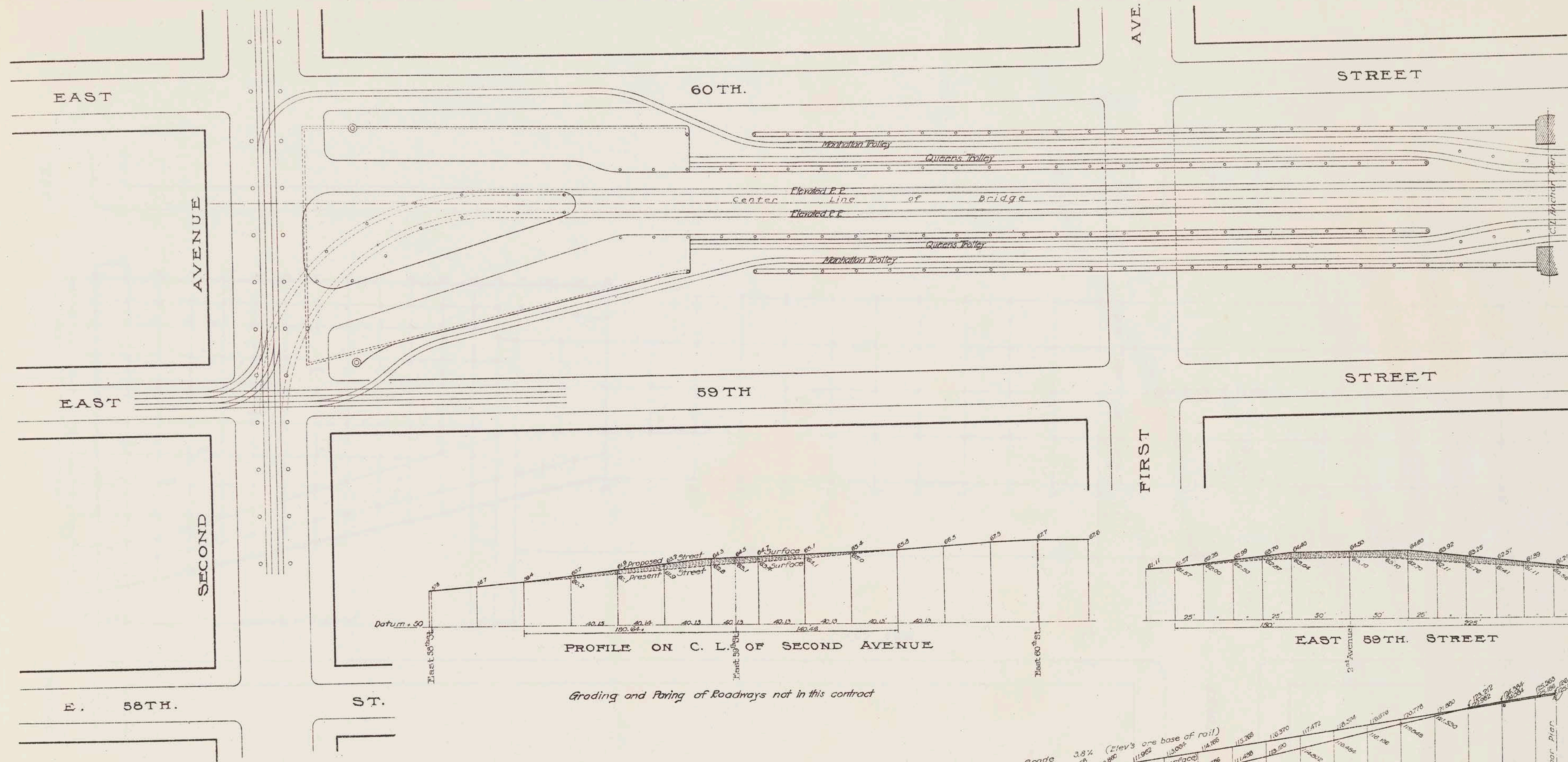
Chief Engr
Commissioner



CONDUIT FOR ELECTRIC LIGHTING:—
No. 100 INCH DIAMETER IRON BARRED CONDUIT SHALL BE RUN FROM JUNCTION BOX IN
SECTION 116.1 TO EACH OUTLET OF STAIR HOUSES. THERE SHALL BE AN OUTLET FOR
EACH RECESSED LIGHT, AND TWO OUTLETS FOR ANY ILLUMINATED SIGN PLACED IN
LOBBY OF EACH HOUSE AS INDICATED BY DIRECT.

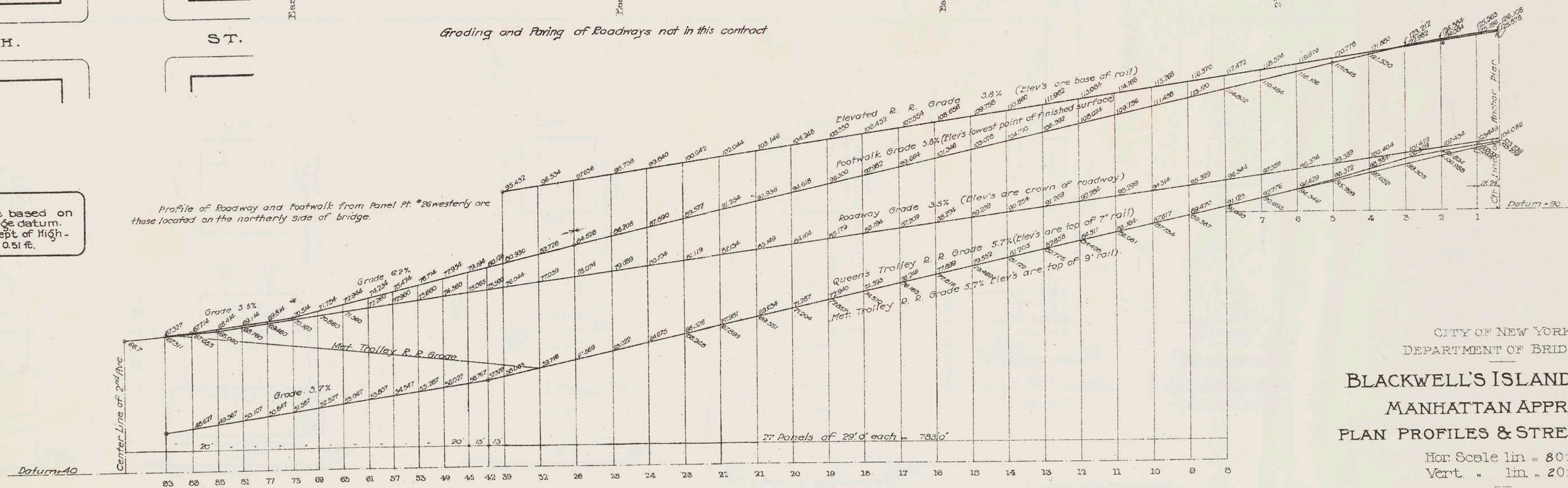
Chief Engineer.
Commissioner.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
MANHATTAN SUBWAY STATION
STAIR HOUSES & STAIRS
Scale, 1/2 in. = 1 ft.



Datum
Elevations given are based on
Blackwell's Id Bridge datum.
For Elevations of the Dept of High-
ways subtract 0.51 ft.

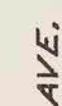
Profile of Roadway and Footwalk from Panel Pt. #26 westerly are
those located on the northerly side of bridge.



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
PLAN PROFILES & STREET GRADES.

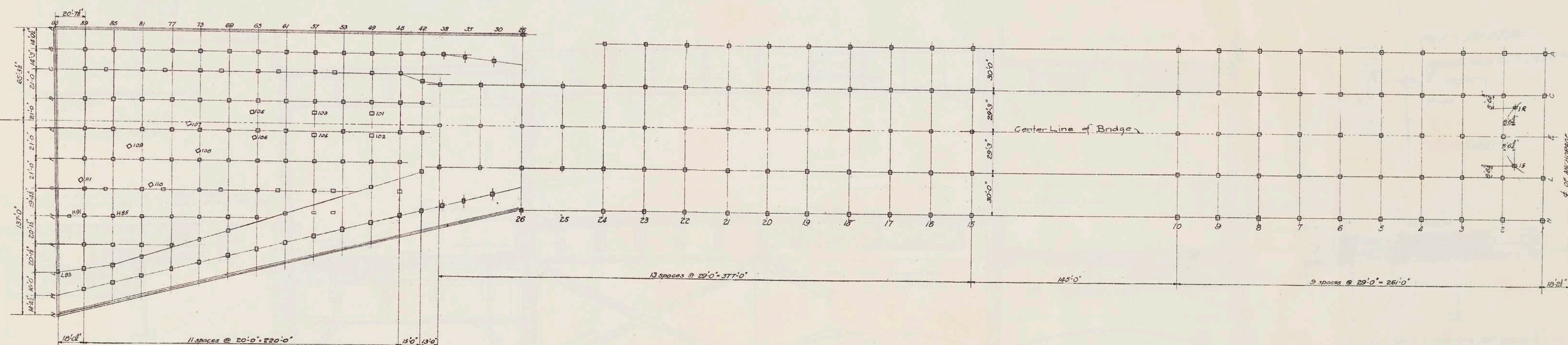
Hor. Scale 1 in. = 80 ft
Vert. " 1 in. = 20 ft.

Chief Engineer.
Commissioner.



EAST 60TH

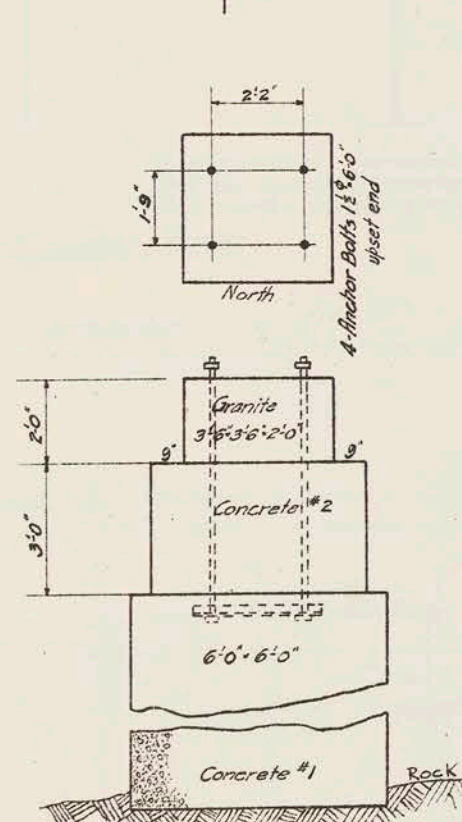
ST.

EAST 59TH

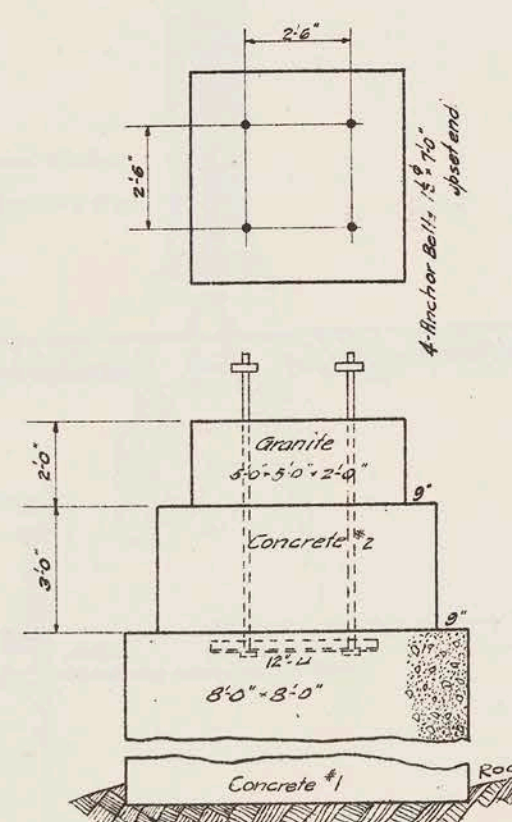
ST.

SECOND

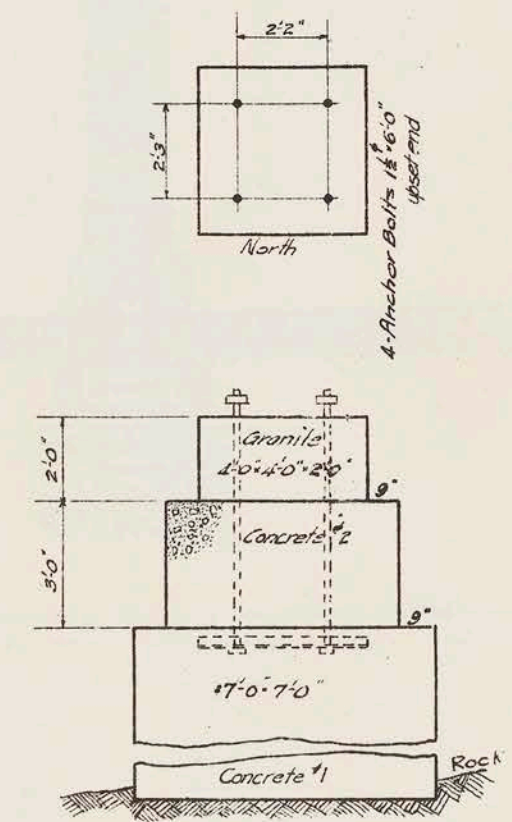
FIRST



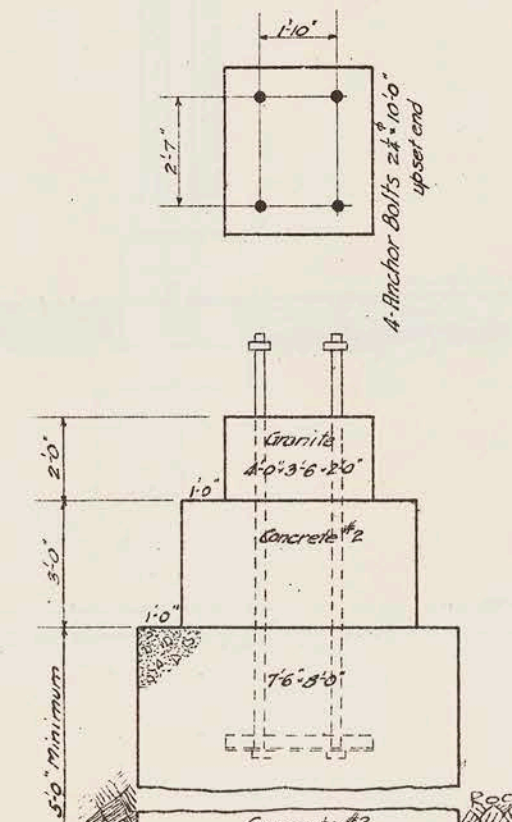
E-2 to 26 & 32 & 39



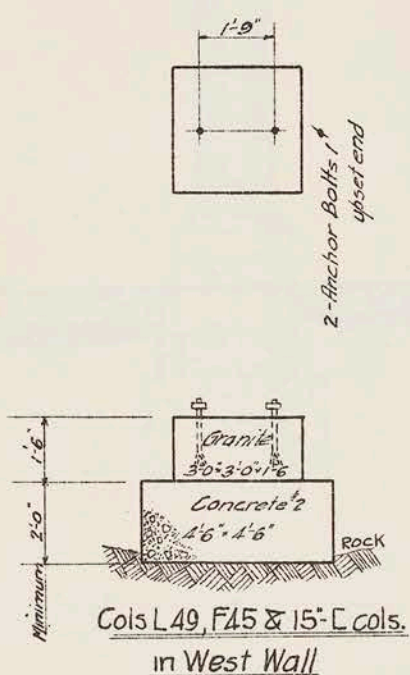
L & C - 1 to 26 & 32 & 39



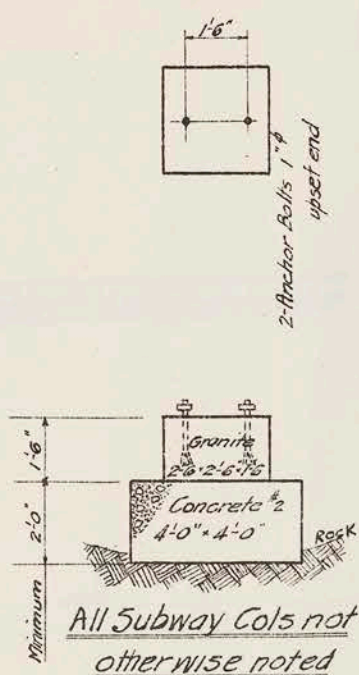
A & N - 1 to 26 & 128/15



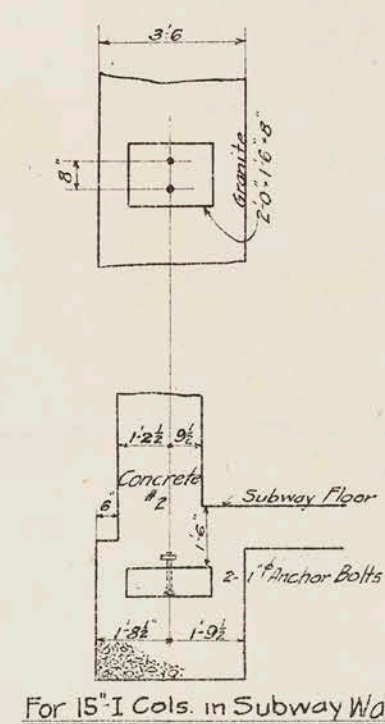
Cols 101 to 111, H85 & 91 & L93



Coils L49, F45 & 15" C coils
in West Wall



All Subway Cols not
otherwise noted



For 15" I Cols. in Subway Wall

CITY OF NEW YORK
DEPARTMENT OF BRIDGES

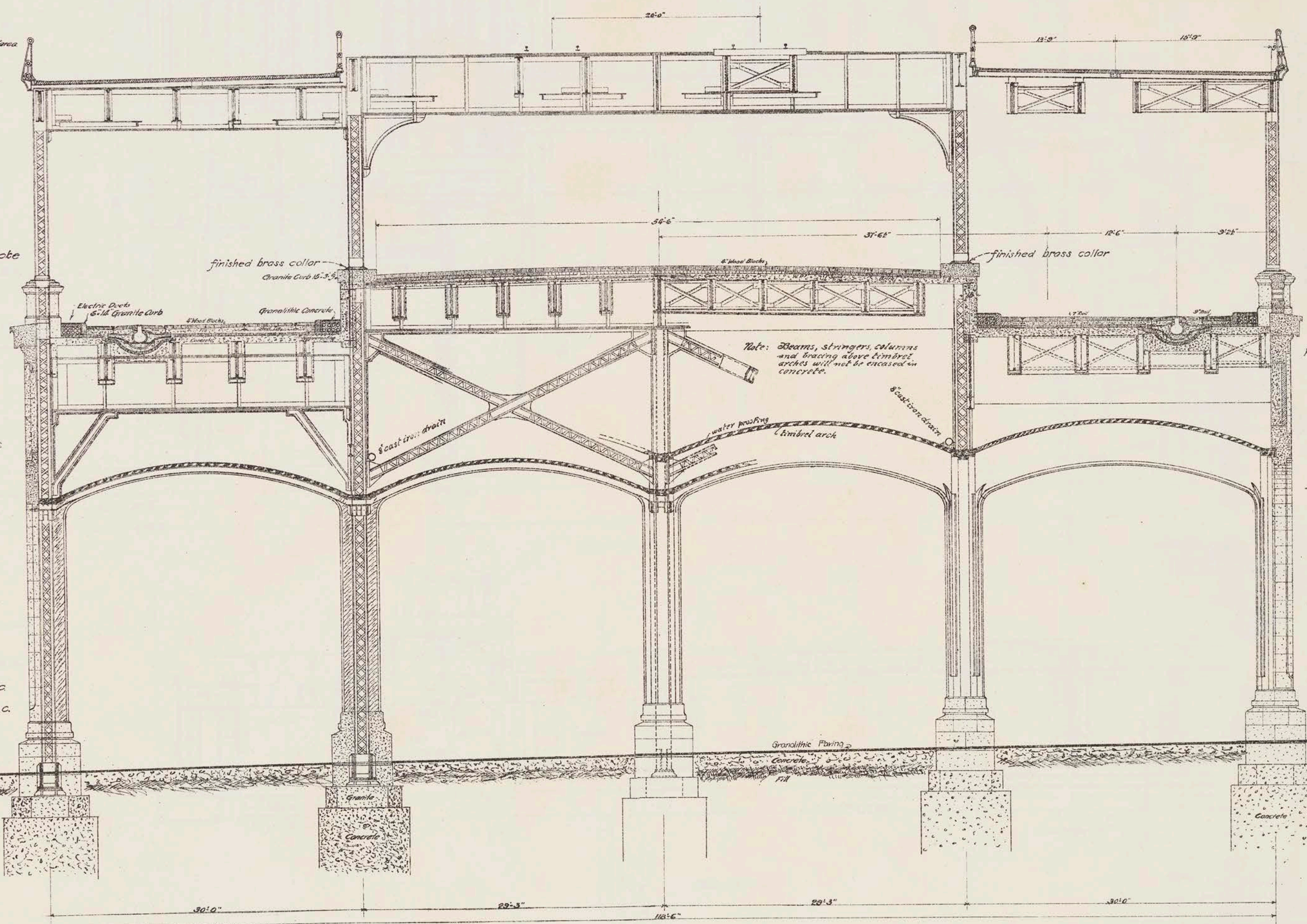
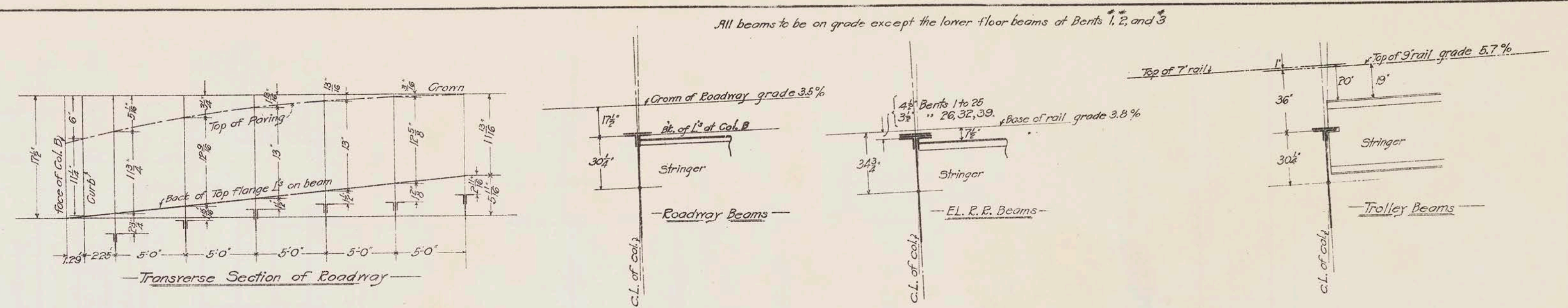
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH.

COLUMN FOUNDATIONS.

Scale 1 in. = 60 ft.

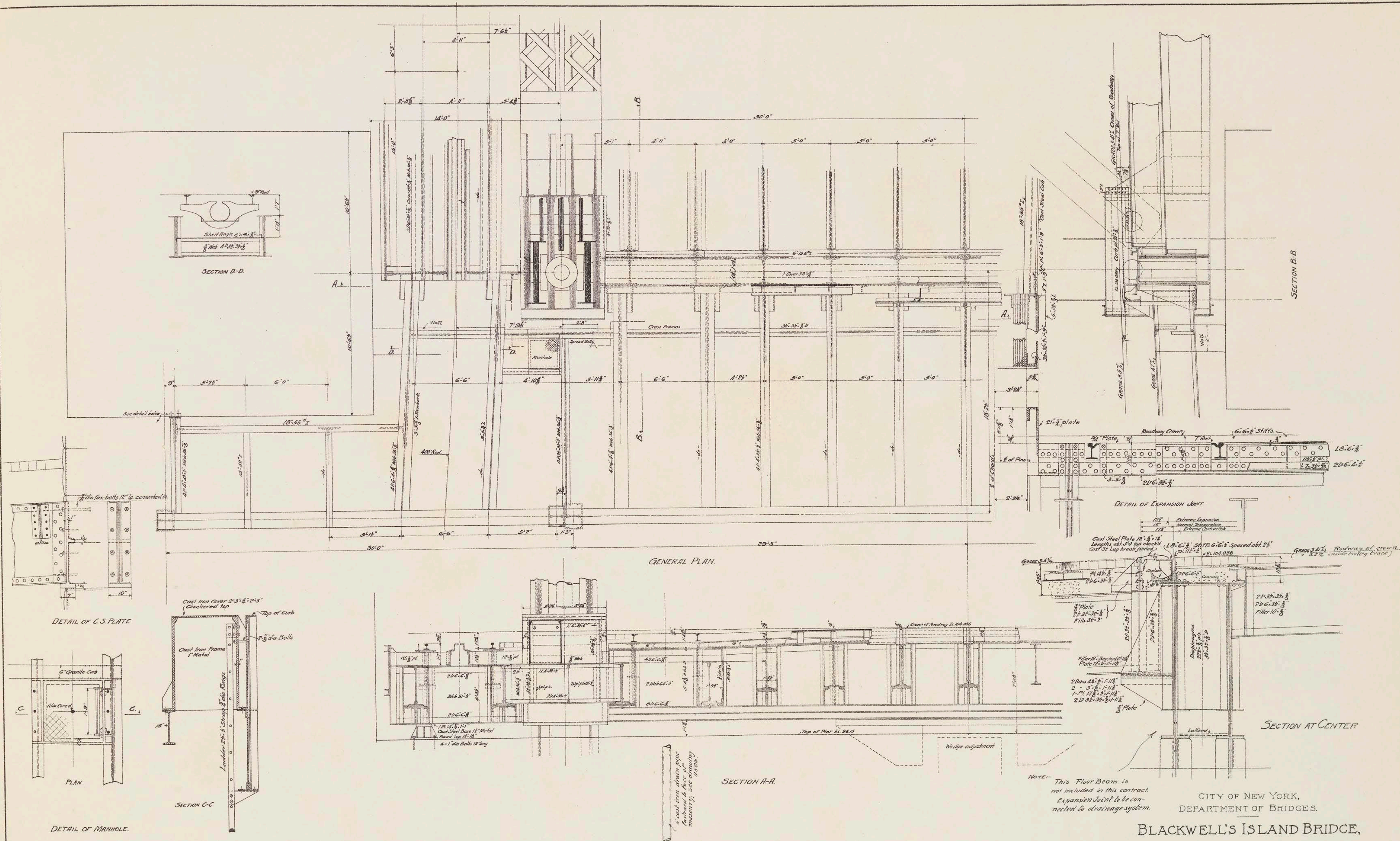
Chief Engineer:

Commissioner.



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
MANHATTAN APPROACH
TYPICAL TRANSVERSE SECTION
Scale $\frac{3}{4}$ in = 1 ft.

Chief Engineer.
Commissioner.

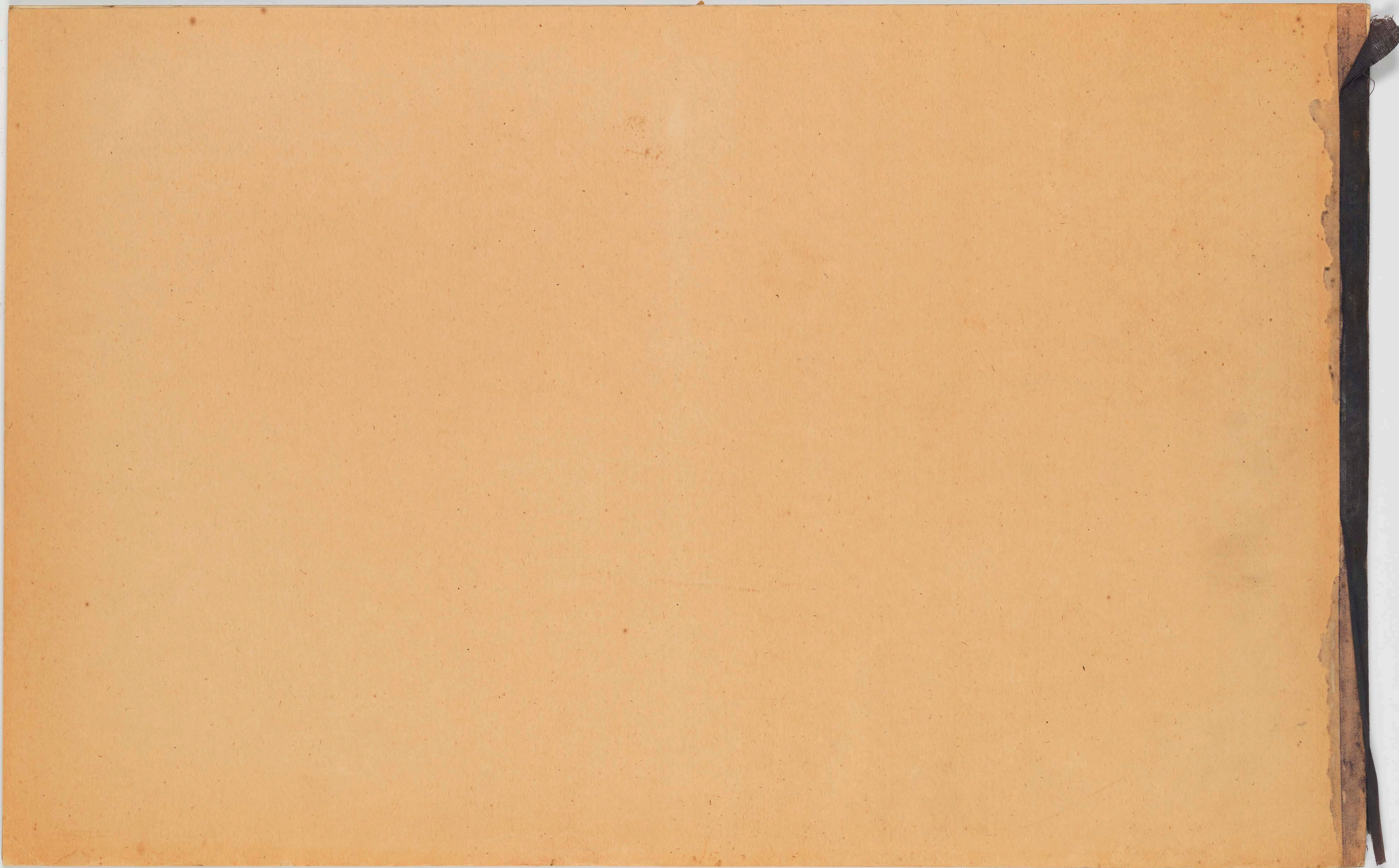


CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

BLACKWELL'S ISLAND BRIDGE,
MANHATTAN APPROACH,
CONNECTION OF APPROACH TO ANCHOR ARM,
LOWER FLOOR.

Scale $\frac{3}{16}$ and $\frac{3}{8}$ in. = 1 ft.

Chief Engineer
[Signature]
Commissioner.



J.D.W.

624.09747
N5688
v.1
pt.6

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1907.

CONTRACT DRAWINGS

FOR

Footwalk

Constructing the Steel and Masonry Approach in
the Borough of Manhattan of the
Blackwell's Island Bridge

Over East River, Between the Boroughs of
Manhattan and Queens.

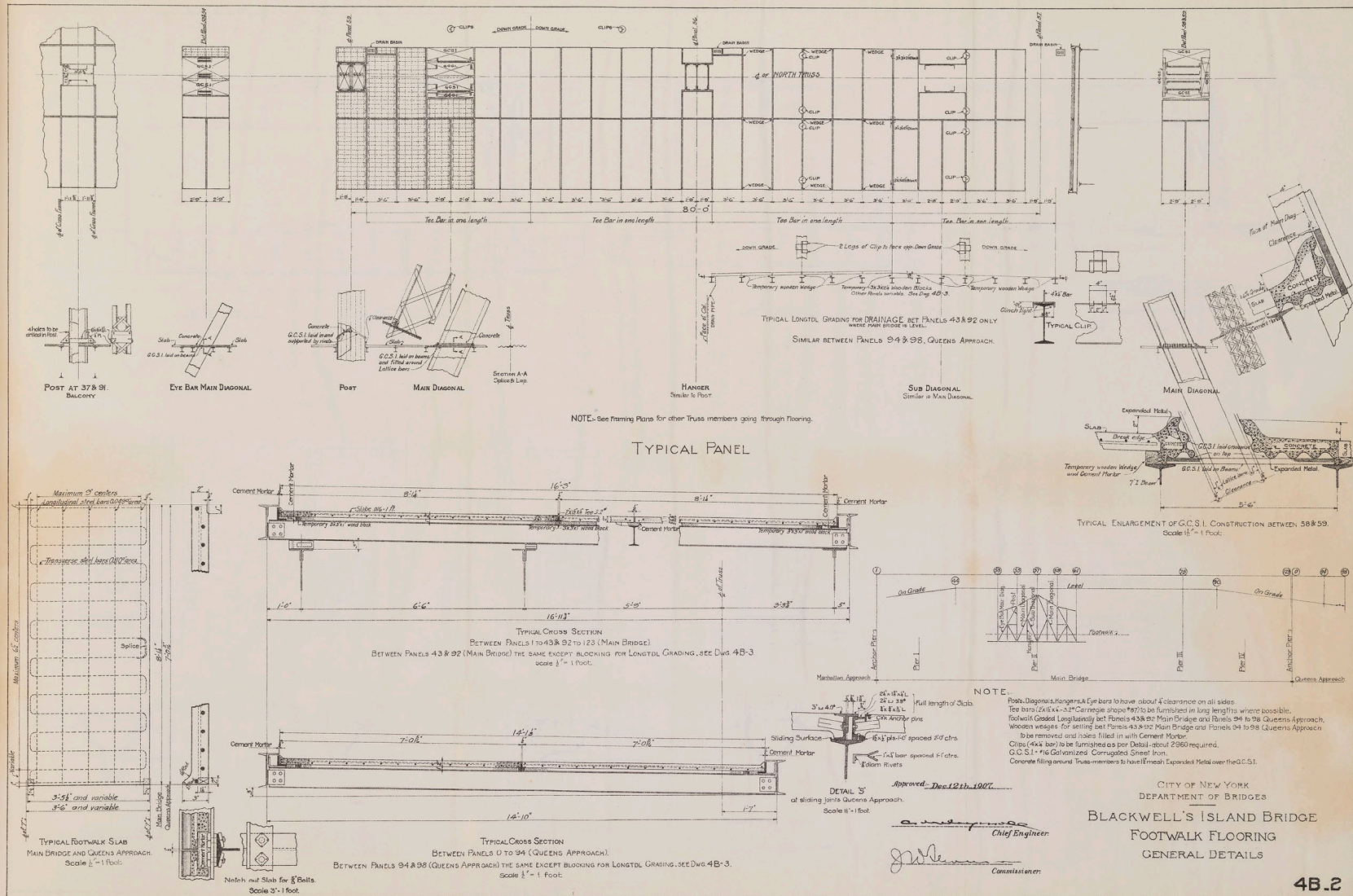
624.09747
N5688
v.1 pt.6

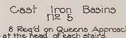
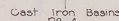
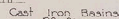
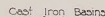
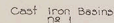
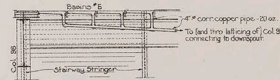
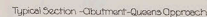
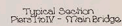
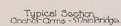
1385-97

Maxim B. Brown Co., Printers, 49-57 Park Pl., N. Y.

SCIENCE

FONDREN LIBRARY
Southern Methodist University
DALLAS, TEXAS

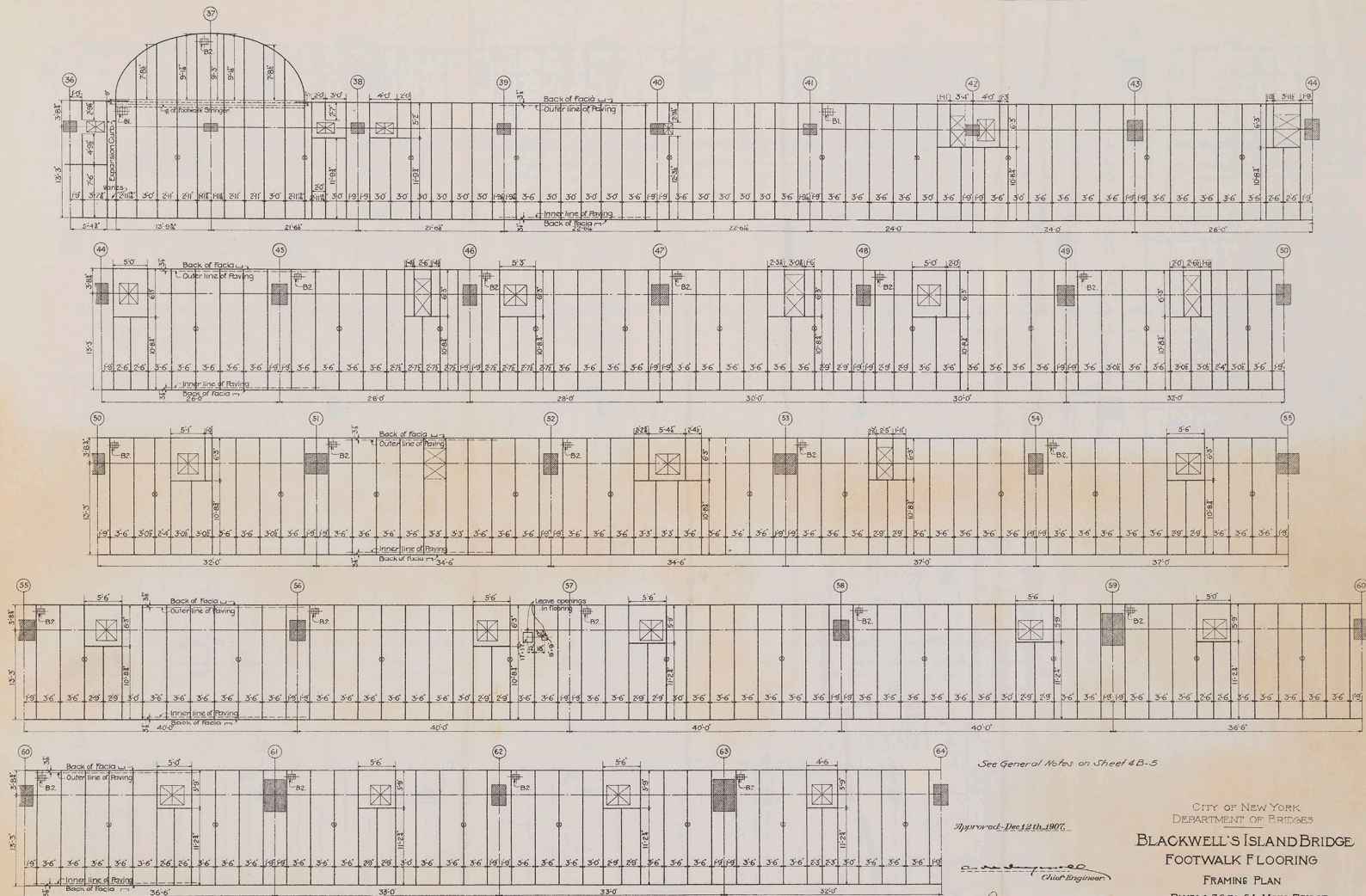




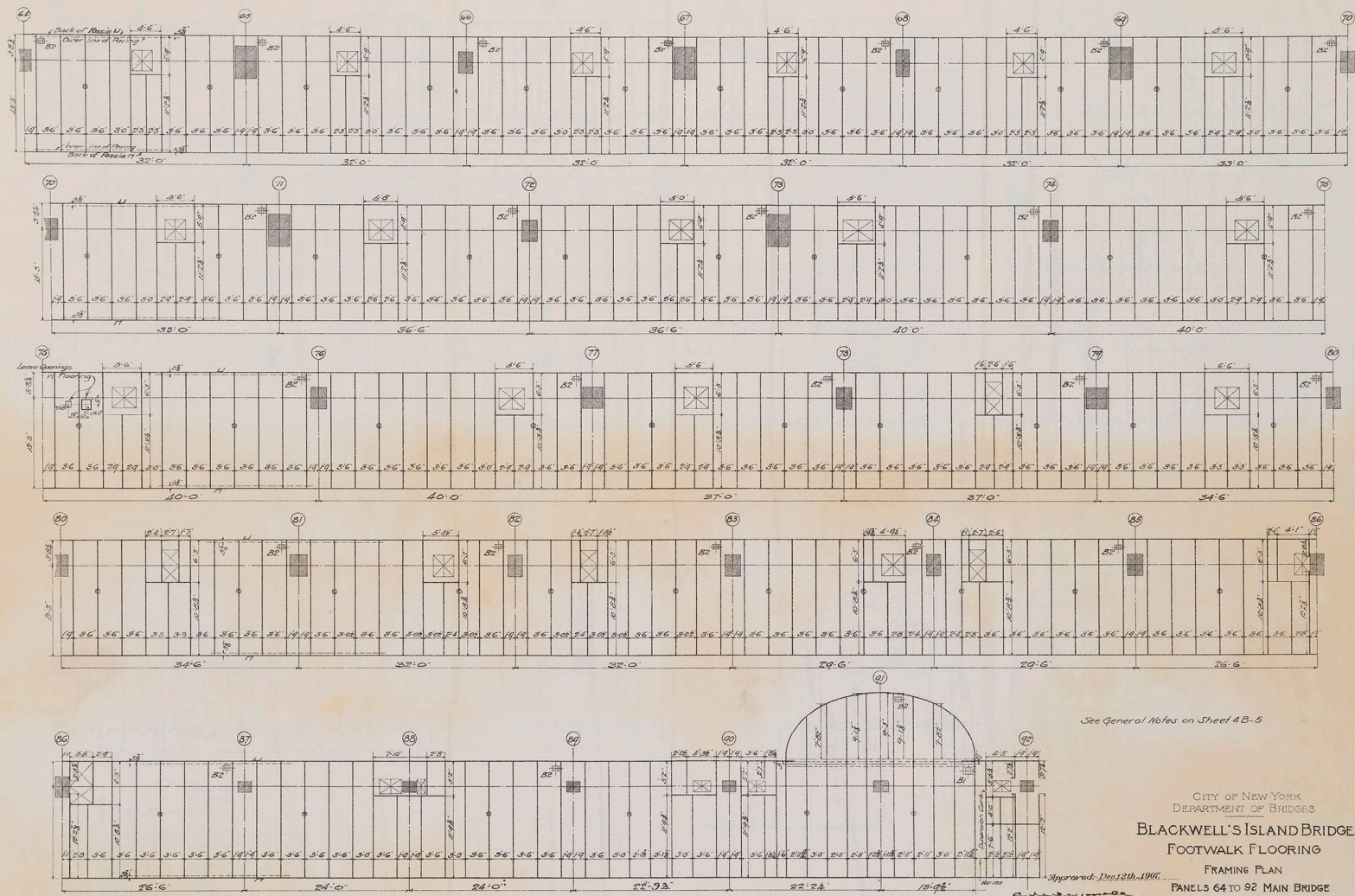
28 Required on Quizing Approach,
2 at each bent* 6, 12, 19, 26, 32, 39, 46, 52, 57,
64, 70, 77, 82 & 88.

Julien
Commissioner

Scale $\frac{3}{8}$ " = 1 ft

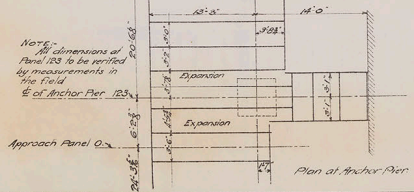
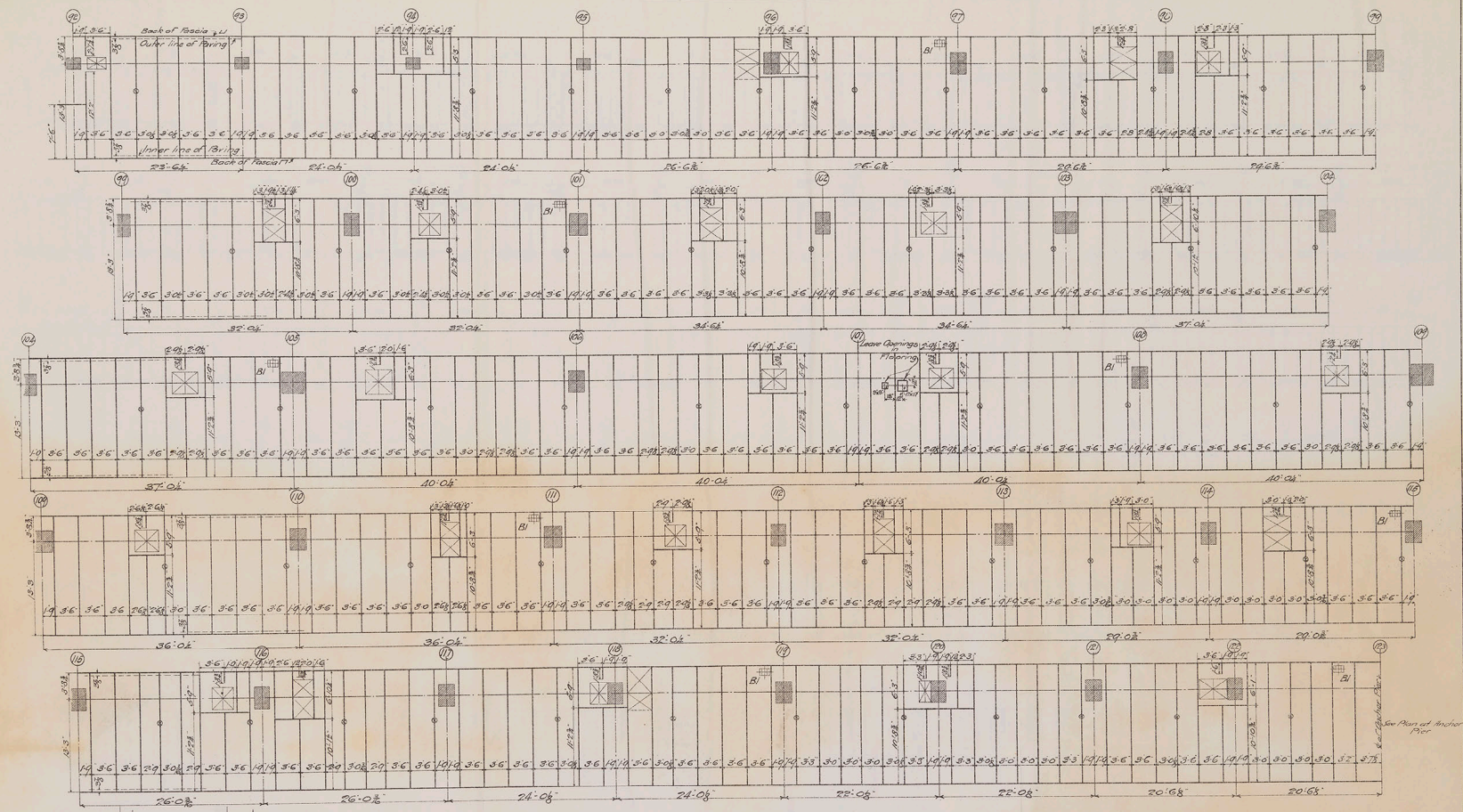


CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
FOOTWALK FLOORING
FRAMING PLAN
PANELS 36 TO 64 MAIN BRIDGE
Scale, $\frac{3}{8}$ " = 1'-0"



See General Notes on Sheet 4B-5

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
FOOTWALK FLOORING
FRAMING PLAN
PANELS 64 TO 92 MAIN BRIDGE
Scale, $\frac{1}{8"} = 1'$
Approved: Dec. 12th, 1906.
Chief Engineer
Commissioner

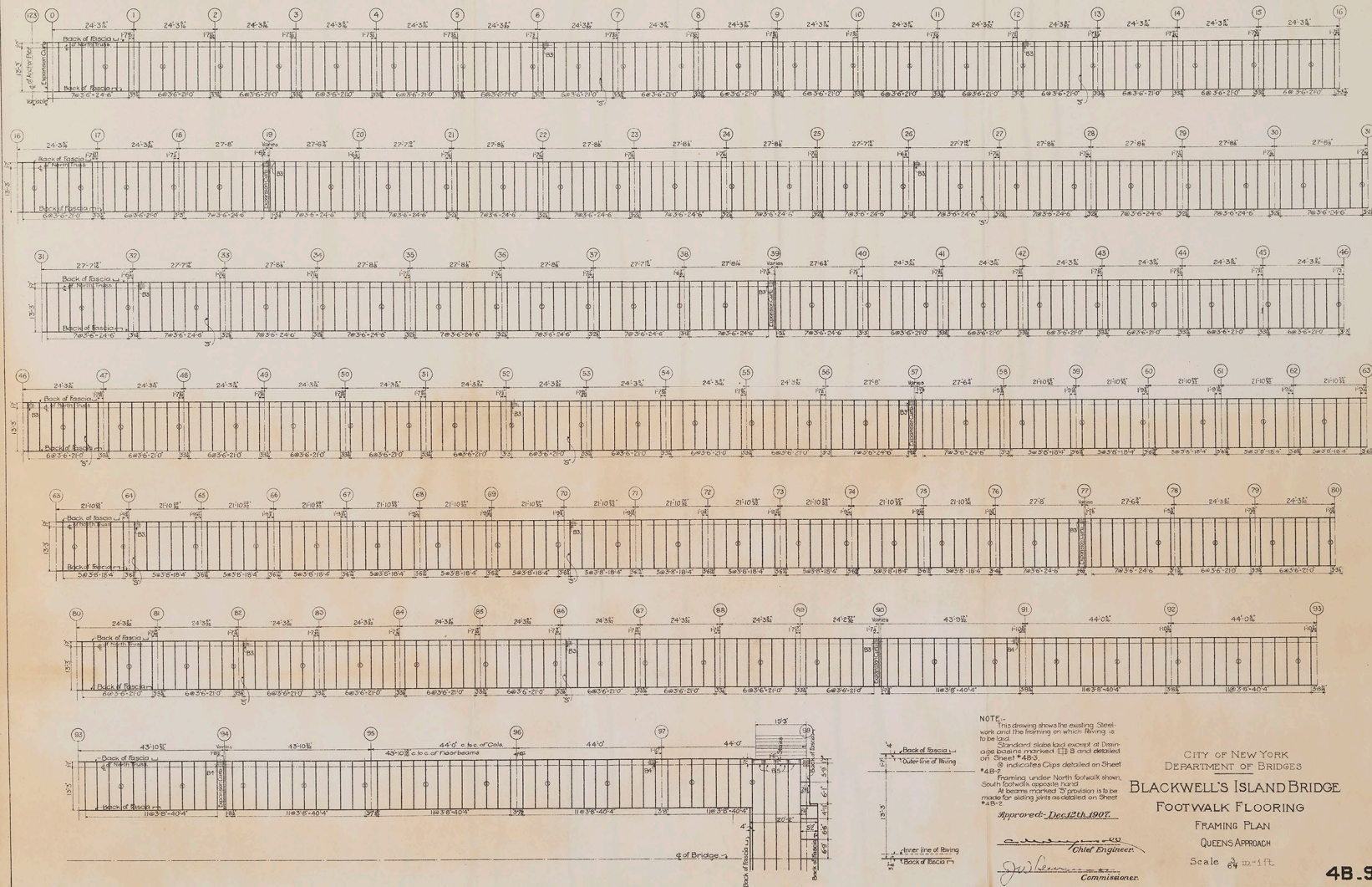


See General Notes on Sheet 4B-5

Approved - Dec 16th, 1906

J.W. L.
Chief Engineer
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
FOOTWALK FLOORING
FRAMING PLAN
PANELS 92 TO 123 MAIN BRIDGE
Scale 3/8" = 1'-0"



NOTE—
This drawing shows the existing Street
work and the framing on which flooring is
to be laid.
Standard detail last extent of Drain-
age basins marked L13 B and detailed
on Sheet 148.3
S indicates Clips detailed on Sheet
148.9
Framing under North Footwalk shown.
South Footwalk opposite hand.
As beams marked "D" provision is to be
made for adding joints as detailed on Sheet
148.2
Approved: Dec 12th 1907.
Chief Engineer
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
FOOTWALK FLOORING
FRAMING PLAN
QUEENS APPROACH
Scale 3/4" = 1'-0"



J.W.

624.09747
N568d
v.1
pt.7

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1907.

Contract Drawings

FOR

Roadway Paving

Constructing the Steel and Masonry Approach

in the Borough of Queens of the

Blackwell's Island Bridge

Over East River, Between the Boroughs of

Manhattan and Queens.

624.09747
N568d
v.1 pt.7

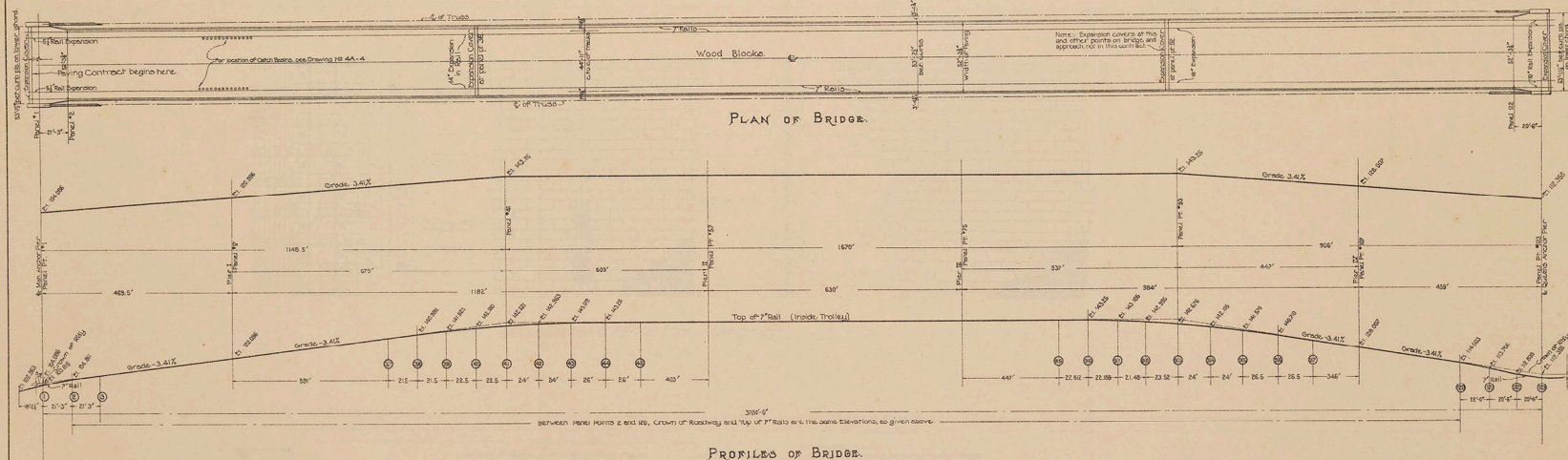
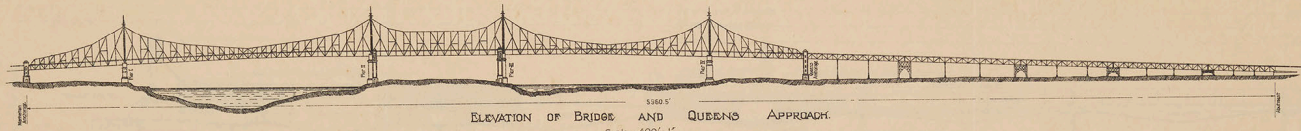
2153-07B



MARTIN B. BROWN Co., Printers, 49 to 57 Park Place, N. Y.

SCIENCE

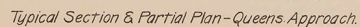
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DALLAS, TEXAS



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
ROADWAY PAVEMENT
AND
INSIDE TROLLEY TRACKS
MANHATTAN ANCHOR PIER TO ELY AVE.
GENERAL PLAN.

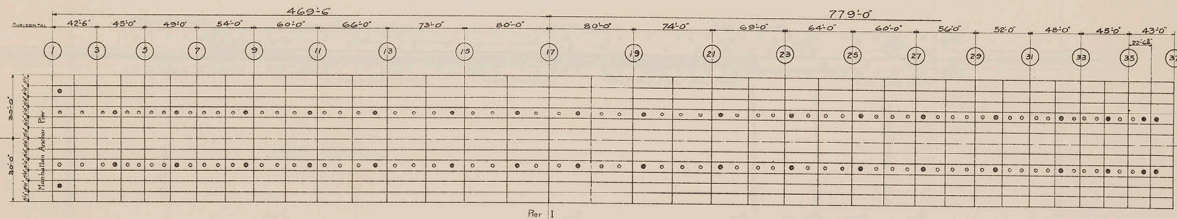
Approved. - Oct. 16, 1907

[Signature] Chief Engineer:
[Signature] Commissioner:

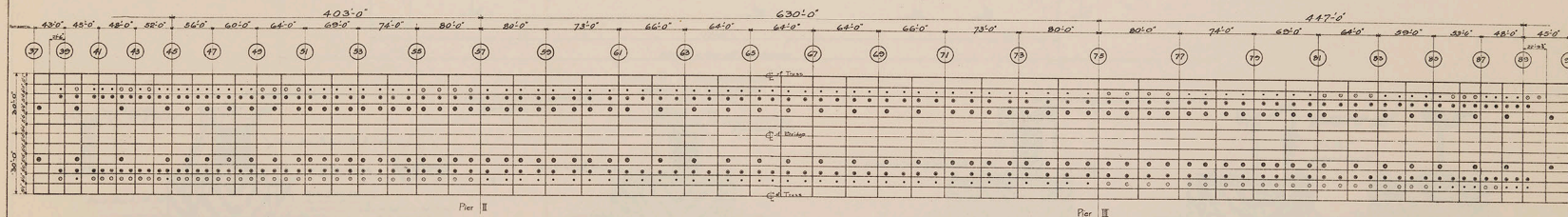


4A.2

Chief Engineer
Commissioner



Page



Pier 1

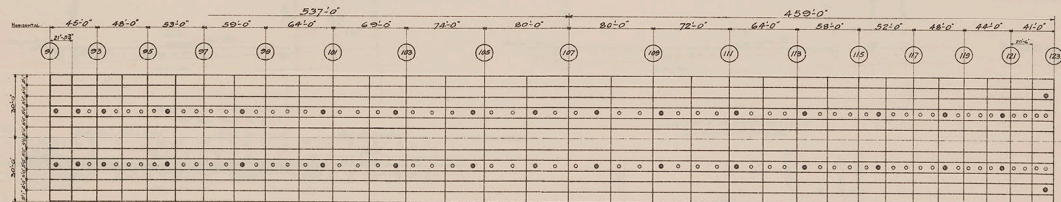
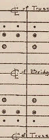


Fig. IV

NOTE:

Drainage Basins shown thus * Panels 1 to 17, and 107 to 123, to be lined with Asphalt and connected to Gutter as per Sheet #4A-6 (32 required); from 17 to 107 to be lined with Asphalt and Copper thimble (Type B). 176 required

Open holes 6" diam. shown thus * to be plugged with Castings.

Open holes 6" diam shown thus o to be plugged with
Casting having 1 1/2" diam Copper thimble.

Open holes 3" diam shown * to have Copper thimble (Type C).
All 12" diam Drain holes (not shown on drawing) in Buckle plates, to be protected by Copper thimble (Type A).

Queens Anchor Pier

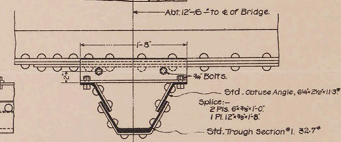
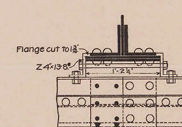
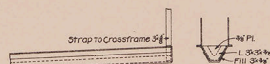
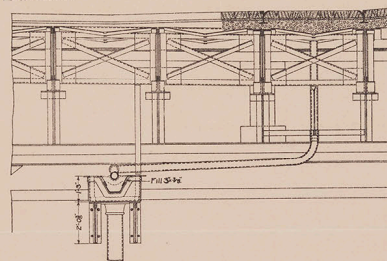
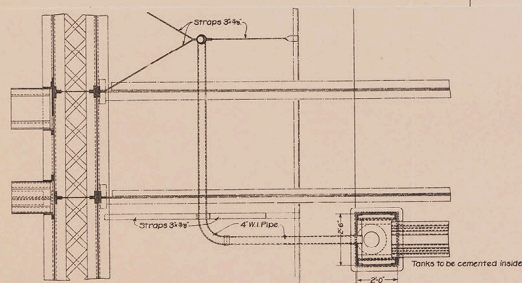
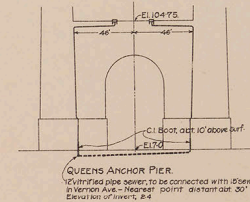
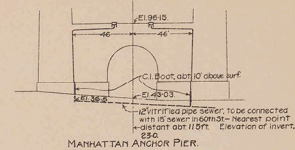
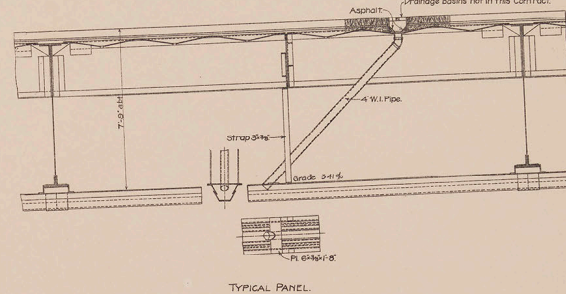
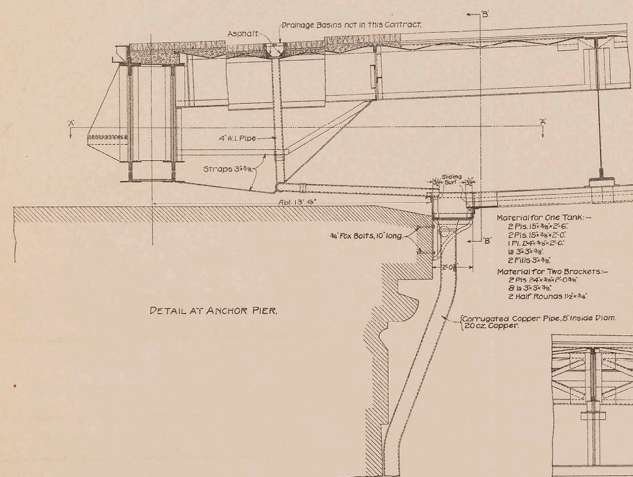
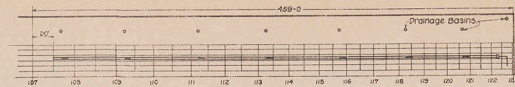
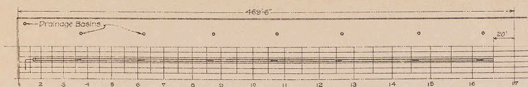
DRAINAGE HOLES IN BUCKLE PLATES FOR ROADWAY ON MAIN BRIDGE

Approved - Oct. 16, 1907

Robert J. ...
Chief Engineer

[Signature]
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
—
BLACKWELL'S ISLAND BRIDGE
—
ROADWAY PAVEMENT
AND
INSIDE TROLLEY TRACKS
—
DRAINAGE.
LOCATION PLAN.



Note:—Joints of Trough to be calked if necessary to secure watertightness

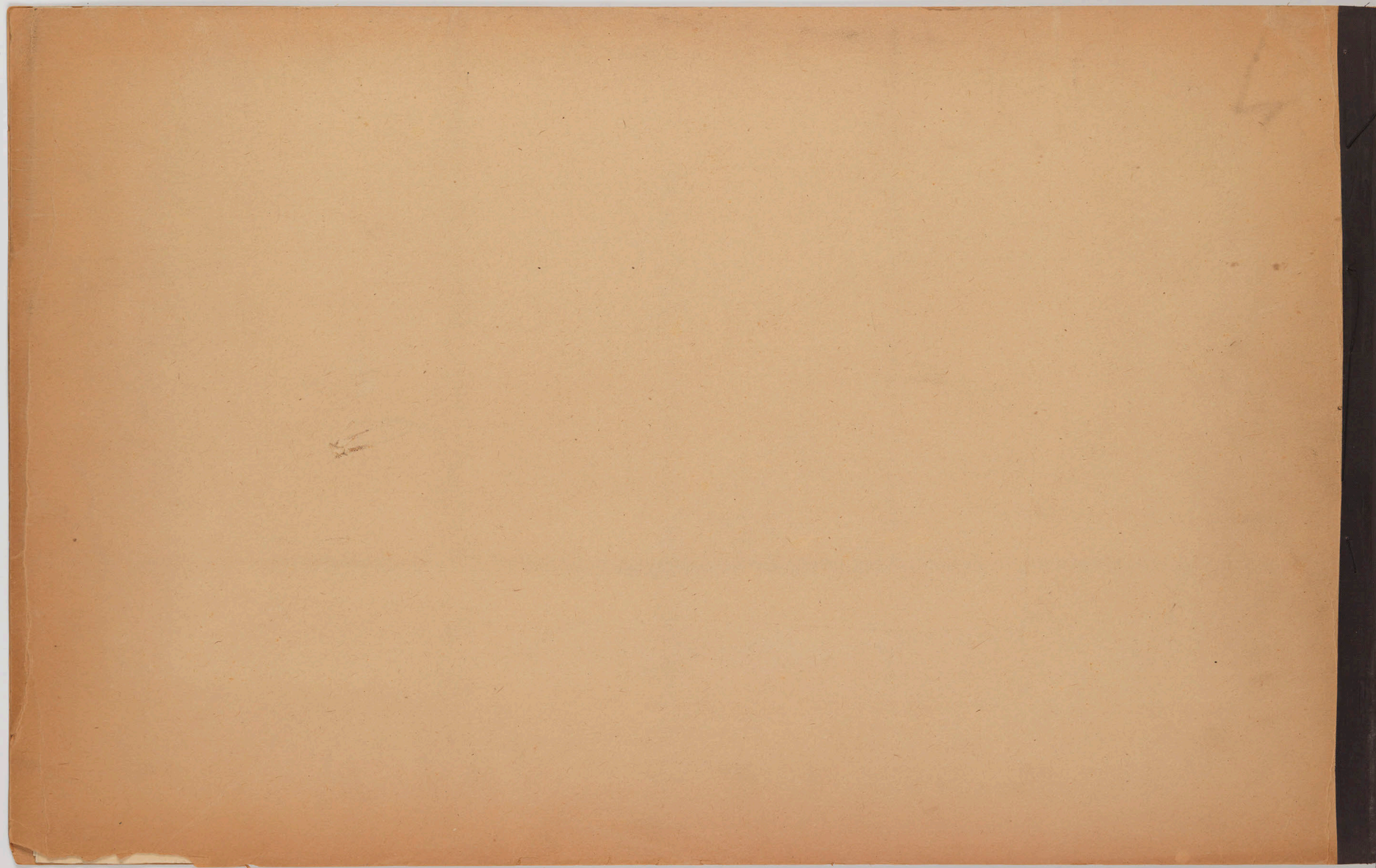
Approved—Oct. 16, 1907.....

Chief Engineer
Commissioner

Commission

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
ROADWAY PAVEMENT
AND
INSIDE TROLLEY TRACKS
DRAINAGE SYSTEM-ANCHOR ARMS.

Scale, $\frac{1}{4}$ in. = 1 ft.



624.09747
N568d
v.1
pt.9

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1907.

Contract Drawings

FOR

Constructing the Steel and Masonry Approach
in the Borough of Queens of the
Blackwell's Island Bridge

Over East River, Between the Boroughs of
Manhattan and Queens.

624.09747
N568d
v.1 pt.9

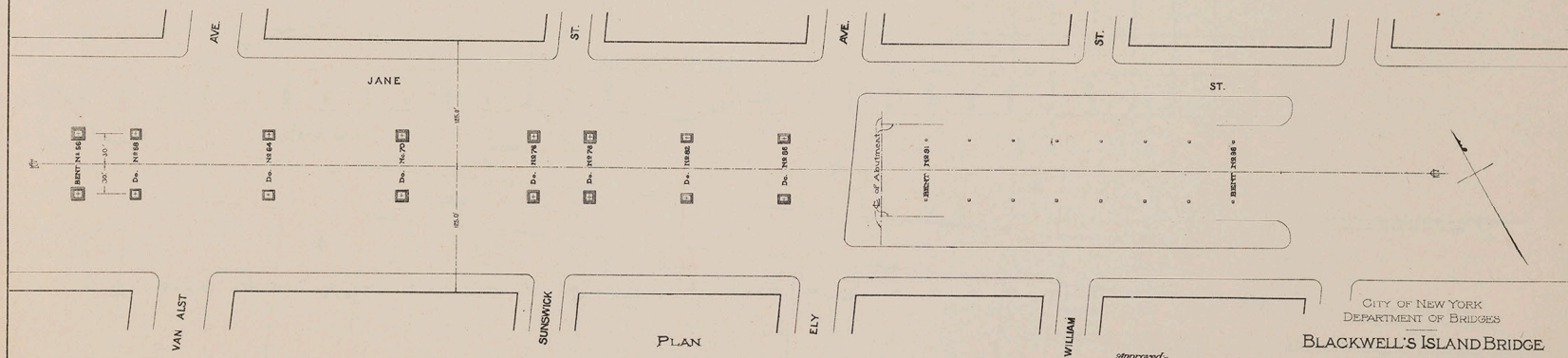
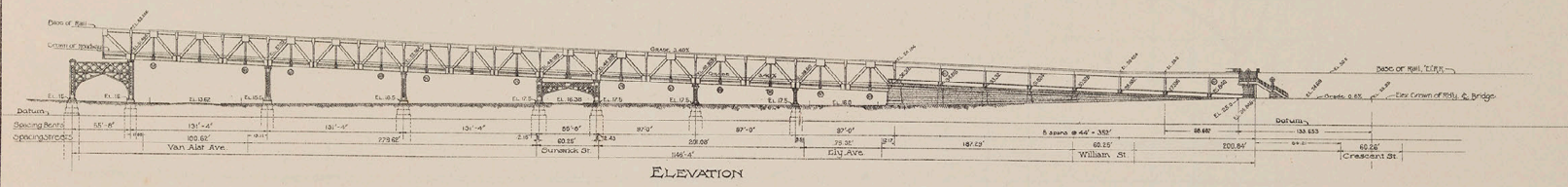
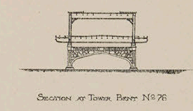
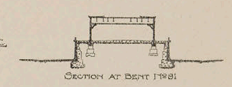
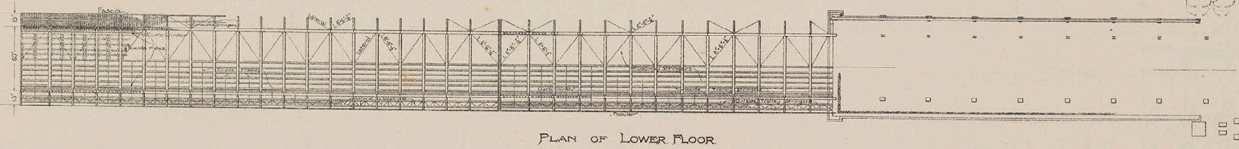
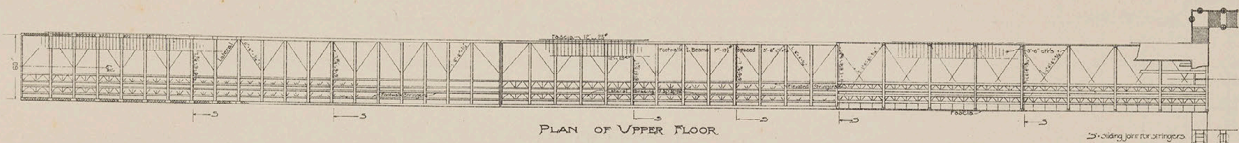
3153-07B



MARTIN B. BROWN Co., Printers, 49 to 57 Park Place, N. Y.

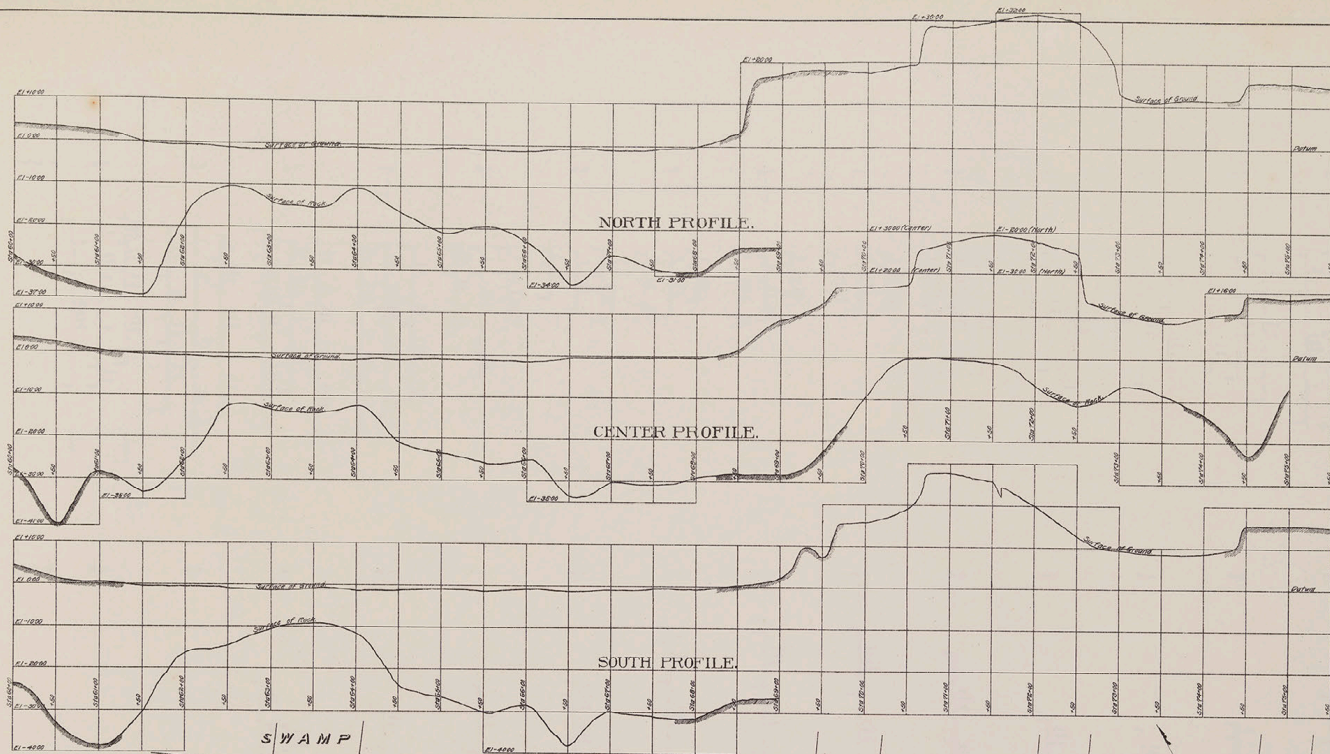
Summit

FONDREN LIBRARY
Southern Methodist University
DALLAS, TEXAS



approved:
[Signature] Chief Engineer
[Signature] Commissioner

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 QUEENS APPROACH
 VAN ALST AVE. TO CRESCENT ST.
 GENERAL DRAWING
 Scale 1/8" = 1'-0"



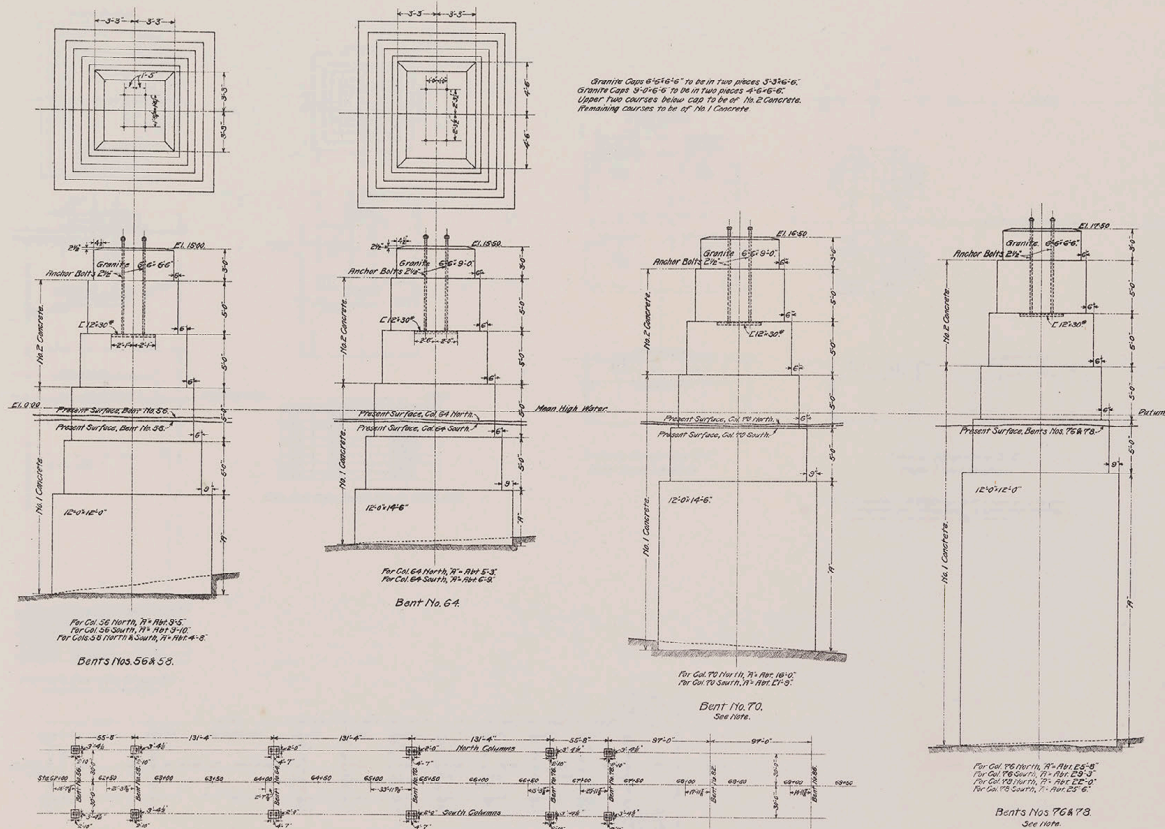
Note - Elevations given on Plan are from sounding
 computed from original ground.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 QUEENS APPROACH
 VAN ALST AVE. TO CRESCENT ST.
 MAP & PROFILES OF LEDGE ROCK
 AS LOCATED BY WASH BORINGS

Horizontal Scale 1/2" = 10'.

Vertical Scale 1/4" = 1'.

4966.

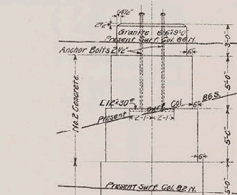


Approved

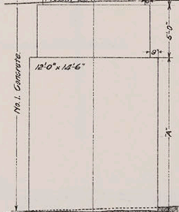
[Signature]
Chief Engineer
[Signature]
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
COLUMN FOUNDATIONS-I.

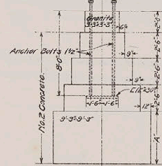
4968.



EL 0000	Present Suck Gel 92.5
---------	-----------------------

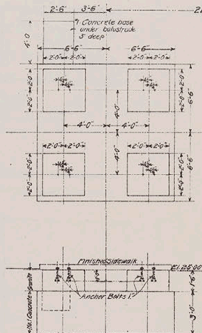


Column No.	Dimension A'	Elev. Top of Caststone
B2 North	Abt 23'-6"	17500
B2 South	Abt 24'-6"	17500
B6 North	Abt 19'-6"	17500
B6 South	Abt 20'-6"	17500

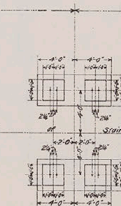


Best No.	Dimension A'	File type Geostore
91	6-0"	28816
92	6-3"	29320
93	3-0"	28824
94	3-0"	24320
95	3-0"	28032
96	3-0"	21336
97	5-0"	19040
98	5-0"	18844

Elev. R.R. Cols., Bents Nos. 91 to 98, Incl.



*Stairway Foundations 'S
Under Upper Landings.*

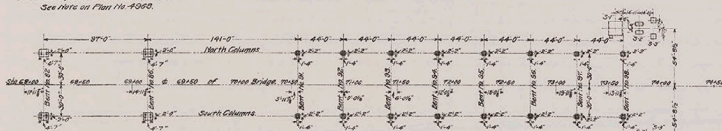


Stairway Foundations 'S-2,'
Under Lower Landings.



Stairway Foundations S-3.
Under Ends of Stair Strings

Note: - Embankment at Stairways to be brought up to required finished grade, and subsequently excavated when Stairway Foundations S-1, S-2 and S-3 are to be built.



Anchor Plan.
Scale, $\frac{1}{8}$ in. = 1 ft.

Notes: - Center of Queens Anchor Pier is located at Sta. 44+16.
Distance, Center of Queens Anchor Pier to Bent No. 82, = 204'-11 1/2".
For Bents Nos. 56 to 78, see Plan No.

Approved:.....

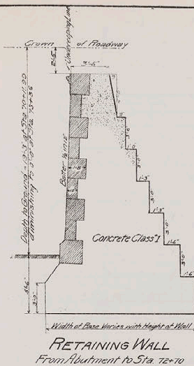
Chief Engineer

Commissioner:

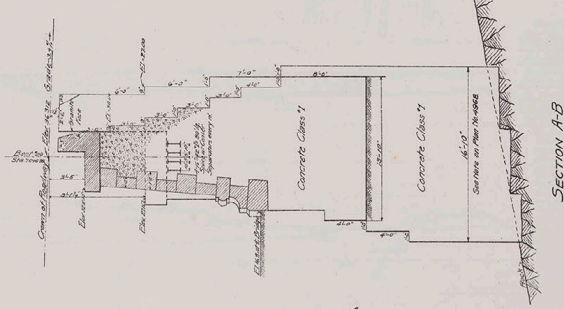
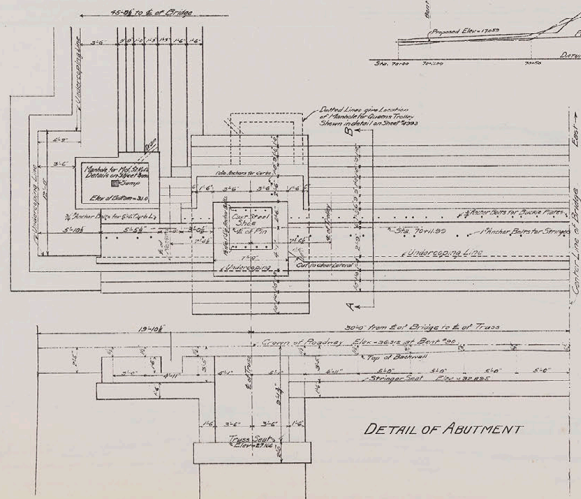
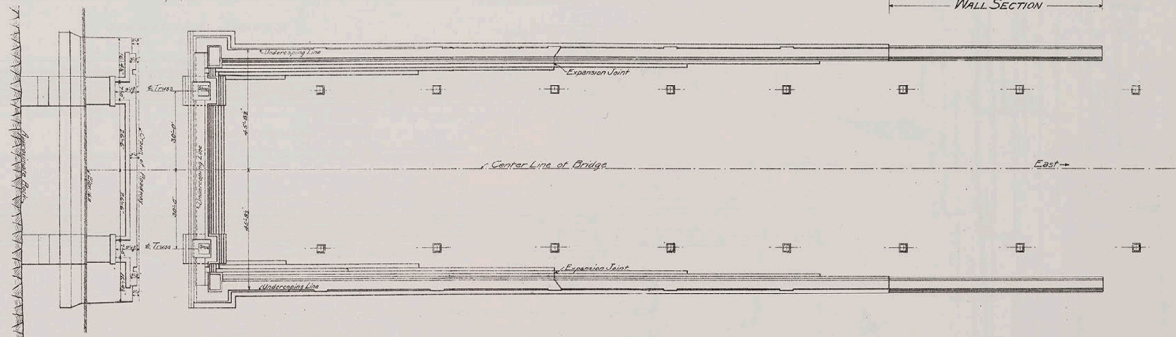
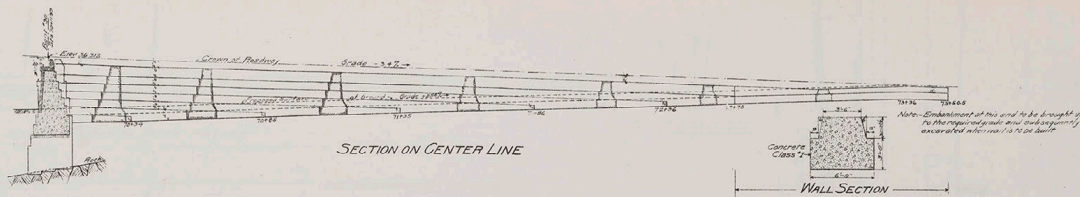
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
COLUMN FOUNDATIONS - II.

Scale: $\frac{1}{8}$ in. = 1 ft.

4969.



RETAINING WALL
From Abutment to Sta. 72+10



Approved

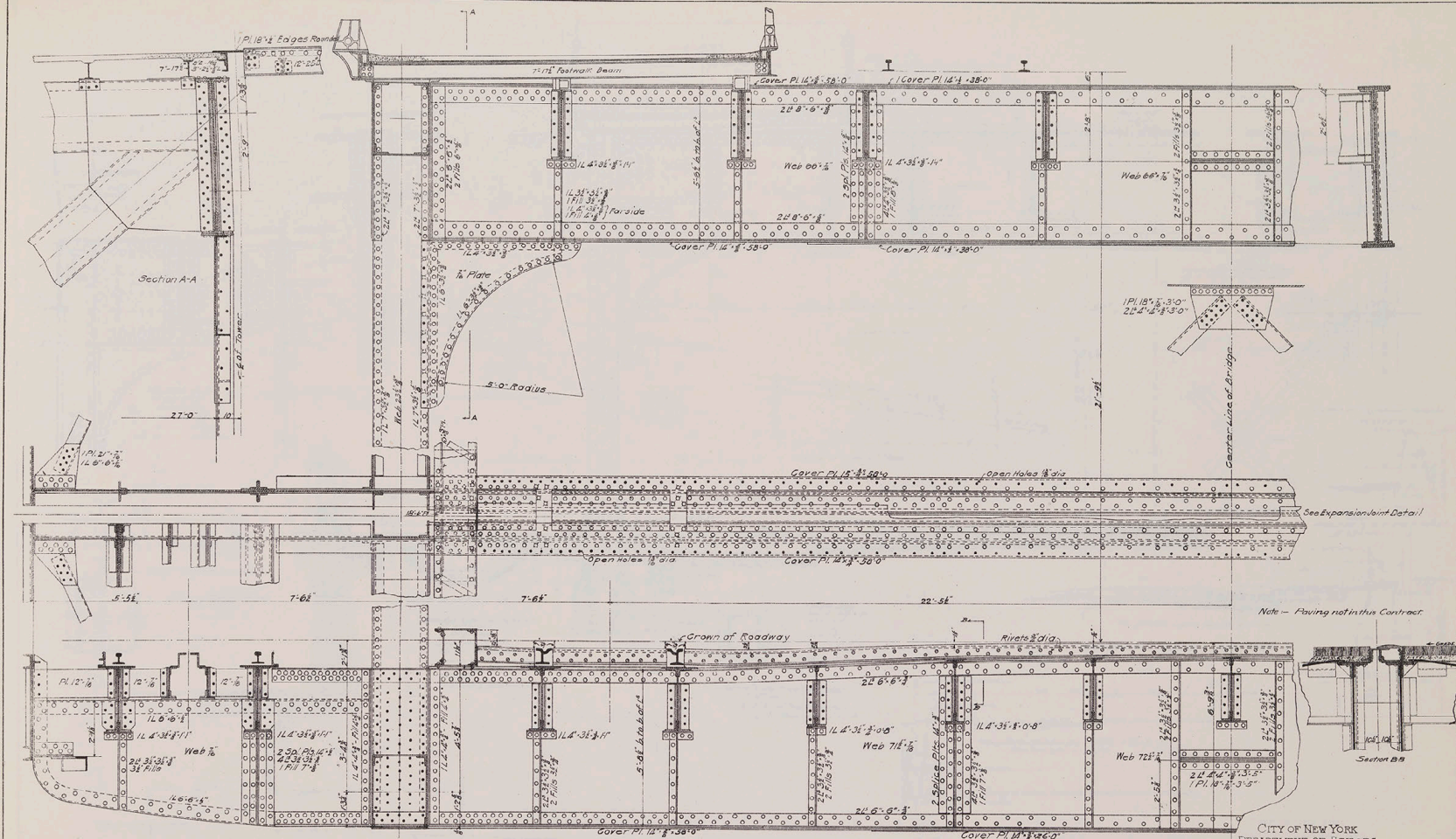
[Signature] Chief Engineer
[Signature] Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
ABUTMENT AND RETAINING WALLS II

Scale 1/2" = 1'-0"

4971.



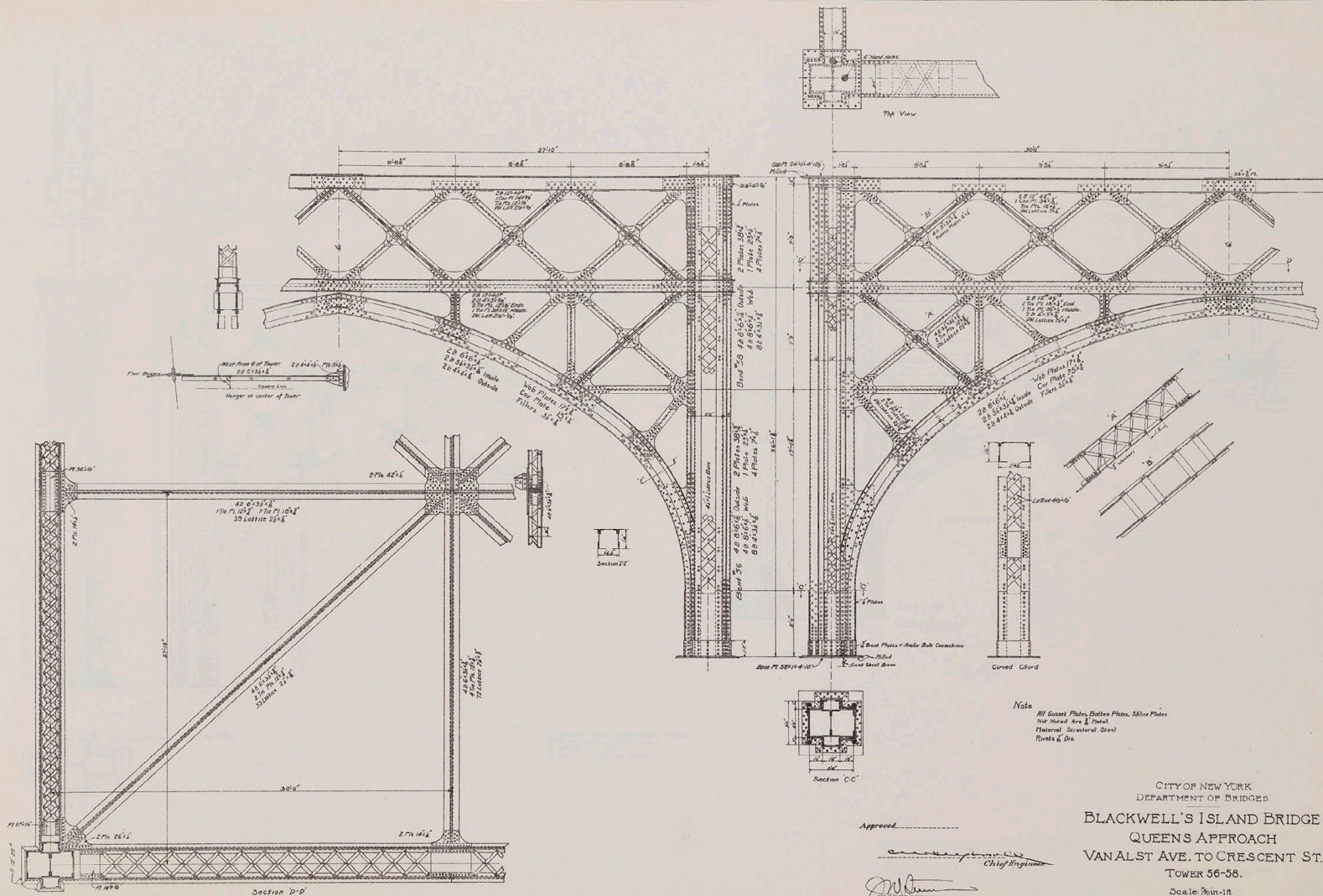


Approved: *[Signature]* Commissioner
[Signature] Chief Engineer

Note—Material Structural Steel
 Rivets $\frac{3}{4}$ dia. Open Holes $\frac{1}{8}$ dia. Unless Noted

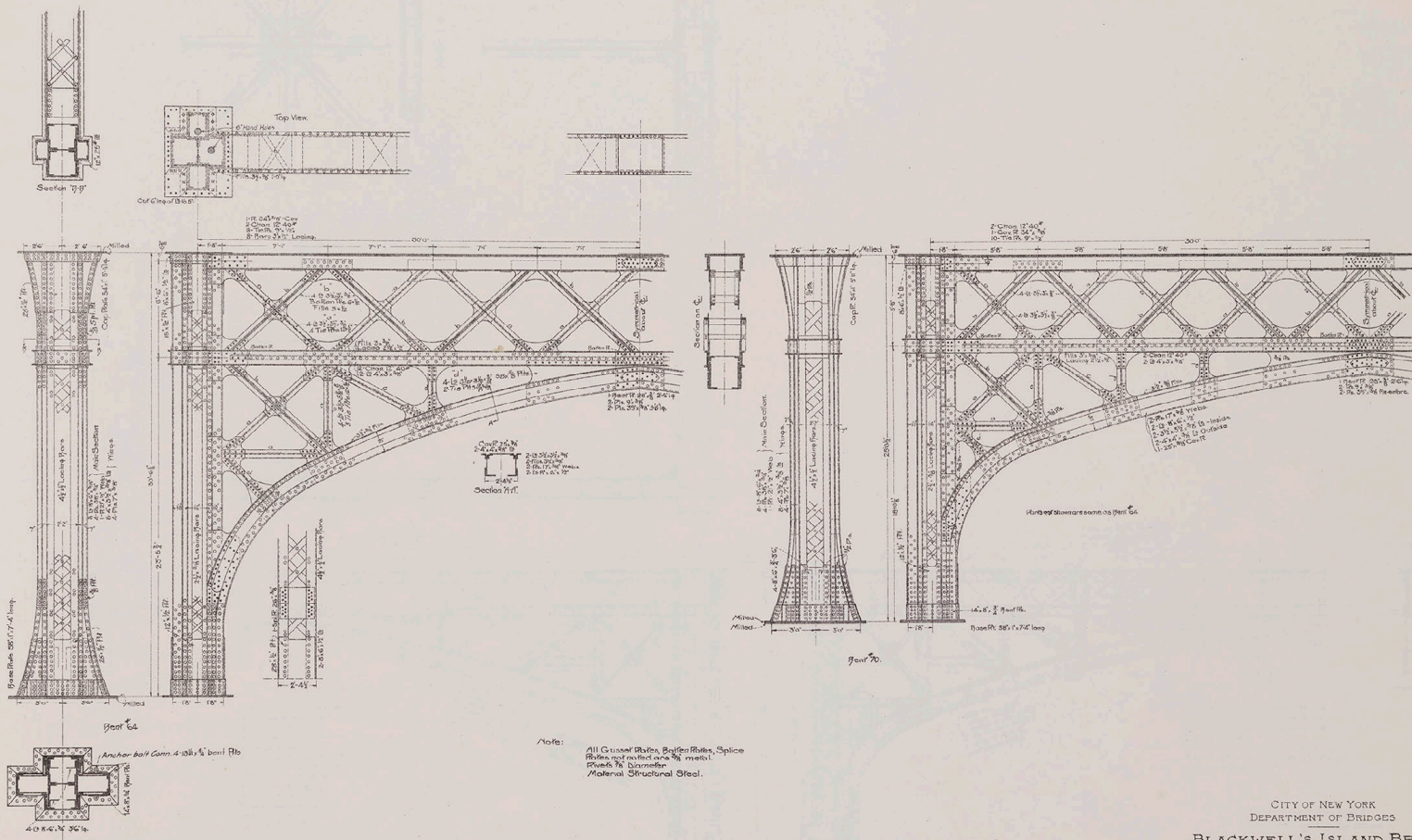
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 QUEENS APPROACH
 VAN ALST AVE. TO CRESCENT ST.
 CROSS SECTION OF CANTILEVER END
 BENTS 57 & 77
 Scale $\frac{1}{2}$ in. = 1 ft.

4974



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
VAN ALST AVE. TO CRESCENT ST.
TOWER 56-58.

Approved: _____
Chief Engineer
Commissioner

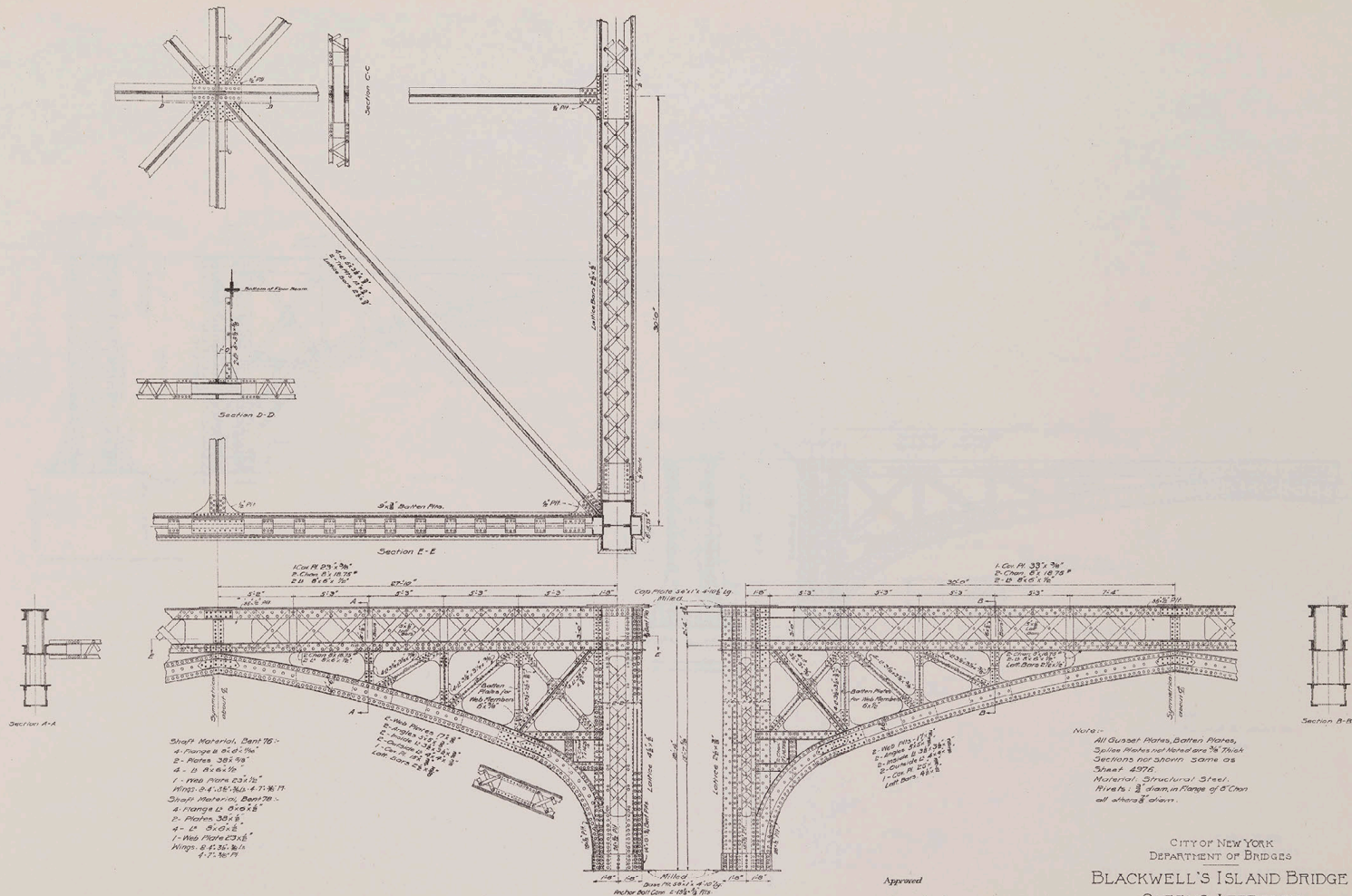


Approved

Chief Engineer
 Commissioner

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE
 QUEENS APPROACH
 VANALST AVE TO CRESCENT ST.
 BENTS 64 AND 70

Scale: $\frac{1}{8}$ in. = 1 ft.



Approved

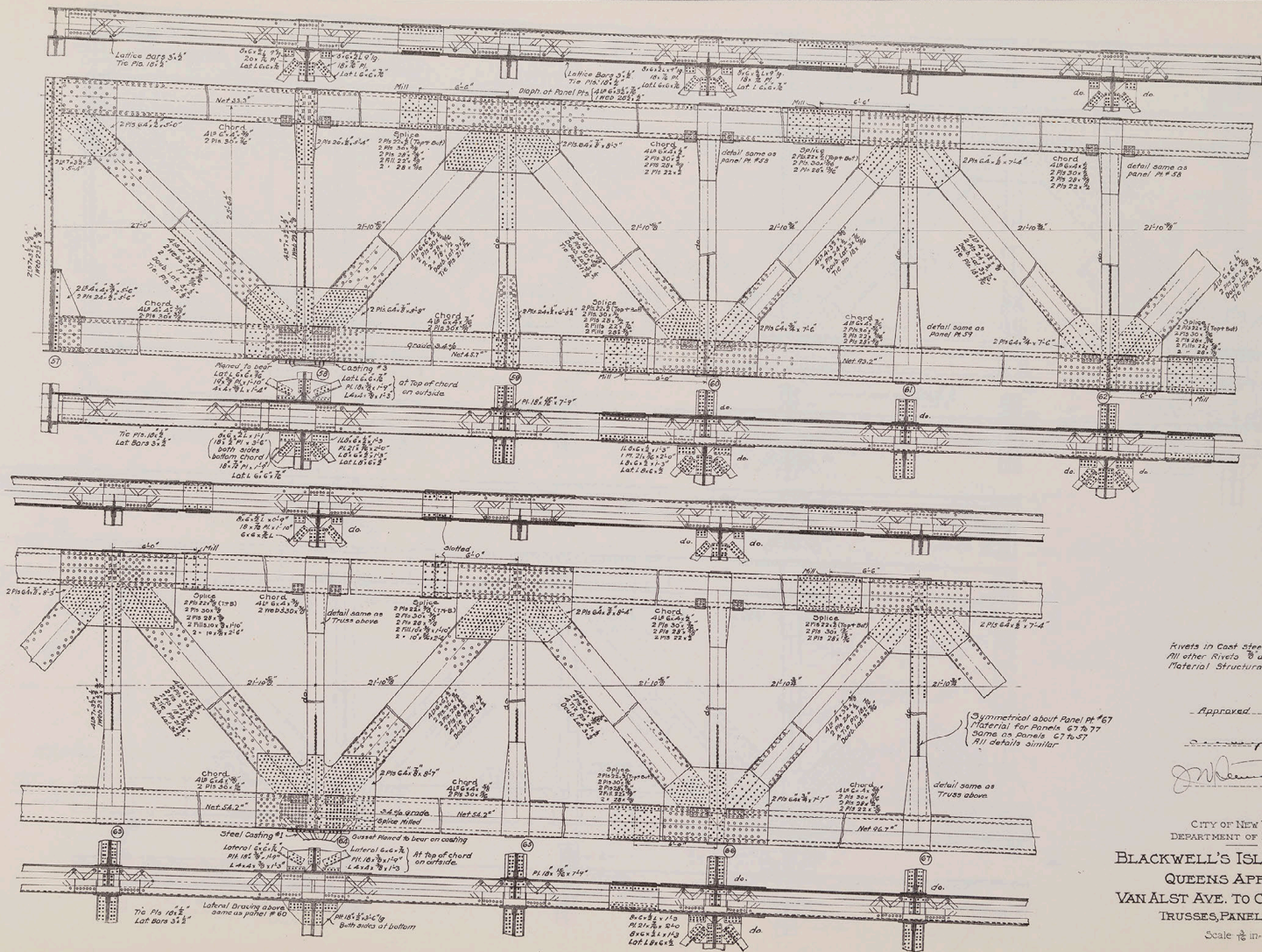
[Signature]
Chief Engineer

Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
TOWER 76 -- 78.

Scale: 1/8" = 1'

4978



Rivets in cast steel shown 1 dia.
All other Rivets 3/4 dia
Material Structural Steel

Approved _____

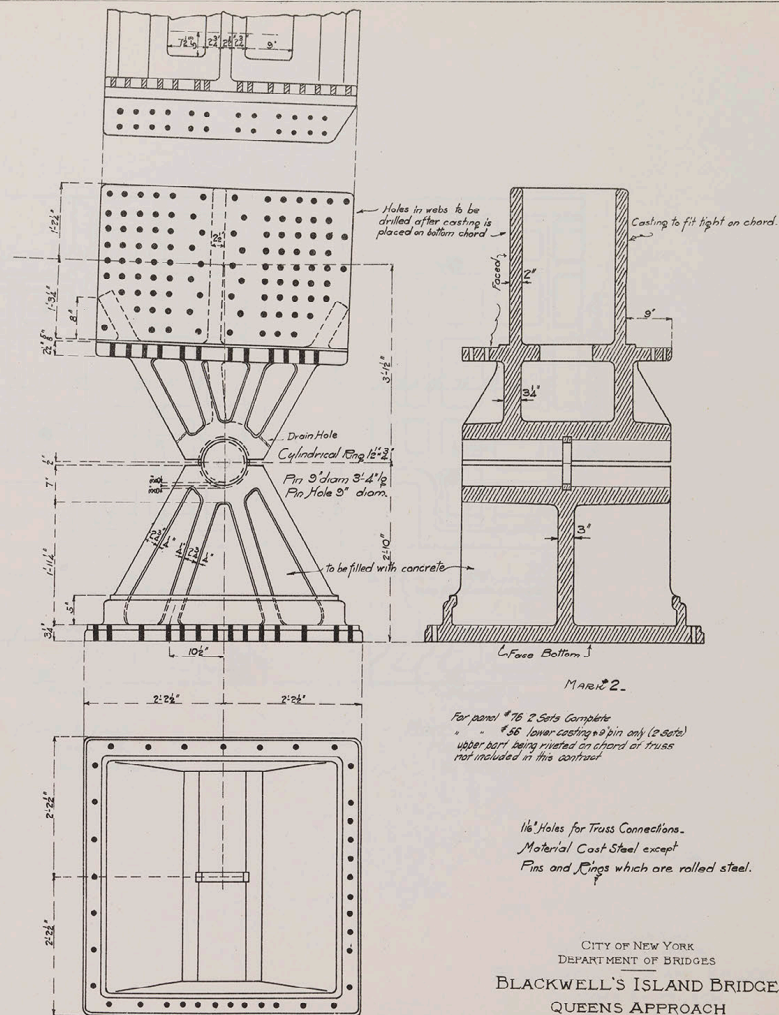
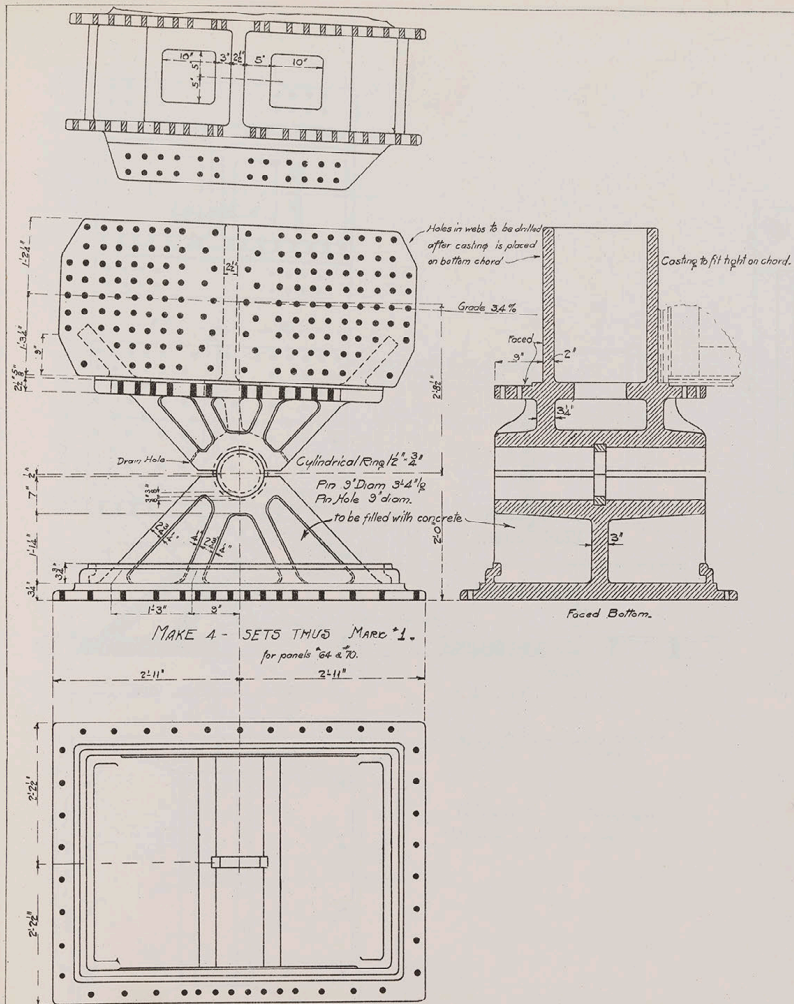
Chief Engineer

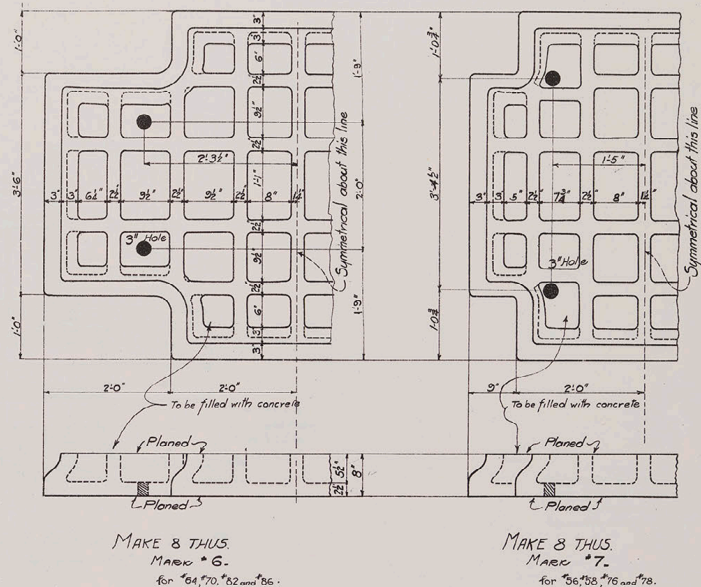
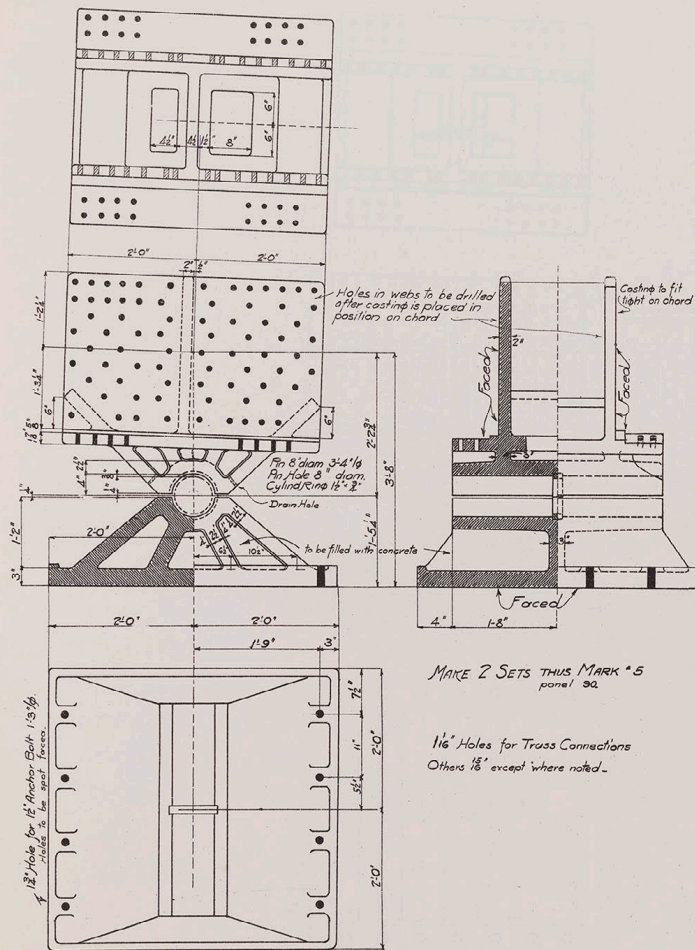
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
TRUSSES, PANELS 57 TO 77

Scale 1/8" = 1'-0"

4980





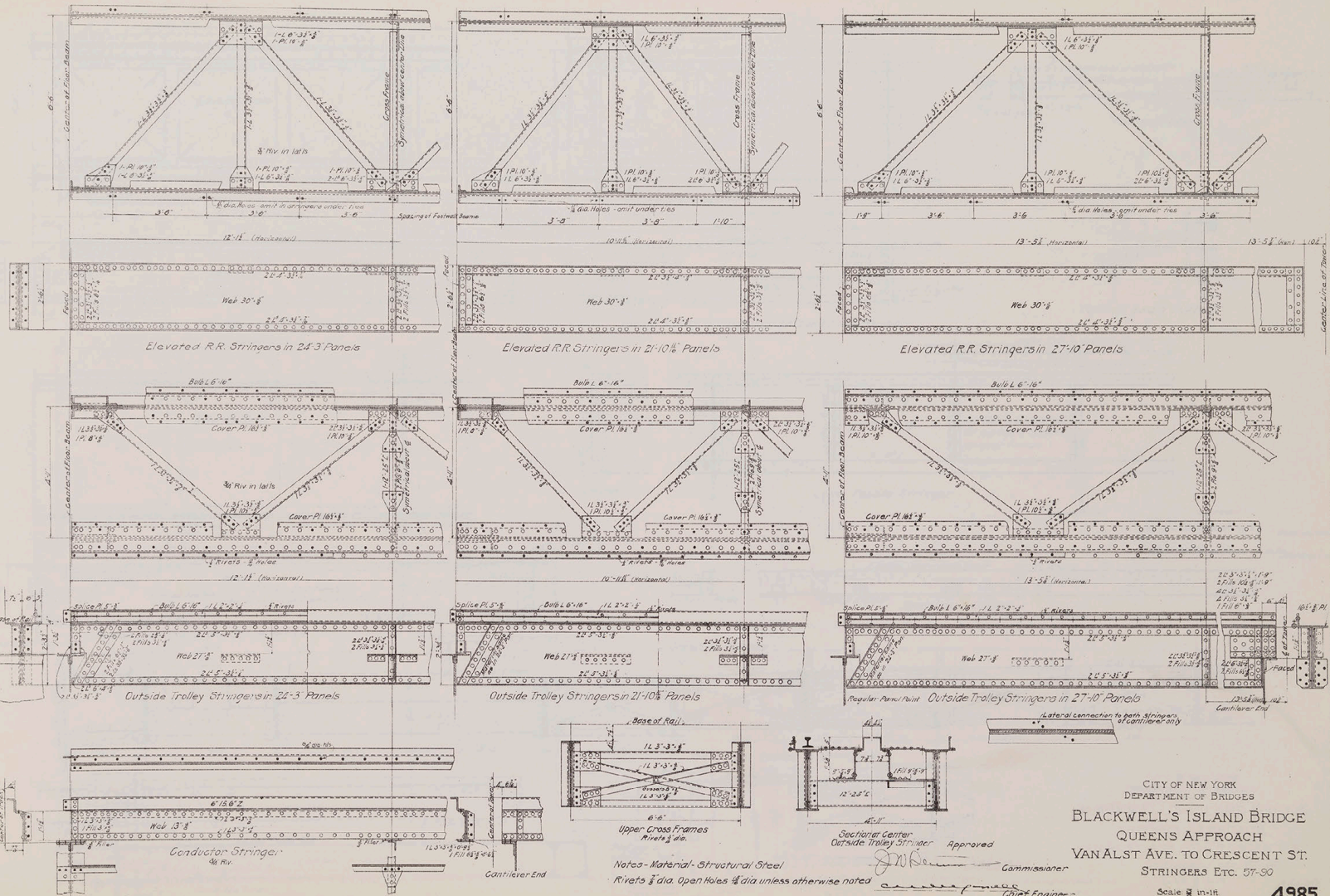
Material Cost Steel except
Pins and Rings which are rolled steel.

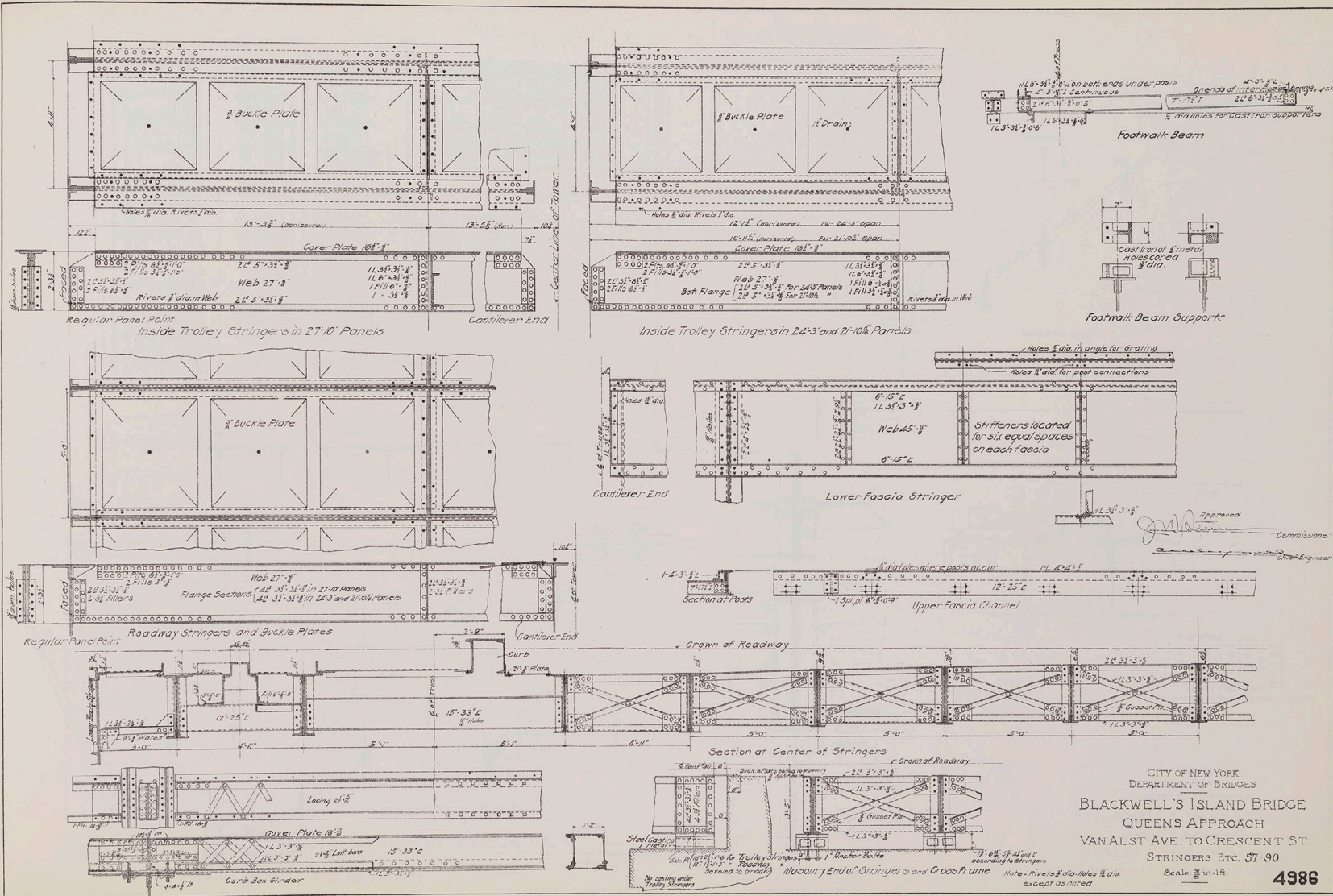
CITY OF NEW YORK.
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE TO CRESCENT ST.
CAST STEEL SHOES & BASES 5, 6 & 7.

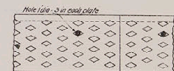
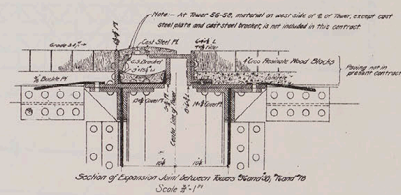
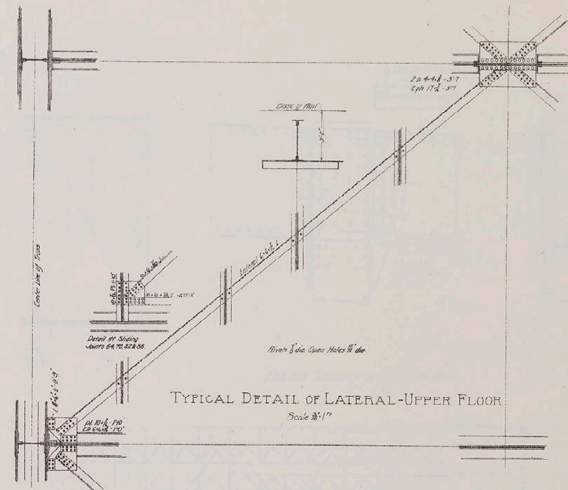
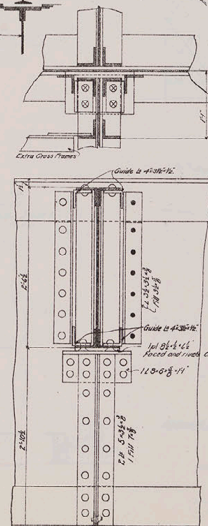
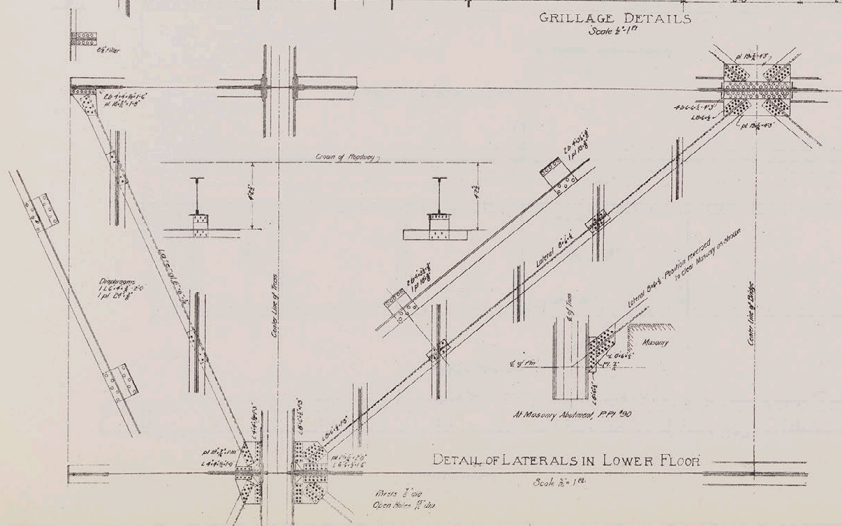
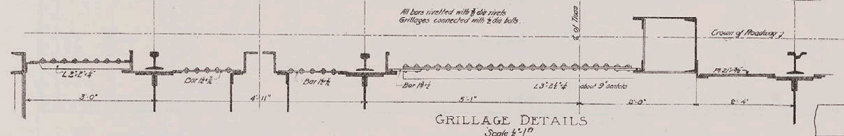
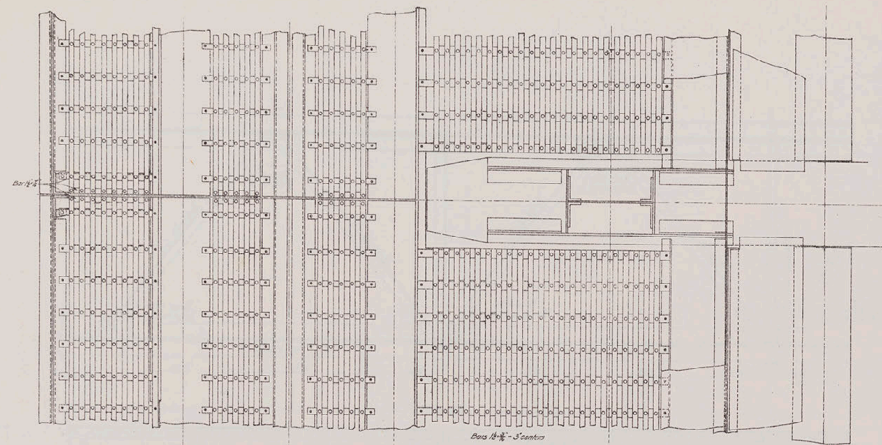
Chief Engineer
Commissioner

Scale: 3/4" = 1'-0"

4983

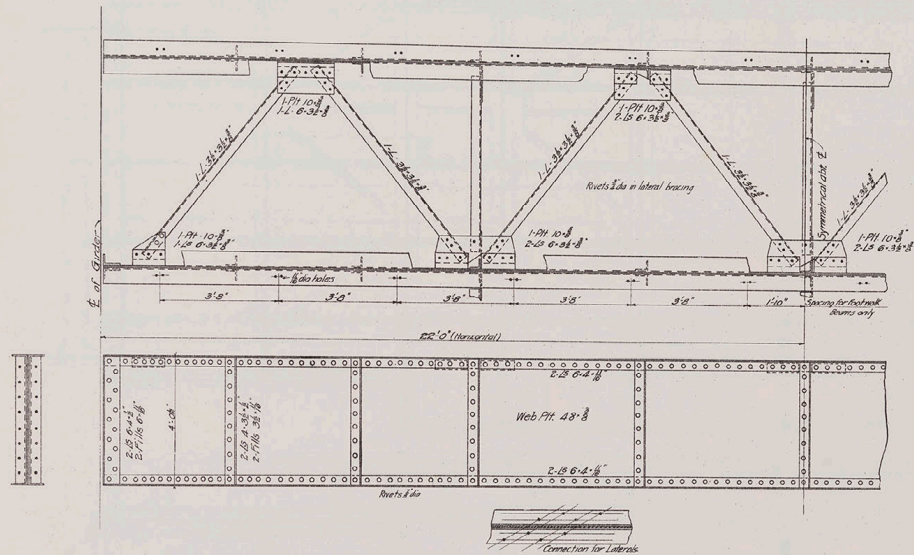




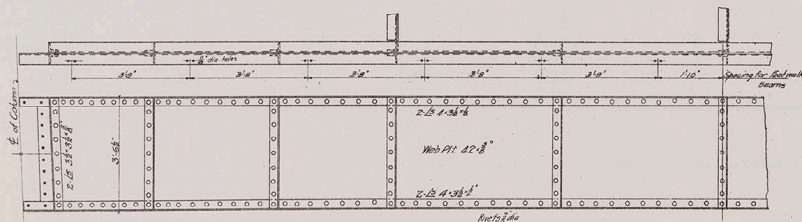


Approved: *[Signature]* *[Signature]*
 City Engineer
 City Engineer

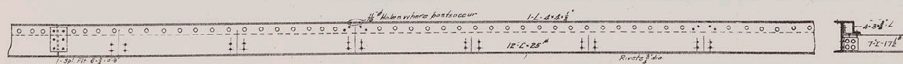
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE
 QUEENS APPROACH
 VANALST AVE TO CRESCENT ST.
 GRILLAGE-LATERALS-EXPANSIONS
 57-90



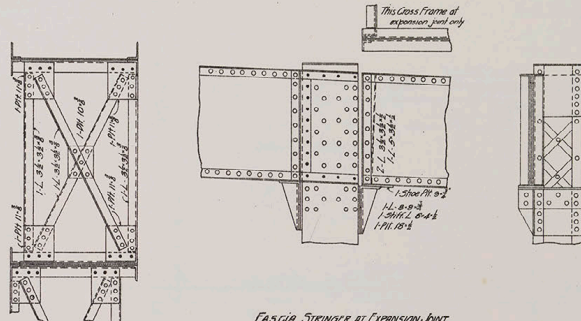
ELEVATION OF FOOTWALK STRINGERS



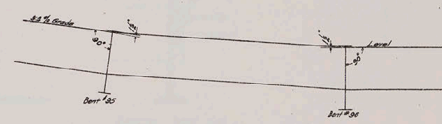
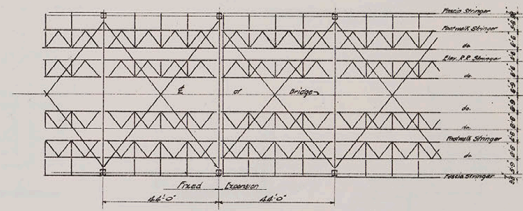
FASCIA STRINGER



FASCIA CHANNEL



FASCIA STRINGER AT EXPANSION JOINT

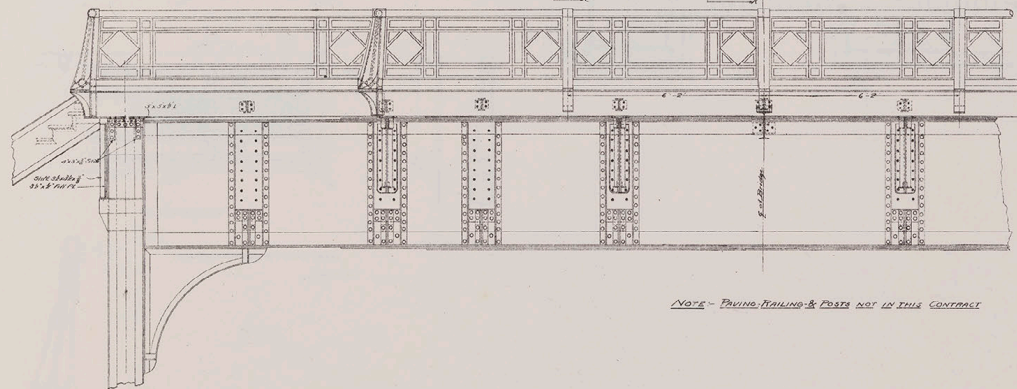
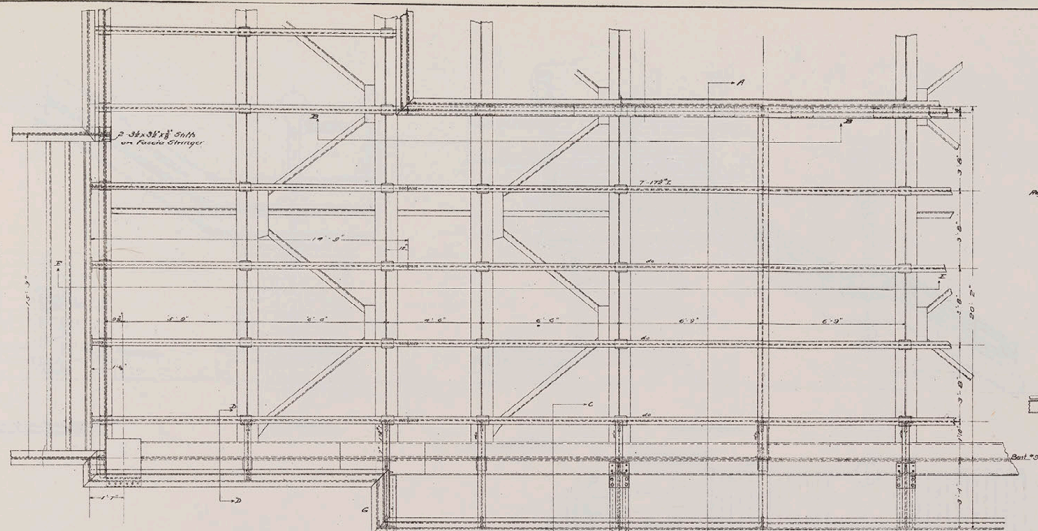


STRINGER BETWEEN BENTS 90 & 96

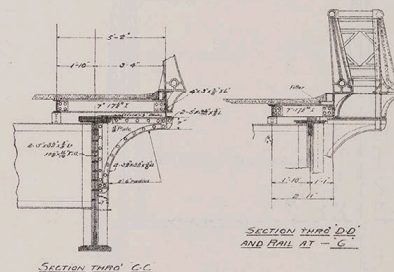
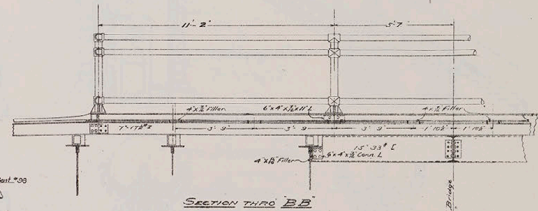
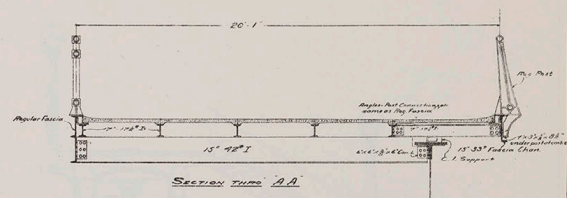
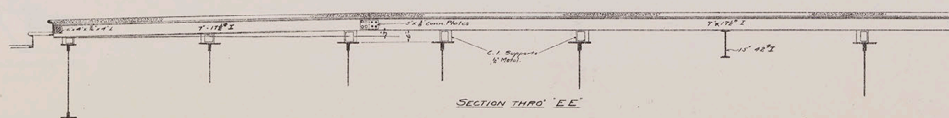
Approved _____
 Chief Engineer
 Commissioner

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE
 QUEENS APPROACH
 VAN ALST AVE TO CRESCENT ST.
 STRINGER'S BENTS 90 TO 98

Scale 1/4" = 1'-0"



NOTE - PAVING, RAILING & POSTS NOT IN THIS CONTRACT



Approved

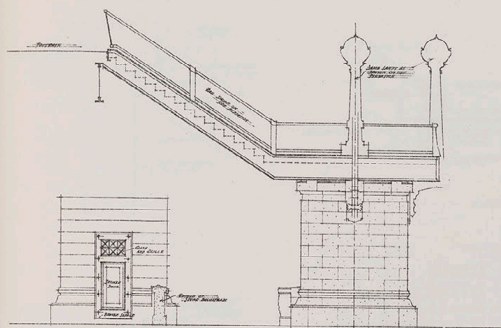
[Signature]
Chief Engineer

[Signature]
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
FOOTWALK FRAMING AT END

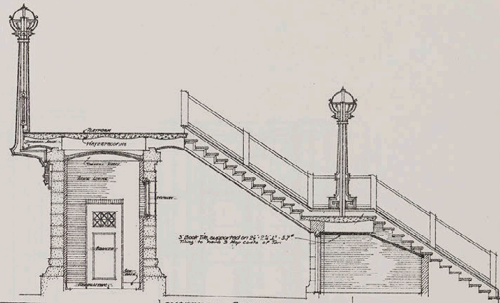
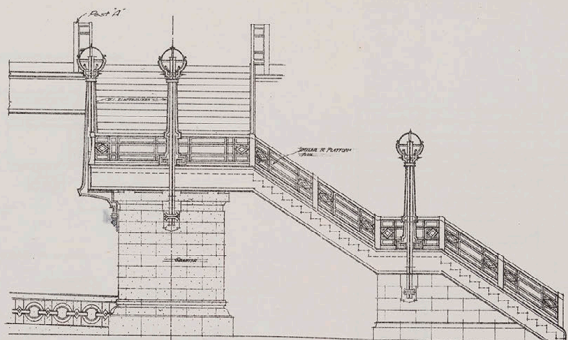
Scale: 3/4 in. = 1 ft.

4989.

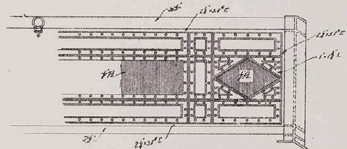


Side Elevation of Stair
Structure, New York

End Elevation



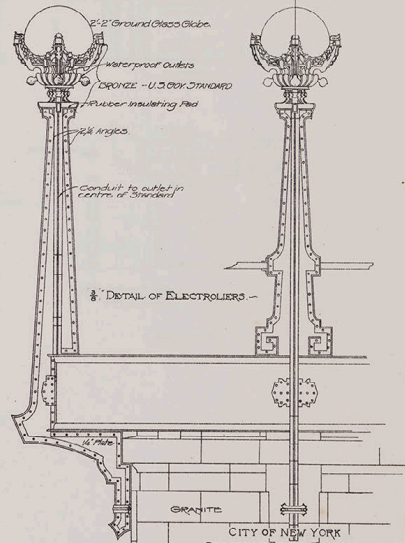
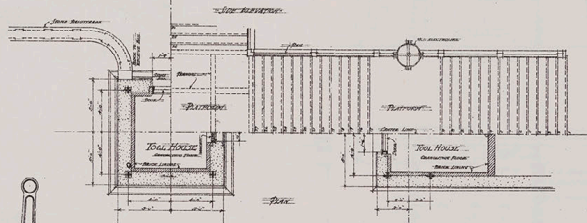
Longitudinal Section



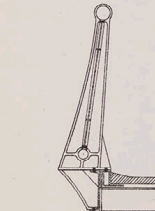
Railing on Platform



End Stair, Platform



Detail of Electrolights

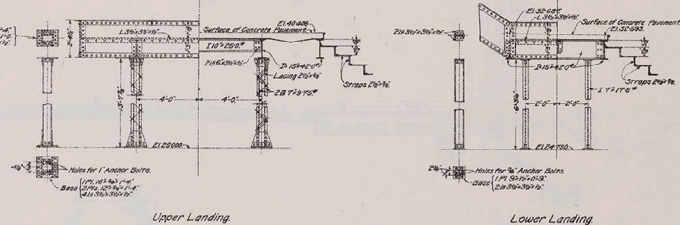


Post on Truss Girder
Scale 1/4" = 1'

All RAIL PLATES OF POSTS & METAL
SCALE 1/4" = 1'

Chief Engineer
Commissioner

BLACKWELL'S ISLAND BRIDGE
QUEEN'S APPROACH
VAN ALST AVE. TO CRESCENT ST.
STAIRS AND STAIR HOUSES
Scale 1/4" = 1'



Upper Landing.

Lower Landing.

rivering.—
In 2224's and 7203^oD, use 4/20 rivers; open notes 4/6.
Elsewhere use 4/20 rivers and 4/6 open notes unless
otherwise noted.

Approved: _____

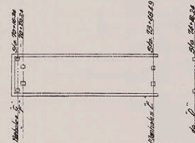
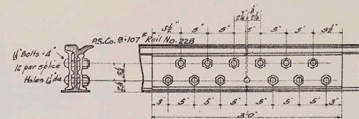
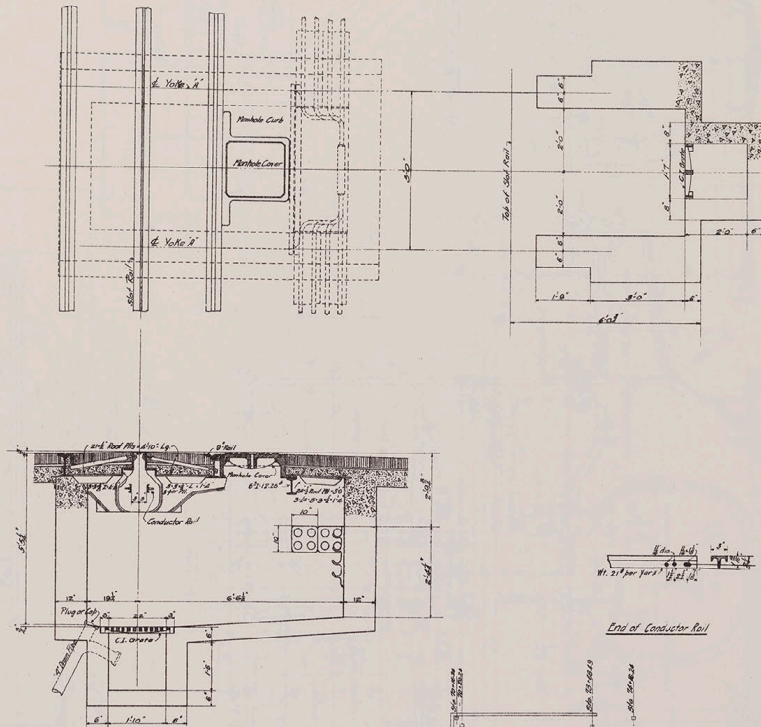
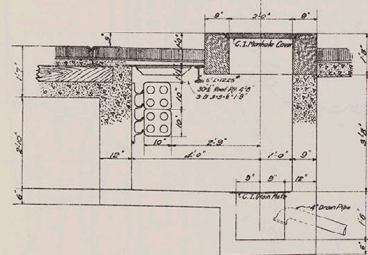
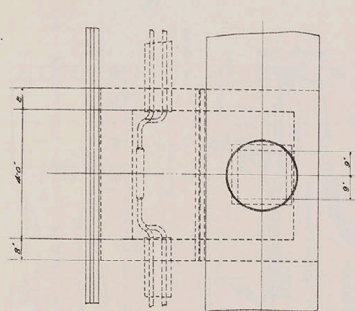
 Chief Engineer

 Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
DETAILS OF STAIRWAYS.

Scale: $\frac{3}{8}$ in. = 1 ft.

4991.

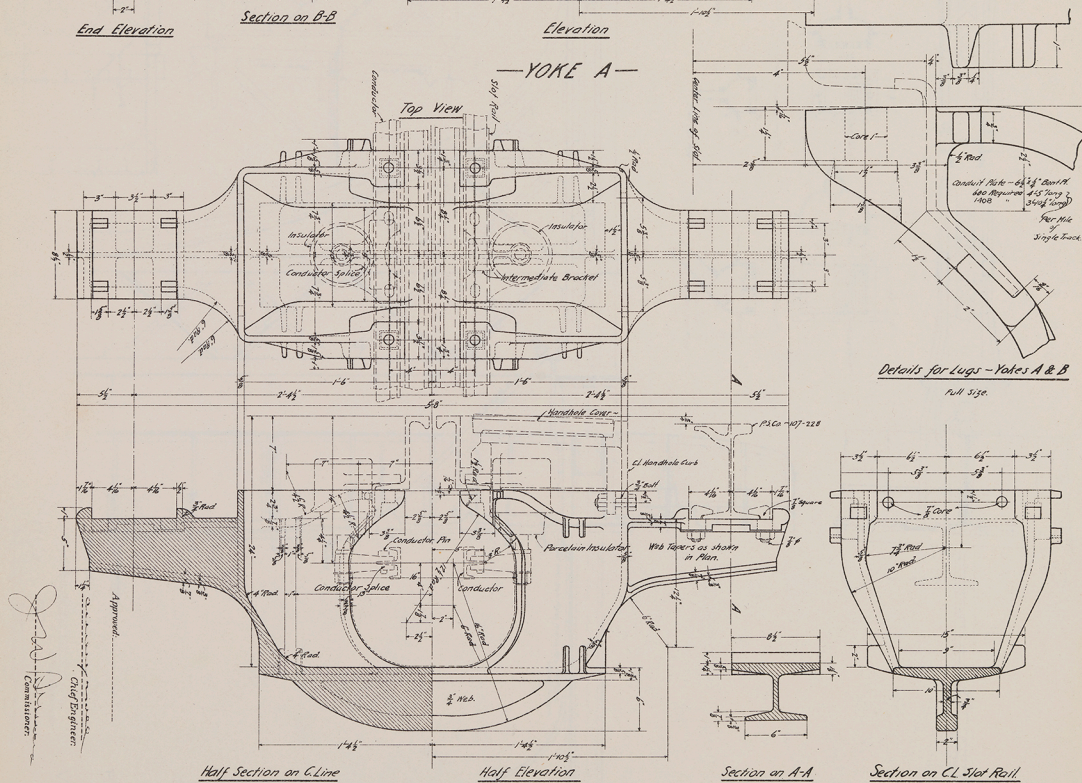
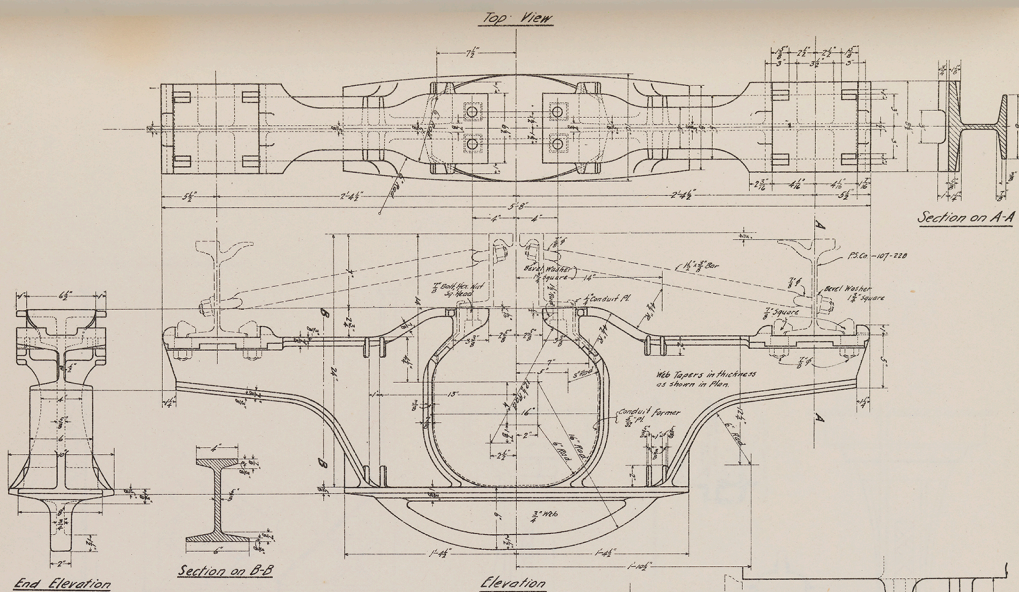


FEEDER MANHOLE FOR QUEENS TROLLEY

FEEDER MANHOLE FOR MANHATTAN TROLLEY

Approved:

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
FEEDER MANHOLES & RAIL SPICES
Scale $\frac{1}{2}$ in. = 1 ft.

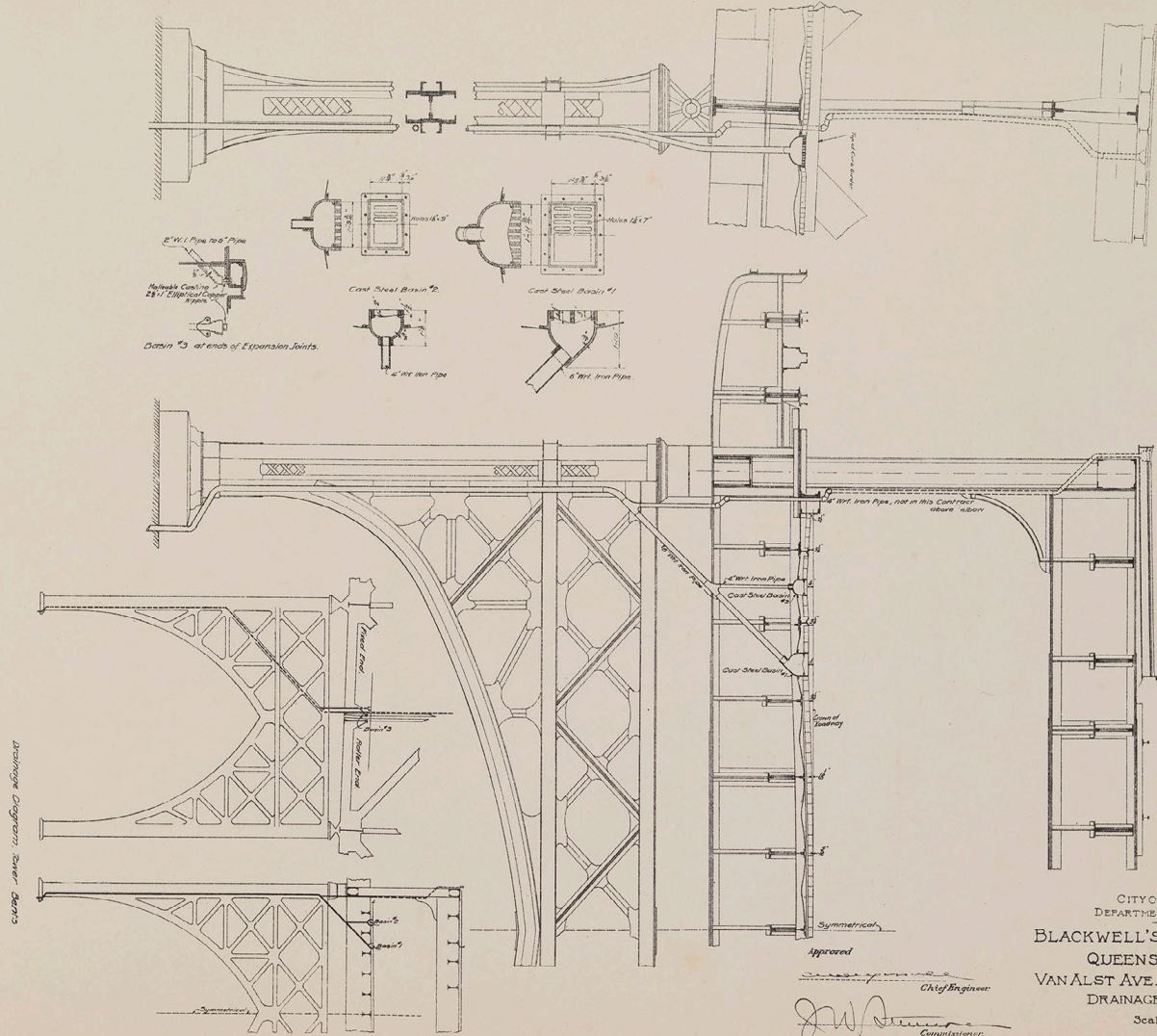


—YOKE B—

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
CAST IRON YOKES

Scale: 1/8 in. = 1 ft.

4994.



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
QUEENS APPROACH
VAN ALST AVE. TO CRESCENT ST.
DRAINAGE DIAGRAM 57-90

Scale: $\frac{1}{8}$ in. = 1 ft.

4995



237W.
624,09747.
N568d
v.1
pt.2
c.1

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

1903.

CONTRACT DRAWINGS

FOR
THE CONSTRUCTION OF

The Power Houses and Elevator
Towers on the Piers

OF THE

Blackwell's Island Bridge
(No. 4)

Over the East River, Between the Boroughs of
Manhattan and Queens.

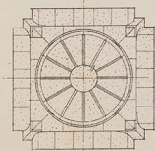
624,09747/
N568d
v.1 pt.2 c.1

(7208)

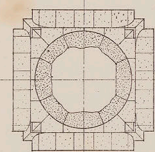
MARTIN B. BROWN Co., Printers, 49 to 57 Park Place, N. Y.

SCIENCE

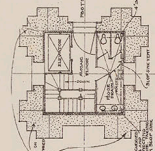
HONORER LIBRARY
Southern Methodist University
DALLAS, TEXAS



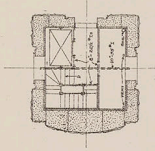
PLAN AT A



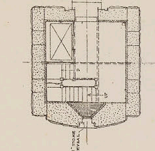
PLAN AT C



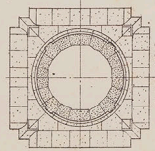
PLAN AT E



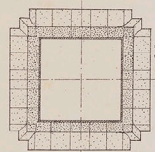
PLAN AT G



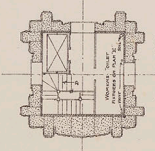
PLAN AT I



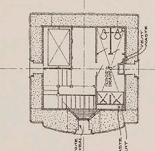
PLAN AT B



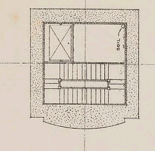
PLAN AT D



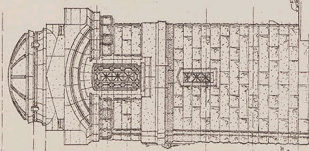
PLAN AT F



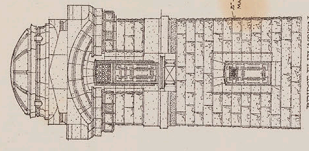
PLAN AT H



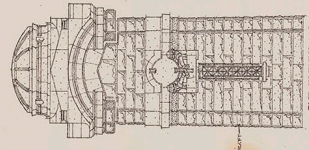
PLAN AT J



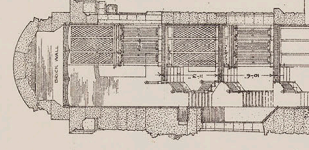
SIDE ELEVATION
OF TOWER
TOWERS OF EAST ANCHOR PIER ABOVE
LEVEL OF GROUND AS SHOWN ON WEST ANCHOR
PIER



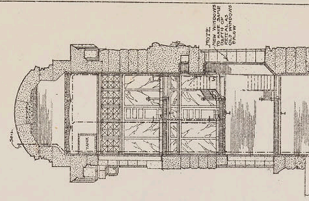
SIDE ELEVATION



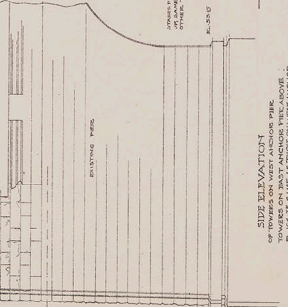
SIDE ELEVATION



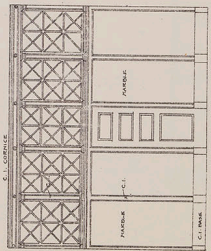
SIDE ELEVATION



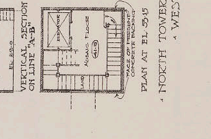
SIDE ELEVATION



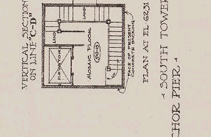
ELEVATION OF TOWER



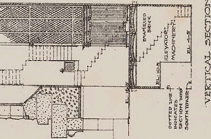
VERTICAL SECTION
ON LINE A-B
SCALE 3/8"=1'-0"



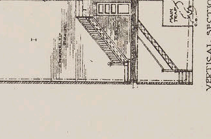
VERTICAL SECTION
ON LINE A-B
SCALE 3/8"=1'-0"



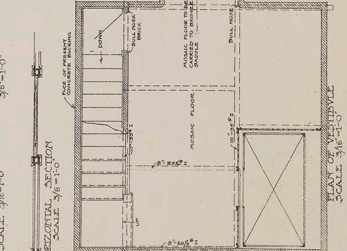
VERTICAL SECTION
ON LINE C-D
SCALE 3/8"=1'-0"



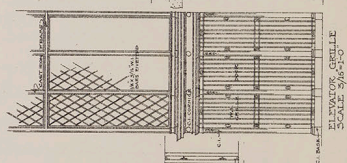
VERTICAL SECTION
ON LINE A-B
SCALE 3/8"=1'-0"



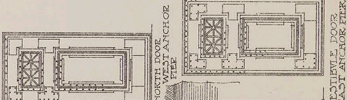
VERTICAL SECTION
ON LINE C-D
SCALE 3/8"=1'-0"



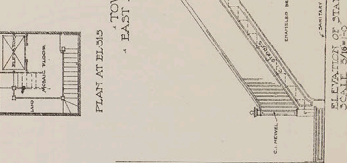
PLAN OF TOWER
SCALE 3/8"=1'-0"



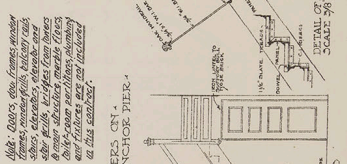
PLAN OF TOWER
SCALE 3/8"=1'-0"



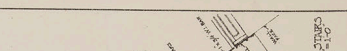
PLAN OF TOWER
SCALE 3/8"=1'-0"



PLAN OF TOWER
SCALE 3/8"=1'-0"



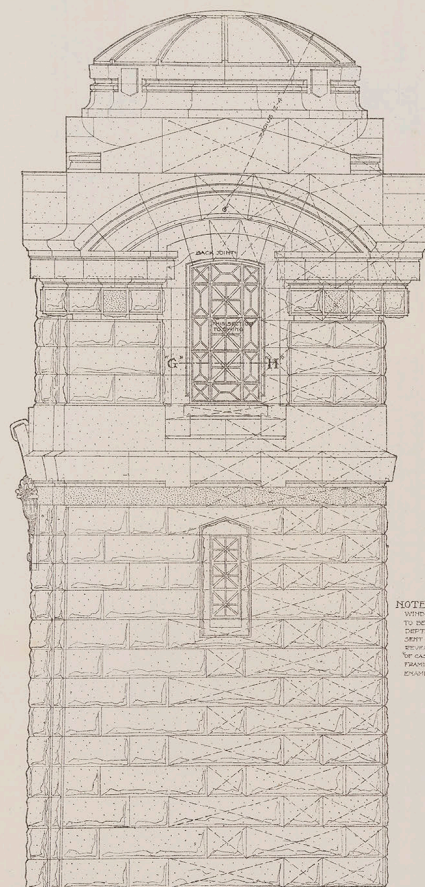
PLAN OF TOWER
SCALE 3/8"=1'-0"



PLAN OF TOWER
SCALE 3/8"=1'-0"

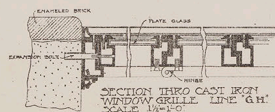
Approved Oct. 30th, 1903.
By the Board of Commissioners.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELLS ISLAND BRIDGE (N^o. 4)
EAST AND WEST ANCHOR PIERS
ELEVATOR TOWERS
SCALE 1/16"=1'-0"

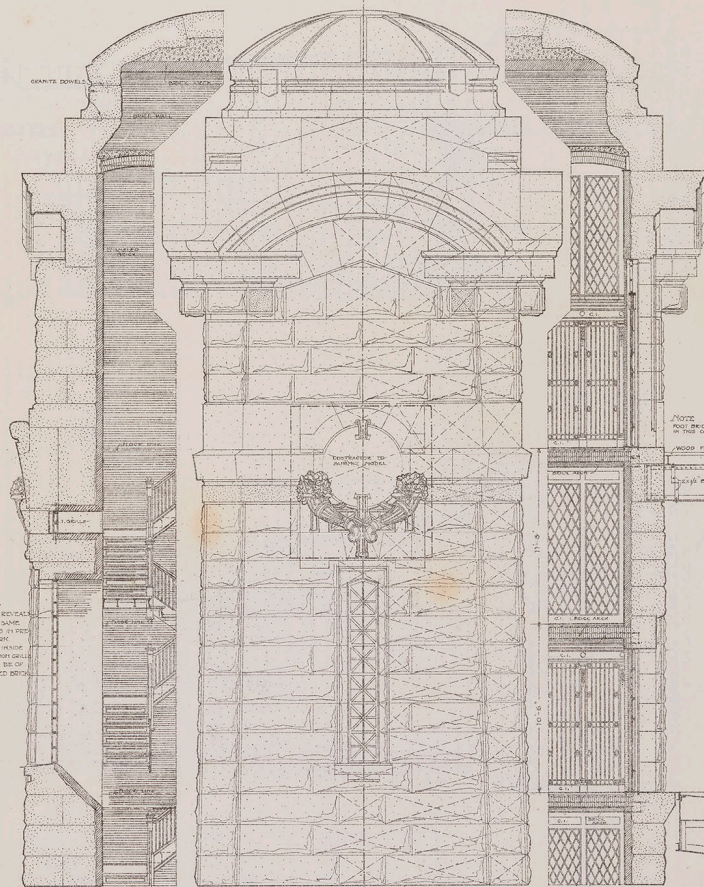


SIDE ELEVATION.

NOTE.—
WINDOW REINFORCED
TO BE OF SAME
DEPTH AS IRON
SPRAY IRON
REINFORCED
SPRAY IRON
FRAMES TO BE OF
ENAMELLED BRICK

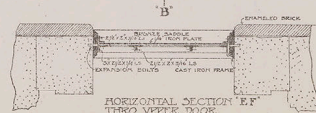


SECTION THROUGH CAST IRON
WINDOW GRILL LINE G-H.
SCALE 1/8"=1'-0"

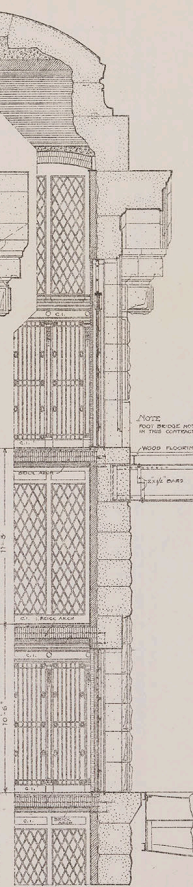


SECTION AB

END ELEVATION.



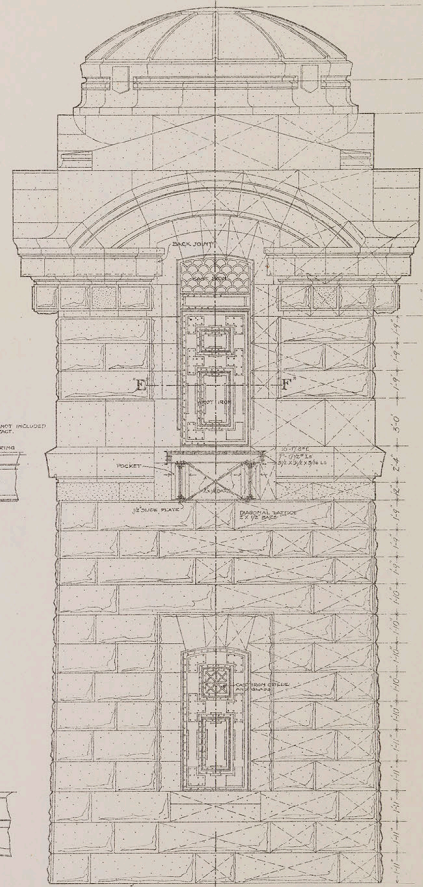
HORIZONTAL SECTION E-F
THROUGH WATER DOOR.
SCALE 3/8"=1'-0"



SECTION CD

NOTE
THIS ELEVATION IS INCLUDED
IN THE CONTENT

NOTE
ELEVATION OF THIS JOINT
EAST ANCHOR PIER 104.32
WEST 96.15
SEE 1/4" SCALE ELEVATIONS



D CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELLS ISLAND BRIDGE (N^o 4)

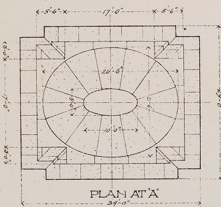
EAST AND WEST ANCHOR PIERS

ELEVATOR TOWERS

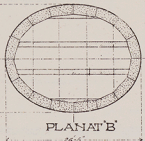
SCALE 3/8"=1'-0"

Approved Oct. 30th, 1903.

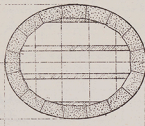
S. S. Ketchum, Commissioner.



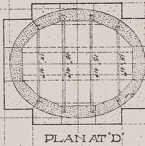
PLAN AT 'A'



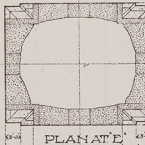
PLAN AT 'B'



PLAN AT 'C'



PLAN AT 'D'



PLAN AT 'E'

NOTE: 1/2\"/>

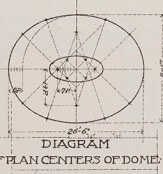
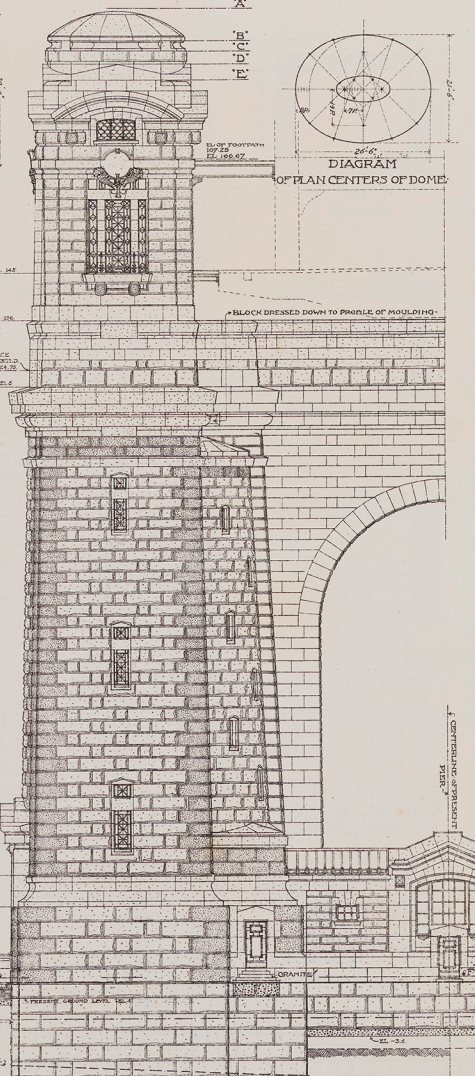
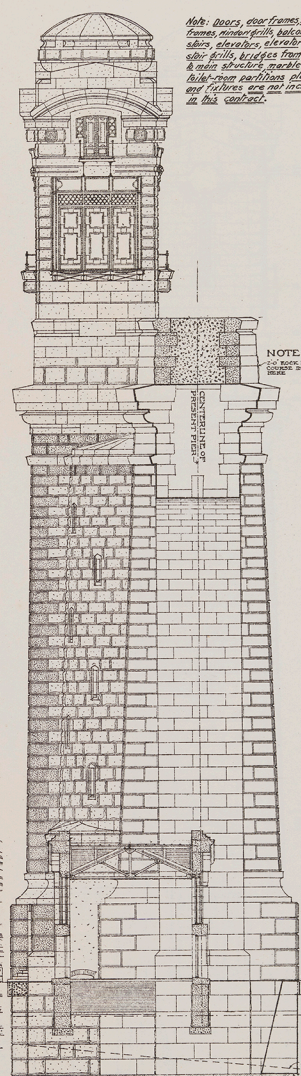


DIAGRAM OF PLAN CENTERS OF DOME



ONE HALF EAST ELEVATION OF PIER II



TRANSVERSE SECTION OF PIER II

Note: Doors, door frames, window frames, window sills, balcony rails, stairs, elevators, stairs, and other fills, bridges from towers to main structure, marble floors built over partitions, plumbing and fixtures are not included in this contract.

NOTE: 1/2\"/>

ELEVATION INDICATION:

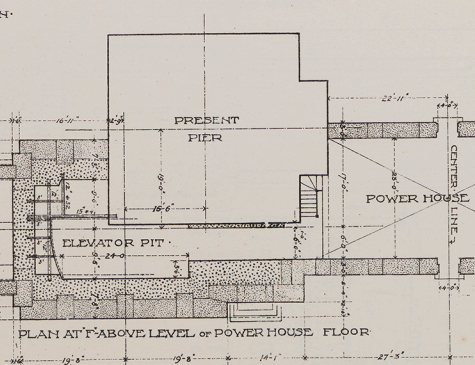
- OLD WORK
- NEW ROCK (P)
- NEW ROUGH P
- NEW FILL CUT
- PAVING STREET

PLAN AND SECTION INDICATION:

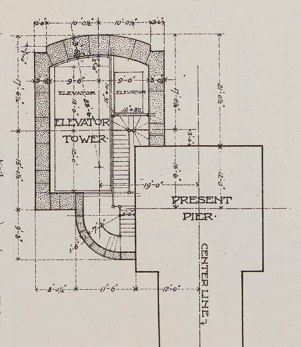
- OLD WORK
- 2\"/>

NOTE: FOUNDATIONS OF ELEVATOR TOWERS ON PIER II AND III TO BE CARRIED TO SAME DEPTH AS OLD PIERS. POWER HOUSE FOUNDATIONS TO ROCK.

BLACKWELL'S ISLAND BRIDGE NO. 4
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
PIERS II AND III
ELEVATOR AND STAIRCASE TOWERS.

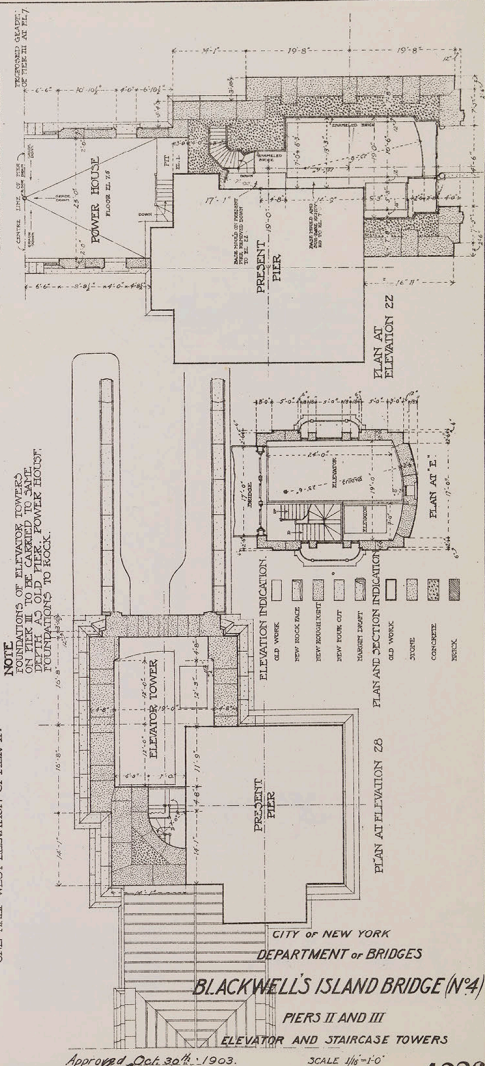
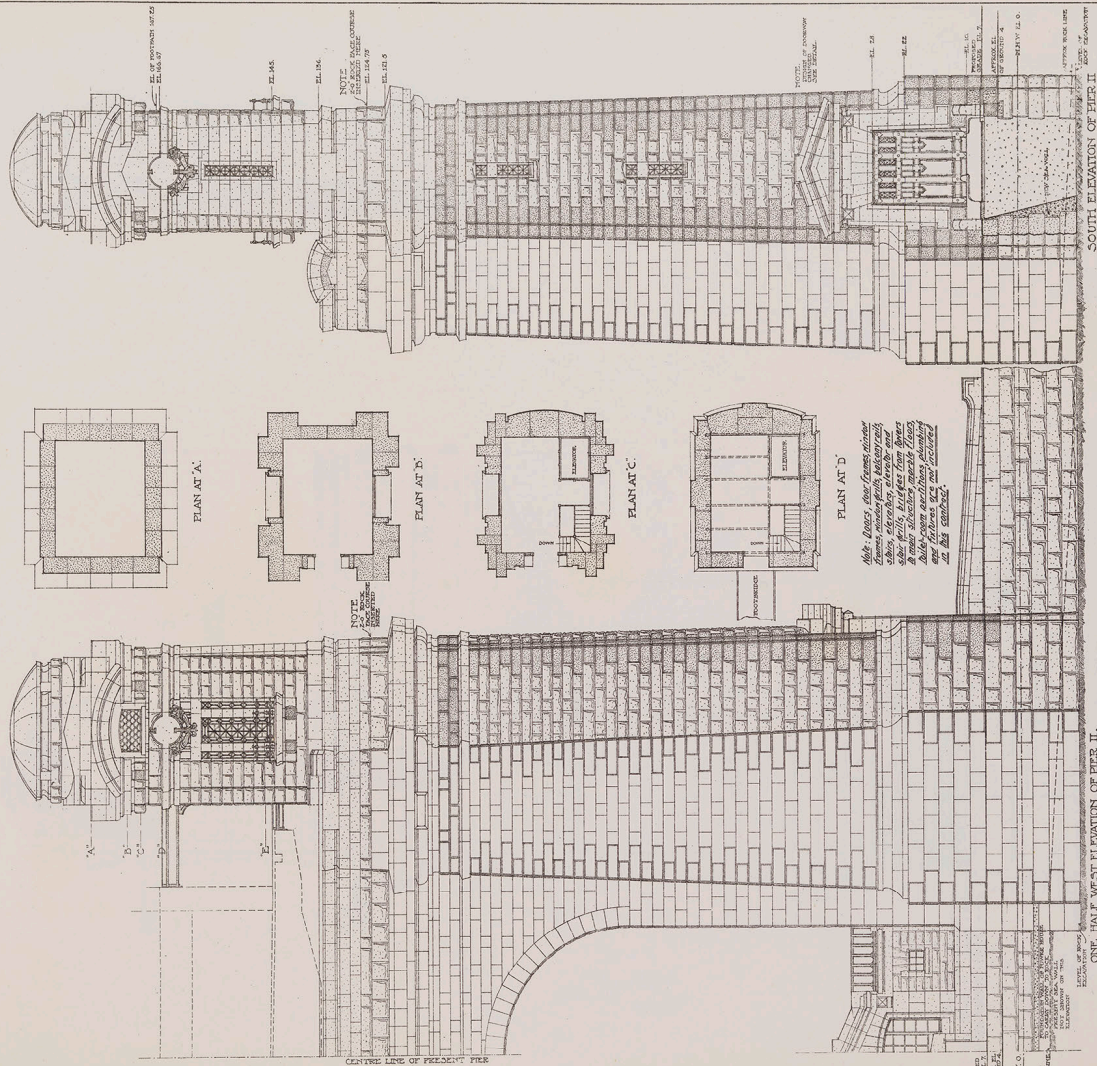


PLAN AT 'F' ABOVE LEVEL OF POWER HOUSE FLOOR

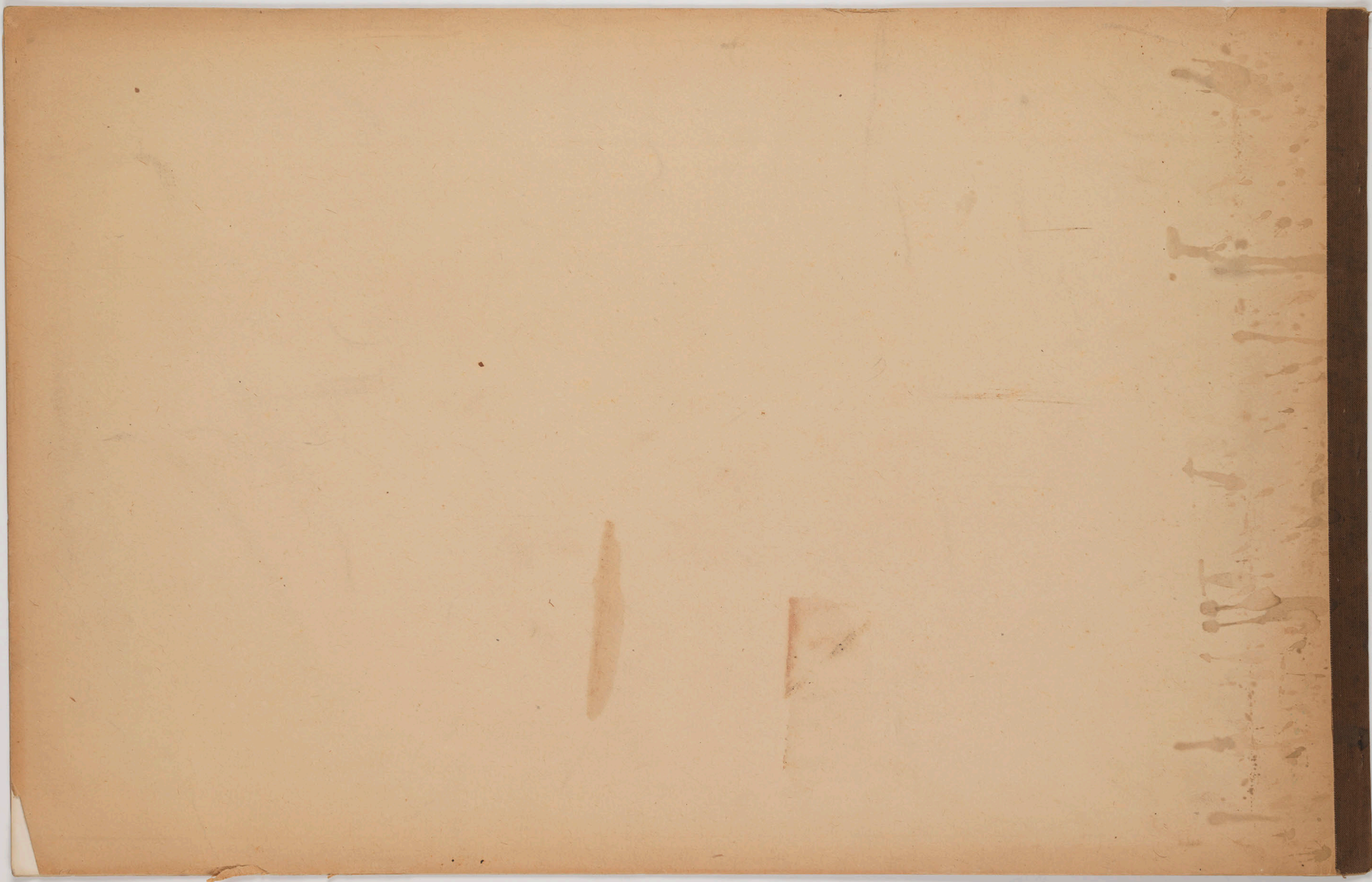


PLAN AT ELEVATION

Approved, Dec. 30th, 1903.
Commissioner of Bridges



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (N^o 4)
PIERS II AND III
ELEVATOR AND STAIRCASE TOWERS
Approved Oct. 30th, 1903.
J. H. M. S. Commissioner
SCALE 1/16"=1'-0"



J.M.

624.09747
N568d
v. 1
pt. 10

THE CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

—
1907.
—

Contract Drawings

FOR

*Manhattan and Queens Anchorages and
Additional Anchorages*

Blackwell's Island Bridge

Over East River, Between the Boroughs of
Manhattan and Queens.

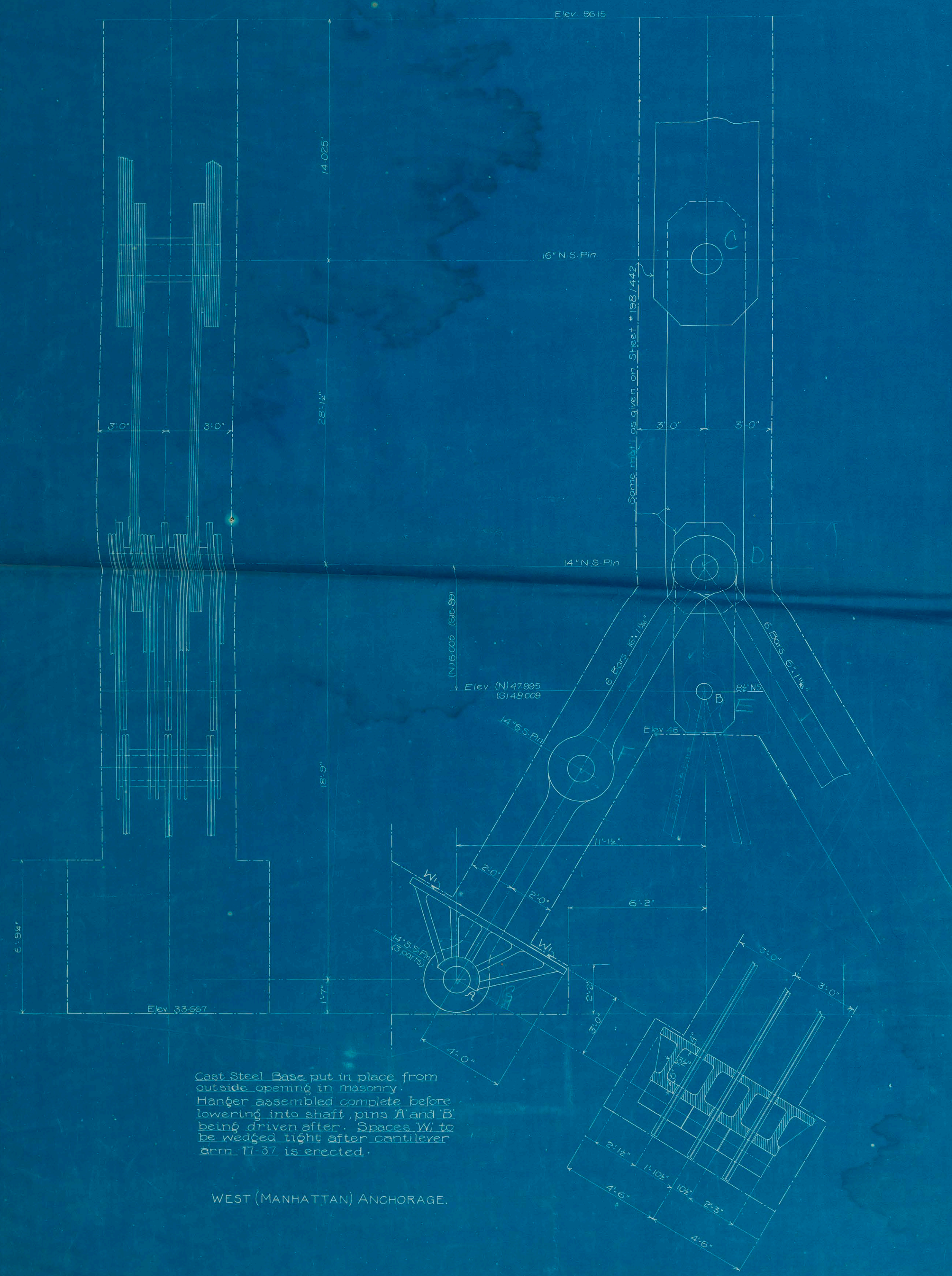
624.09747
N568d
v.1 pt.10

2153-07B

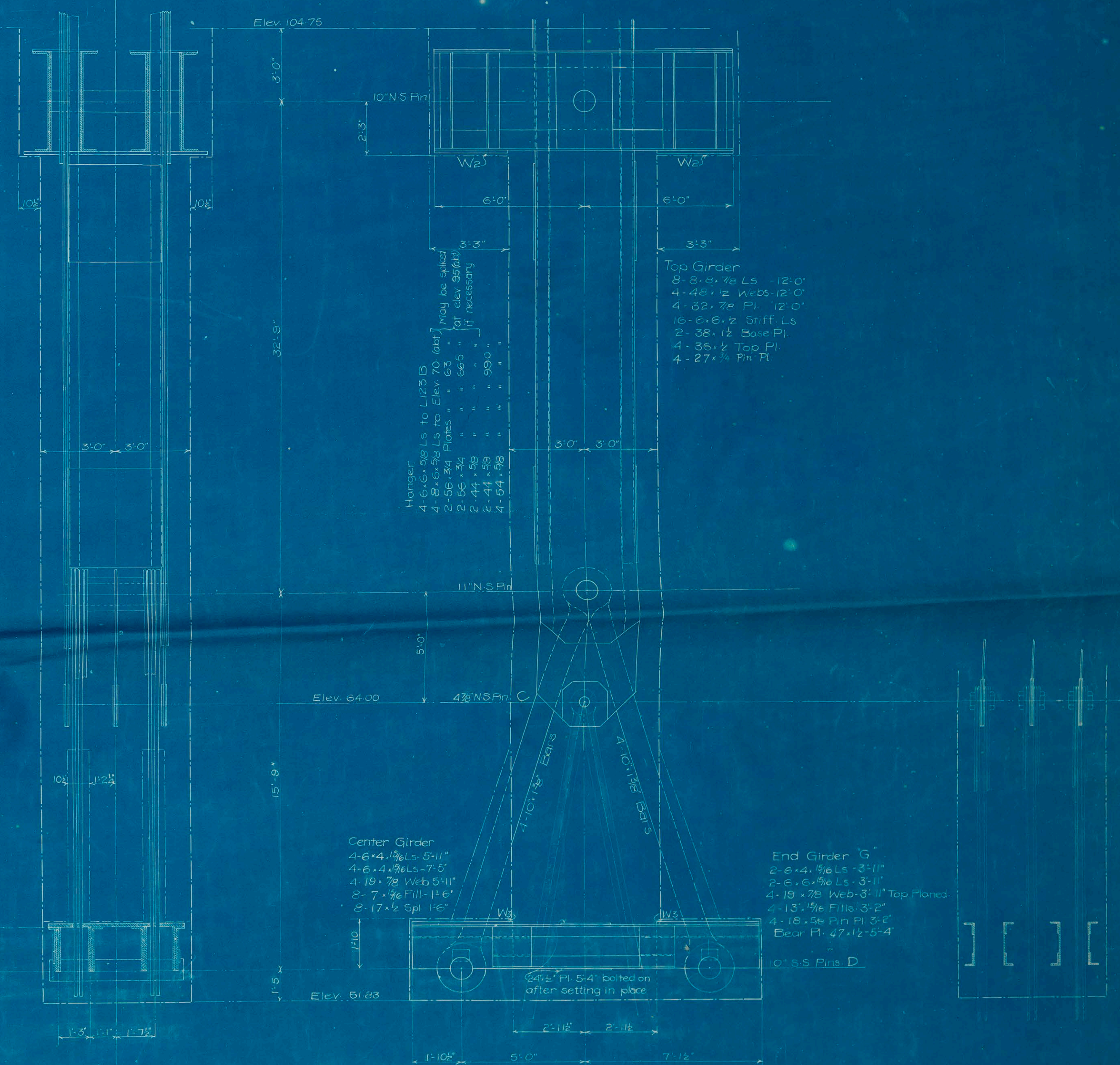


MARTIN B. BROWN Co., Printers, 49 to 57 Park Place, N. Y.

SCIENCE
FONDREN LIBRARY
Southern Methodist University
DALLAS, TEXAS



Cast Steel Base put in place from outside opening in masonry. Hanger assembled complete before lowering into shaft, pins A and B being driven after. Spaces W to be wedged tight after cantilever arm 91-97 is erected.



End girders 'G' lowered into shaft & blocked up. Hanger assembled complete with pins 'D' in place, then lowered and girders 'G' lowered on pin. Center girder lowered in four parts and spliced to end girders with pin bolts. Pins 'C' then driven, connecting hanger with 6" bars now in place. W₂ and W₃ to be wedged tight only after Cantilever arm 91-107 is erected.

EAST (QUEENS) ANCHORAGE.

Chief Engineer.

Commissioner.

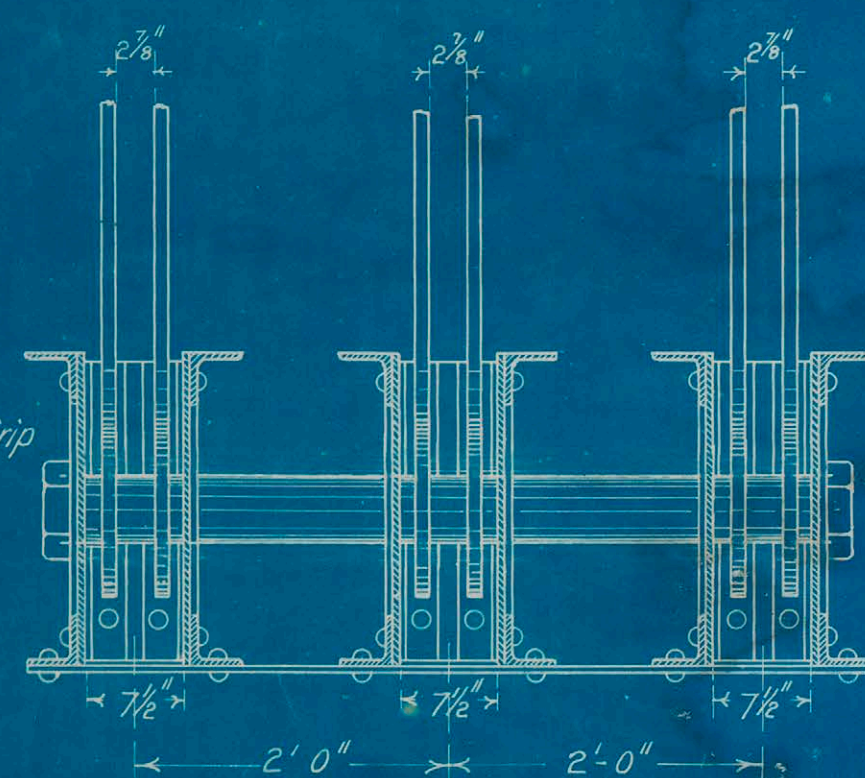
CITY OF NEW YORK,
DEPARTMENT OF BRIDGES.

BLACKWELL'S ISLAND BRIDGE.
EAST & WEST ANCHOR PIERS,
ADDITIONAL ANCHORAGE.

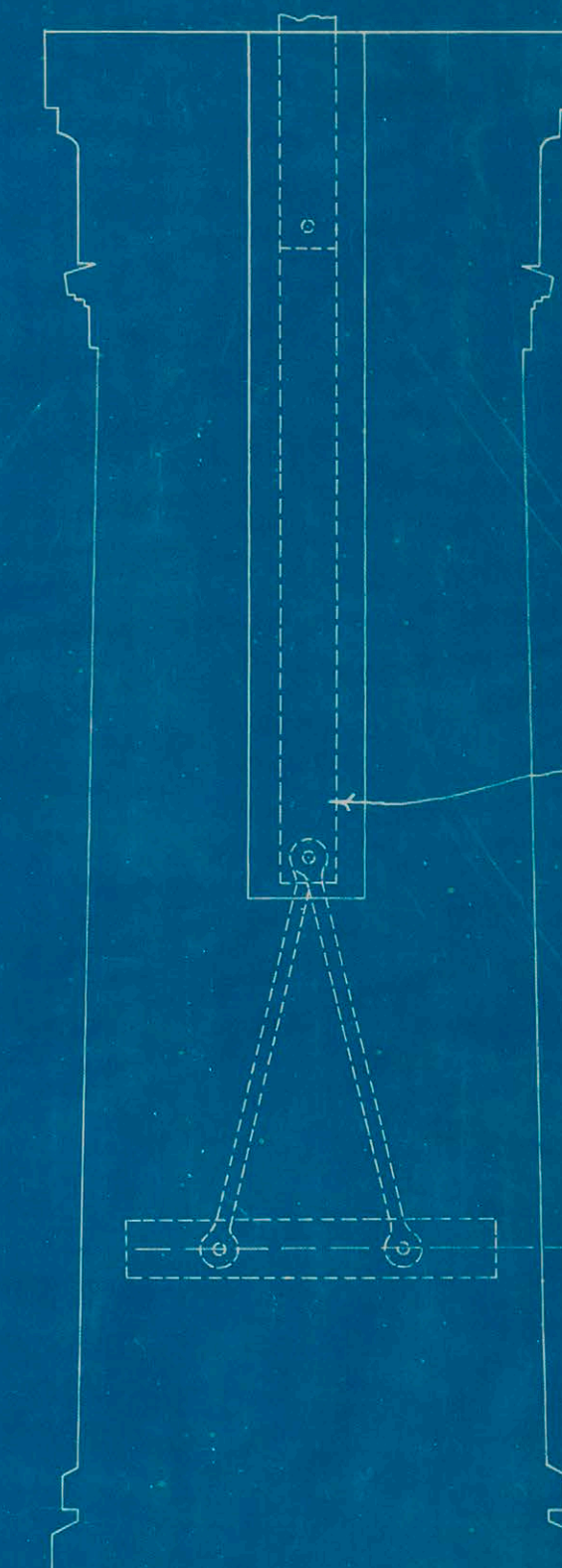
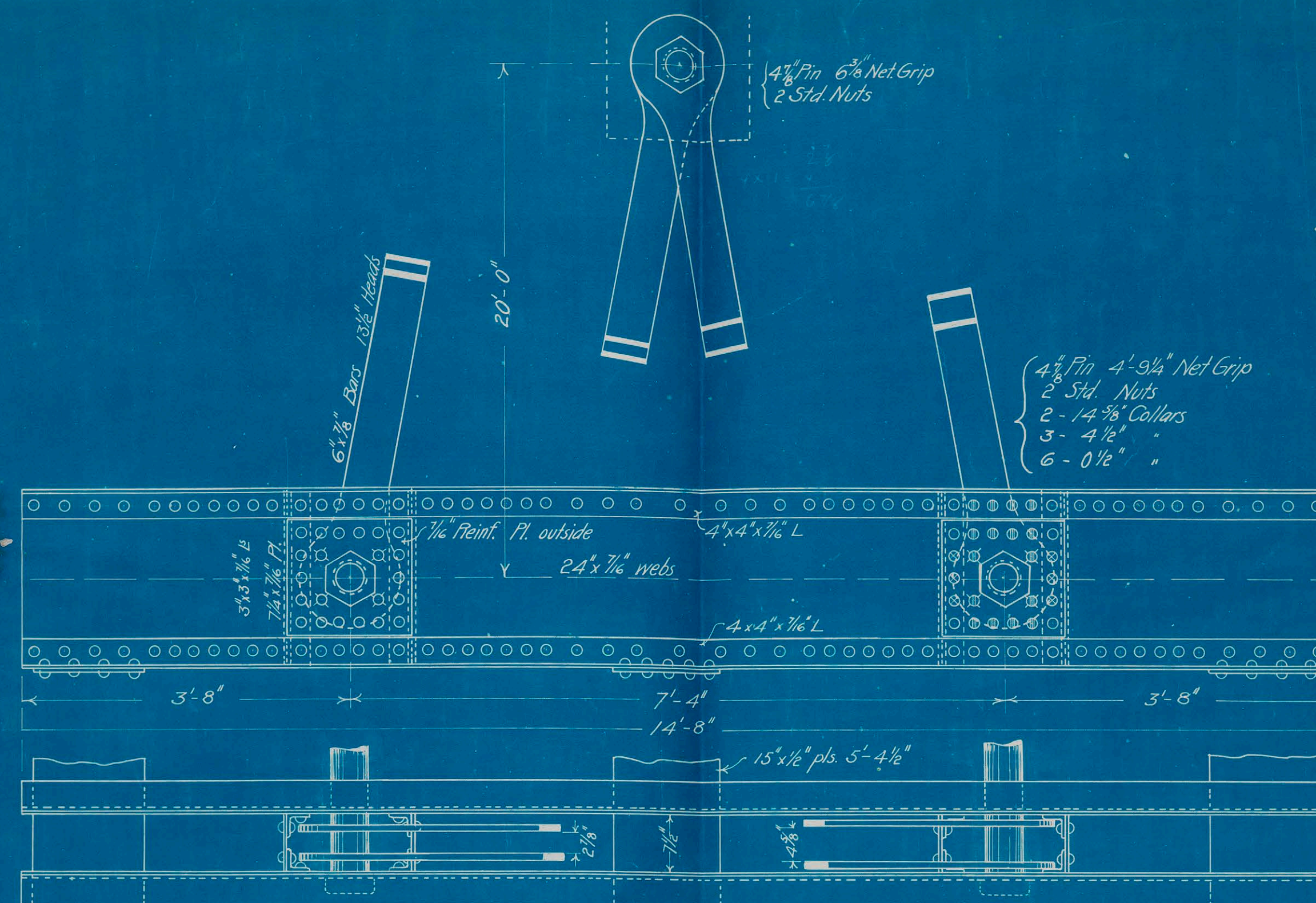
Scale, $\frac{3}{8}$ in. = 1 ft.

4242.

$4\frac{1}{8}"$ Pin $4'-9\frac{3}{4}"$ Net Grip
 2 Std. Nuts
 2 - $1\frac{1}{2}"$ Collars
 3 - $2\frac{3}{4}"$ "
 6 - $1\frac{3}{8}"$ "

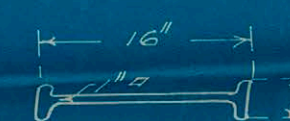


Anchorage for 1 Truss
 Queens End
 2 Wanted



This part of Anchor not included in Contract for Piers

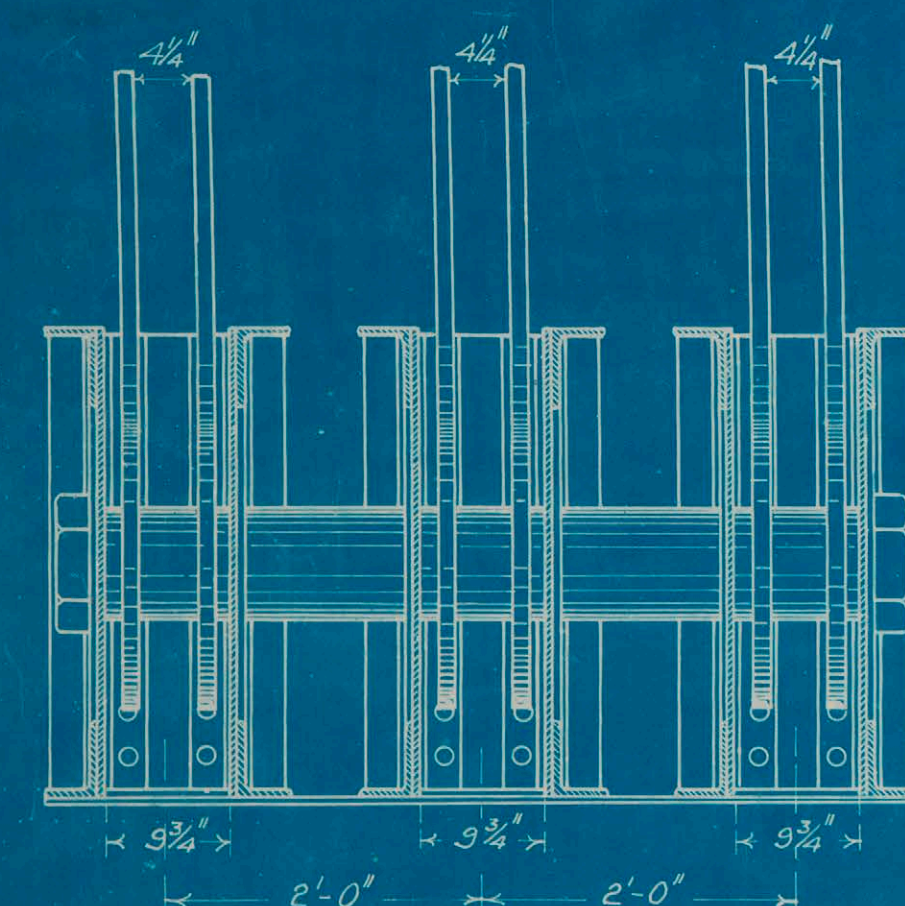
Elev. 28 for Manhattan
 44 for Queens



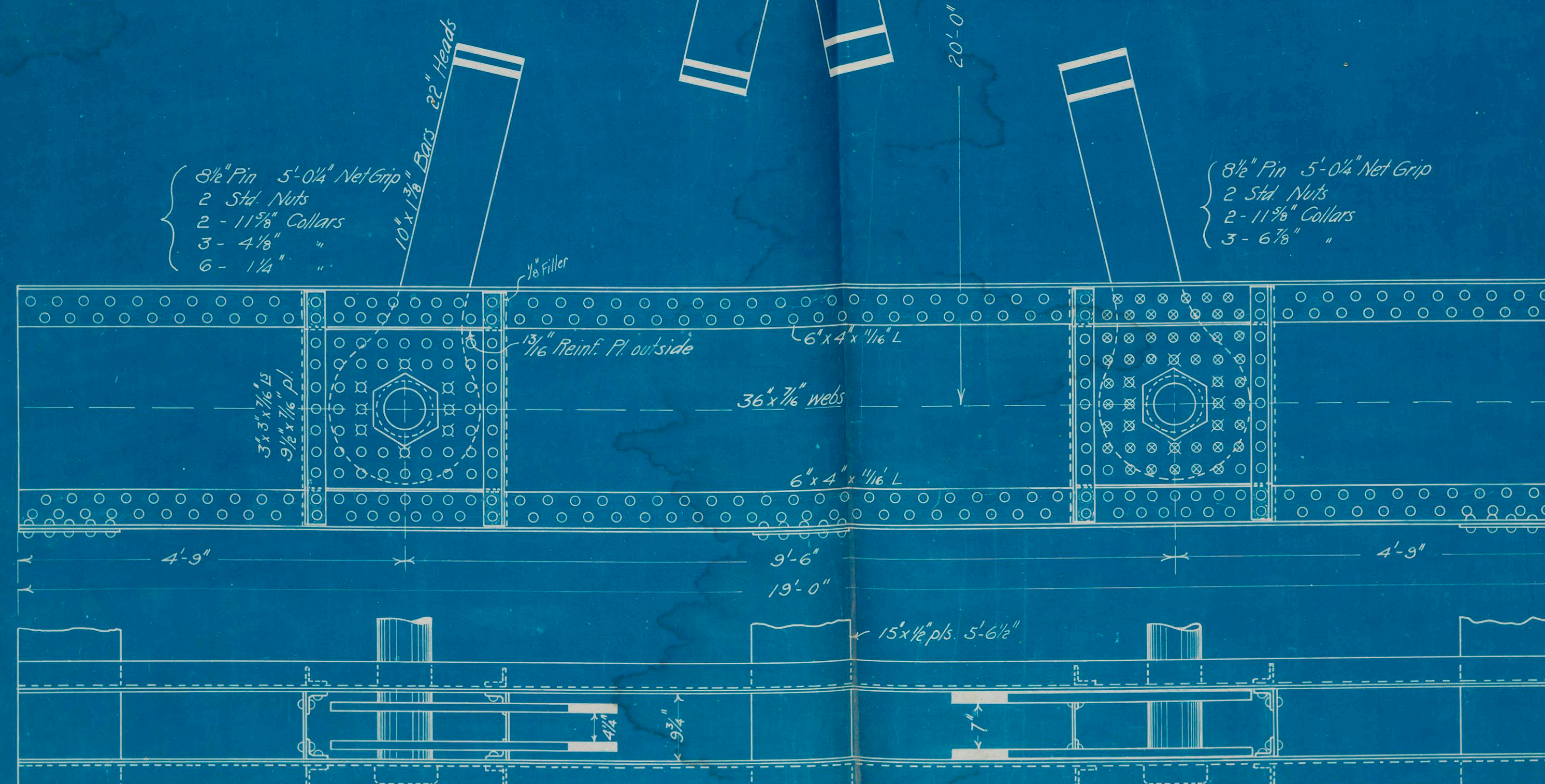
Detail of Steel Clamp

$8\frac{1}{8}"$ Pin $5'-0\frac{1}{4}"$ Net Grip
 2 Std. Nuts
 1 Collar $4\frac{1}{8}"$

$7\frac{1}{8}"$ Rivets
 All Rivet Holes punched $\frac{3}{4}"$ and reamed to $\frac{5}{16}"$



Anchorage for 1 Truss
 Manhattan End
 2 Wanted



Approved Oct. 20, 1902

H. L. Chiotti, Engineer in Charge

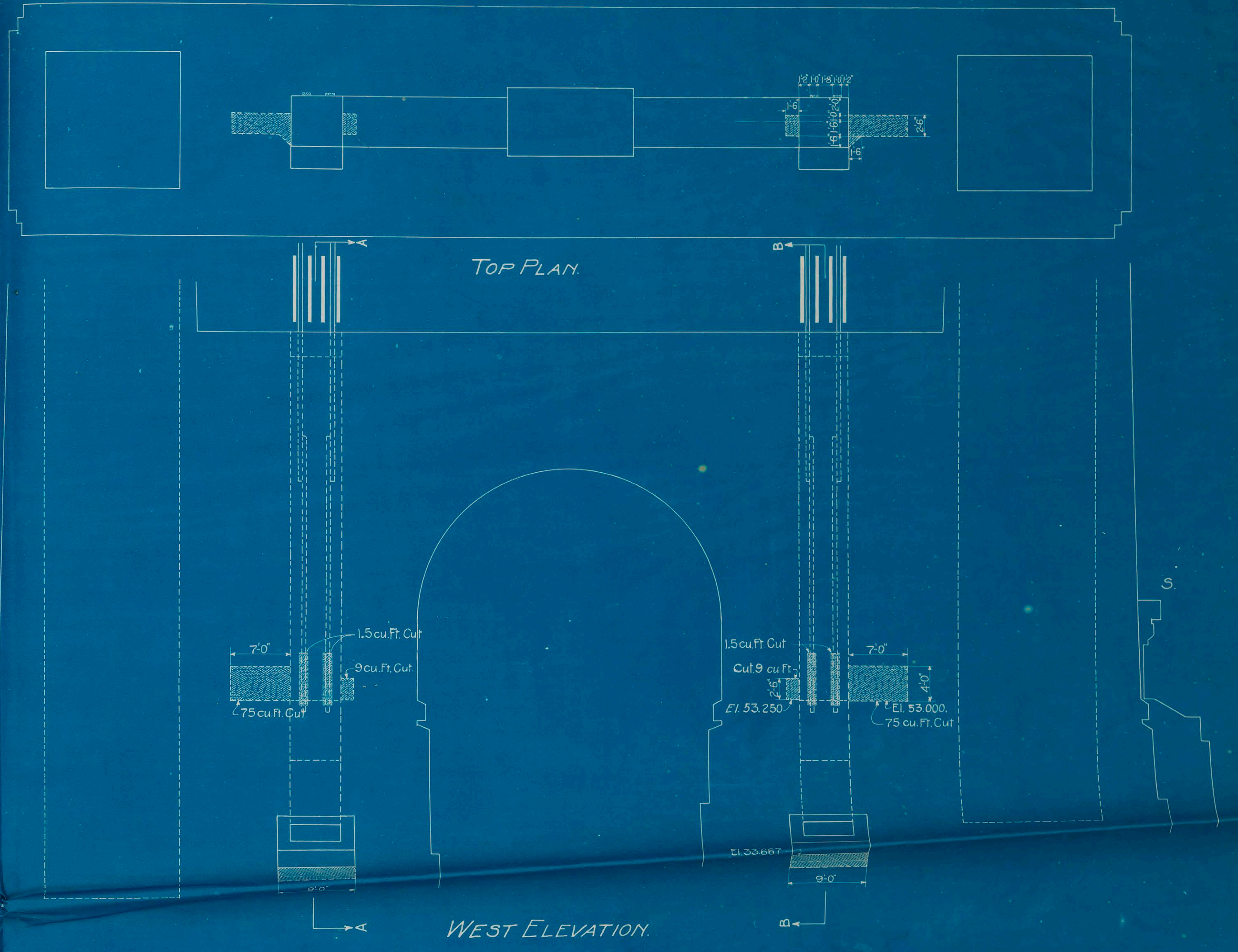
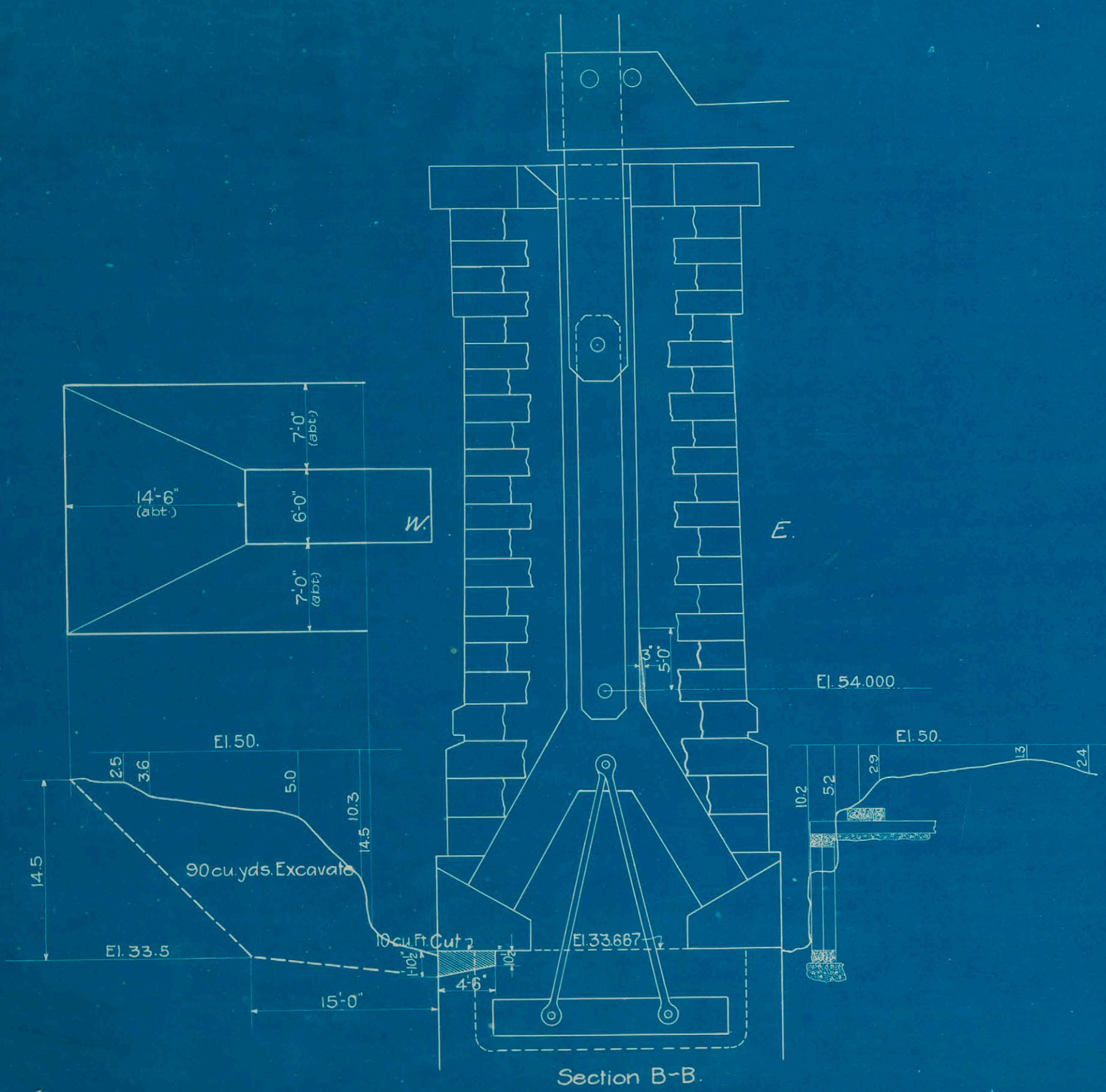
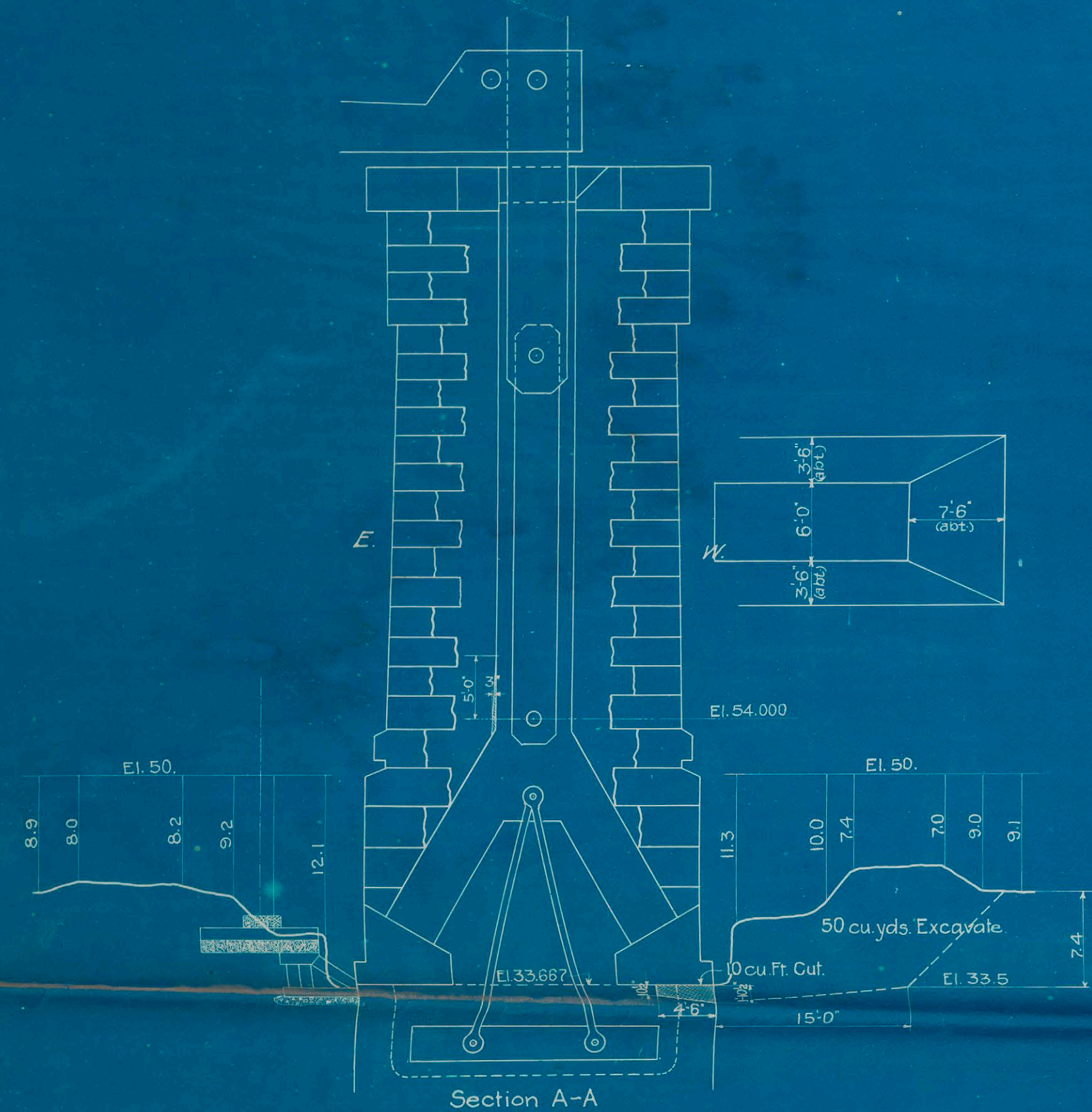
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELLS ISLAND BRIDGE (N^o 4)

DETAILS OF ANCHORS

SCALE 1" = 1'

OCT. 16, 1902

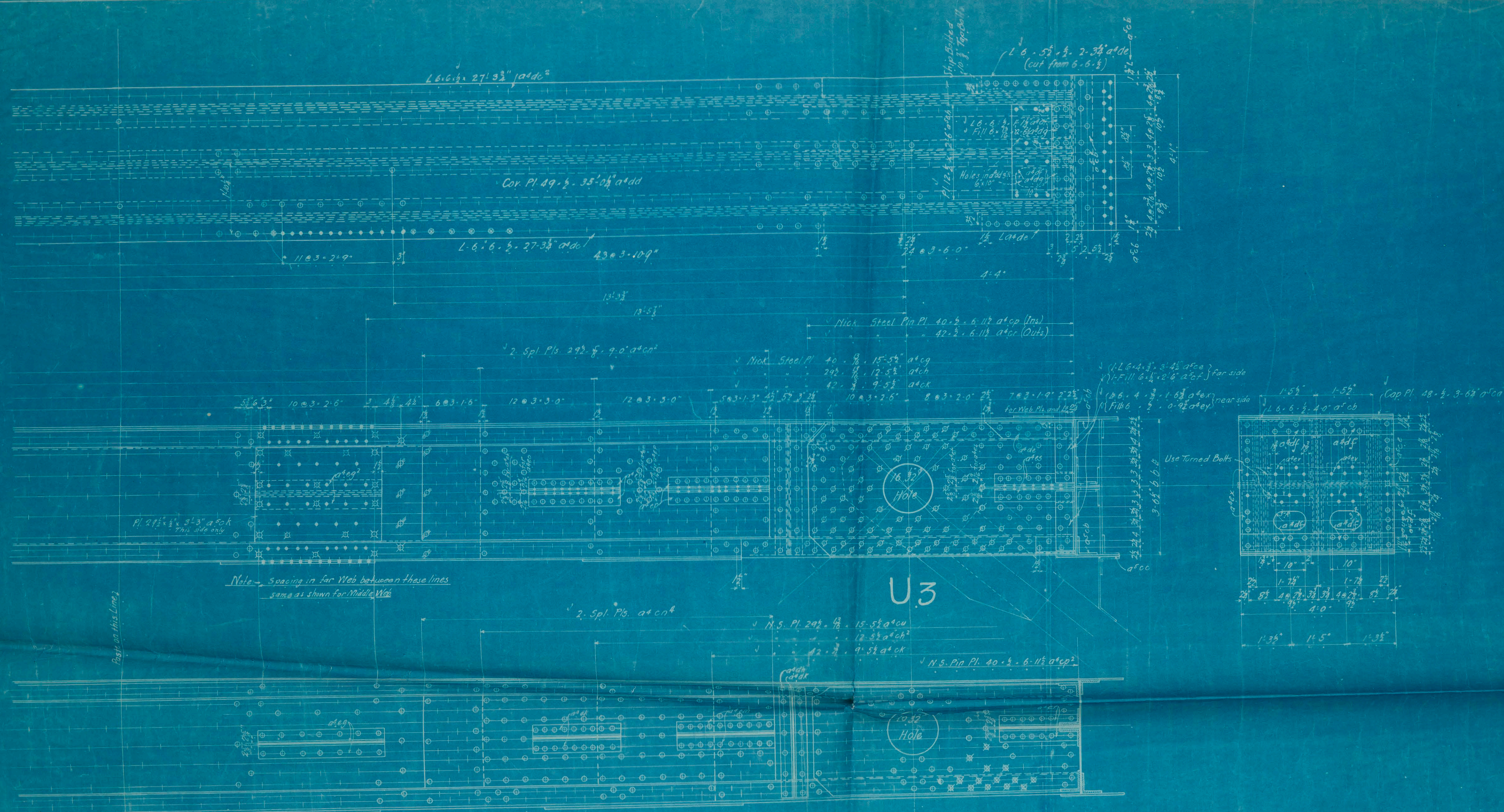
4213



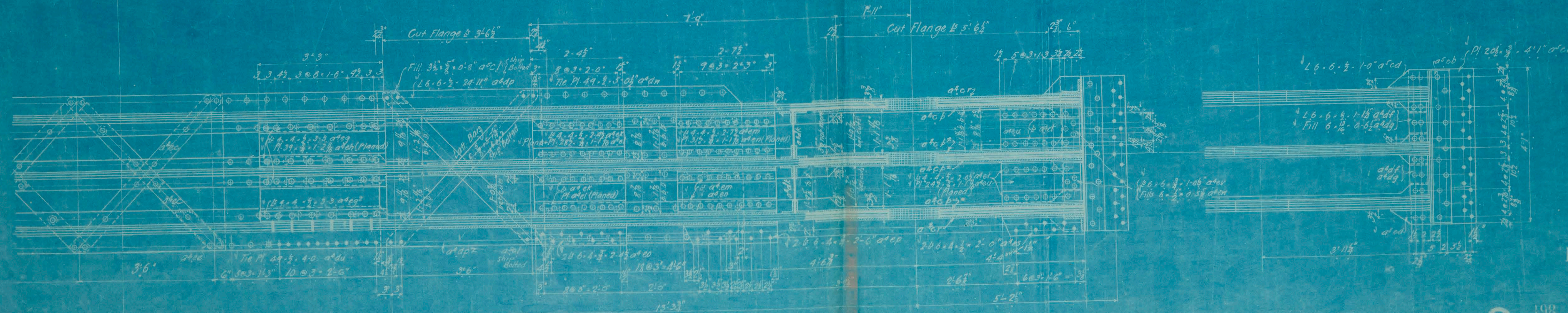
Total Masonry cutting:- 191 cubic feet.
Total Earth excavation:- 140 cubic yards.

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
WEST ANCHOR PIER
FINAL CUTTING
FOR ADDITIONAL ANCHORAGE.
Scale, $\frac{1}{8}$ in = 1 ft.
4246

Anchor Post & Links
Manhattan Anchor Arms
BLACKWELL'S ISLAND BRIDGE, NO. 4
Over East River, New York City
BUILT BY
THE PENNSYLVANIA STEEL CO.,
Bridge & Construction Dept.,
Steelton, Pa.



REQUIRED
 1- END POST L1-U3^R
 1- " " L1-U3^L



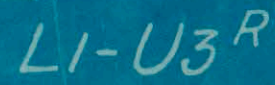
APR - 1 1908
 End Post L1 U3
 Manhattan Anchor Arm
 BLACKWELL'S ISLAND BRIDGE, NO. 1
 Over East River, New York City

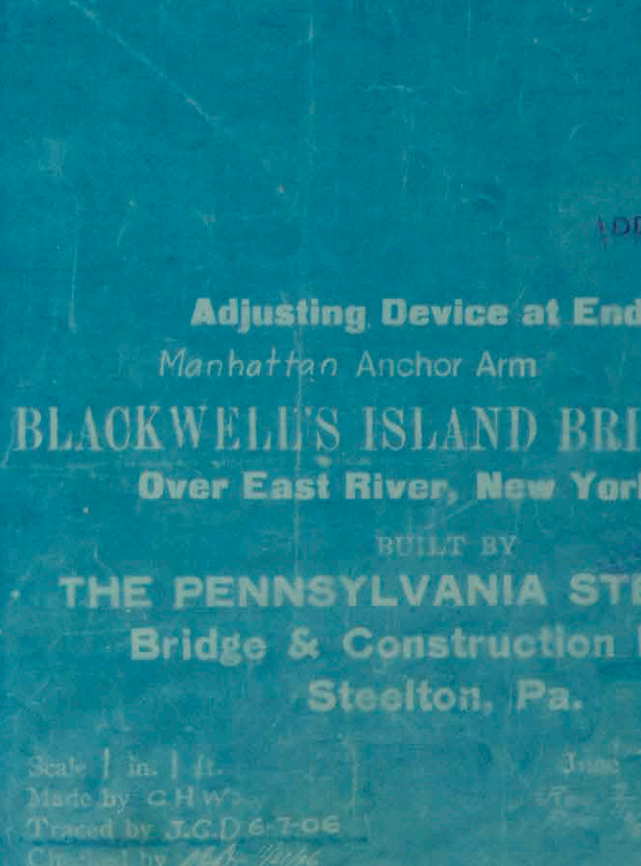
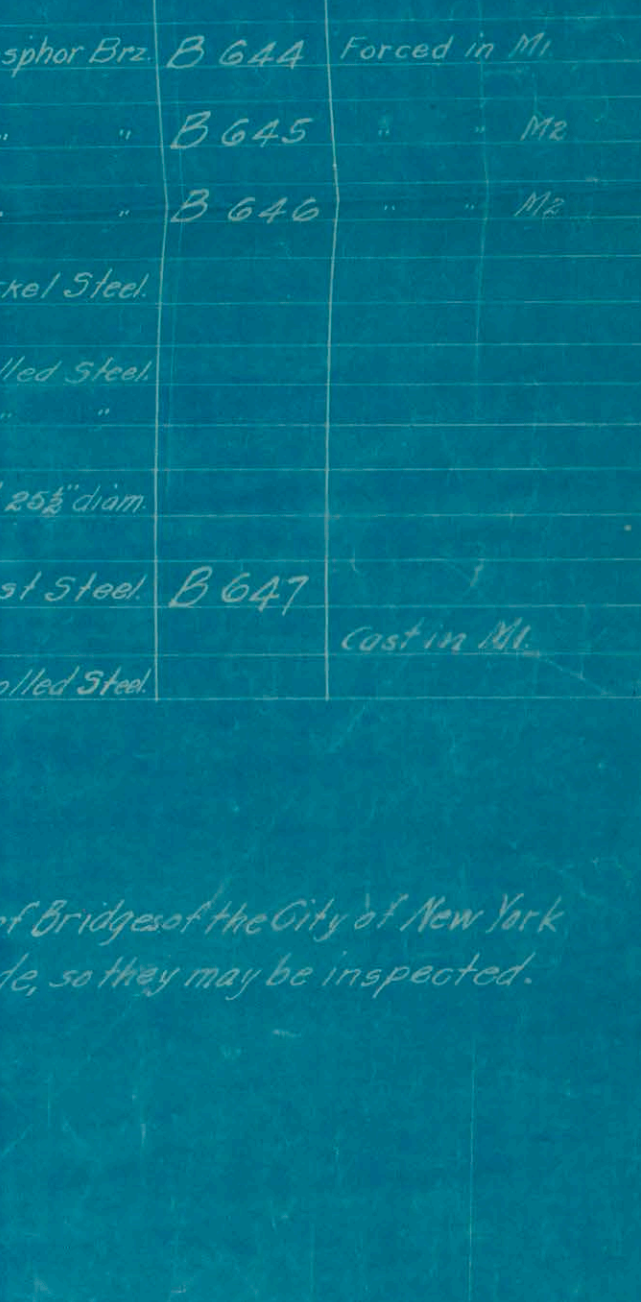
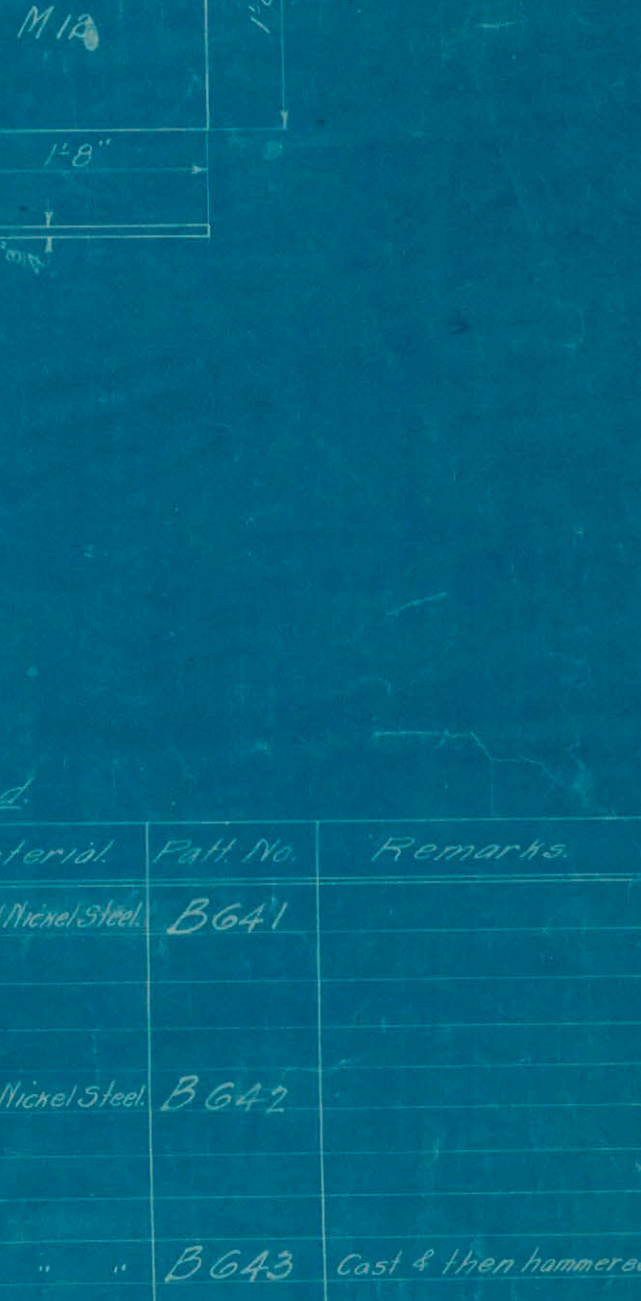
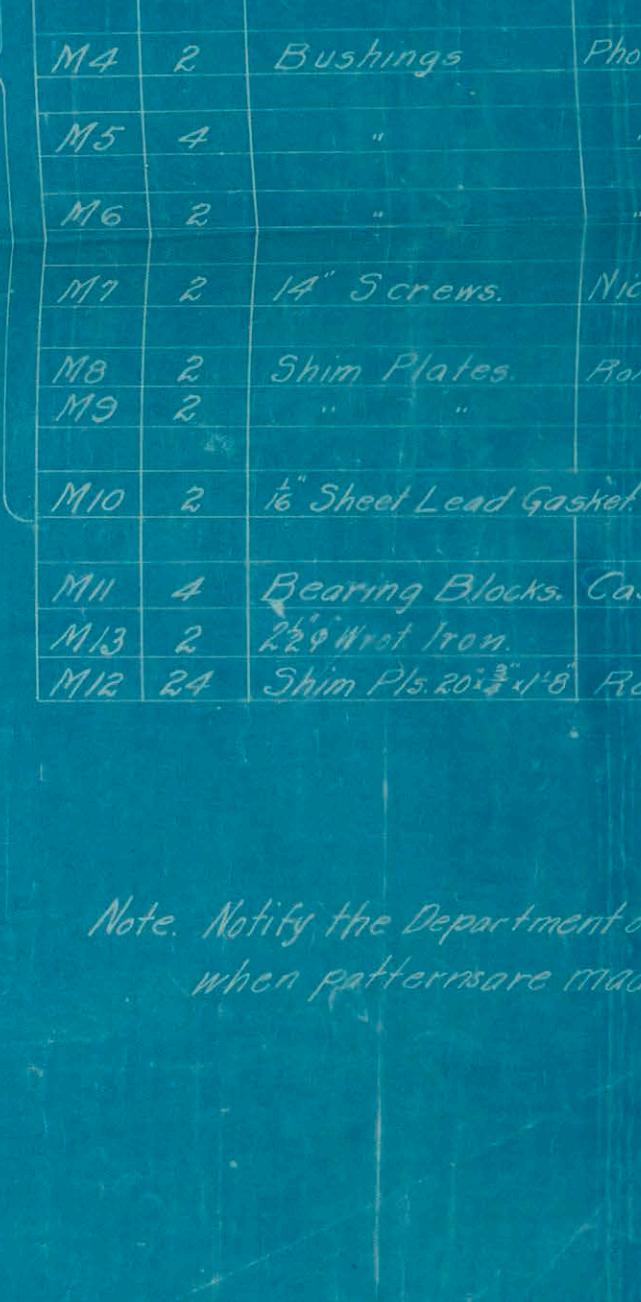
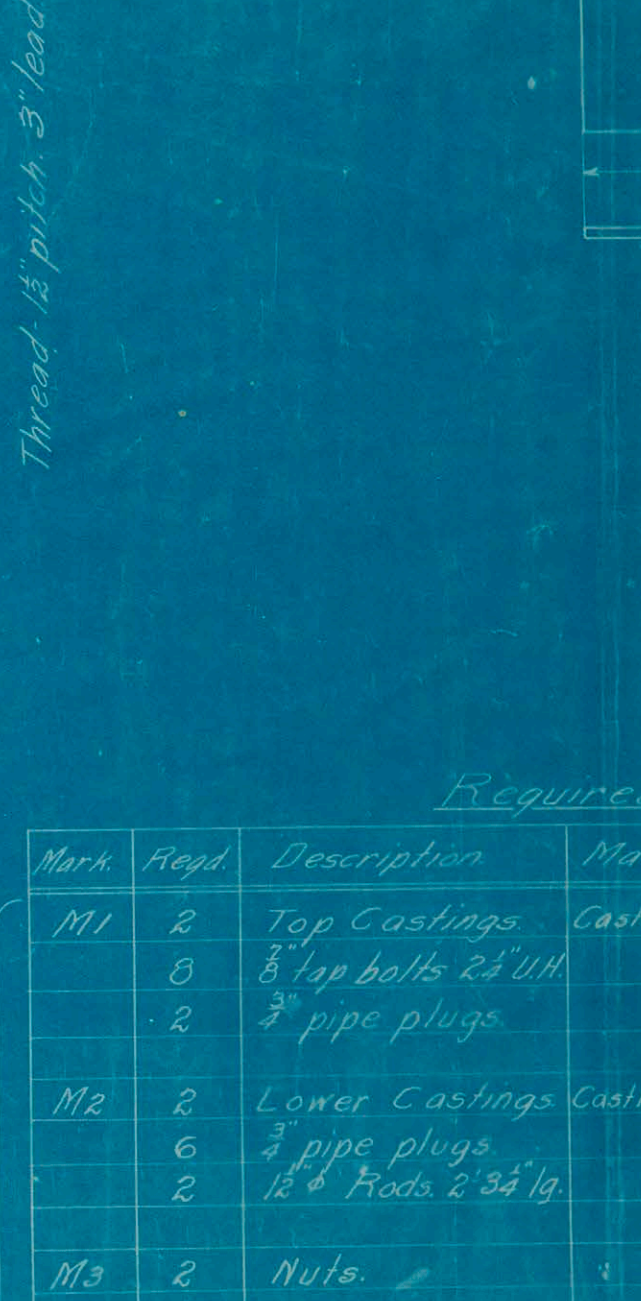
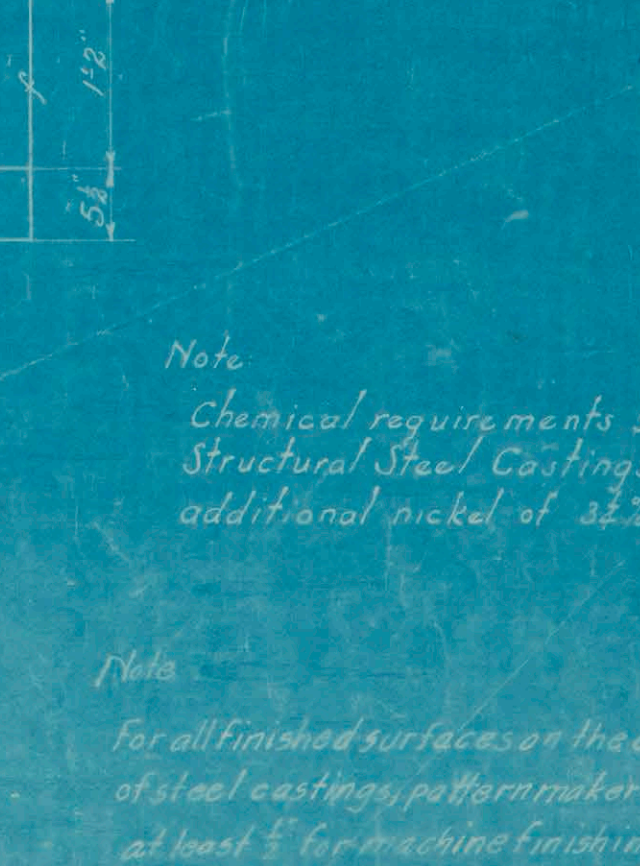
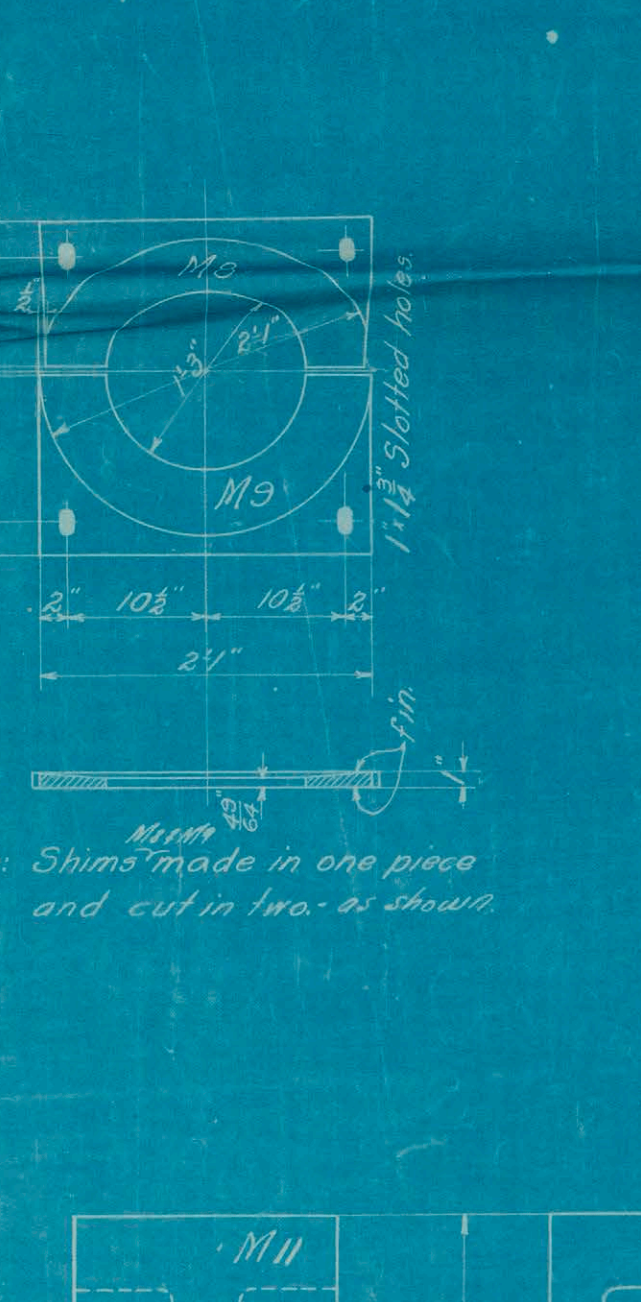
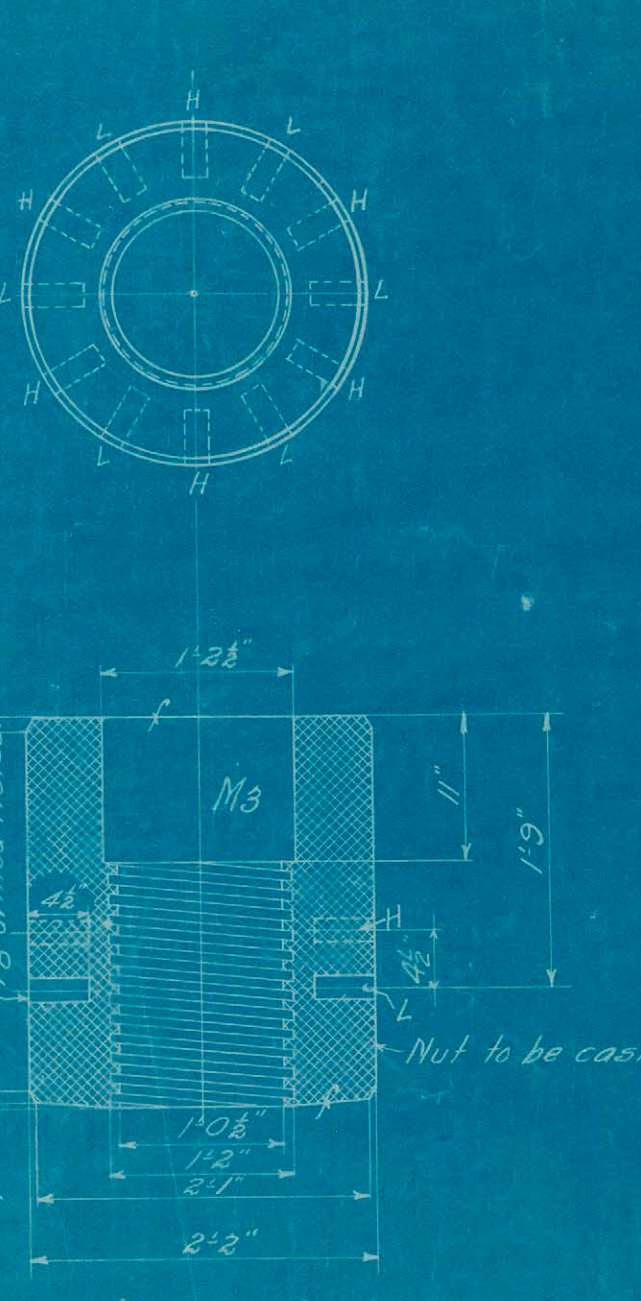
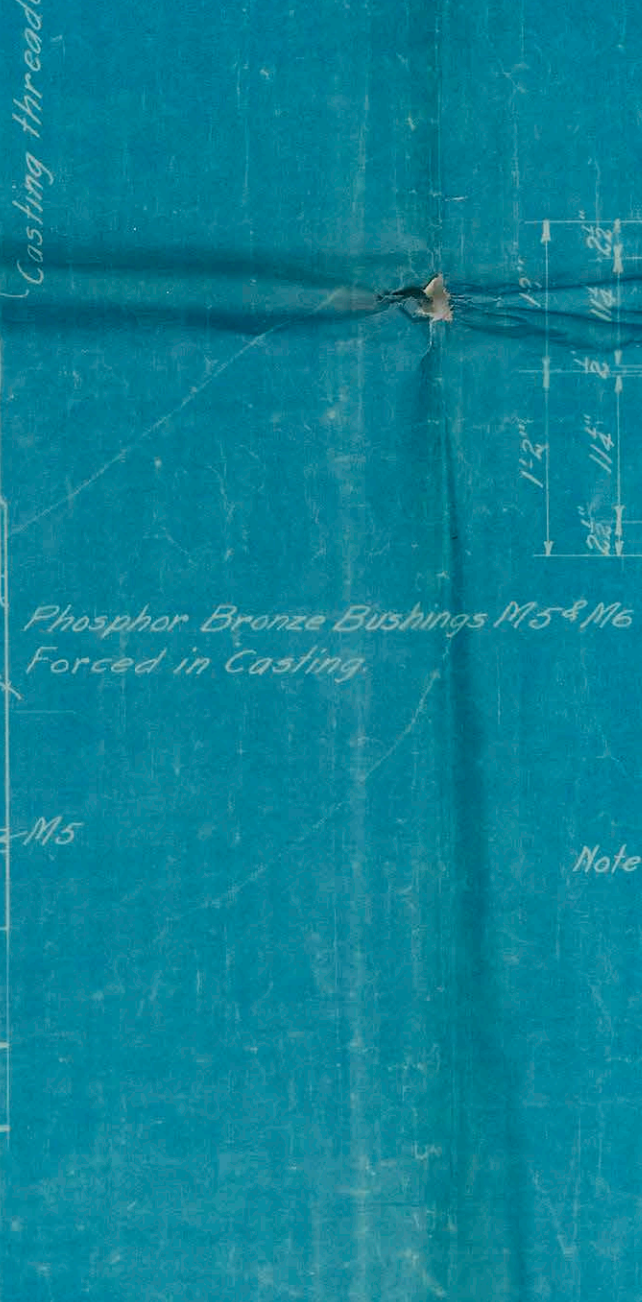
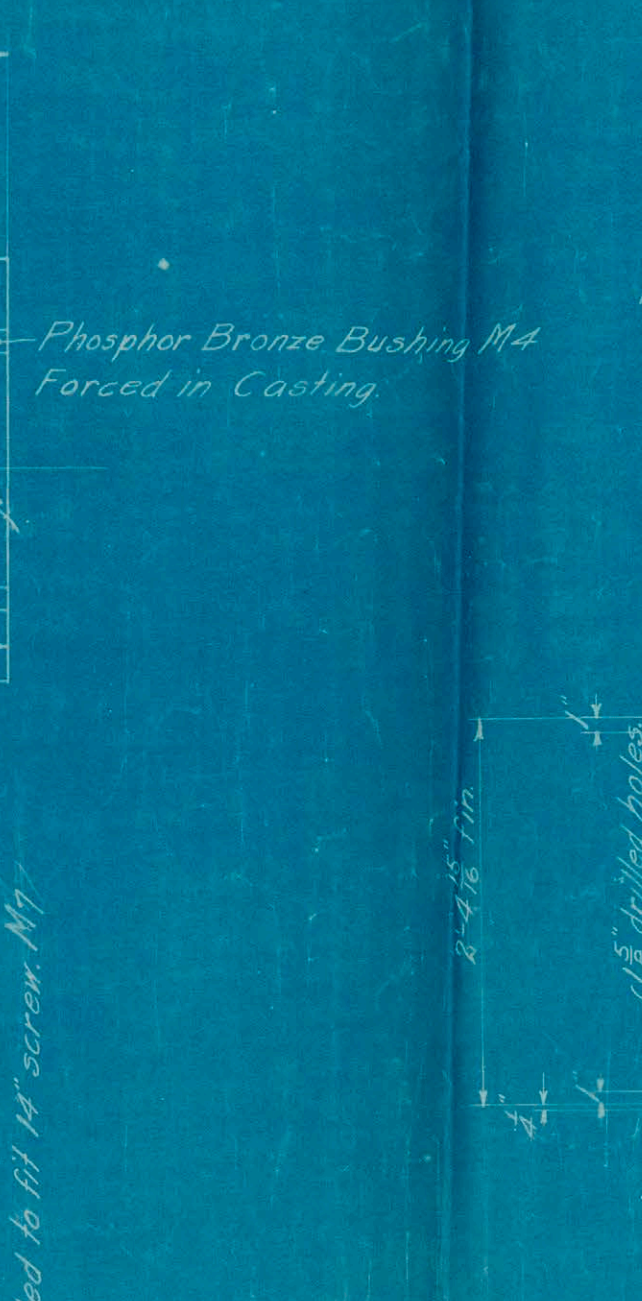
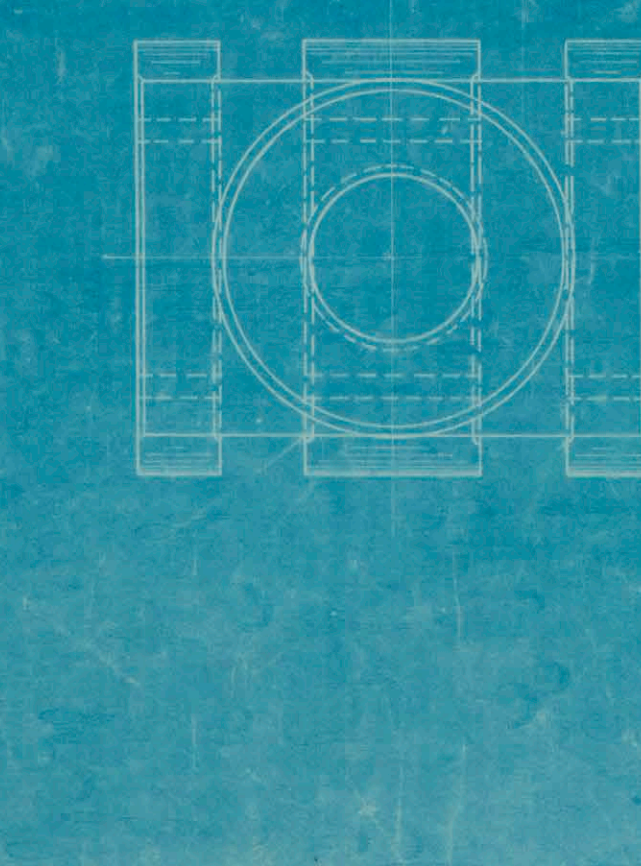
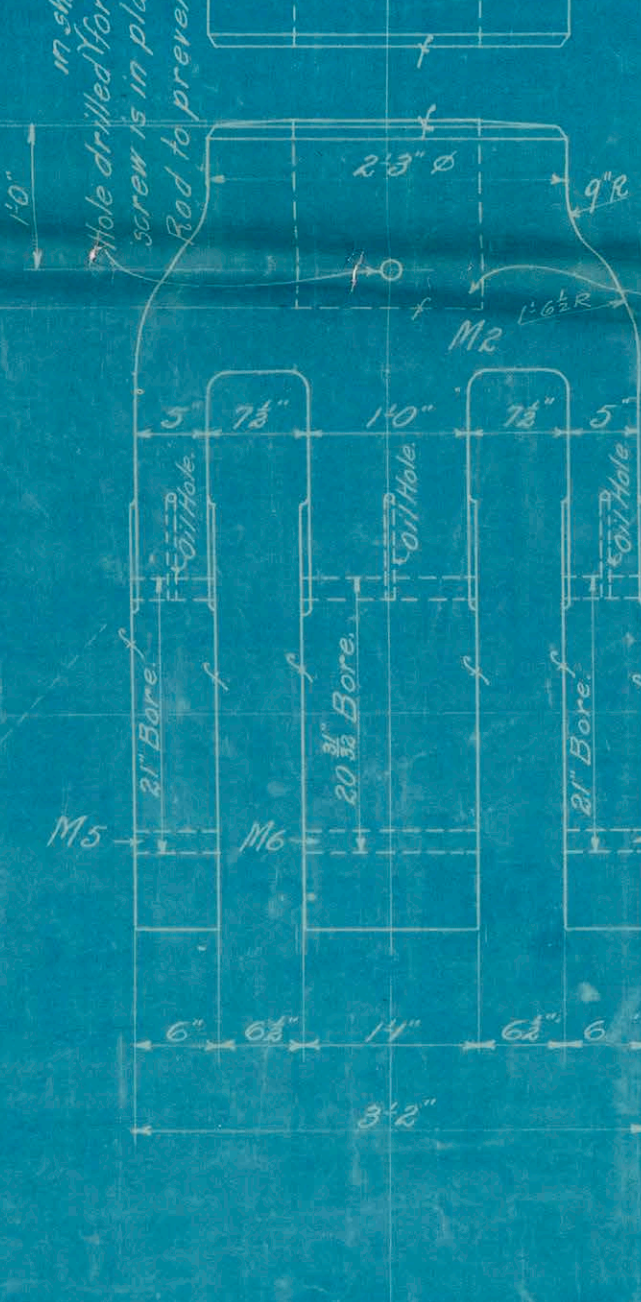
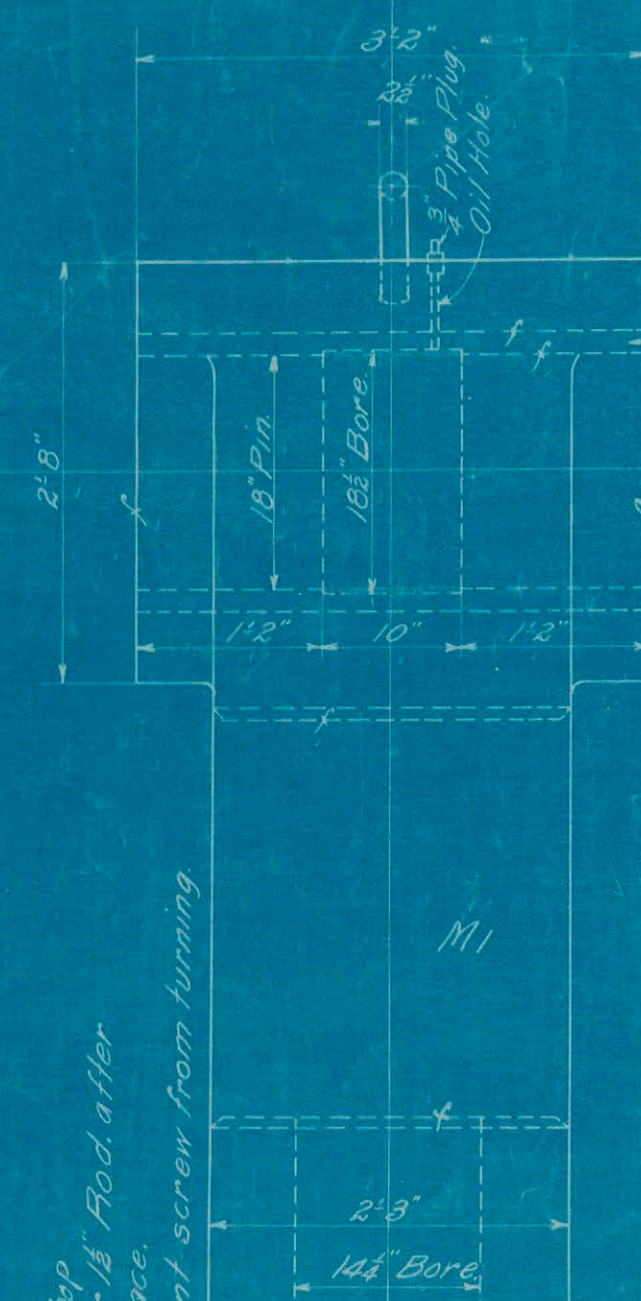
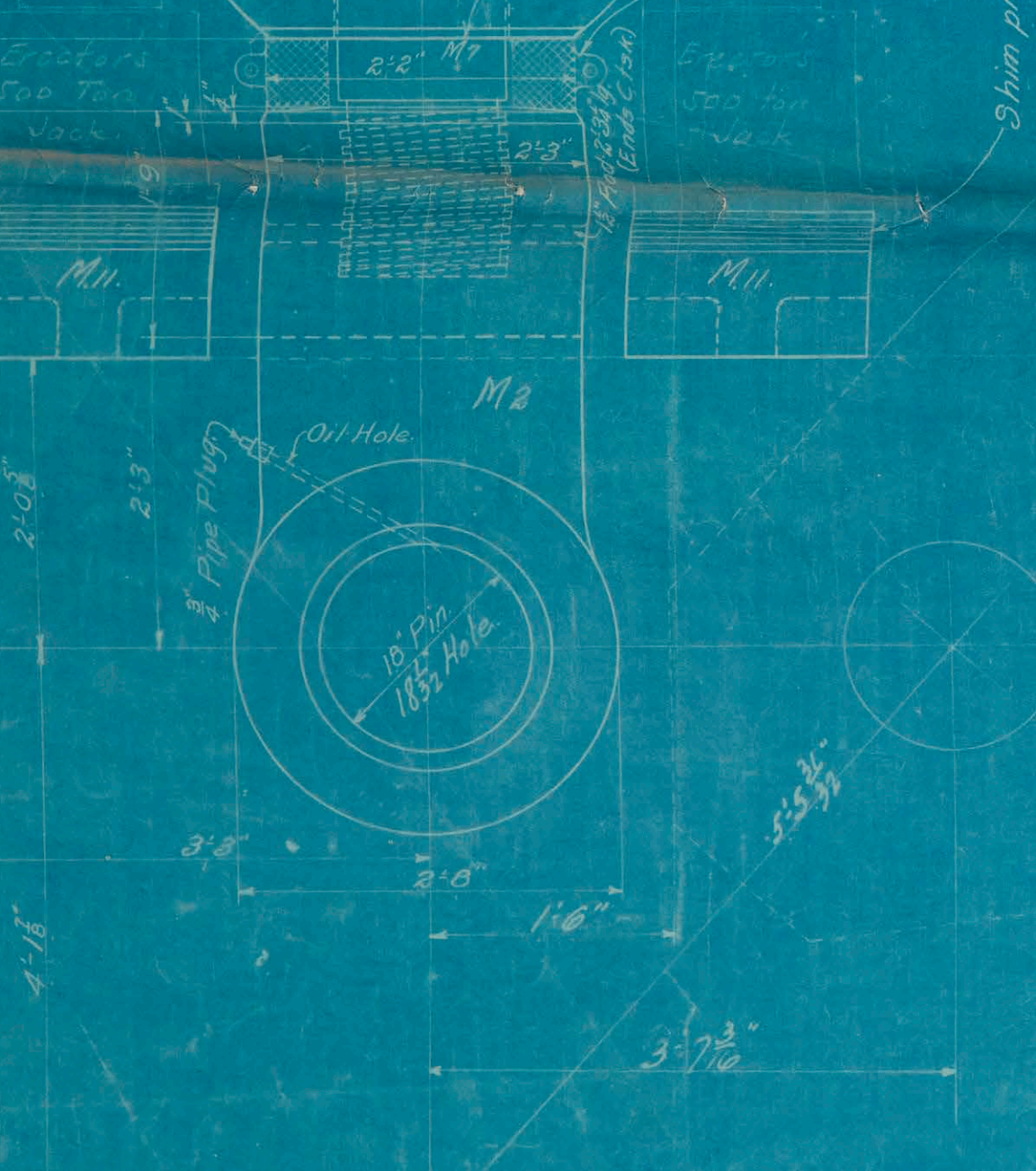
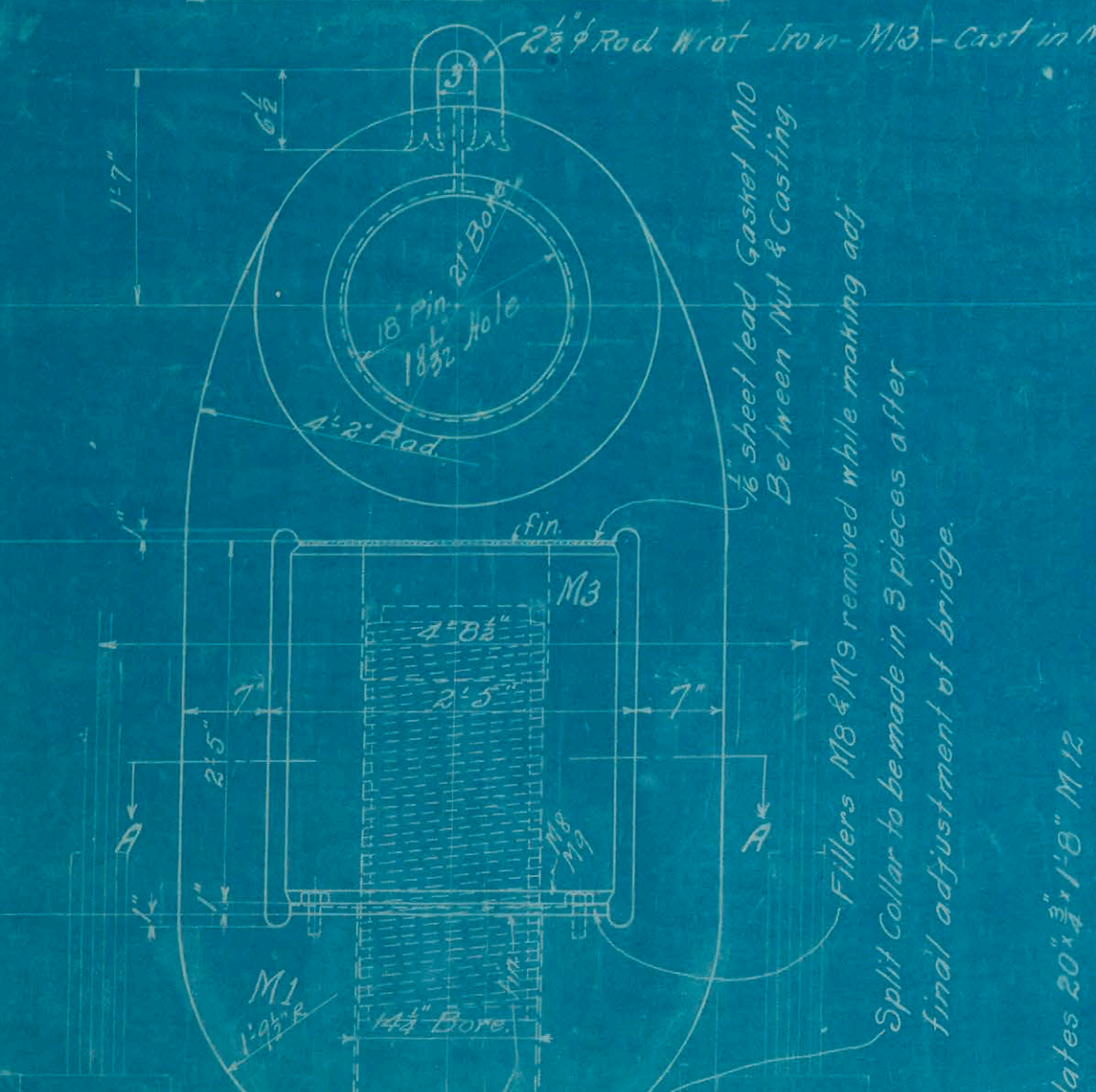
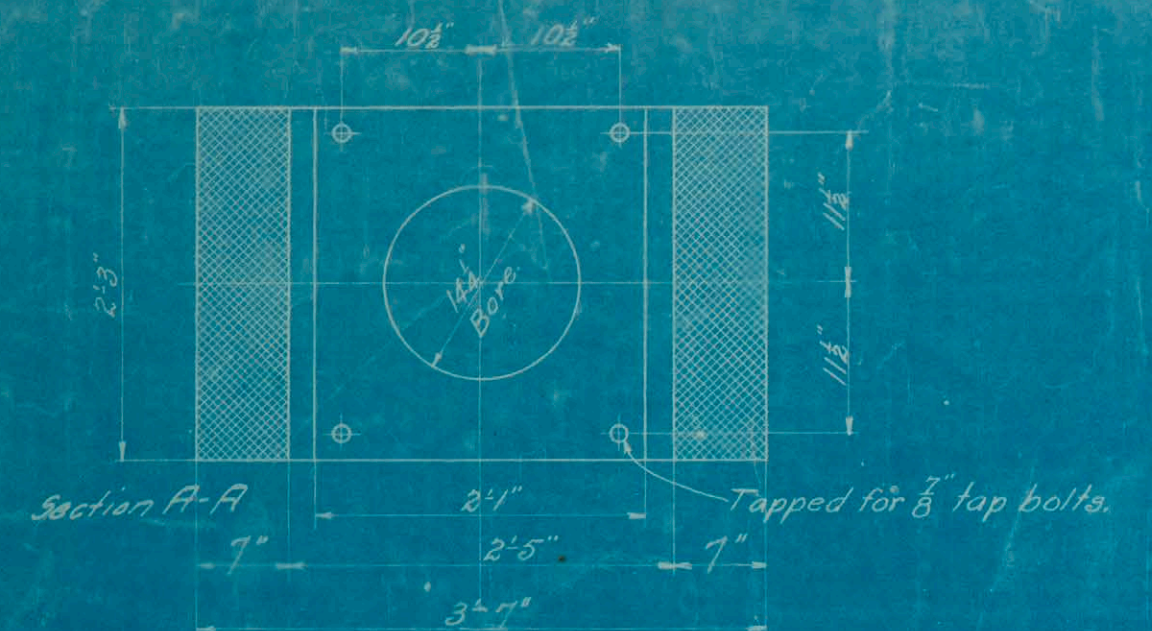
C 198
 410A

BUILT BY
 THE PENNSYLVANIA STEEL CO.,
 Bridge & Construction Dept.
 Steelton, Pa.

Scale: 1/4" = 1'-0"
 Made by: [illegible]
 Traced by: [illegible]
 Checked by: [illegible]
 In Charge: [illegible]
 Bill Sheets: 4401, 4402, 4403, 4404

Li





Mark	Qtd	Description	Material	Part No.	Remarks
M1	2	Top Castings	Cast Nickel Steel	B 641	
	8	3/8" lap bolts 2 1/2" L			
	2	3/8" pipe plugs			
M2	2	Lower Castings	Cast Nickel Steel	B 642	
	6	3/8" pipe plugs			
	2	1/2" Rods 2' 3/4" Lg.			
M3	2	Nuts	"	B 643	Cast & then hammered
M4	2	Bushings	Phosphor Brz	B 644	Forced in M1
M5	4	"	"	B 645	" " M2
M6	2	"	"	B 646	" " M2
M7	2	1/4" Screws	Nickel Steel		
M8	2	Shim Plates	Roller Steel		
M9	2	"	"		
M10	2	1/2" Sheet Lead Gasket 20 1/2" diam			
M11	4	Bearing Blocks	Cast Steel	B 647	
M13	2	2 1/2" Iron			Cast in M1
M12	24	Shim Pls 20 1/2" x 1/8"	Roller Steel		

Note. Notify the Department of Bridges of the City of New York when patterns are made, so they may be inspected.

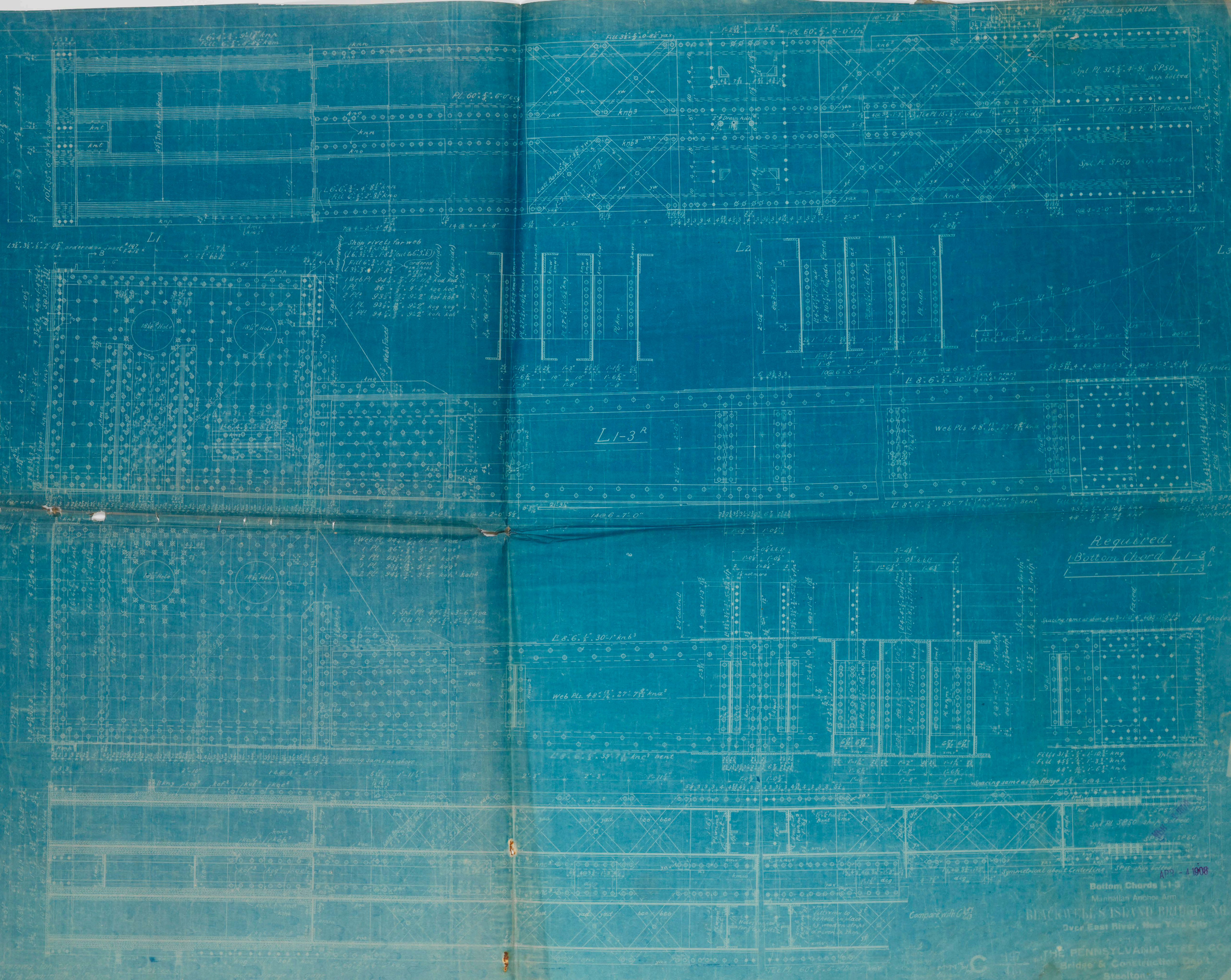
Note. Chemical requirements same as Structural Steel Castings with additional nickel of .32% min.

Note. For all finished surfaces on the cope side of steel castings, patternmaker will allow at least 1/8" for machine finishing.

Adjusting Device at End of
Manhattan Anchor Arm
BLACKWELL'S ISLAND BRIDGE, NO. 1
Over East River, New York City
BUILT BY
THE PENNSYLVANIA STEEL CO.,
Bridge & Construction Dept.,
Steelton, Pa.

Scale 1 in. = 1 ft.
Made by C.H.W.
Designed by J.C.D. & T.C.C.
Checked by M.C. & M.C.
In Charge
Bill Sheets

Rivets in Main Webs 1" diam.
 All other Rivets 3/4" diam.
 Open Holes 1/2" diam. unless otherwise marked.
 Holes in all material except lacing
 diaphragms, lateral connections and
 diaphragms to be sub-punched 3/4" and
 reamed or drilled from solid.
 For punching and reaming of field
 connections see General Specifications
 for Shop.
 Sheared edges of material except
 lacing, tie plates and lateral connections,
 to be planed off 1/4".



Required:
 Bottom Chord L1-3R
 L1-3L

APR - 1908
 Bottom Chords L1-3
 Manhattan Arch Bridge
 Over East River, New York City
 THE PENNSYLVANIA STEEL CO.
 Bridge & Construction Dept.
 Steelton, Pa.



STW

624.09747
N5684
v.1
pt.11

THE CITY OF NEW YORK
DEPARTMENT OF BRIDGES.

1908.

CONTRACT DRAWINGS

FOR

Constructing the Railings on the Footwalks and the Lower
Floor, and the Ornamental Work on the
Four Towers of the Blackwell's
Island Bridge

Over the East River, Between the Boroughs of Manhattan
and Queens.

1745-68B

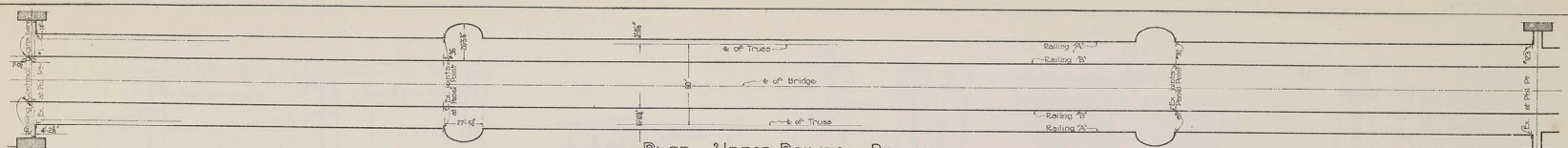


MARTIN B. BROWN CO. PRINTERS, 49-57 Park Pl., N. Y.

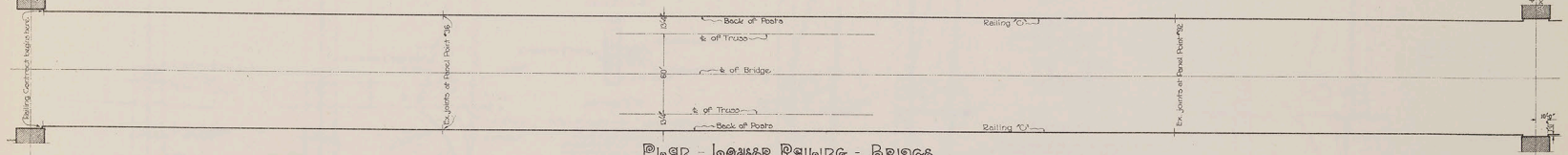
SCIENCE

FONDREN LIBRARY
Southern Methodist University
DALLAS, TEXAS

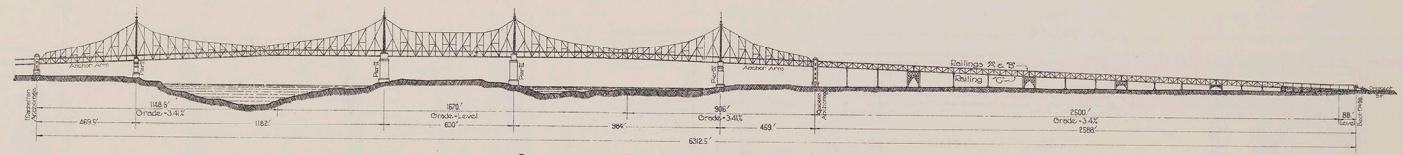
624.09747
N5684
v.1 pt.11



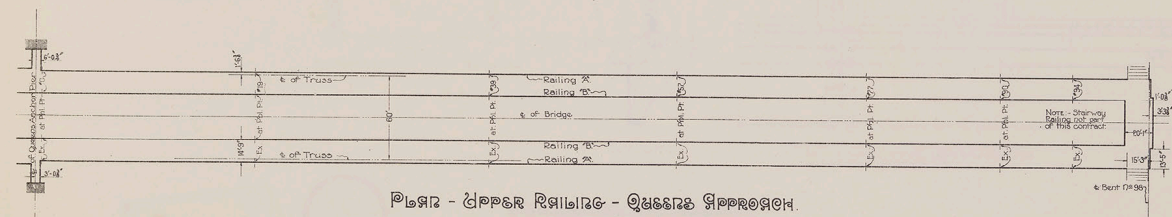
ପ୍ଲାନ - ମୁଖ୍ୟ ଡିଗ୍ରାମାଟ - ଡିଗ୍ରାମାଟ



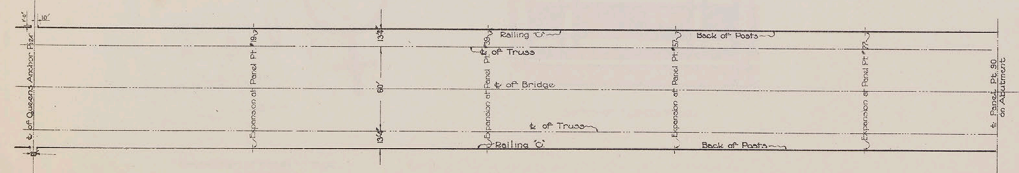
ପ୍ଲାନ - ଲେଖକ ଡିଗ୍ରାମାଟ - ଡିଗ୍ରାମାଟ



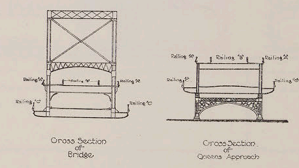
ଓଭରଲ୍ୟୁଟ୍ ଅଫ୍ ଡିଗ୍ରାମାଟ ଗତ ଓଭରଲ୍ୟୁଟ୍ ଗ୍ରାମାଟ.
Scale - 400' 1".



ପ୍ଲାନ - ମୁଖ୍ୟ ଡିଗ୍ରାମାଟ - ଓଭରଲ୍ୟୁଟ୍ ଗ୍ରାମାଟ



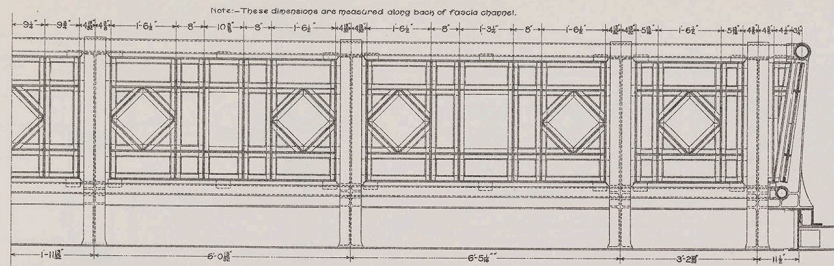
ପ୍ଲାନ - ଲେଖକ ଡିଗ୍ରାମାଟ - ଓଭରଲ୍ୟୁଟ୍ ଗ୍ରାମାଟ



Approved: April 2nd, 1908

Wm. B. Smith
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
RAILINGS
MAIN BRIDGE AND QUEENS APPROACH
GENERAL PLAN



Development of Railing at Balcony.

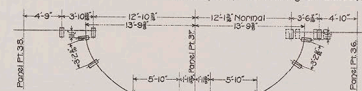


Diagram of Balcony at Panel Pt. 37.
Note.—North balcony drawn, south balcony to other hand.

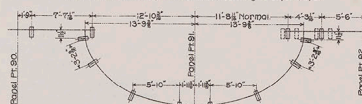
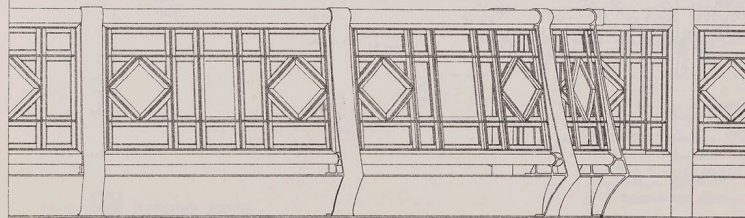
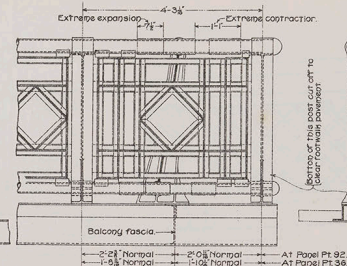


Diagram of Balcony at Panel Pt. 91.
Note.—South balcony drawn, north balcony to other hand.
Scale 1/8" = 1'-0".

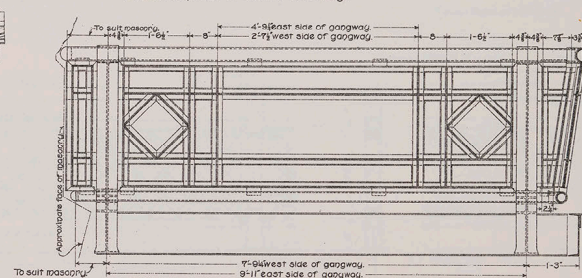
Plan of Railing at Balcony.



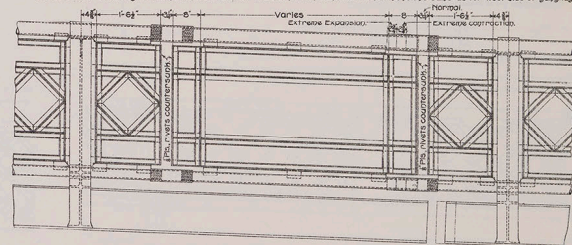
Elevation of Railing at Balcony.



Expansion Joint at End of Balcony.

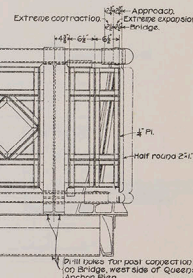
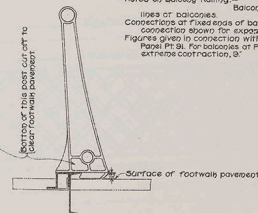


Railing and Expansion Joints at Gangway to Elevator Tower, Queens Anchor Pier.
Note.—Return of railing at Manhattan Anchor Pier to be similar in construction. Dimensions same as for west side of gangway.



Expansion Panel, Queens Approach.

Notes on Balcony Railing.—
Ropes of balconies. Balcony railings are symmetrical about center line of balconies.
Connections at fixed ends of balconies are similar in construction to connection shown for expansion joint.
Figures given in connection with expansion joint apply to balconies at Panel Pt. 91. For balconies at Panel Pt. 37, extreme expansion is 5' and extreme contraction, 8'.



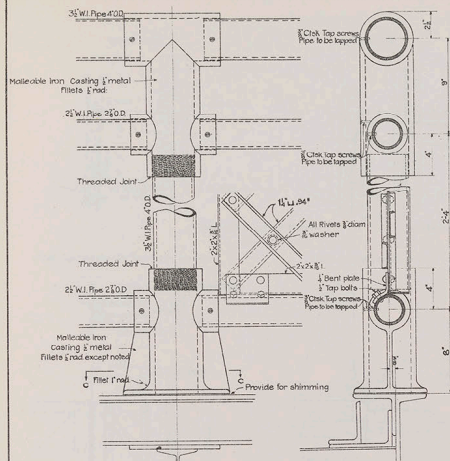
Approved: April 2nd, 1900.

Chief Engineer.
Commissioner.

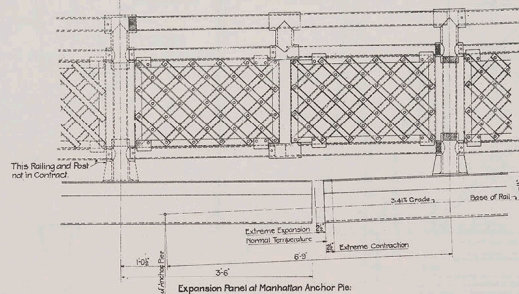
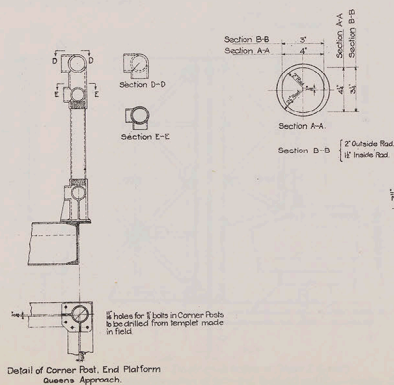
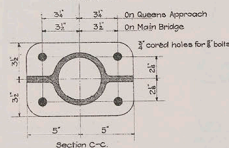
CITY OF NEW YORK.
DEPARTMENT OF BRIDGES.

BLACKWELL'S ISLAND BRIDGE.
RAILINGS.
SPECIAL DETAILS, RAILING 'A'.

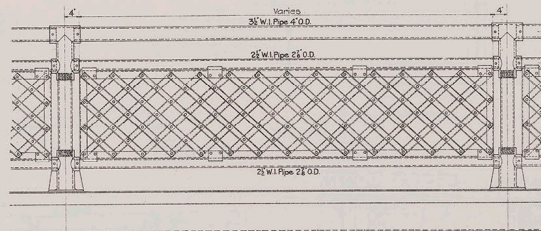
Scale, 1/4" = 1'-0".



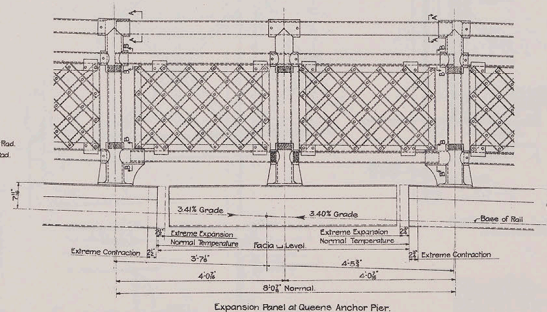
Detail of Typical Rail Joint
Scale: 3/16" = 1"



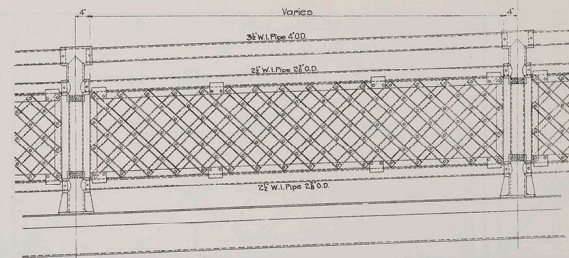
Expansion Panel of Manhattan Anchor Pier



Typical Panel on Level portion of Bridge

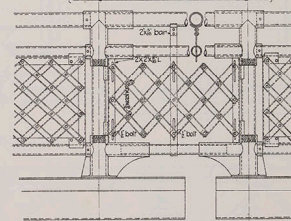


Expansion Panel of Queens Anchor Pier



Typical Panel on 3.41% Grade

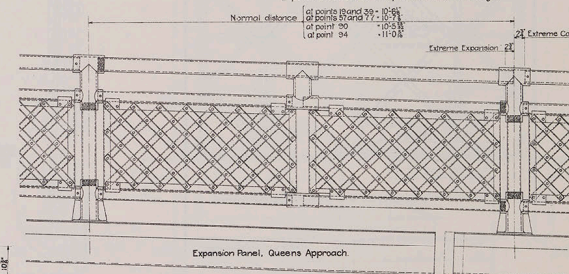
at point 36-37	Extreme Contraction	5'0"	between points 31-32
at point 37-38	Normal Temperature	3'11"	
at point 38-39	Extreme Expansion	3'11"	



NOTE
Extremities Steel Bolts
with Nut and Collar pin for
all movable joints

Expansion Panel between points 36-37 Main Bridge
Expansion Panel between points 31-32 Main Bridge

Normal distance	at point 36-37	10'4"	Extreme Contraction
	at point 37-38	10'4"	
	at point 38-39	11'0"	



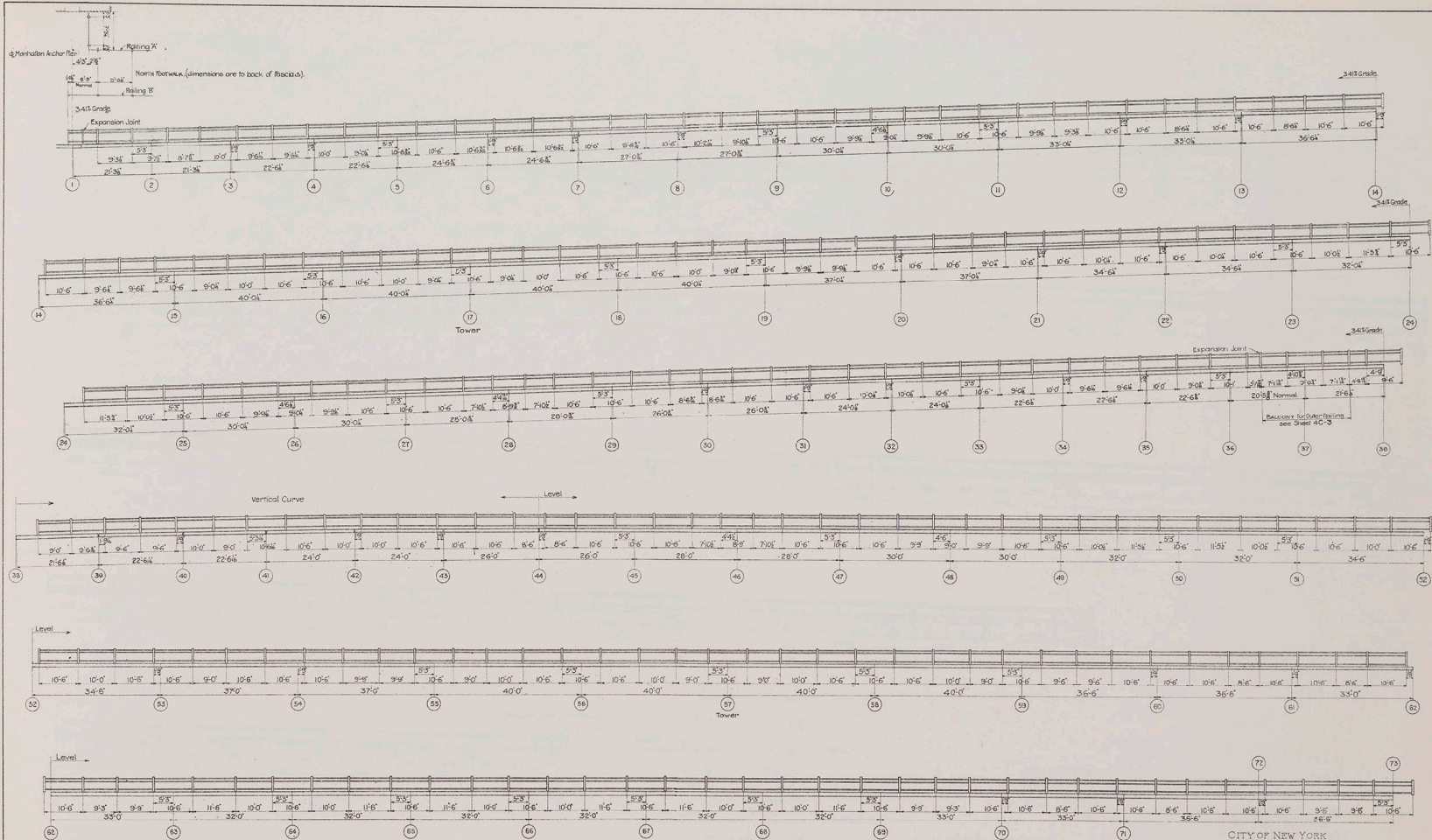
Expansion Panel, Queens Approach

CITY OF NEW YORK
DEPARTMENT OF BRIDGES

BLACKWELL'S ISLAND BRIDGE
RAILINGS
DETAILS, RAILING 'B'
Scale: 1/4" = 1'

Approved April 2nd, 1902

J. W. R.
Chief Engineer
Commissioner

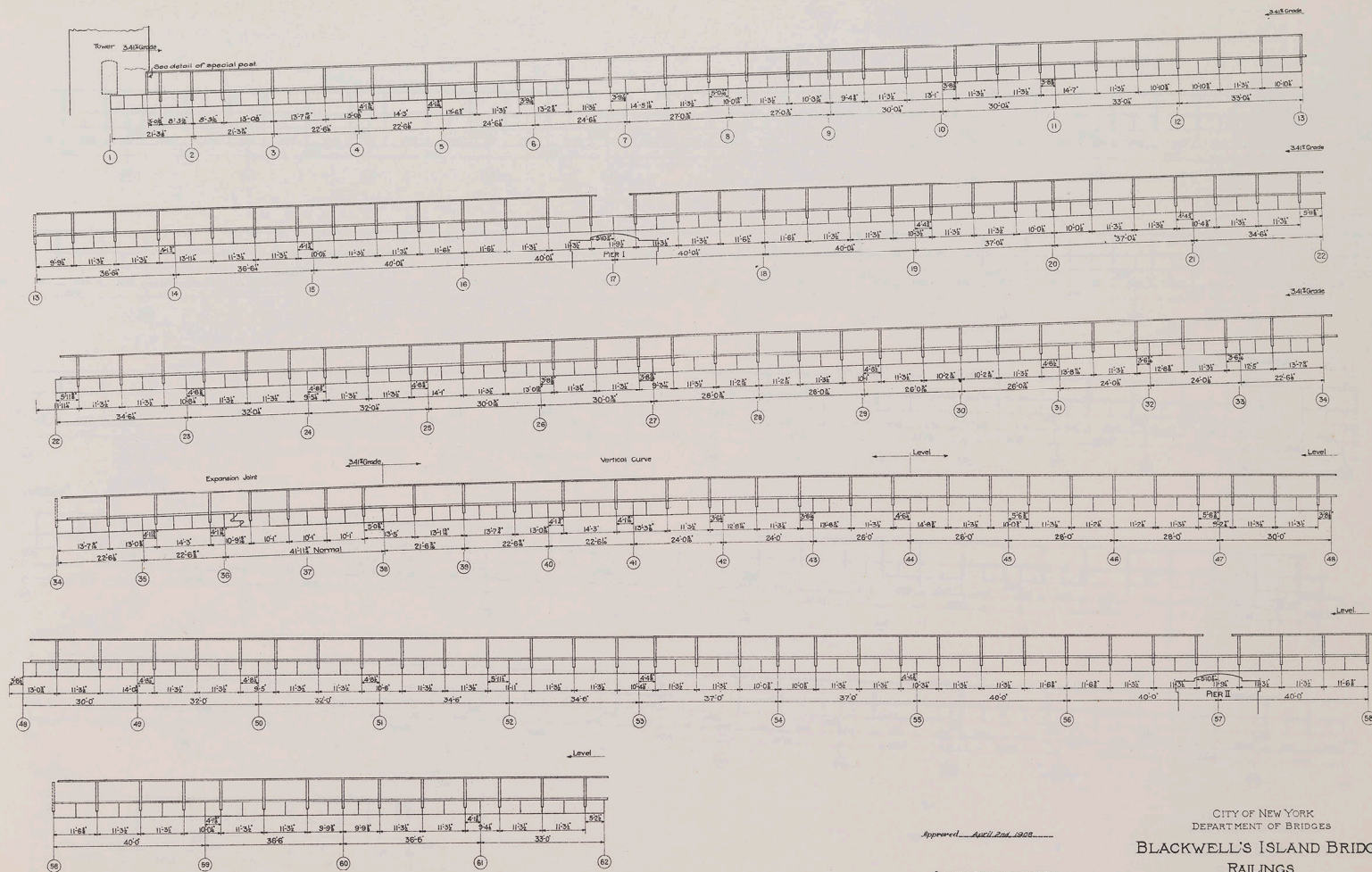


Approved April 2nd, 1912

Chief Engineer
 Commissioner

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 RAILINGS
 SPACING OF POSTS A & B
 PANELS 1 TO 73 MAIN BRIDGE
 Scale, Main-1ft.

4C.6

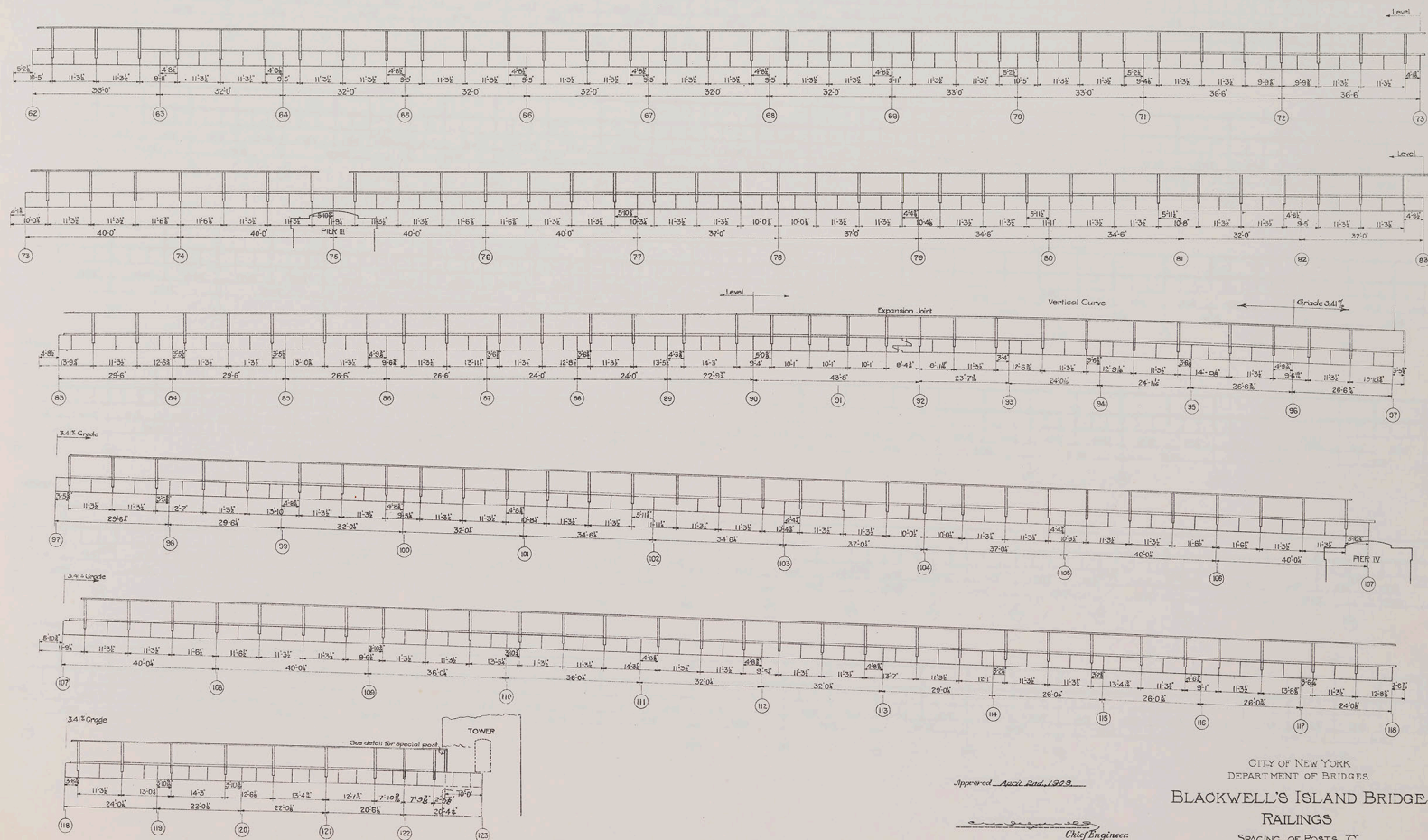


Approval—April 2nd, 1908

[Signature]
Chief Engineer
[Signature]
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
RAILINGS
SPACING OF POSTS 'C'
PANELS 1 TO 62 MAIN BRIDGE
Scale, 1/4 in. = 1 ft.

4C-9

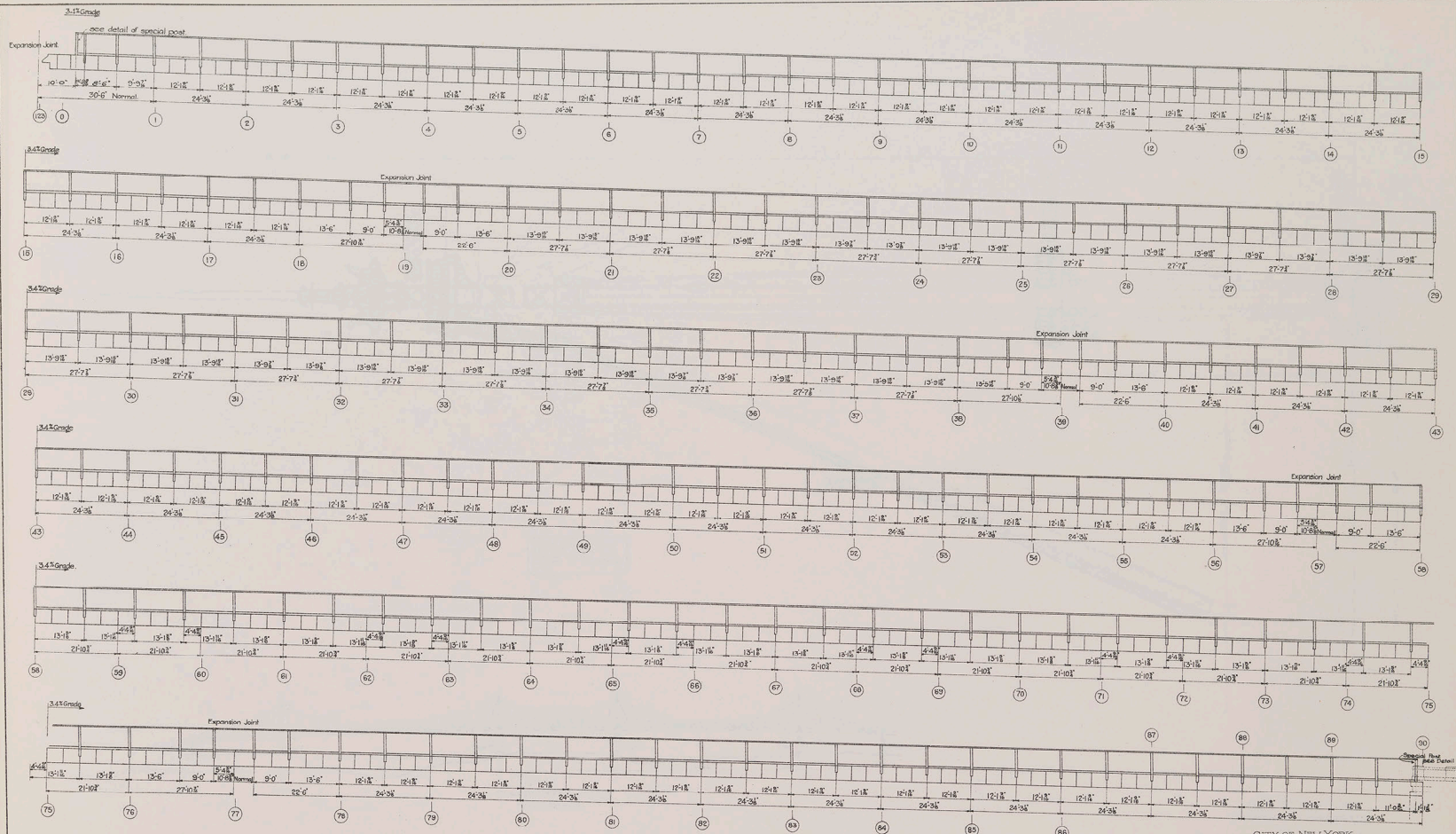


Approved *Aug. 1922*

Chief Engineer
Commissioner

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
 RAILINGS
 SPACING OF POSTS "C"
 PANELS 62 TO 123 MAIN BRIDGE
 Scale, 1/4" = 1'-0"

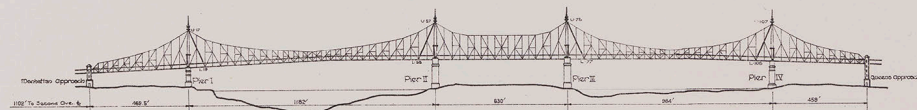
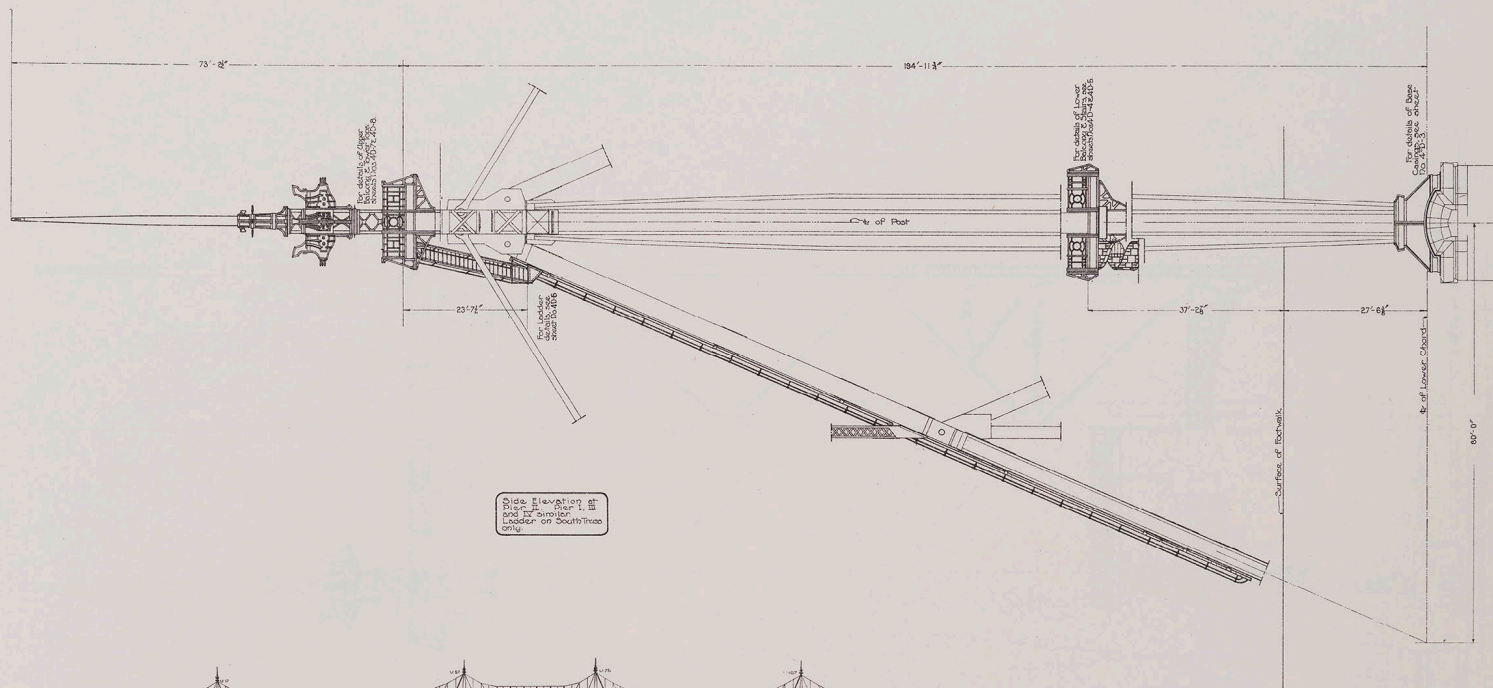
4C-10



Approved April 2nd, 1922

Chief Engineer
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES.
BLACKWELL'S ISLAND BRIDGE
RAILINGS
SPACING OF POSTS TO
QUEENS APPROACH
Scale, 1/4" = 1'-0"



Elevation of Main Bridge
Scale 1/4" = 1 ft

Approved April 2nd, 1908

John S. ...
Chief Engineer
Inspector

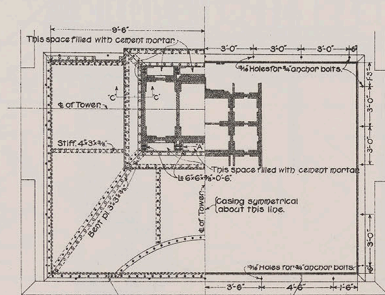
CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
TOWERS - ORNAMENTAL WORK
GENERAL DRAWING
SIDE ELEVATION
Scale 1/8" = 1 ft



Chief Engineer
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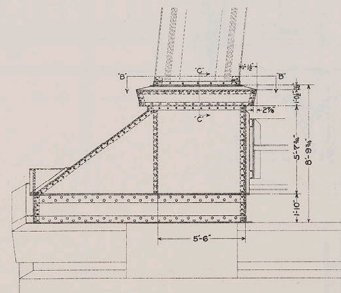
Scale - 1 in - 1 ft

General Notes.
All plates $\frac{1}{2}$ " thick. All angles 3"x3"x $\frac{1}{4}$ ".
All rivets $\frac{1}{2}$ " dia.
Existing structures indicated by light lines and cross-hatched
in section. New work indicated by heavy lines and blacked
in section except in large scale details.

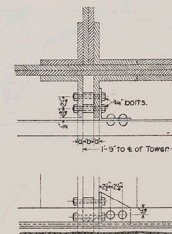


Half Section B-B'

Half Plan at Masonry.



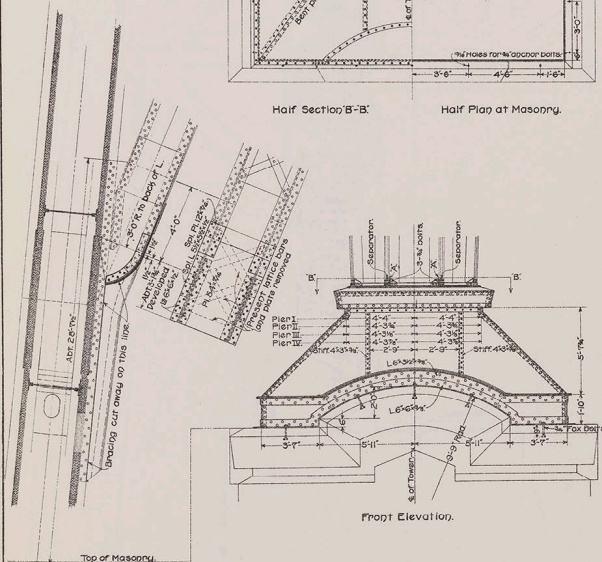
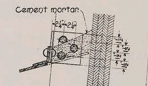
Side Elevation.



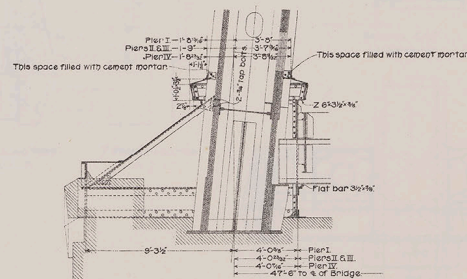
Detail of Connection at A'.
Scale, $\frac{1}{8}$ " = 1'-0"

Table of Dimensions

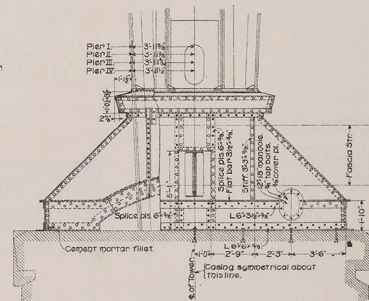
Plan No.	1	2	3	4
Dimensions A	1'	1'	1'	1'
Dimensions B	1'	1'	1'	1'
Dimensions C	1'	1'	1'	1'



Front Elevation.



Longitudinal Section.



Rear Elevation.

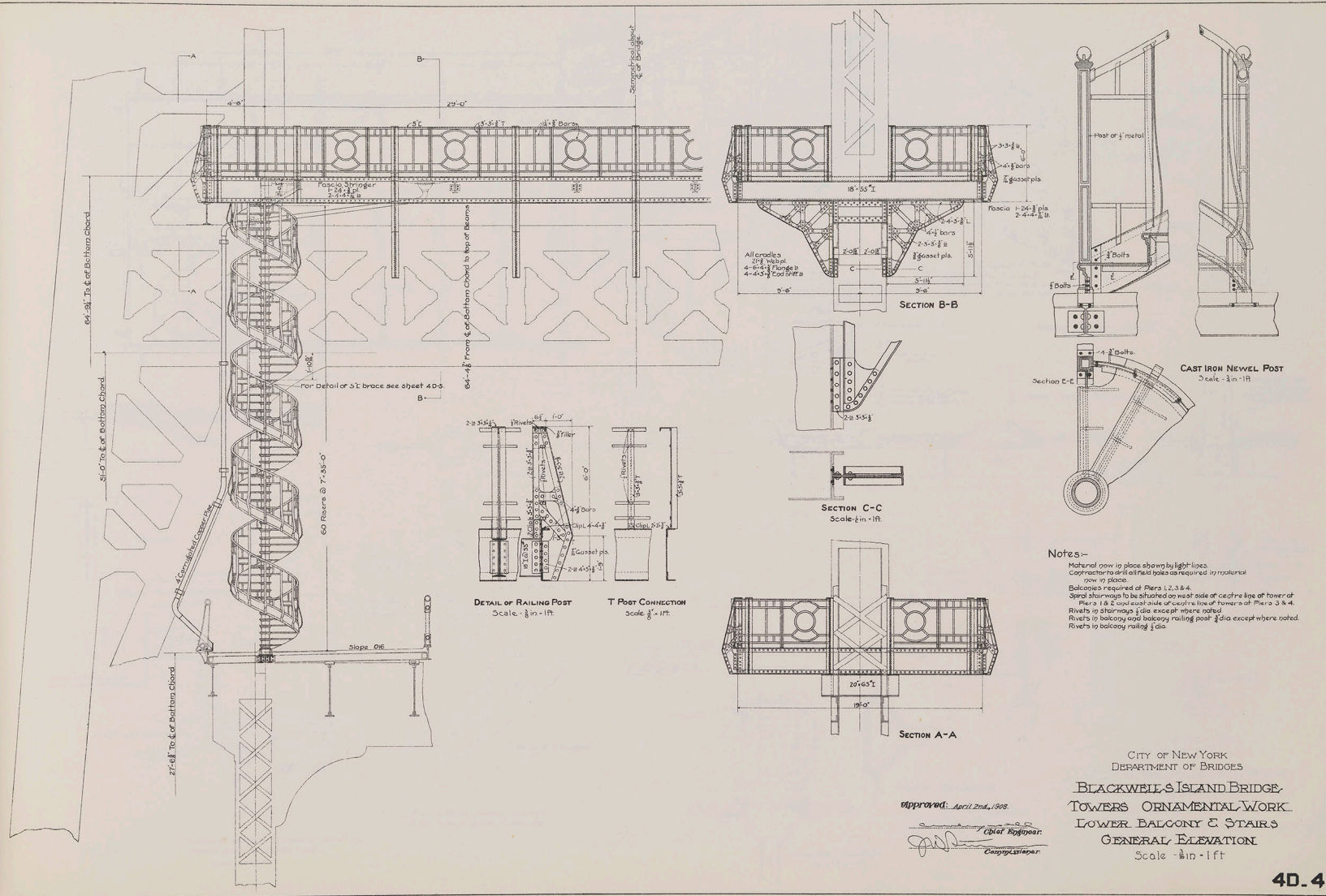
Detail of Coaming in Tower Bracing.

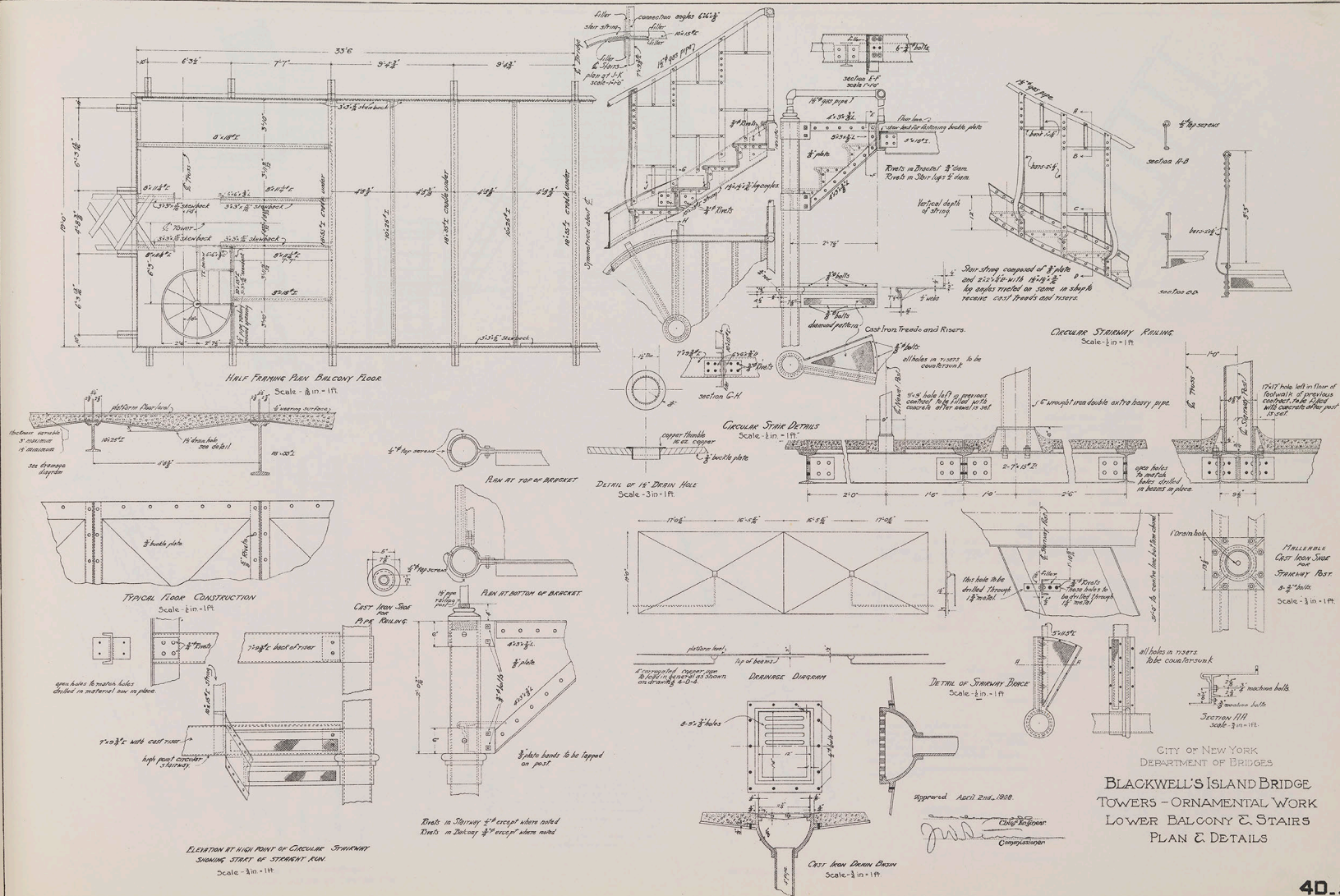
Rivets left in place shown thus:—
New rivets in existing holes shown thus:—
New rivets in new holes shown thus:—

Approved April 2nd, 1902.

[Signature]
Chief Engineer
Comptroller

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
TOWERS - ORNAMENTAL WORK
BASE CASINGS
Scale, $\frac{3}{8}$ " = 1'-0"





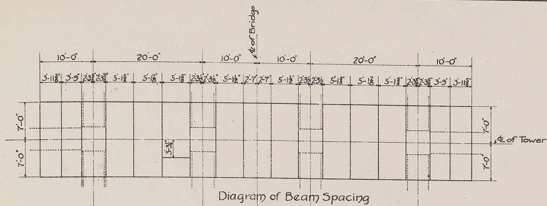


Diagram of Beam Spacing

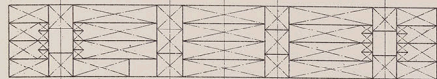
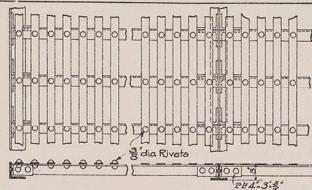
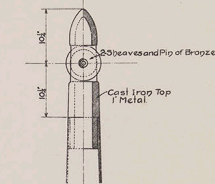


Diagram of Paneling for Grating



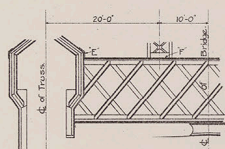
Detail of Floor Grating

Scale: $\frac{3}{4}$ in. = 1 ft.
Note: All grating angles 8° to 12° .
All flats against 8° to 12° Staircase.



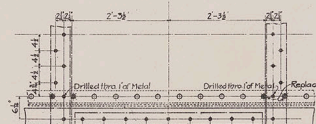
Detail of Flag Pole

Note: All plates $\frac{1}{2}$ in. $3 \times 2 \times 6 \frac{1}{2}$.
Rivets $\frac{1}{2}$ in. Maximum spacing 4 cts.



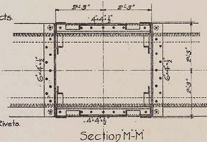
New Holes at 'E'

Note: Holes drilled thro' $\frac{1}{2}$ of Metal.

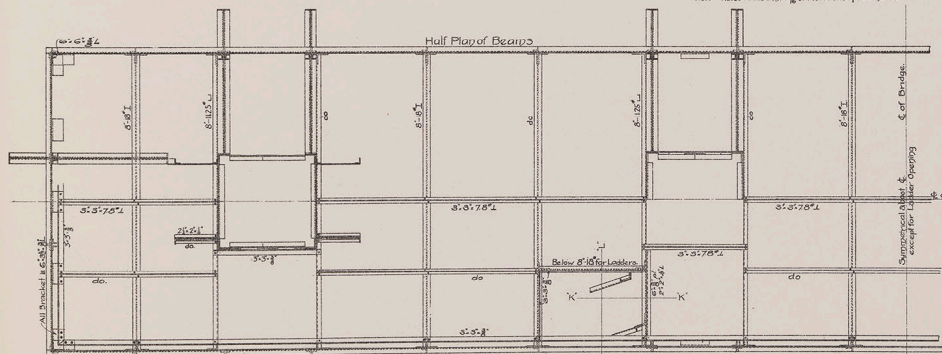
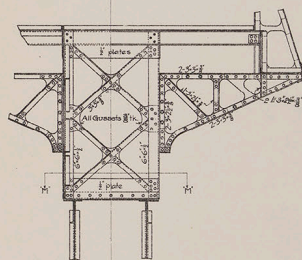
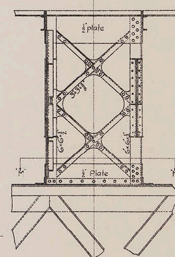


New Holes for Connection at 'F'

Note: Holes drilled thro' $\frac{1}{2}$ of Metal except as noted.



Section M-M



Half Plan of Grating Angles

Note: $\frac{1}{2}$ Rivets conn. to Beams.

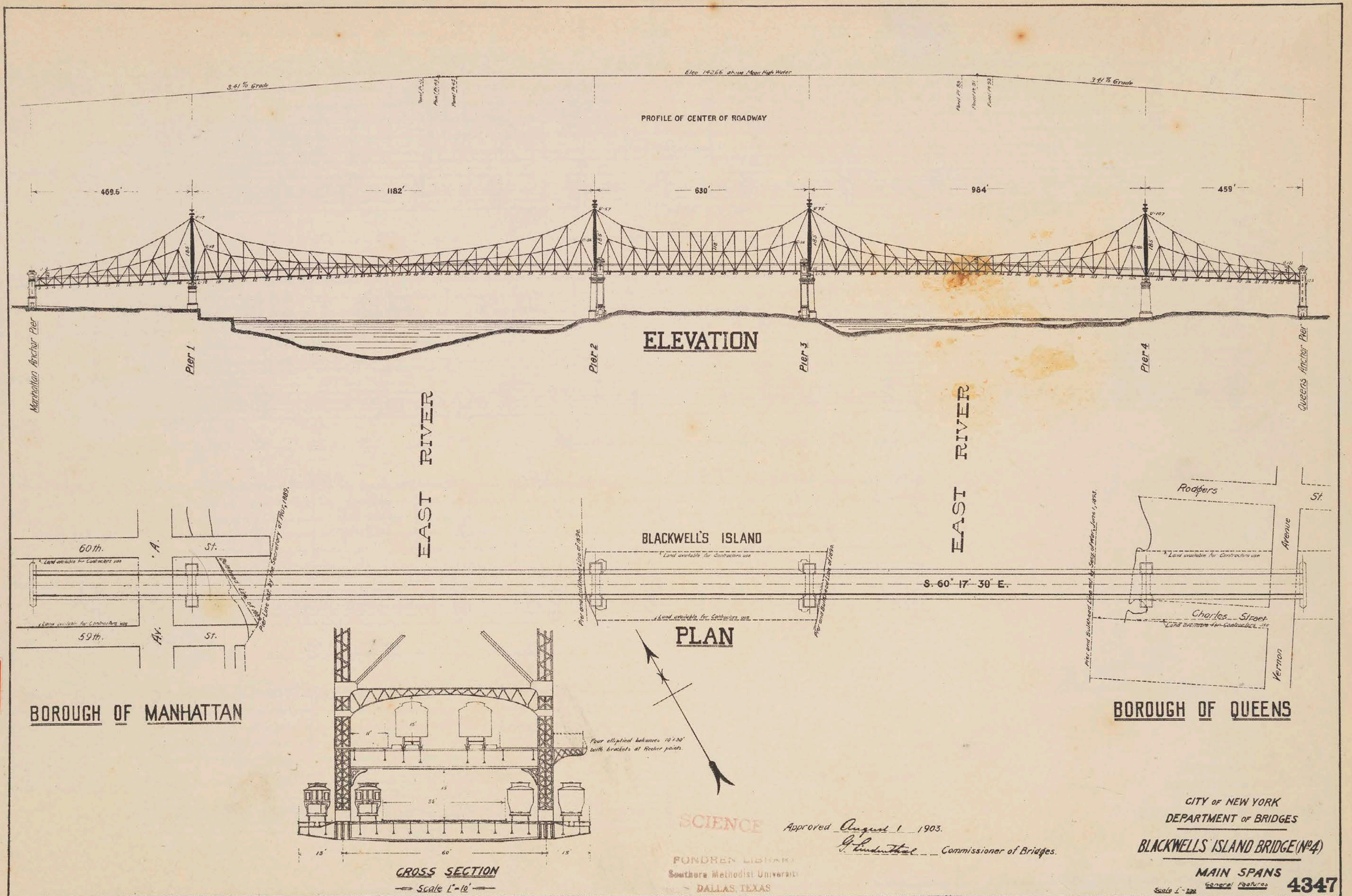
Approved: April 2nd, 1908.

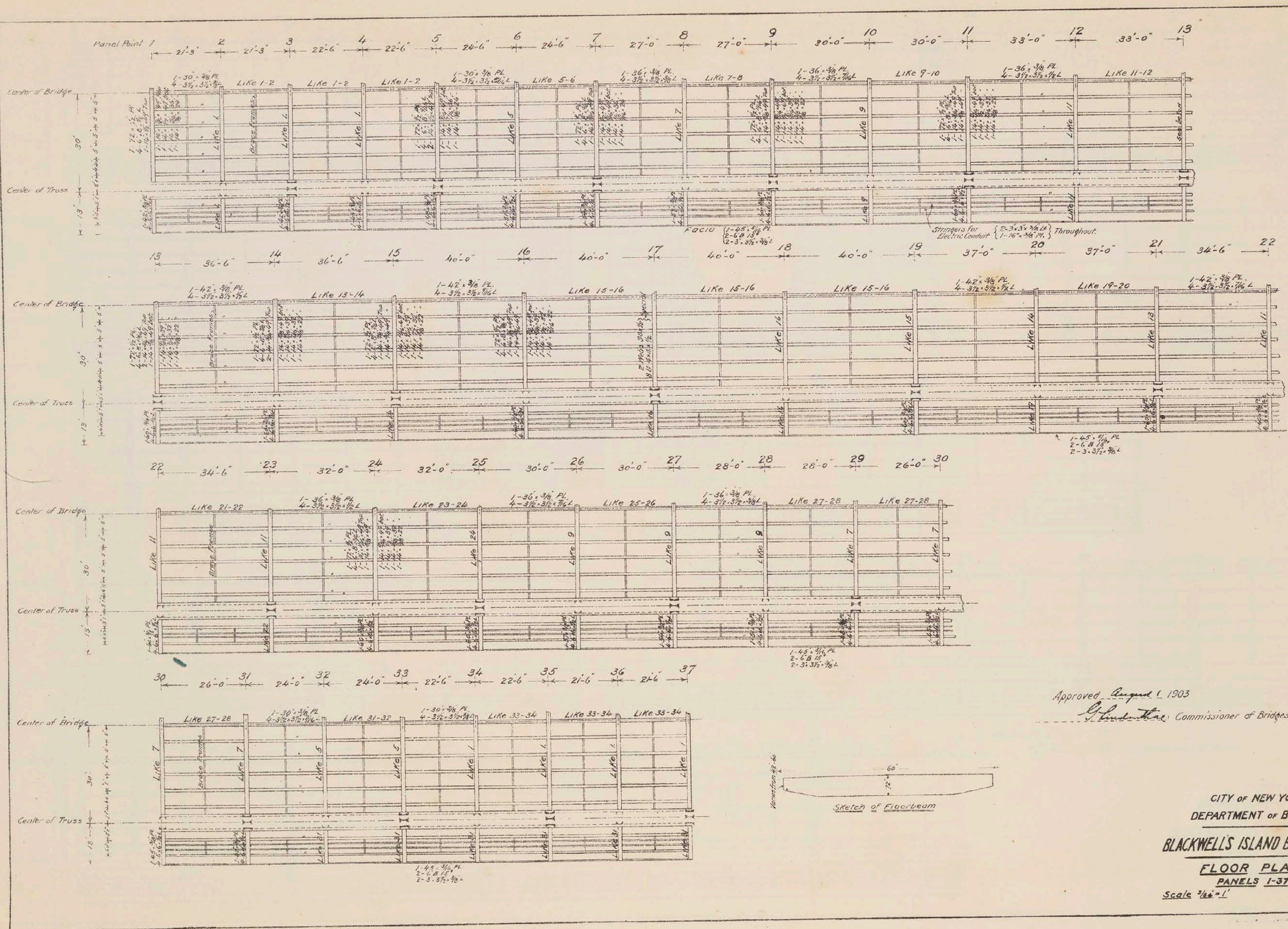
Chief Engineer
Commissioner

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE
TOWERS - ORNAMENTAL WORK
UPPER BALCONY & TOWER TOPS
PLAN & DETAILS
Scale: $\frac{3}{4}$ in. = 1 ft.



624.0974.7
N568d
v.1 pt.4



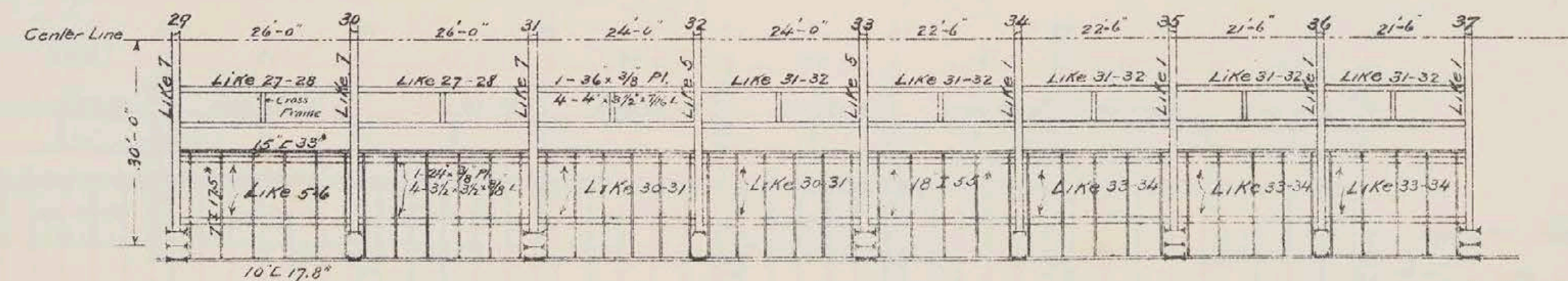
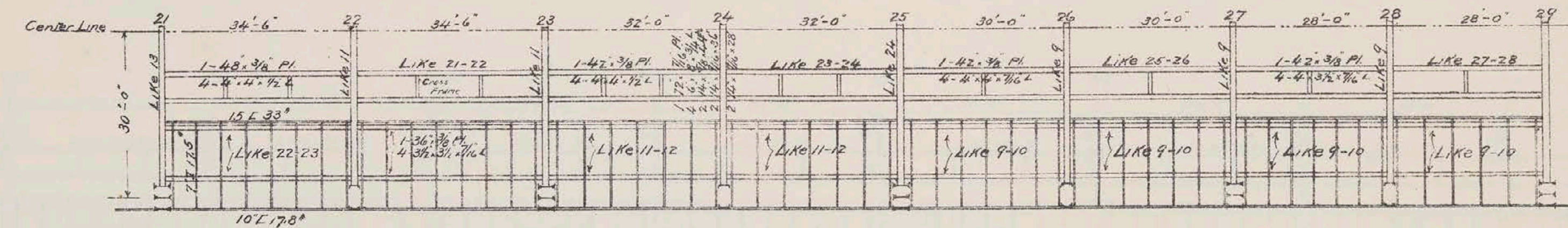
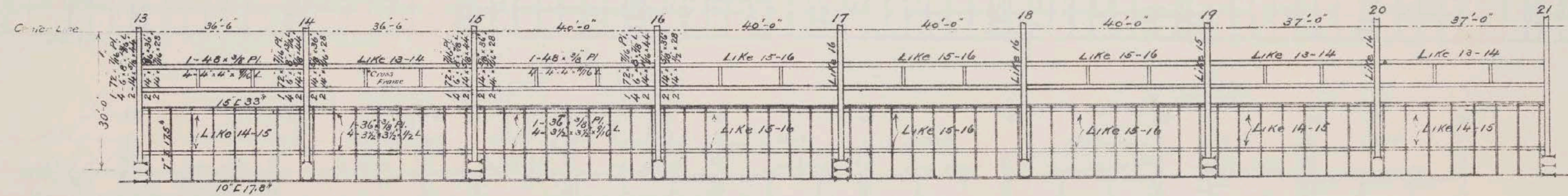
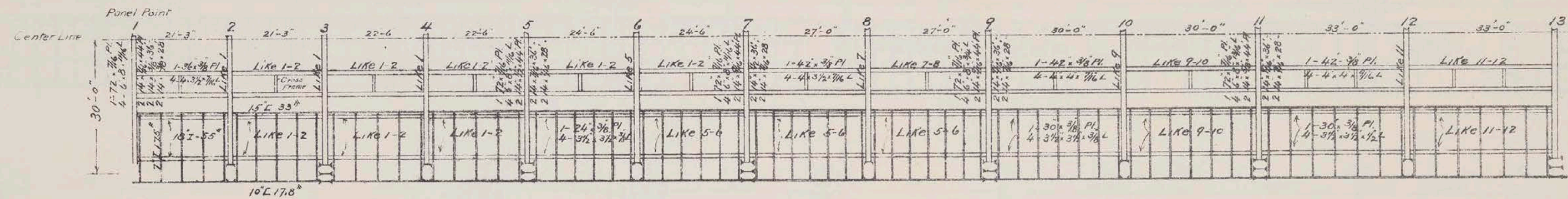


Approved August 1, 1903
G. Lindenthal Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)
 FLOOR PLAN
 PANELS 1-37
 Scale 3/16" = 1'
 4348







Approved August 1, 1903.
 J. Lindenthal, Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)

Elevated Floor System

Scale 3/8"=1' Panels 1-37 4351



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (No. 4)
ELEVATED FLOOR SYSTEM
PANELS 37-91
SCALE 3/8" = 1'

Approved August 1, 1903
G. Lindenthal, Commissioner of Bridges.

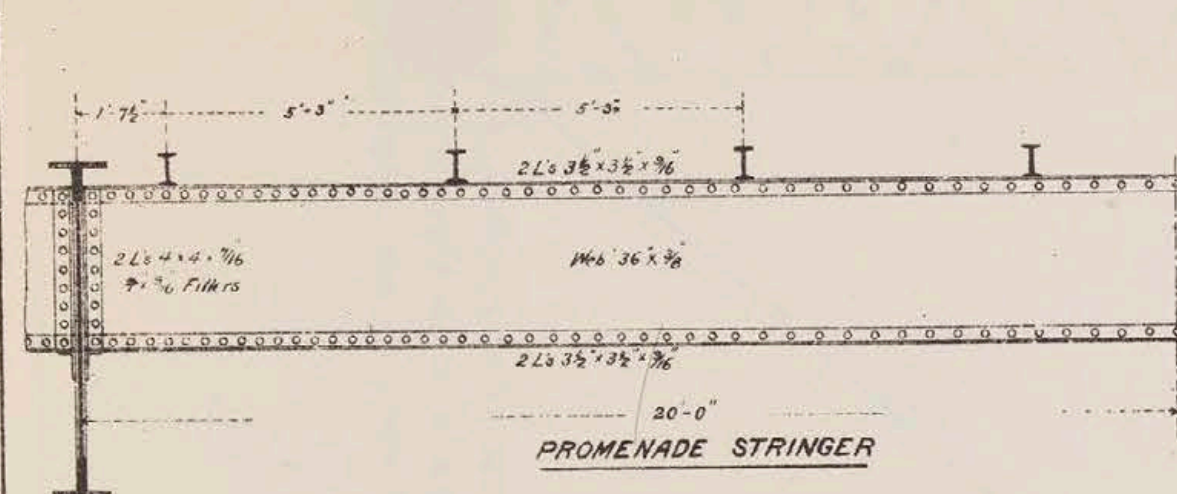


Approved August 1, 1903
G. Lindenthal Commissioner of Bridges

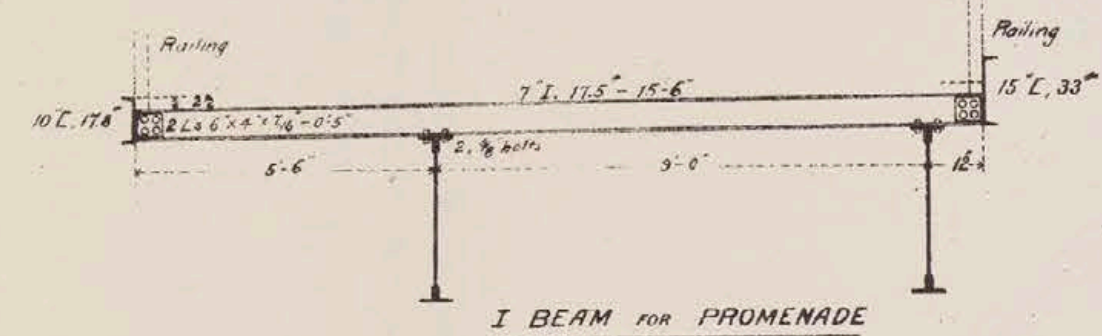
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)
 ELEVATED FLOOR SYSTEM

PANELS 91-123
 SCALE $\frac{1}{8}'' = 1'$

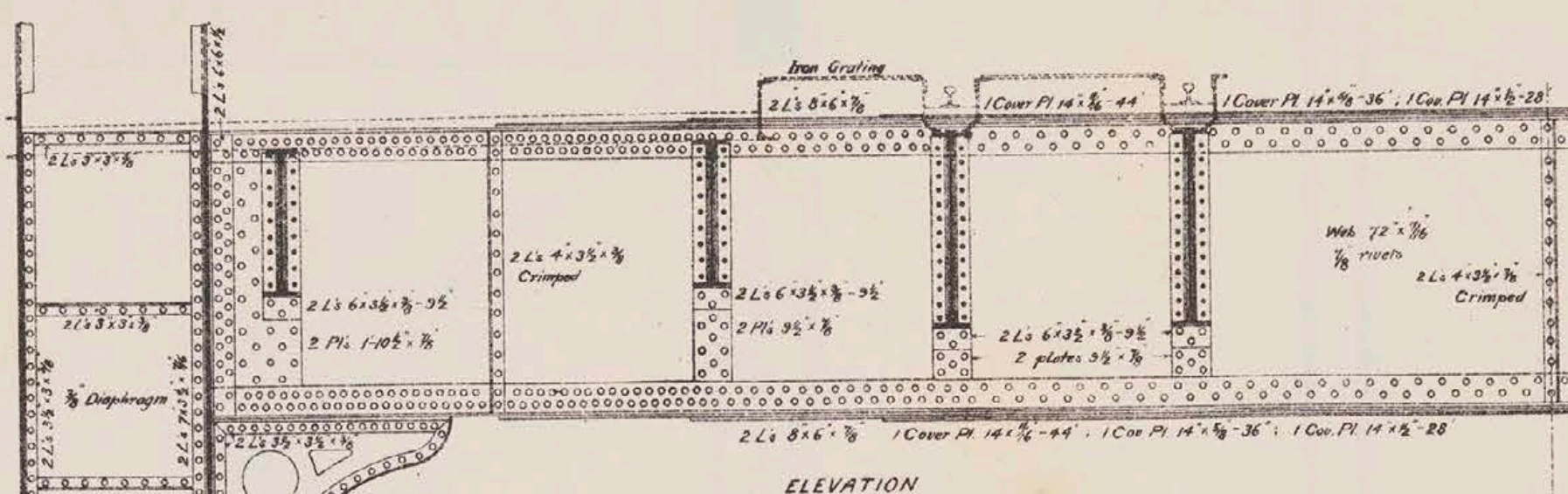
4353



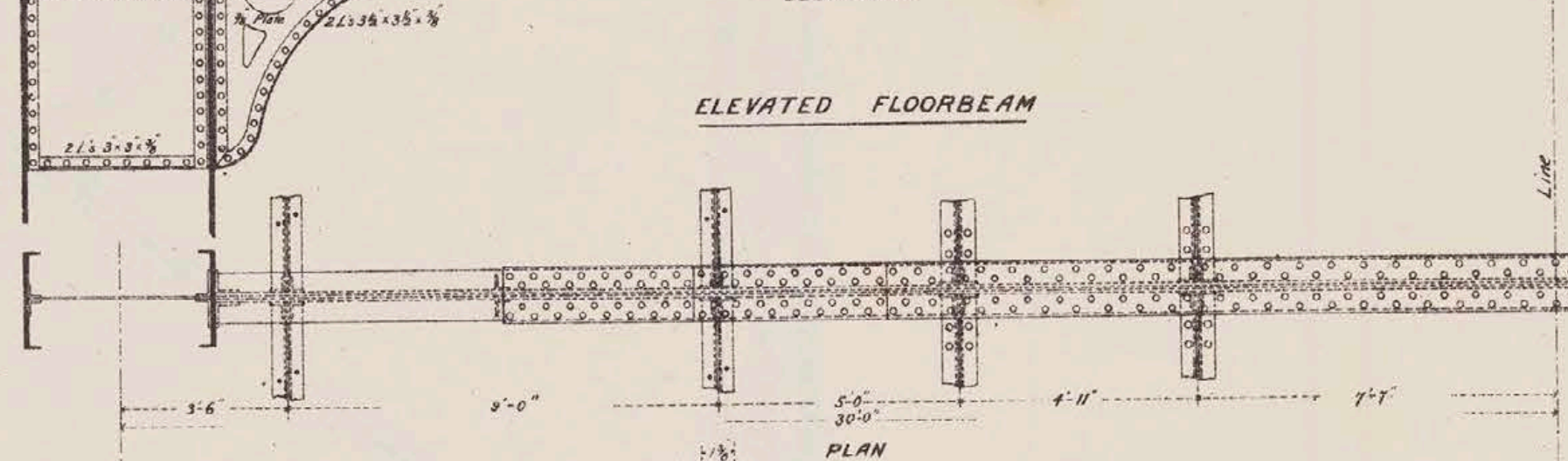
PROMENADE STRINGER



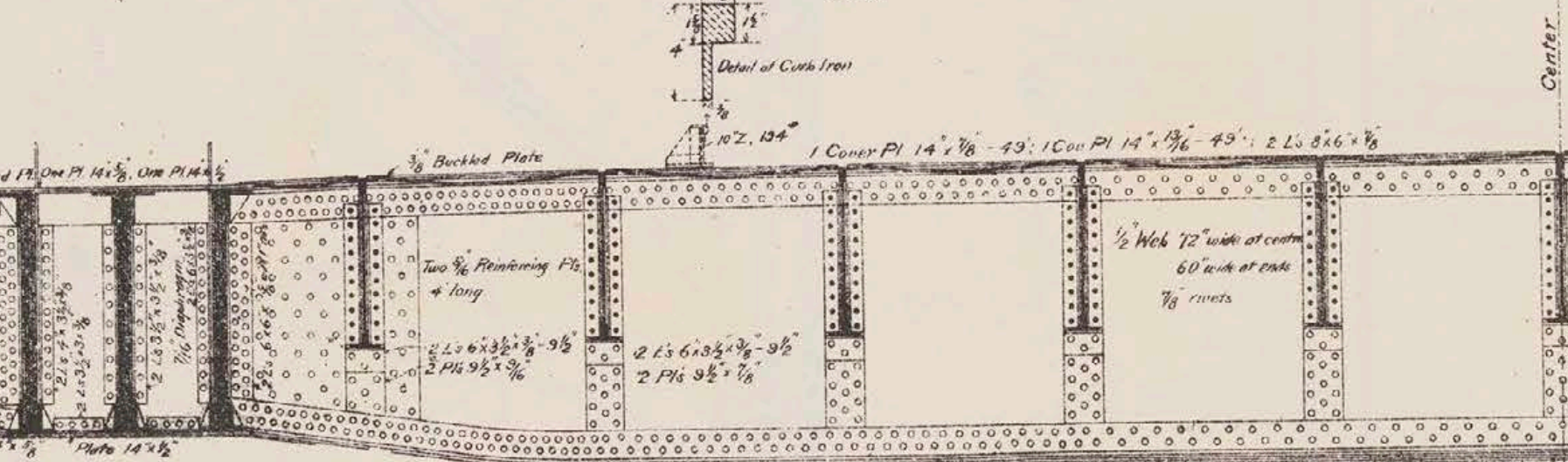
I BEAM FOR PROMENADE



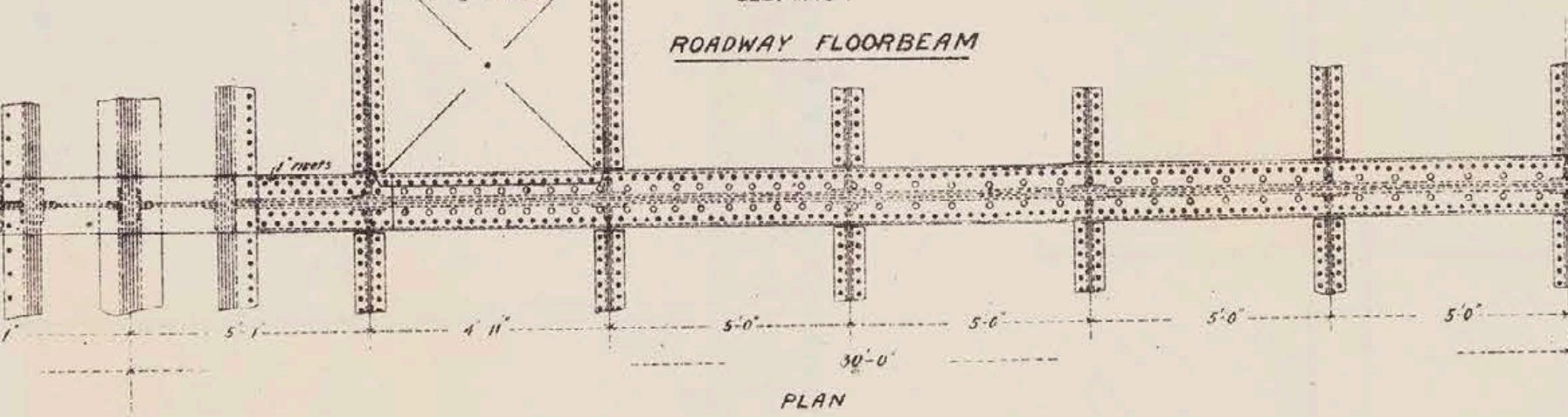
ELEVATION



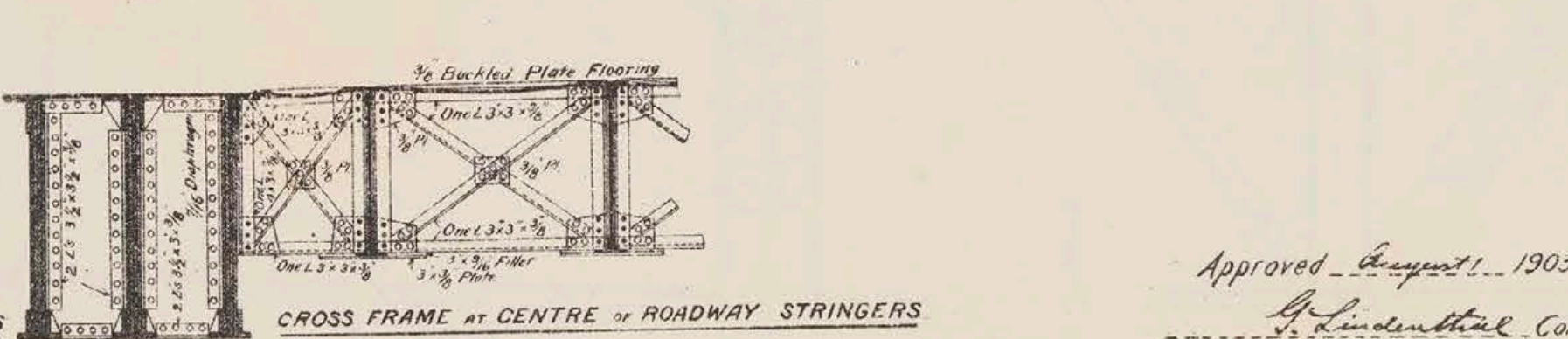
ELEVATED FLOORBEAM



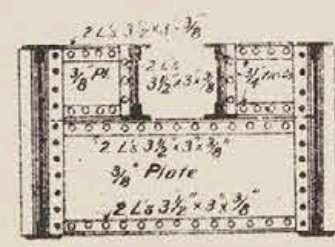
ELEVATION



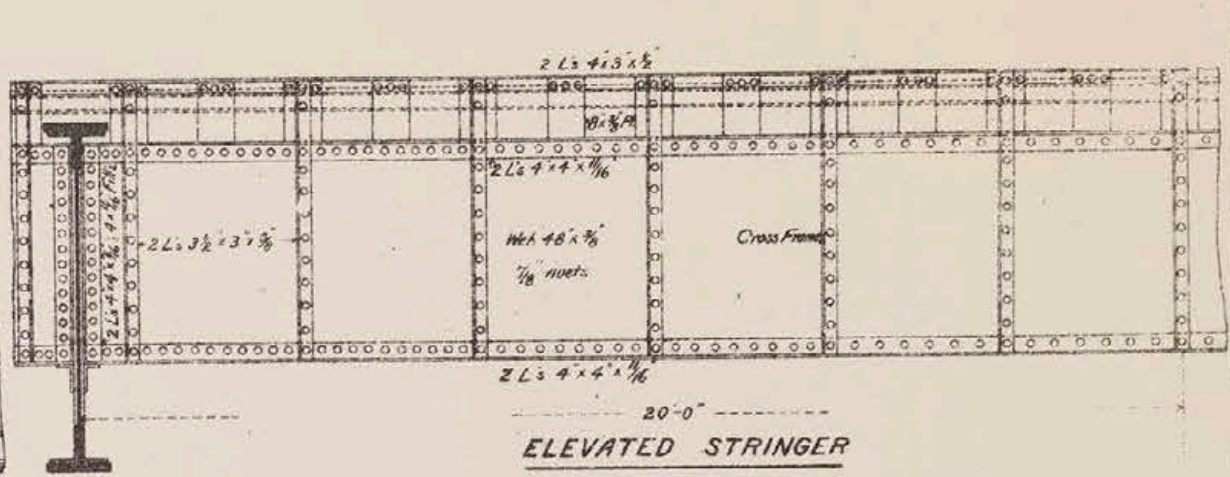
ROADWAY FLOORBEAM



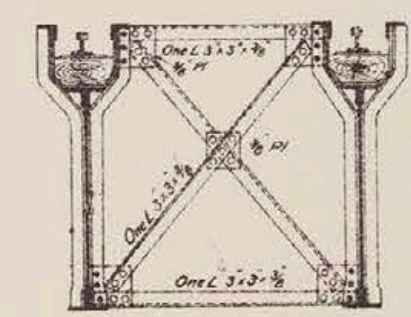
CROSS FRAME AT CENTRE OF ROADWAY STRINGERS



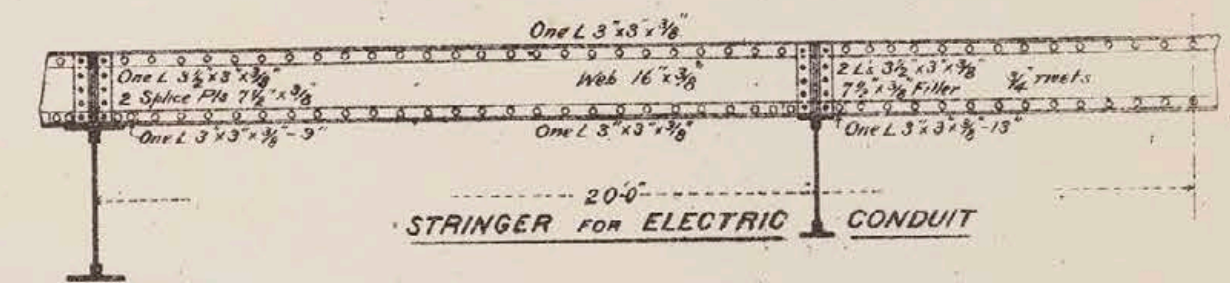
CROSS FRAME FOR TROLLEY STRINGERS



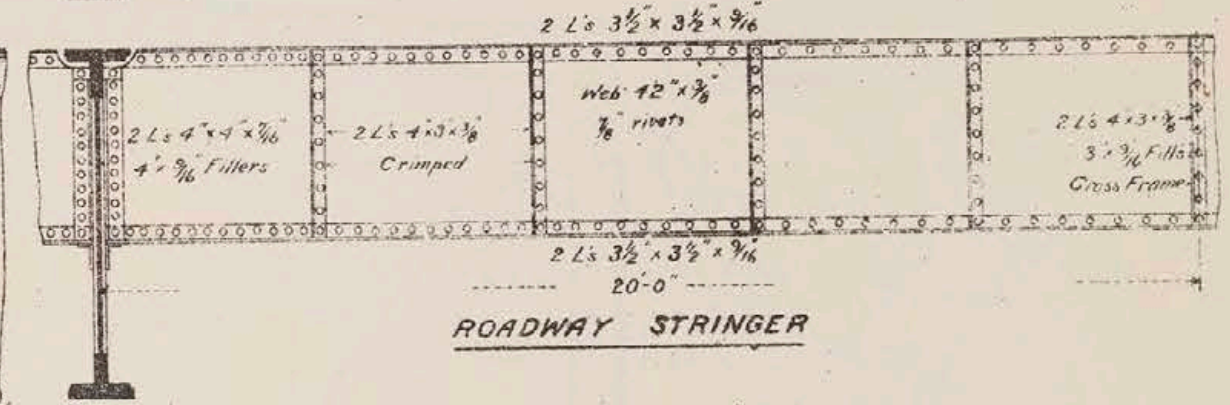
ELEVATED STRINGER



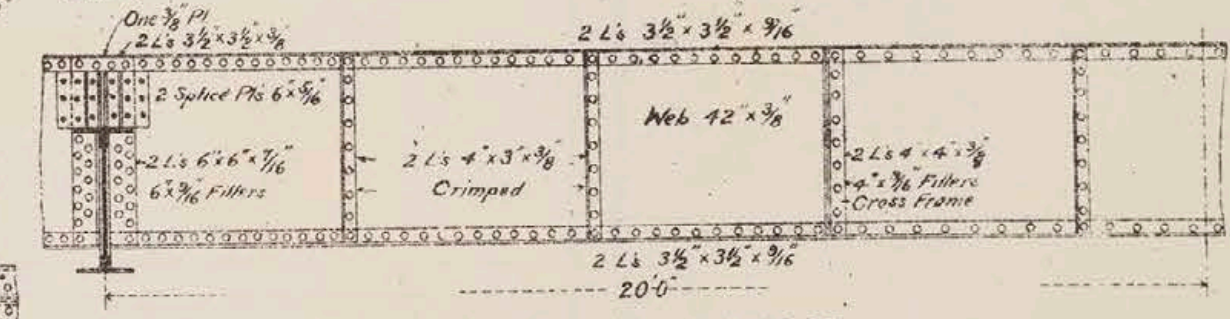
CROSS FRAME FOR ELEVATED STRINGERS



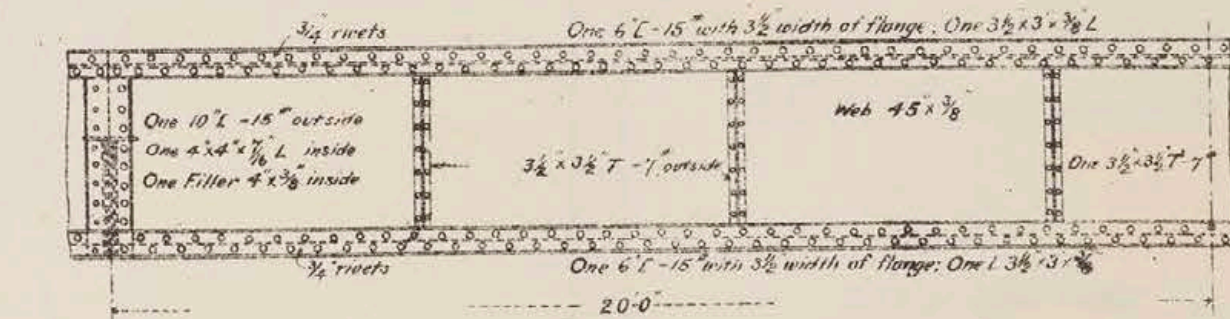
STRINGER FOR ELECTRIC CONDUIT



ROADWAY STRINGER



TROLLEY STRINGER

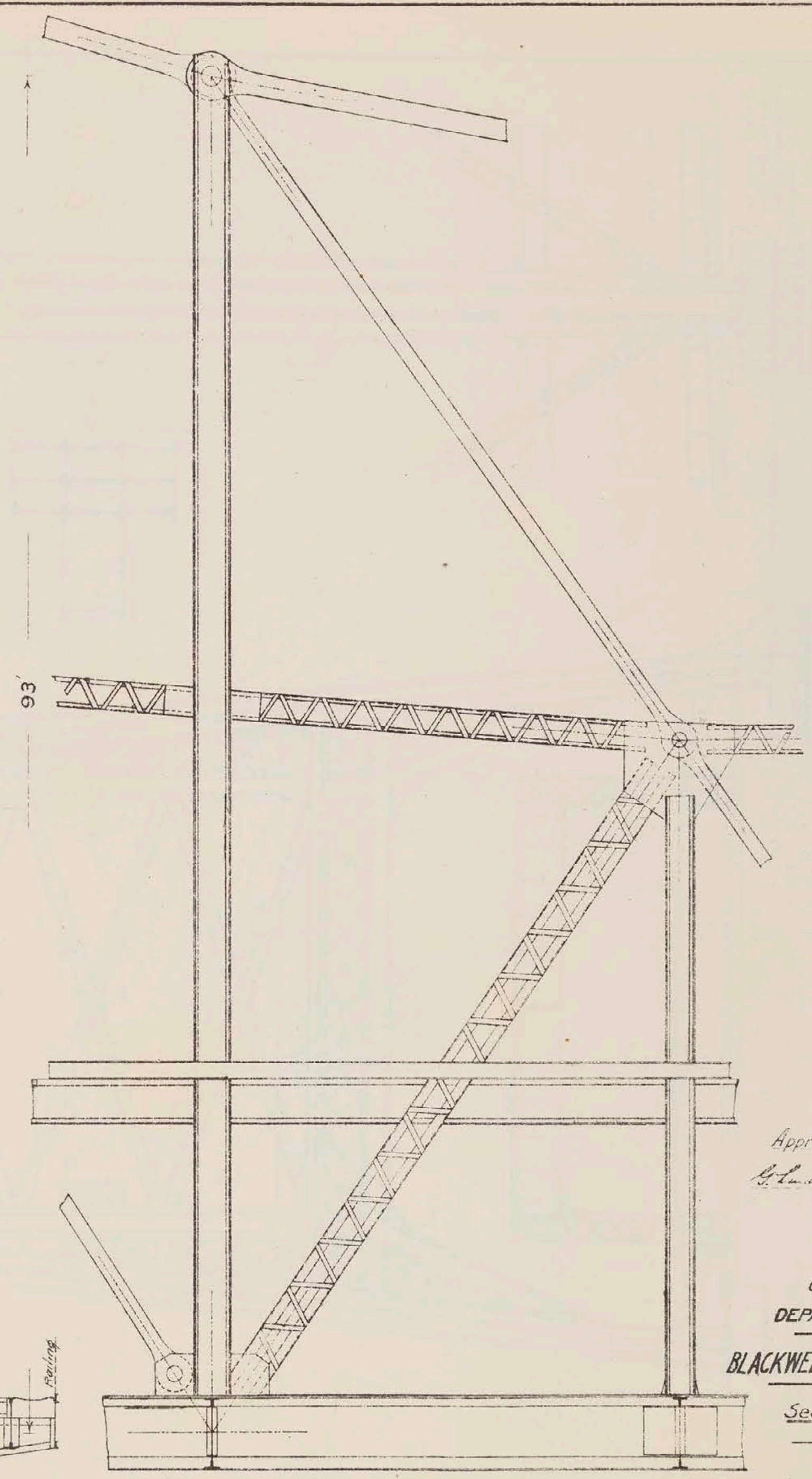
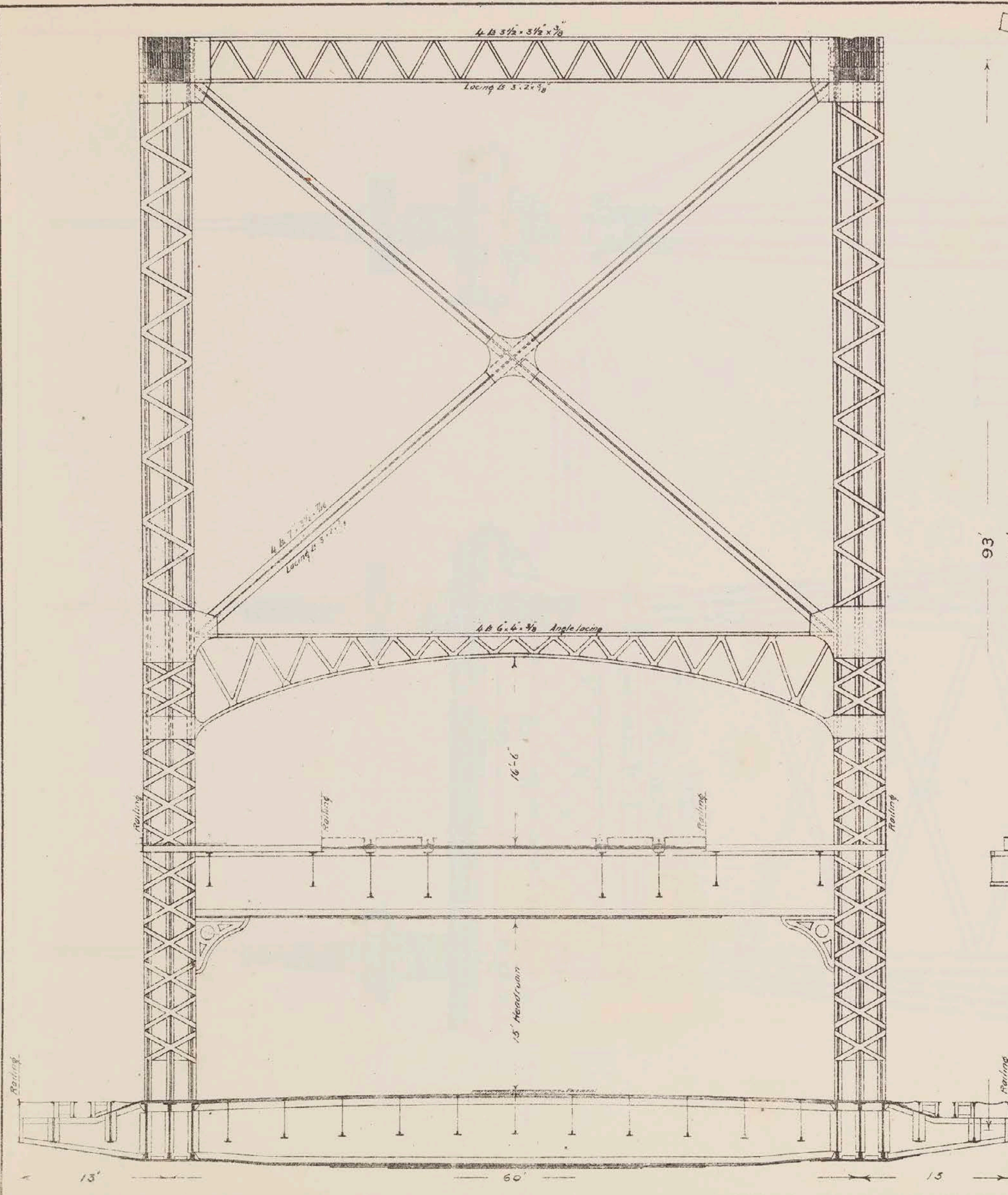


FACIA STRINGER

Approved August 1, 1903
G. Lindenthal Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (N^o 4)
 UPPER AND LOWER FLOOR SYSTEMS
 FOR PANELS 40' IN LENGTH
 SCALE 1" = 4'

4354



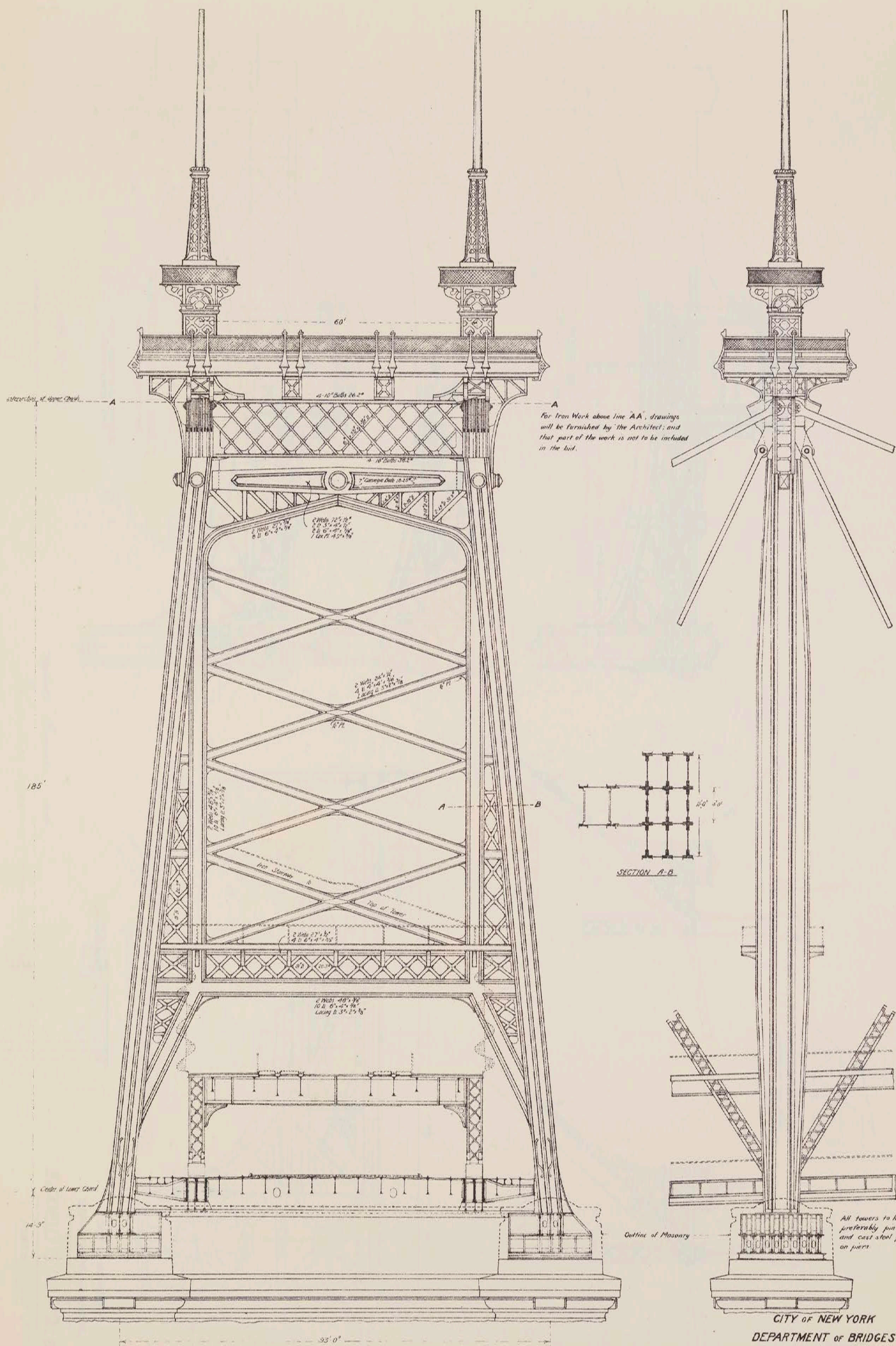
Approved August 11, 1903.
 C. L. Huntington, Commissioner of Bridges

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (Nº 4)

Section and Elevation
 PANEL 23

Scale 1/8" = 1'

4356



Approved August 1 1903

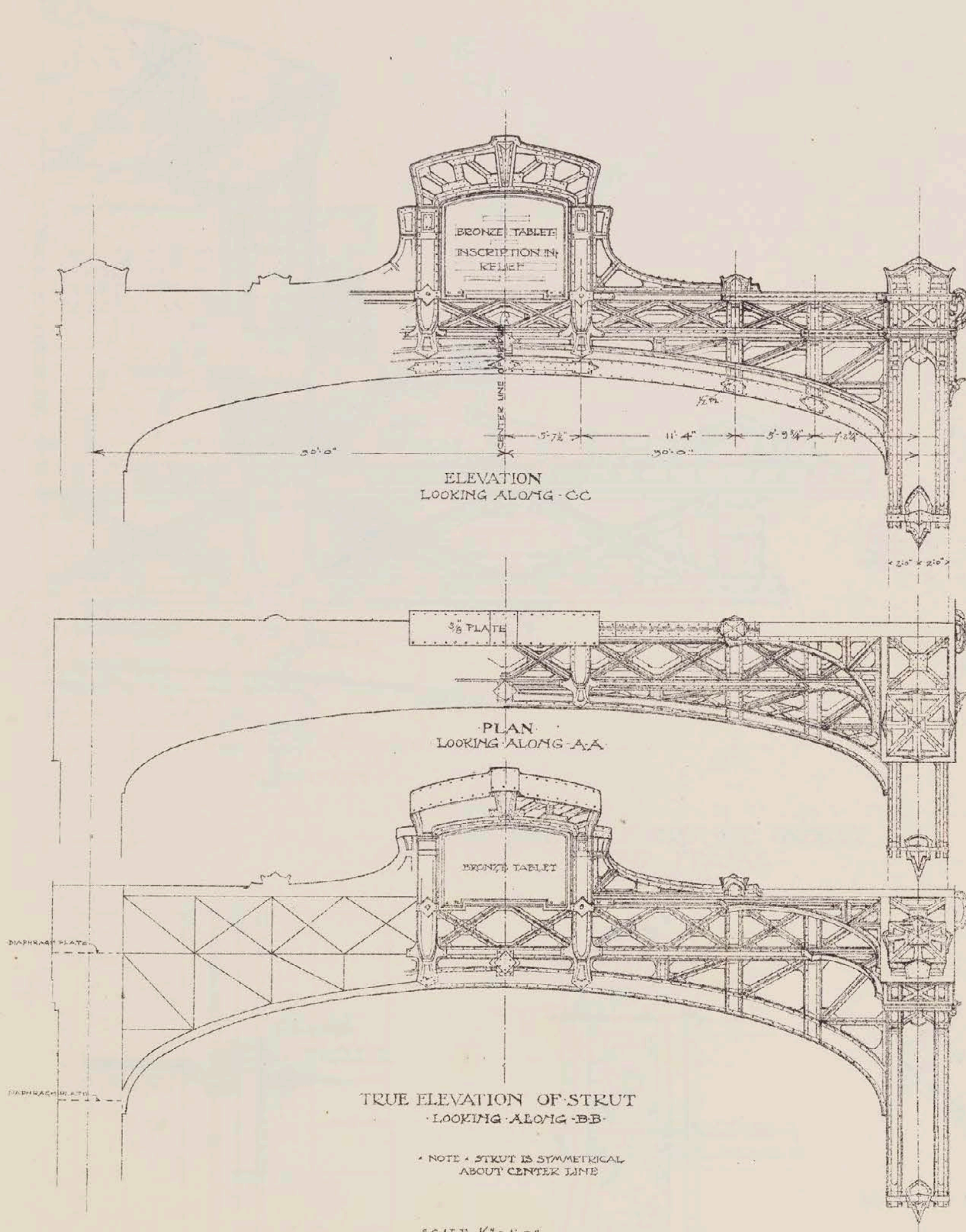
G. Lindenthal Commissioner of Bridges.

BLACKWELL'S ISLAND BRIDGE (No. 4)

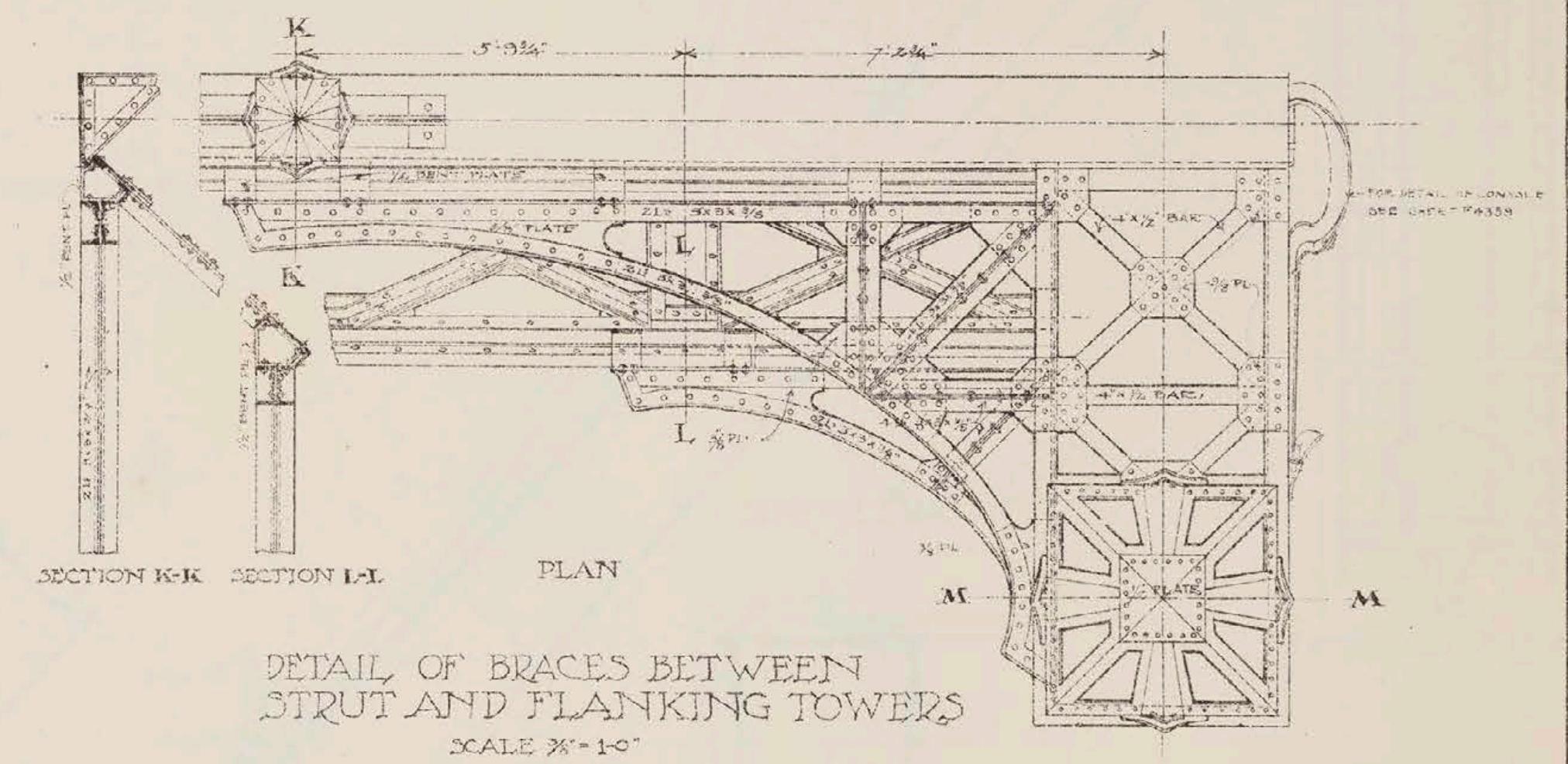
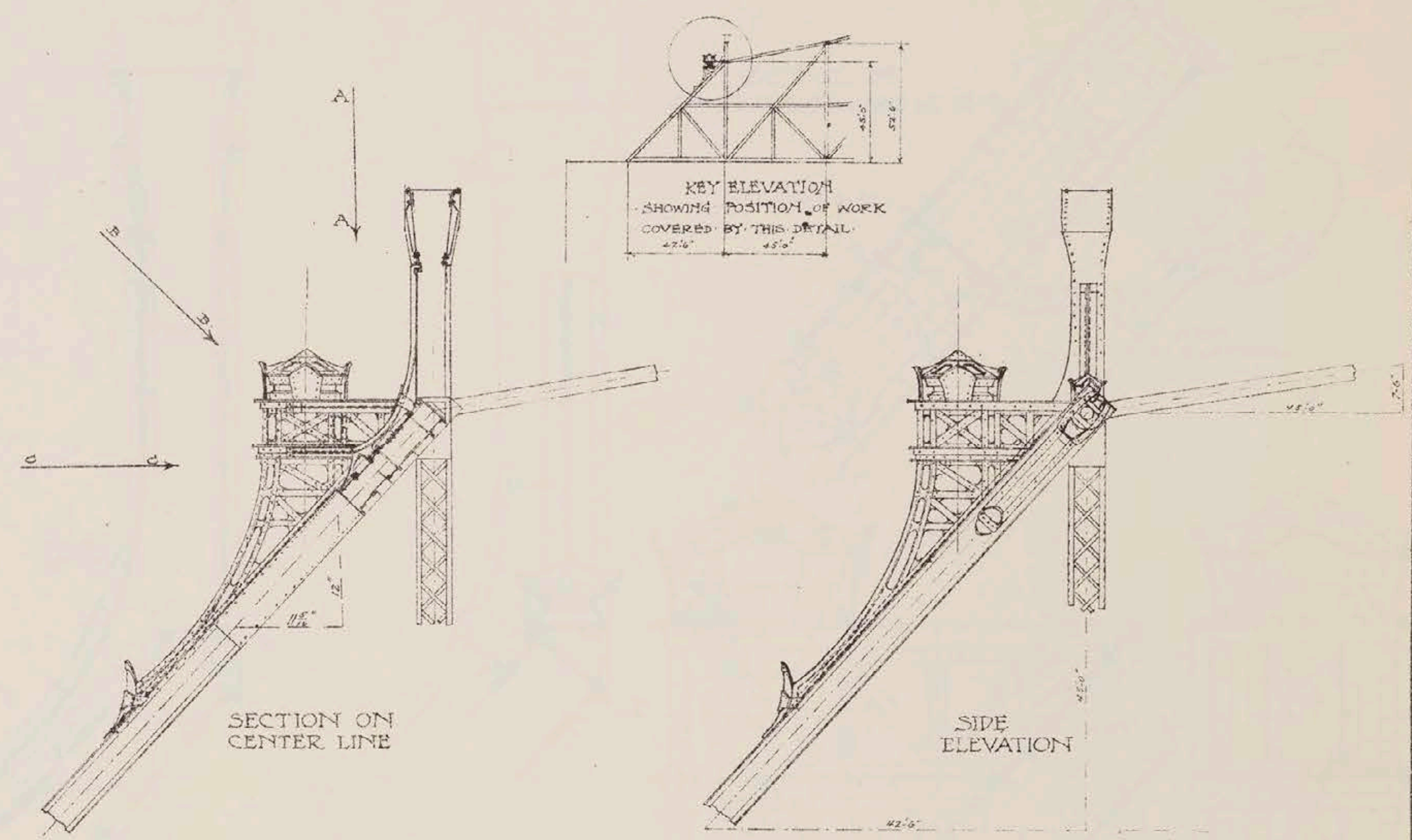
SECTION AND ELEVATION AT
PIERS

4357

4357

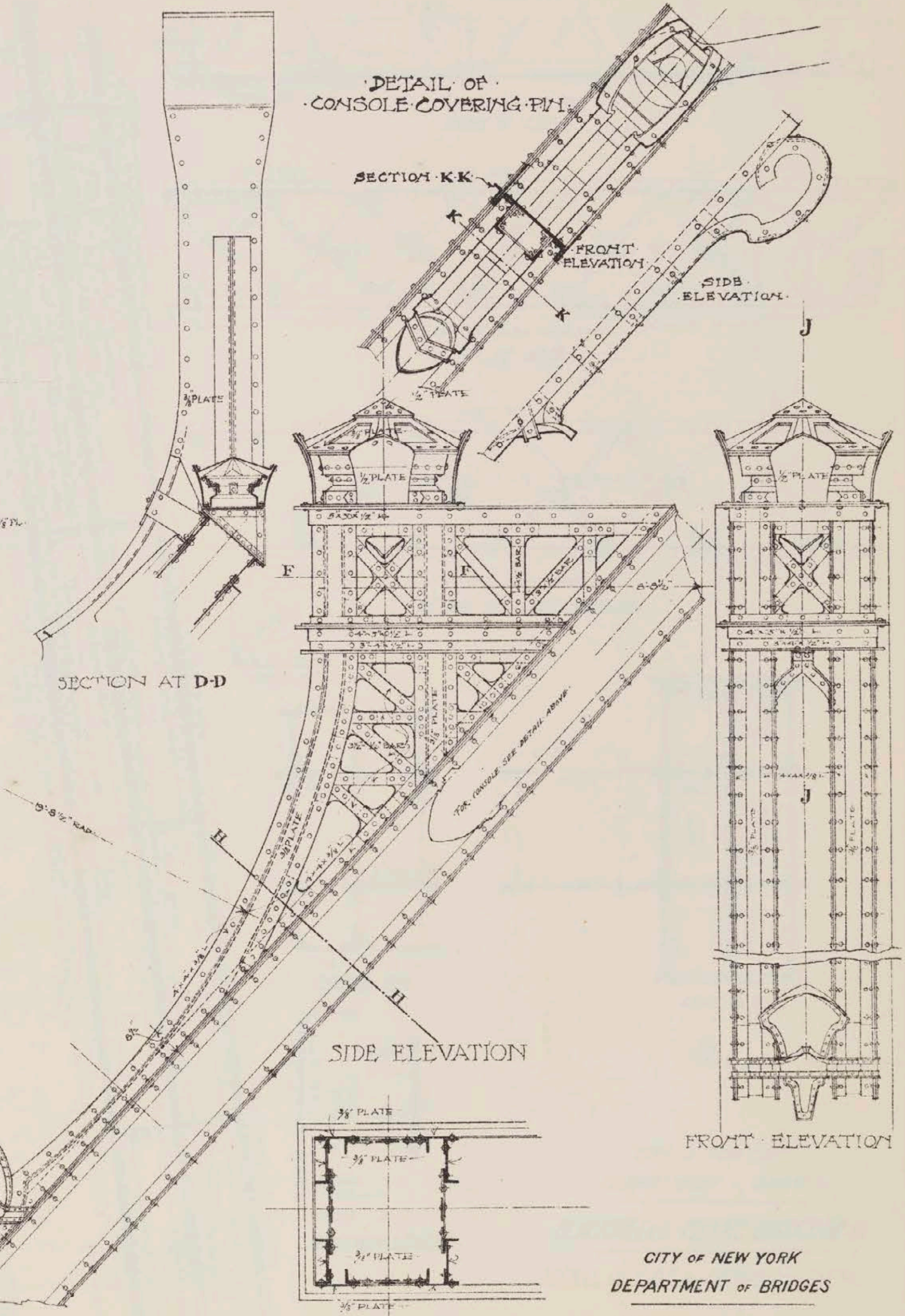
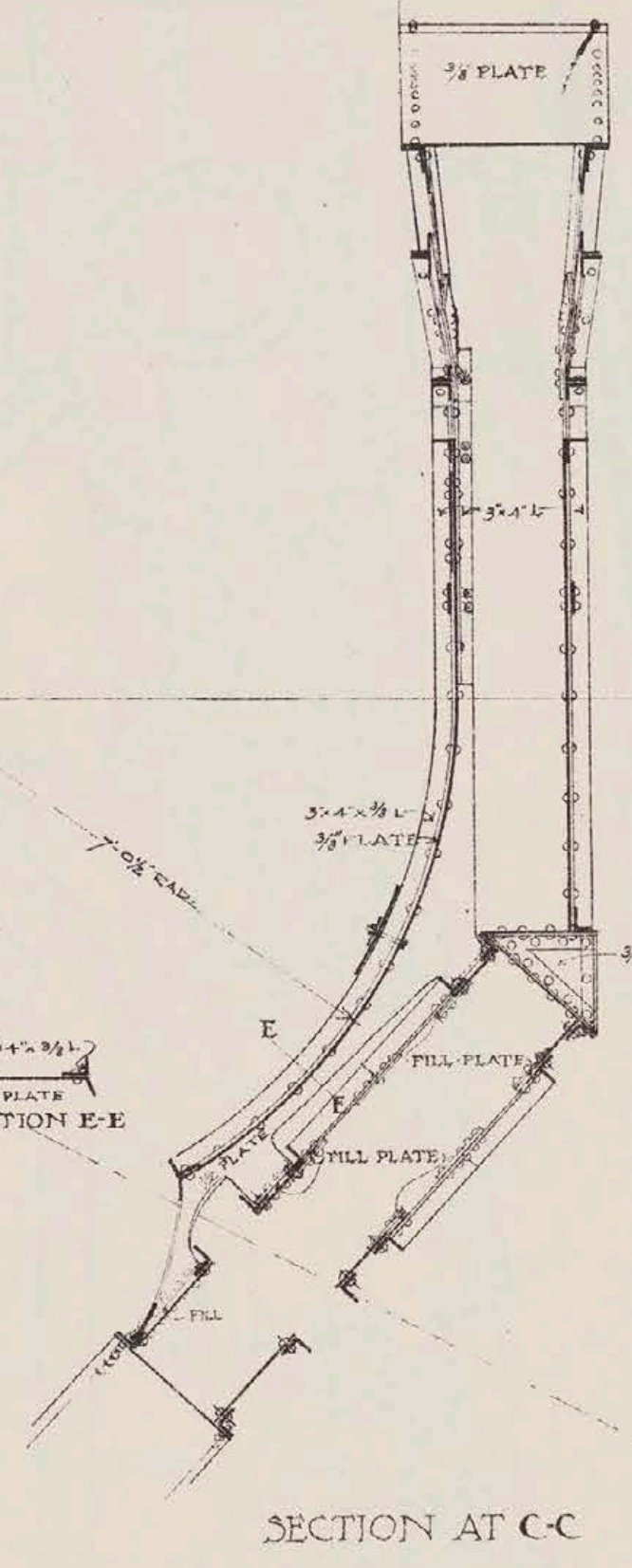
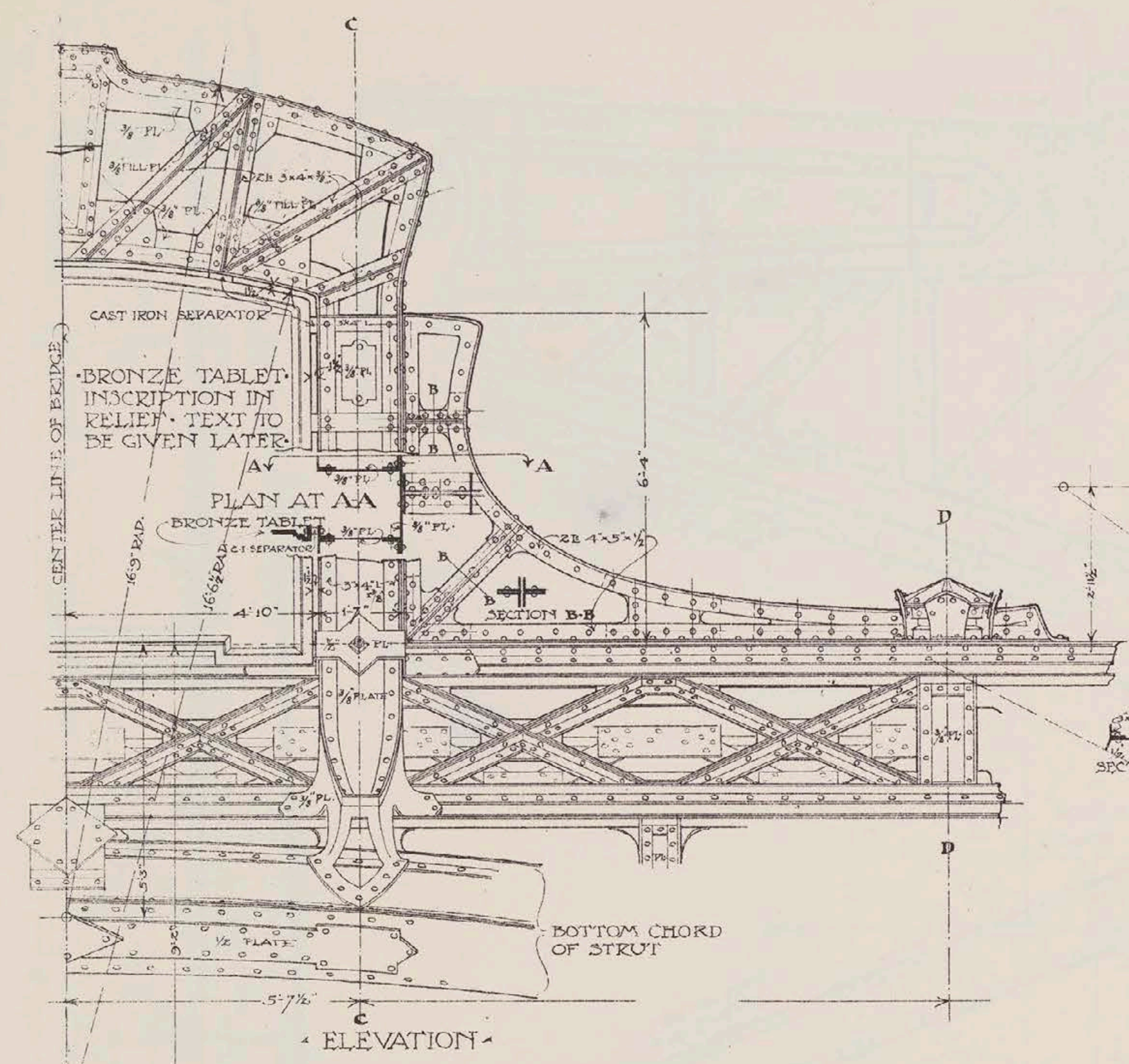


SCALE $\frac{1}{8}" = 1'-0"$
 Material: Structural Steel except where noted

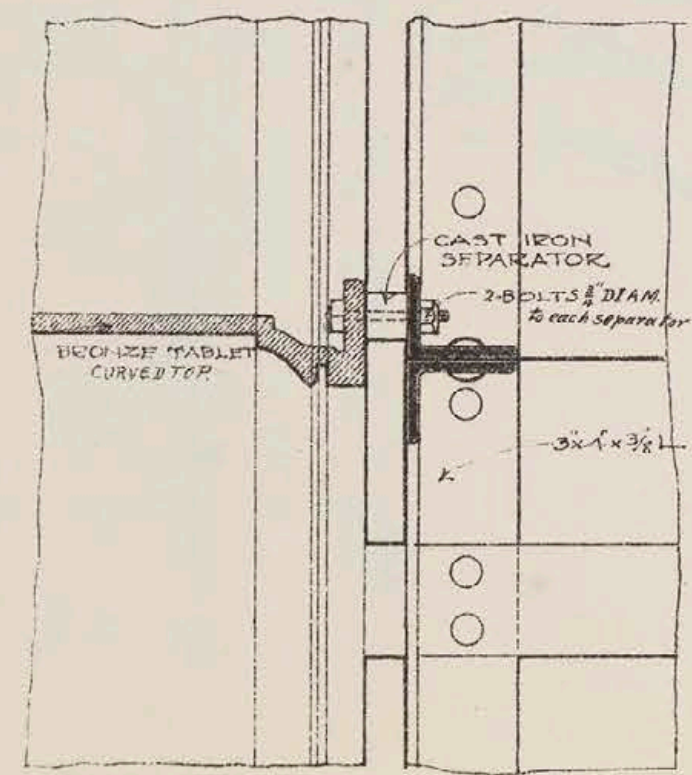


Approved August 1, 1903
 G. Lindenthal, Commissioner of Bridges.

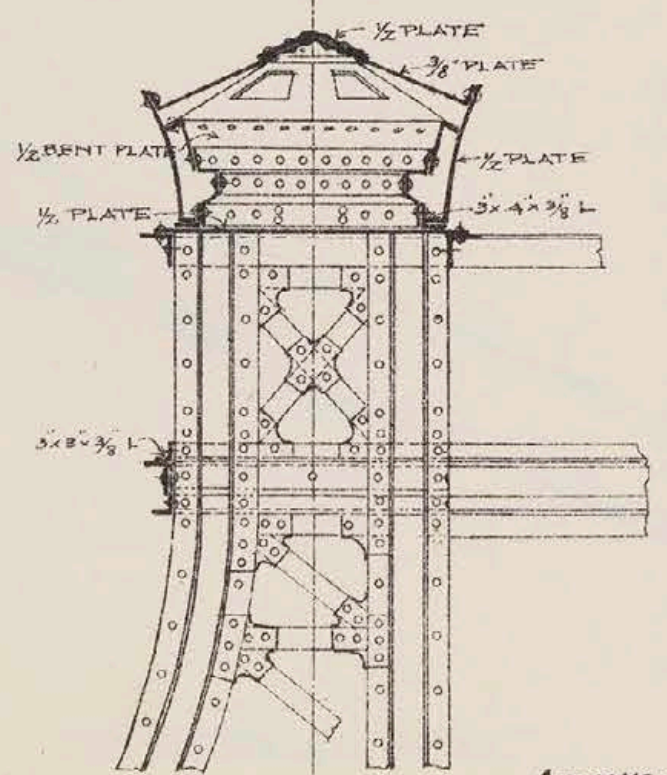
CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (N^o 4)
 PORTAL STRUT



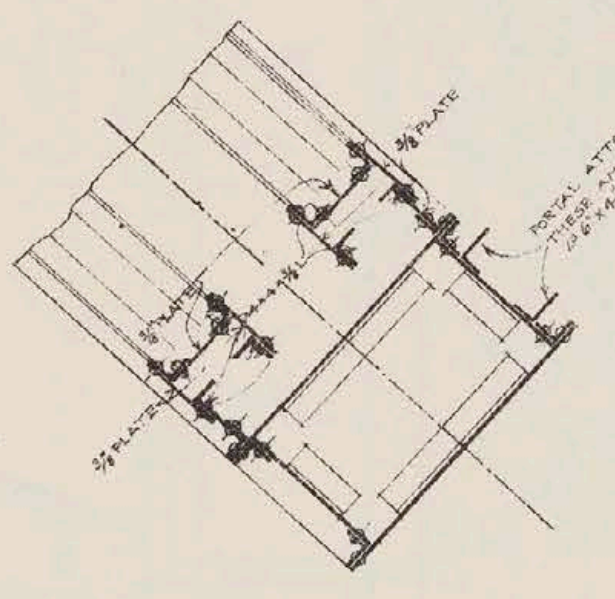
DETAIL OF BRONZE TABLET AND FRAME
SCALE 3/8" = 1'-0"



DETAIL OF BRONZE TABLET AND CONNECTIONS
SCALE 1 1/2" = 1'-0"



SECTION AT J-J



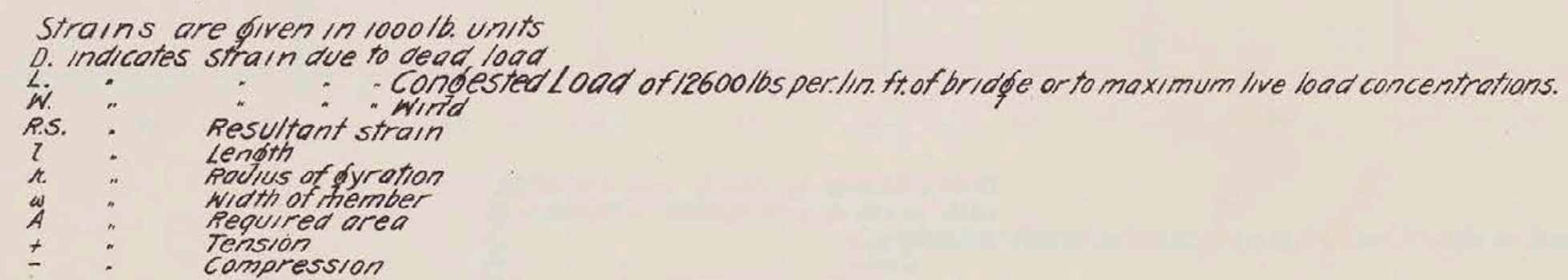
SECTION AT H-H

DETAIL OF FLANKING TOWERS
SCALE 3/8" = 1'-0"

Approved August 1, 1903
G. L. H. Commissioner of Bridges

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (N^o 4)
PORTAL STRUT

Material: Structural Steel except where noted



In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Nickel Steel Eye Bars & Pins	9 000 000	lbs.
Structural " " " "	6 390 000	"
Riveted Girders	23 024 000	"
Towers, Chords, Columns & Struts	41 777 000	"
Roller I's and E's	1 030 000	"
Buckled Plates	4 650 000	"
<u>Total</u>	<u>85 931 000</u>	"

CITY OF NEW YORK
DEPARTMENT OF BRIDGES

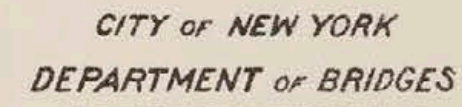
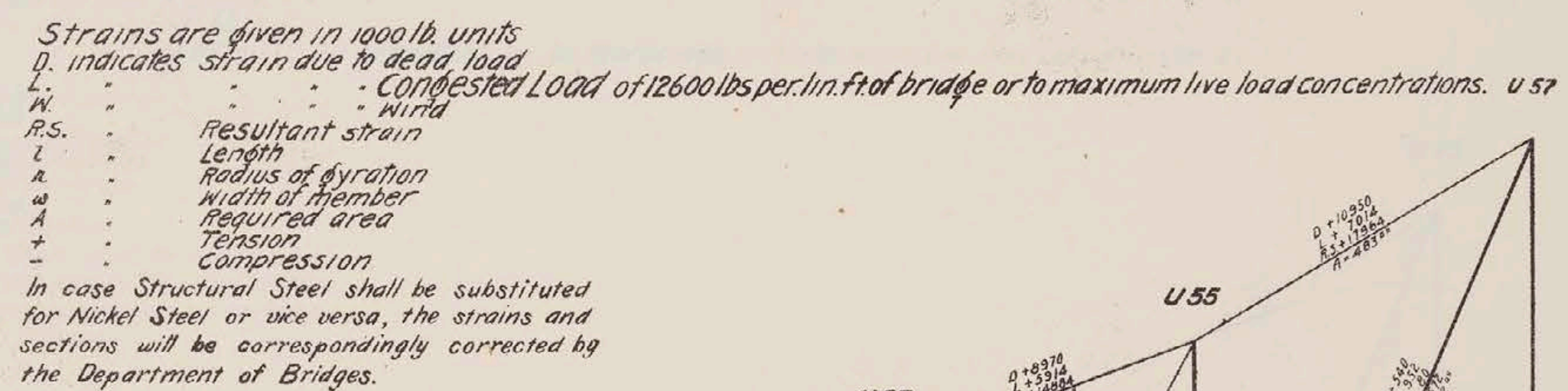
BLACKWELL'S ISLAND BRIDGE (Nº4)

STRAIN AND SECTION SHEET

MANHATTAN ANCHOR ARM

SCALE : 1"=40'

4457

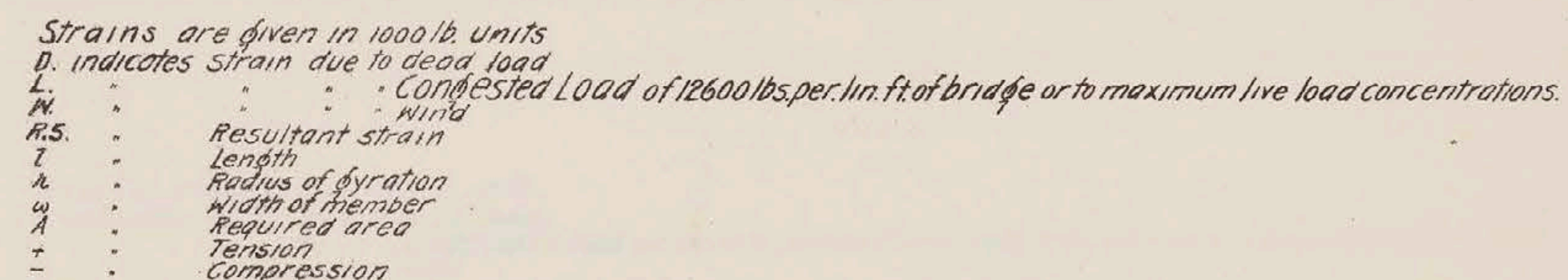


BLACKWELL'S ISLAND BRIDGE (Nº 4)
STRAIN^{no} SECTION SHEET

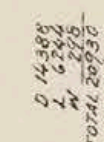
ISLAND CANTILEVER ARM - WEST.

SCALE: 1"=40'

4459



In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.

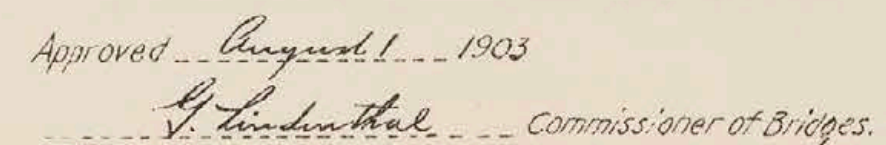


4460

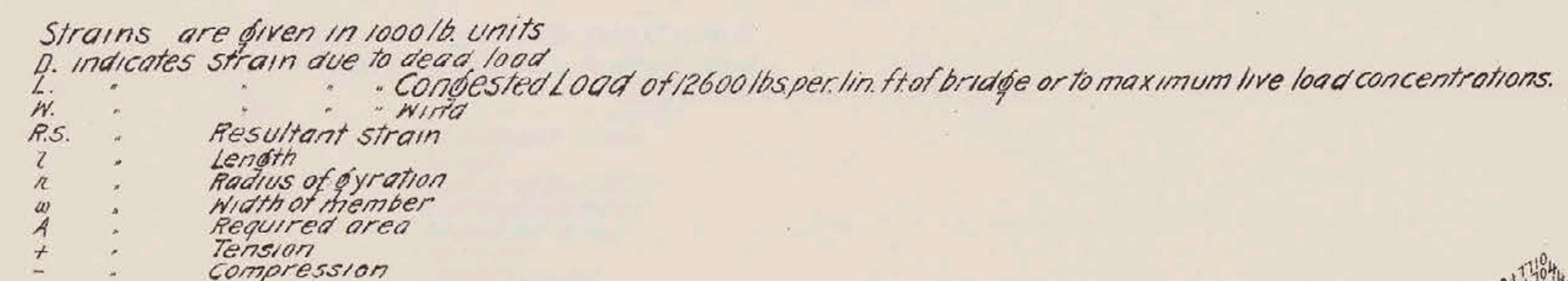
Approved August 1 1903
G. Sundenthal Commissioner of Bridges.



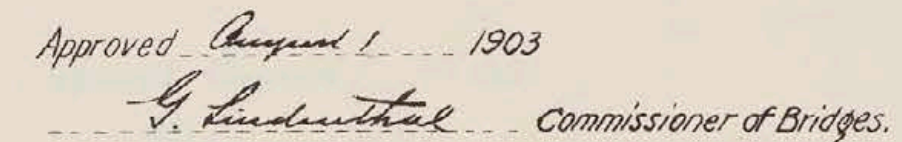
In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



4461



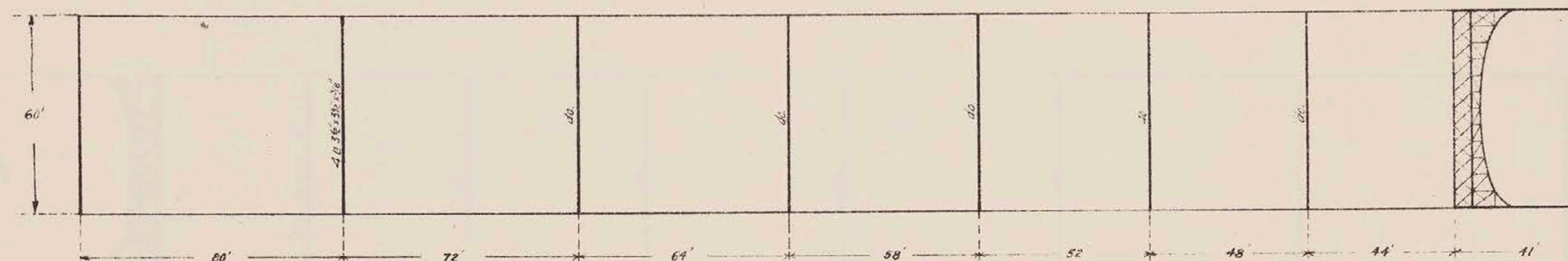
In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BLACKWELL'S ISLAND BRIDGE (N^o 4)
STRAIN AND SECTION SHEET
QUEENS CANTILEVER ARM

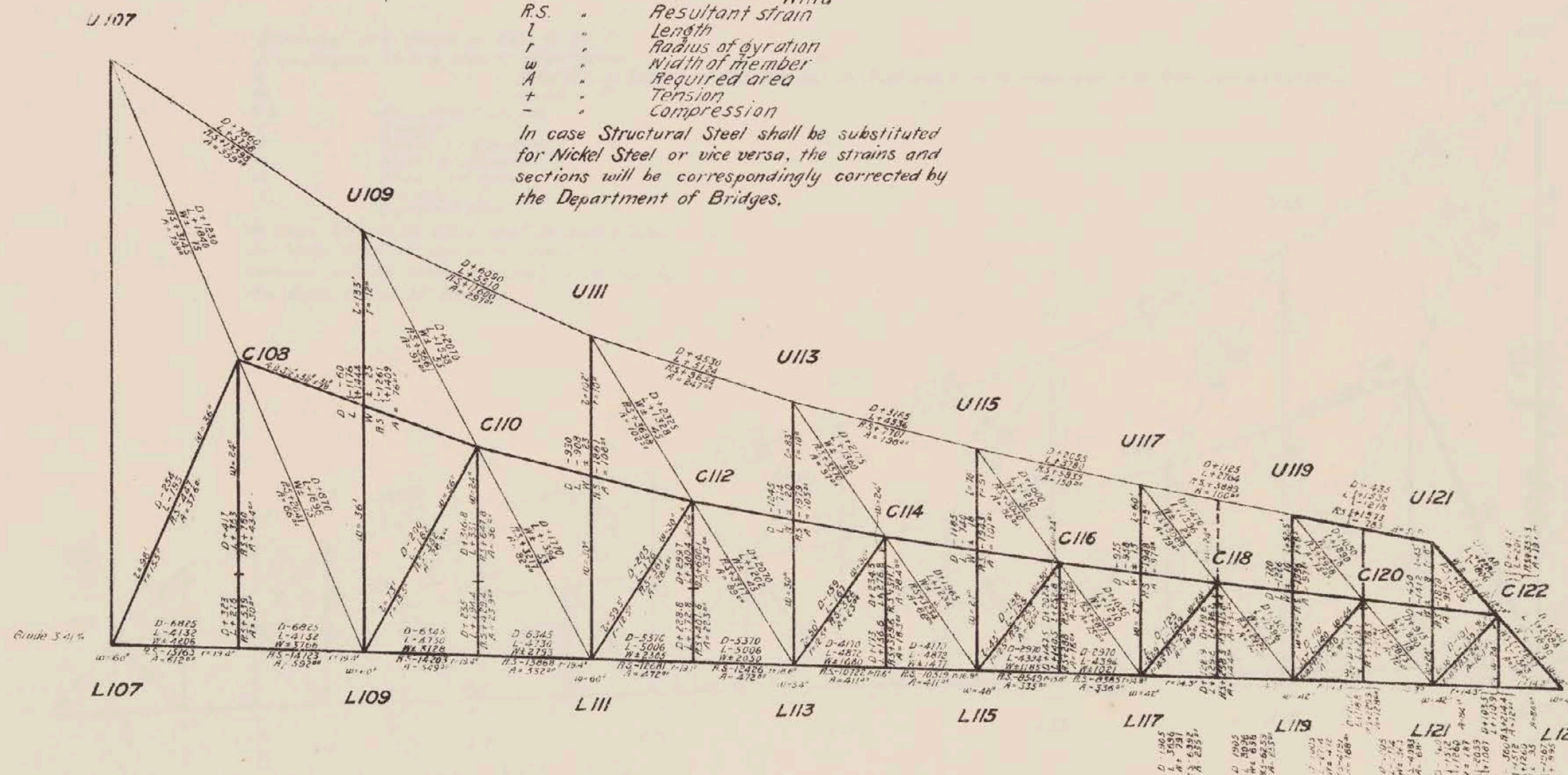
SCALE 1"=40'

4462



Strains are given in 1000 lb. units
 D. indicates strain due to dead load
 L. " " " " Congested Load of 12600 lbs. per lin ft of bridge or to maximum live load concentrations.
 W. " " " " Wind
 R.S. " Resultant strain
 L. " Length
 r. " Radius of gyration
 w. " Width of member
 A. " Required area
 + " Tension
 - " Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Anchorages connection to how do it making the position of floor cross adjustable in height to the extent of 18" total

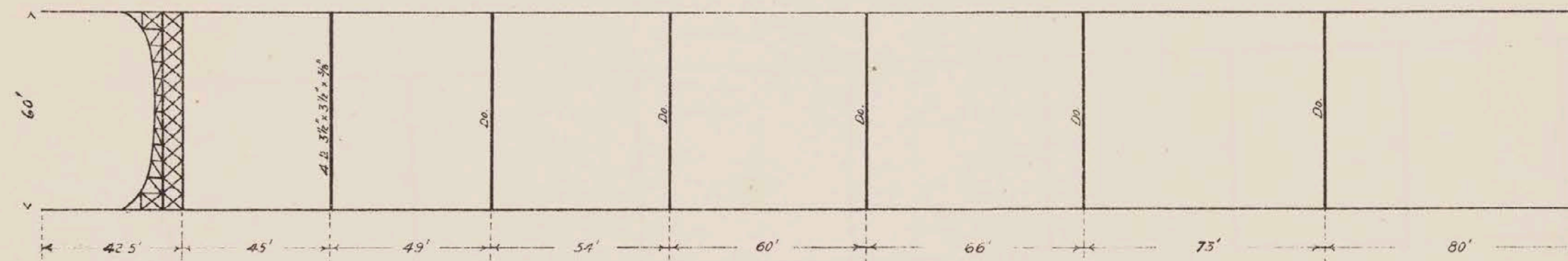
Latent Wind Pressure = 50C

Approved August 1, 1903
 G. Lindenthal Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)
 STRAIN AND SECTION SHEET
 QUEENS ANCHOR ARM

SCALE 40'

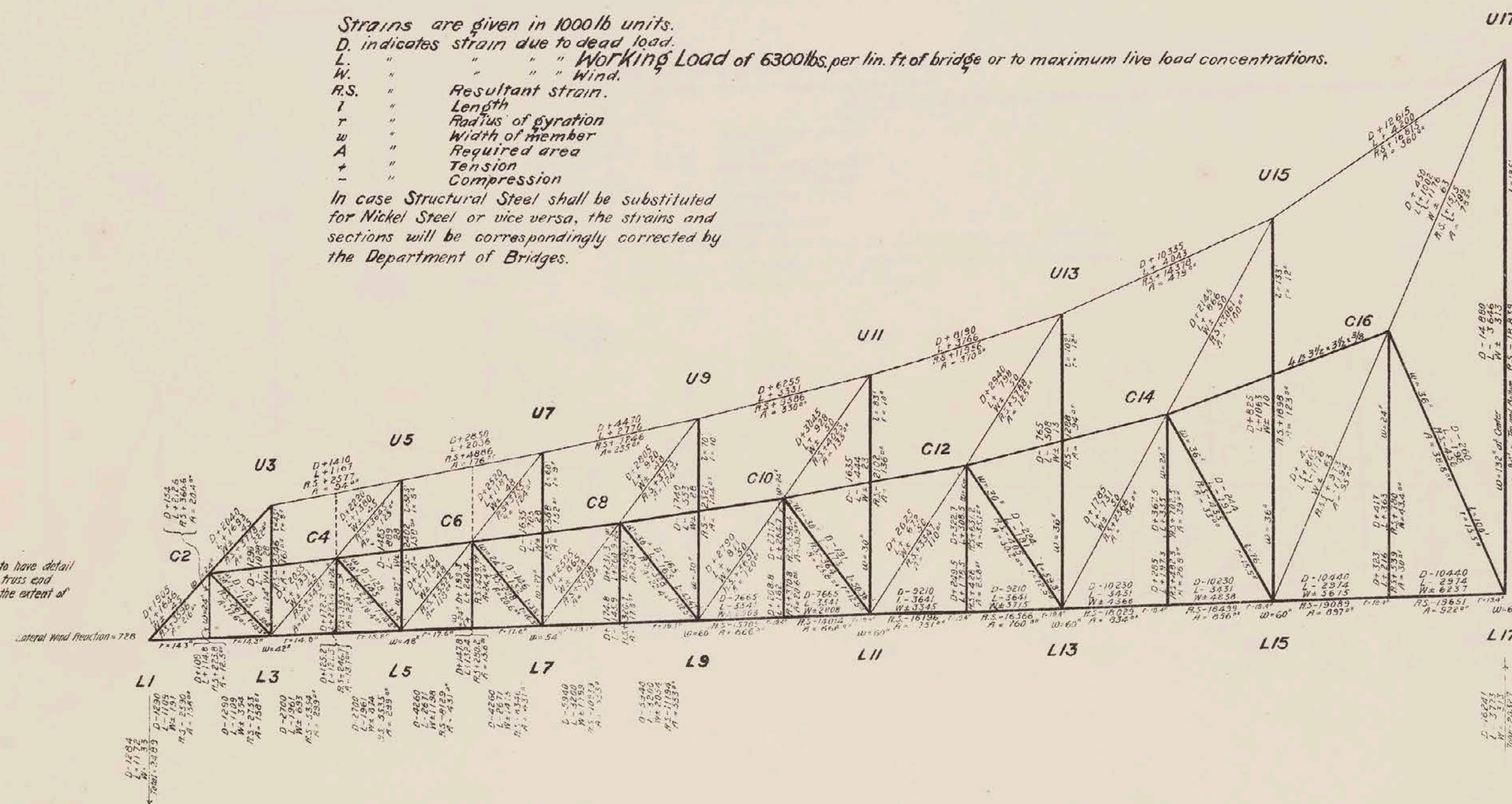
4463



Strains are given in 1000 lb units.
 D. indicates strain due to dead load.
 W. " " " " " Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.
 R.S. " " " " " Resultant strain.
 L. " " " " " Length
 r " " " " " Radius of gyration
 w " " " " " Width of member
 A " " " " " Required area
 T " " " " " Tension
 C " " " " " Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.

Anchor connection to have detail making the position of truss end adjustable in height to the extent of 10" total.



ESTIMATED QUANTITIES-SUPERSTRUCTURE

Nickel Steel Eye Bars & Pins	3 000 000 lbs.
Structural " " "	6 390 000 "
Riveted Girders	23 024 000 "
Towers, Chords, Columns & Struts	41 777 000 "
Roller Is and Is	0 90 000 "
Buckled Plates	4 650 000 "
Total	85 931 000 "

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

BLACKWELLS ISLAND BRIDGE (N°4)

STRAIN SECTION SHEET

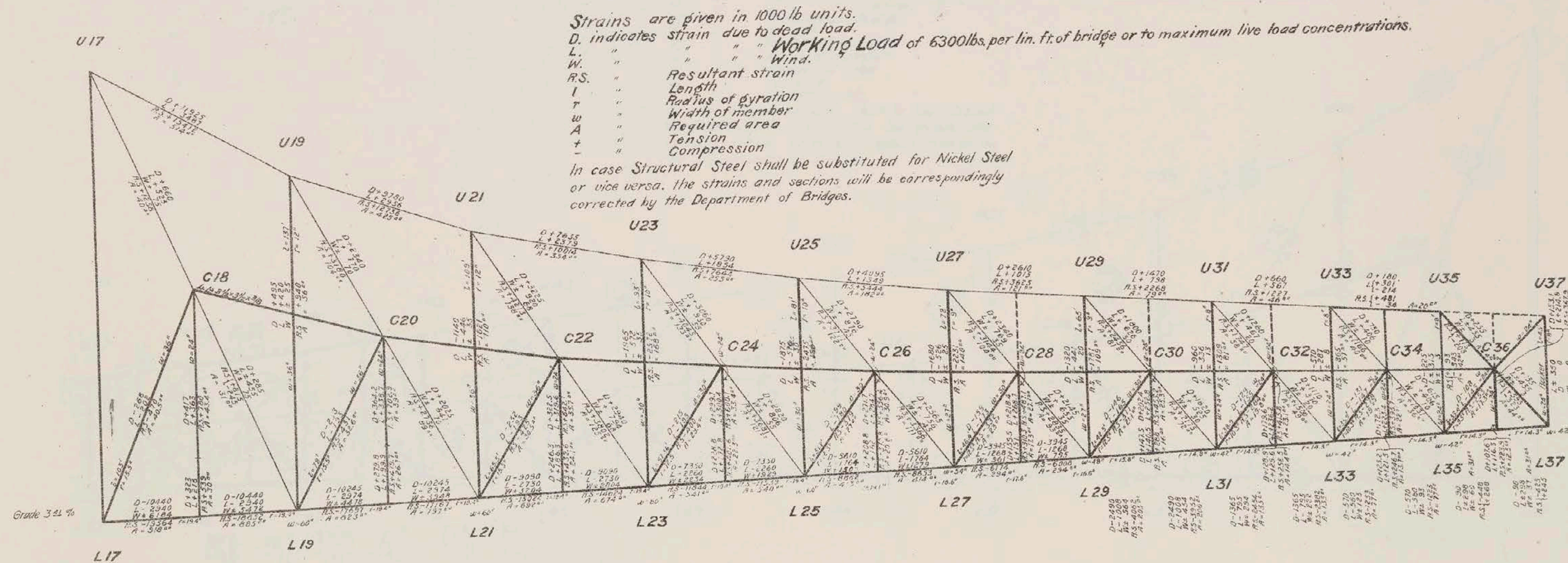
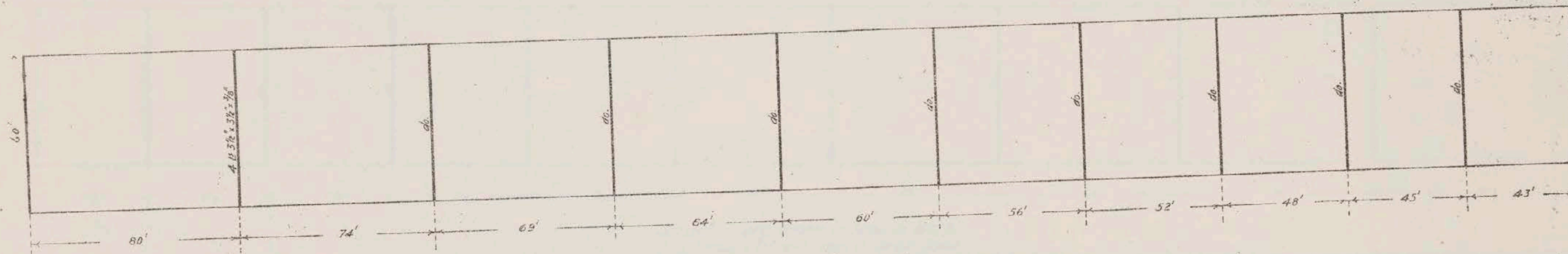
MANHATTAN ANCHOR ARM

SCALE: 1"=40'

4464

Approved August 1, 1903

J. Henderson Commissioner of Bridges.



Anchor subject to alternate tension and compression to have a detail making its length adjustable to the extent of 2" total.

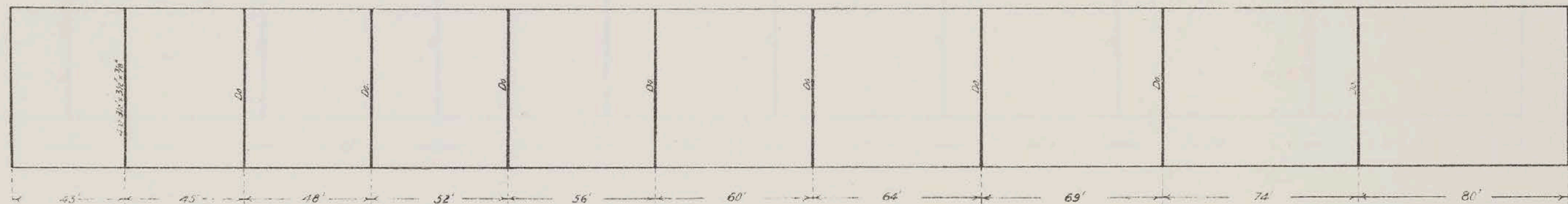
Approved August 1, 1903
 J. J. Johnston Commissioner of Bridges

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (Nº 4)
 STRAIN SECTION SHEET
 MANHATTAN CANTILEVER ARM

SCALE: 1"=40'

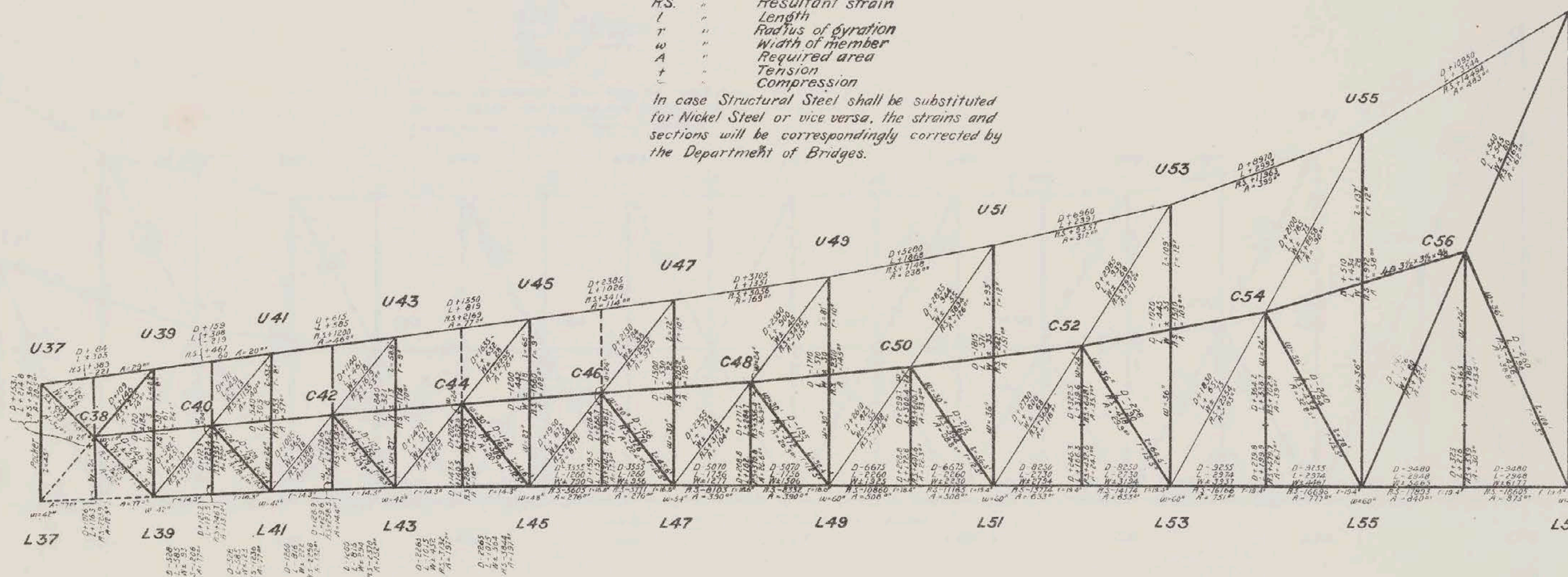
4465

E. G. Soltmann, 125 E. 32d St., New York, N. Y.



Strains are given in 1000 lb units.
 D indicates strain due to dead load.
 L " " " " " Working Load of 6300 lbs per lin ft of bridge or to maximum live load concentrations. U 57
 W " " " " " Wind.
 R.S. Resultant strain
 l Length
 r Radius of gyration
 w Width of member
 A Required area
 + Tension
 - Compression

In case Structural Steel shall be substituted
 for Nickel Steel or vice versa, the strains and
 sections will be correspondingly corrected by
 the Department of Bridges.

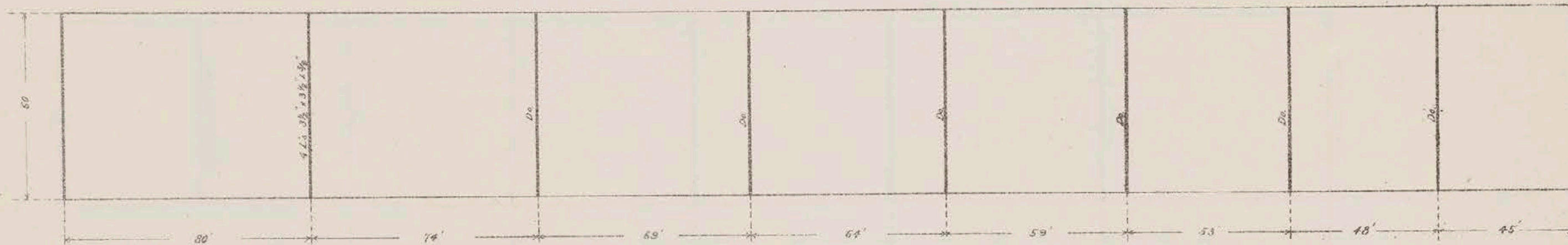


Approved August 1, 1903
 G. Lindenthal Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (N°4)
 STRAIN SECTION SHEET
 ISLAND CANTILEVER ARM - WEST.

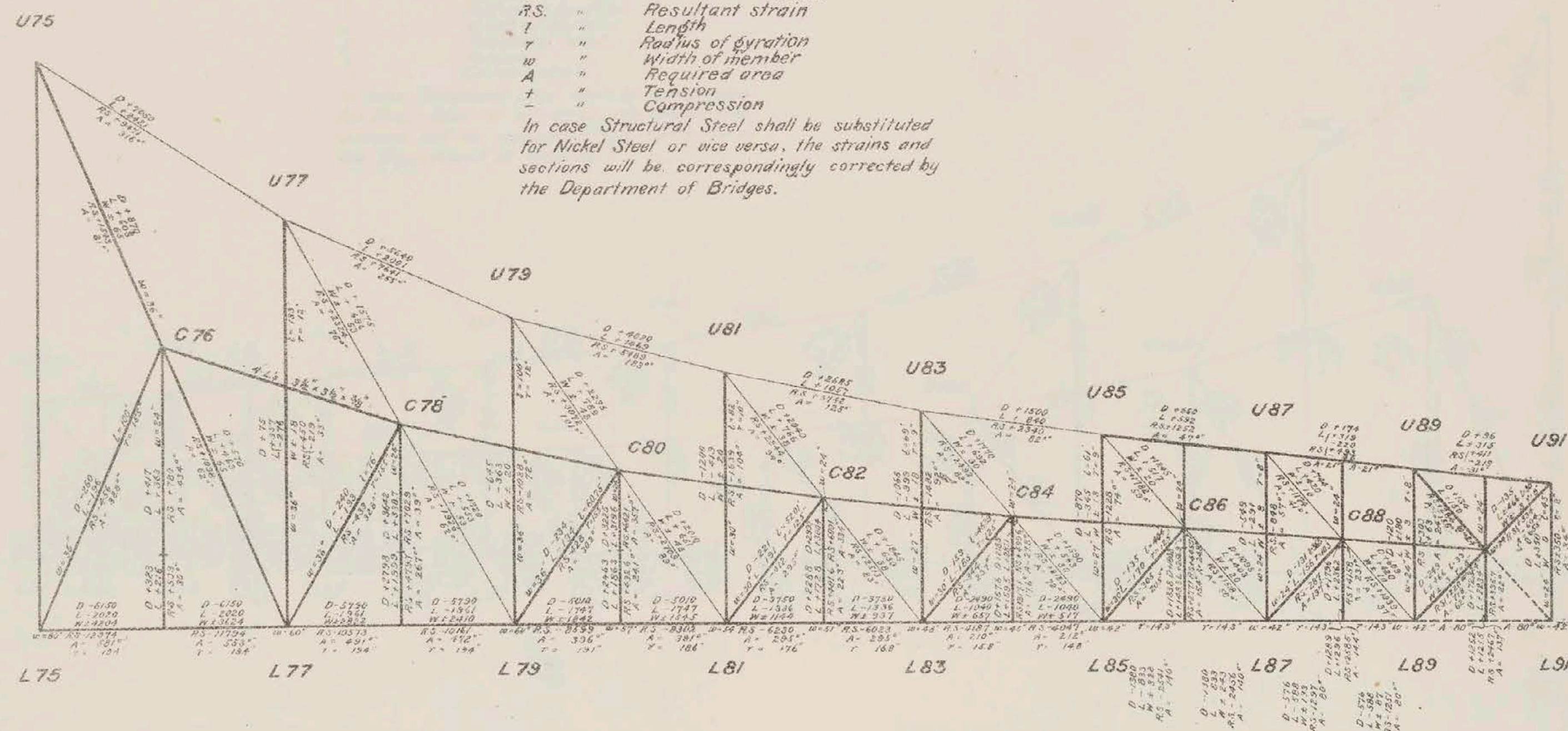
SCALE: 1" = 40'

4466



Strains are given in 1000 lb units.
 D. indicates strain due to dead load.
 L. " " " " Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.
 W. " " " " Wind.
 R.S. " Resultant strain
 l. " Length
 r. " Radius of gyration
 w. " Width of member
 A. " Required area
 + " Tension
 - " Compression

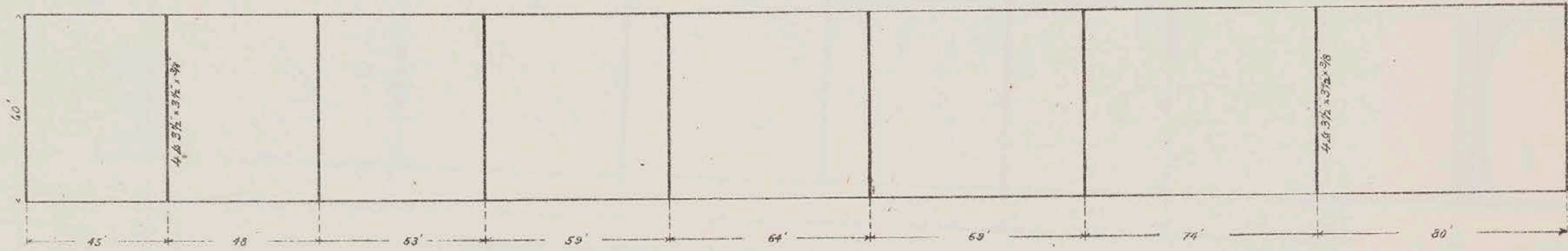
In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Approved *Amey* 1903
S. L. Smith Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
 BLACKWELL'S ISLAND BRIDGE (No. 4)
 STRAIN SECTION SHEET
 ISLAND CANTILEVER ARM - EAST

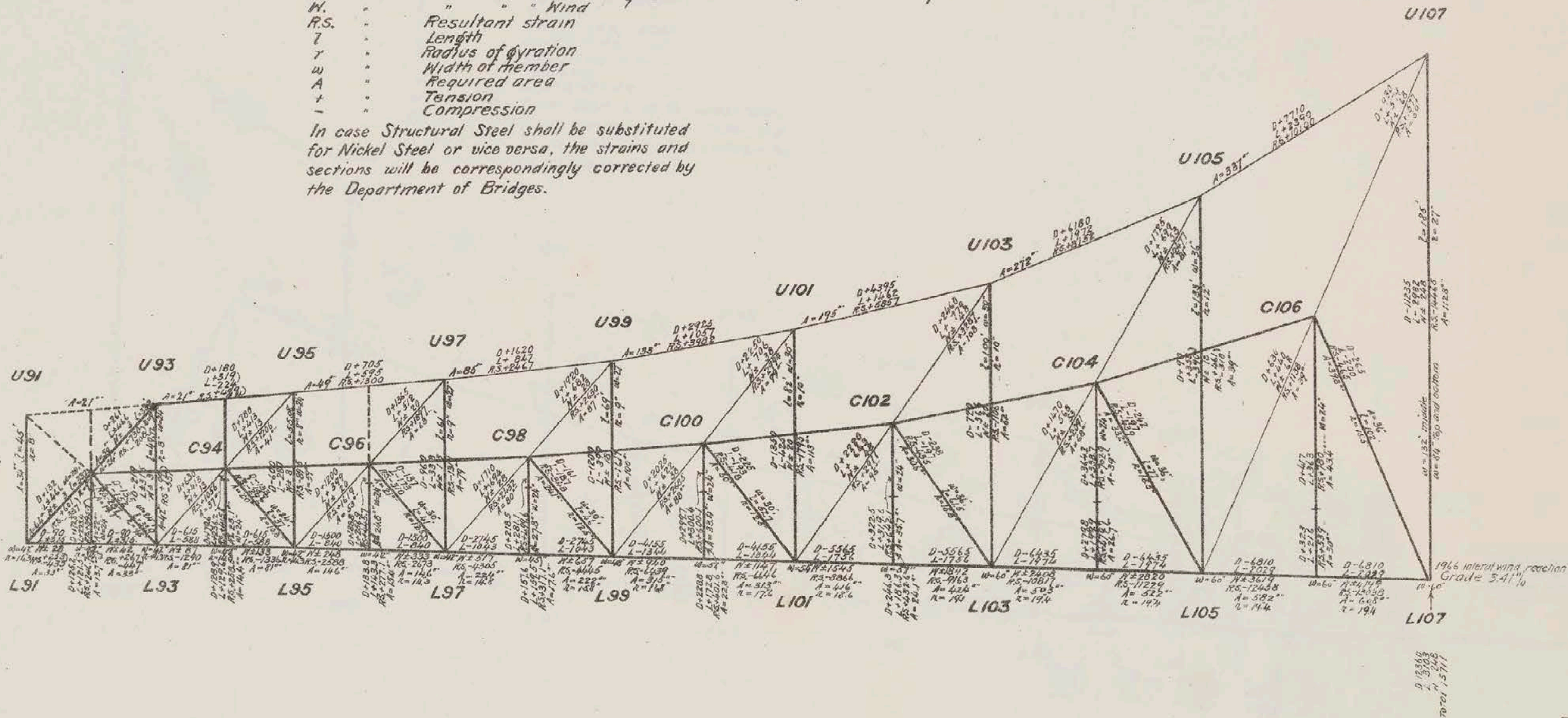
SCALE: 1" = 40' 4468



Strains are given in 1000 lb. units.
 D. indicates strain due to dead load.
 L. " " " " Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.
 W. " " " " Wind
 R.S. " Resultant strain
 L. " Length
 r " Radius of gyration
 w " Width of member
 A " Required area
 + " Tension
 - " Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.

Rockers, subject to alternate tension and compression, to have a detail making its length adjustable to the extent of 2" total.



Approved August 1 1903

J. Lind. Thal Commissioner of Bridges.

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

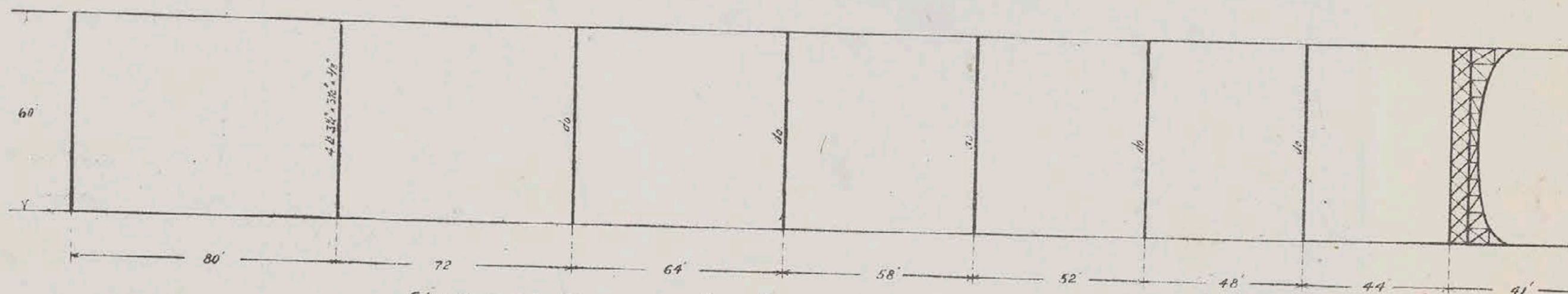
BLACKWELL'S ISLAND BRIDGE (Nº 4)

STRAIN AND SECTION SHEET

QUEENS CANTILEVER ARM

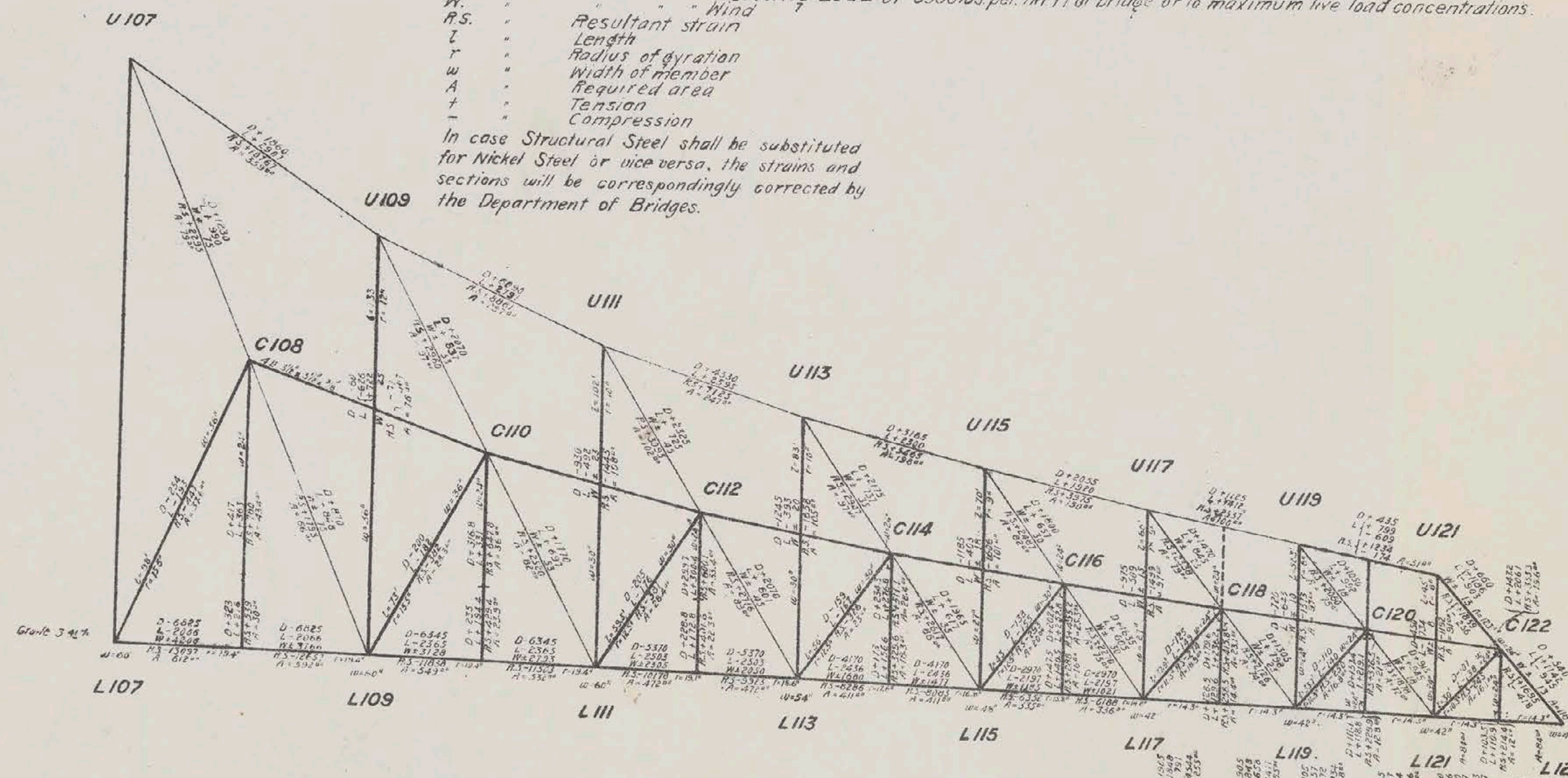
SCALE: 1"=40'

4469



Strains are given in 1000 lb. units.
 D. indicates strain due to dead load.
 W. " " " " Working Load of 6300 lbs. per lin. ft. of bridge or to maximum live load concentrations.
 R.S. " " Resultant strain
 L. " " Length
 r " " Radius of gyration
 w " " Width of member
 A " " Required area
 + " " Tension
 - " " Compression

In case Structural Steel shall be substituted for Nickel Steel or vice versa, the strains and sections will be correspondingly corrected by the Department of Bridges.



Anchorage connection to have detail making the position of truss end adjustable in height to the extent of 10' total.

Lateron Wind Reaction - 506

Approved August 1 1903

L. Lunderthal Commissioner of Bridges

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES

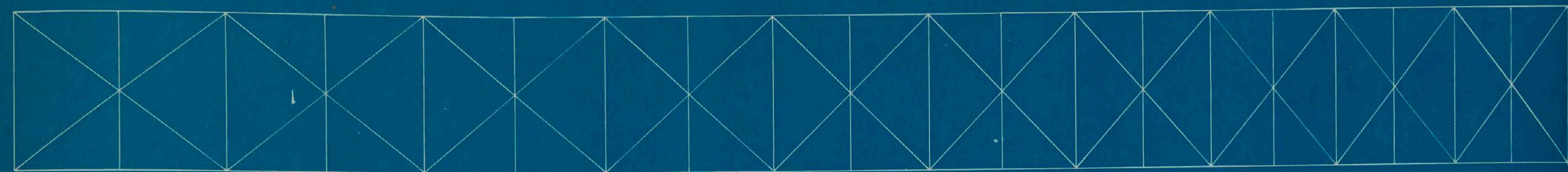
BLACKWELL'S ISLAND BRIDGE (No. 4)

STRAIN AND SECTION SHEET

QUEENS ANCHOR ARM

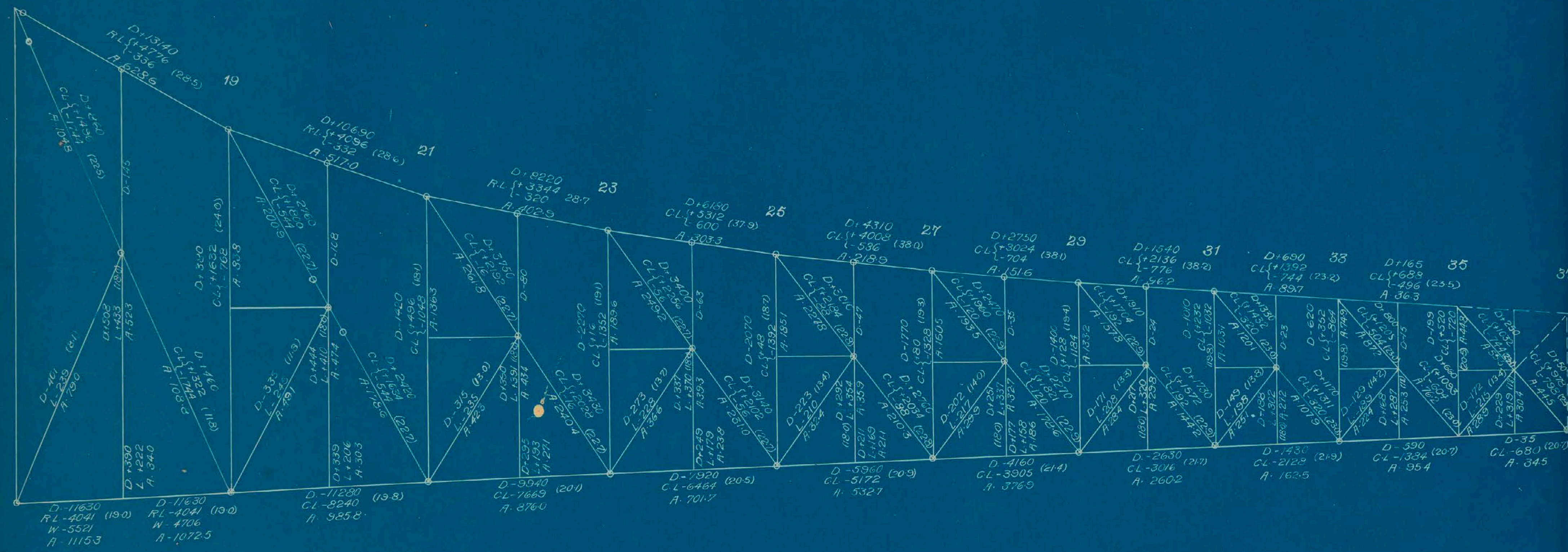
SCALE: 1"=40'

4470

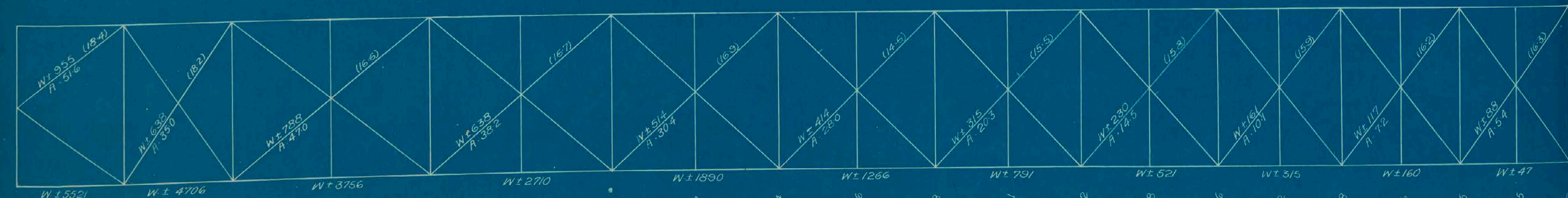


2333 2394 1917 1880 1669 1606 1502 1327 1182 1049 909 828 689 650 531 510 378 327 264 356 82

UPPER PANEL LOADS



Stresses are given in 1000 lb units.
D. indicates stress due to dead load.
R.L. " " " Working Load of 8000 p.l.ft.
C.L. " " " Congested " " 16000 "
W. " " " Wind.
L. " " " Max. Live Load Concentration.
A. " Required Area in sq. in.
Allowed unit stress shown in brackets.

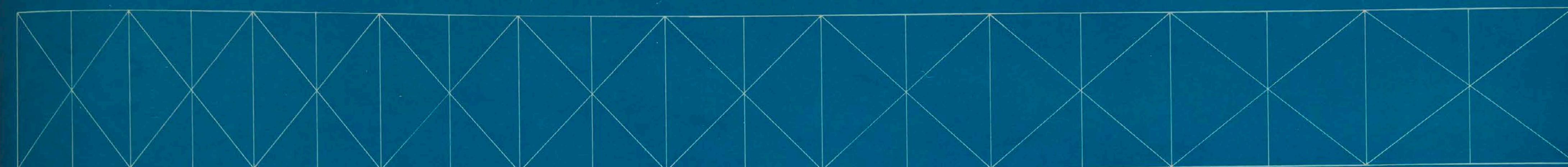


5120 4529 4384 4314 4529 3670 4241 3297 3674 2886 3158 2231 2712 2208 2336 1862 2028 1776 1945 2585 299

LOWER PANEL LOADS

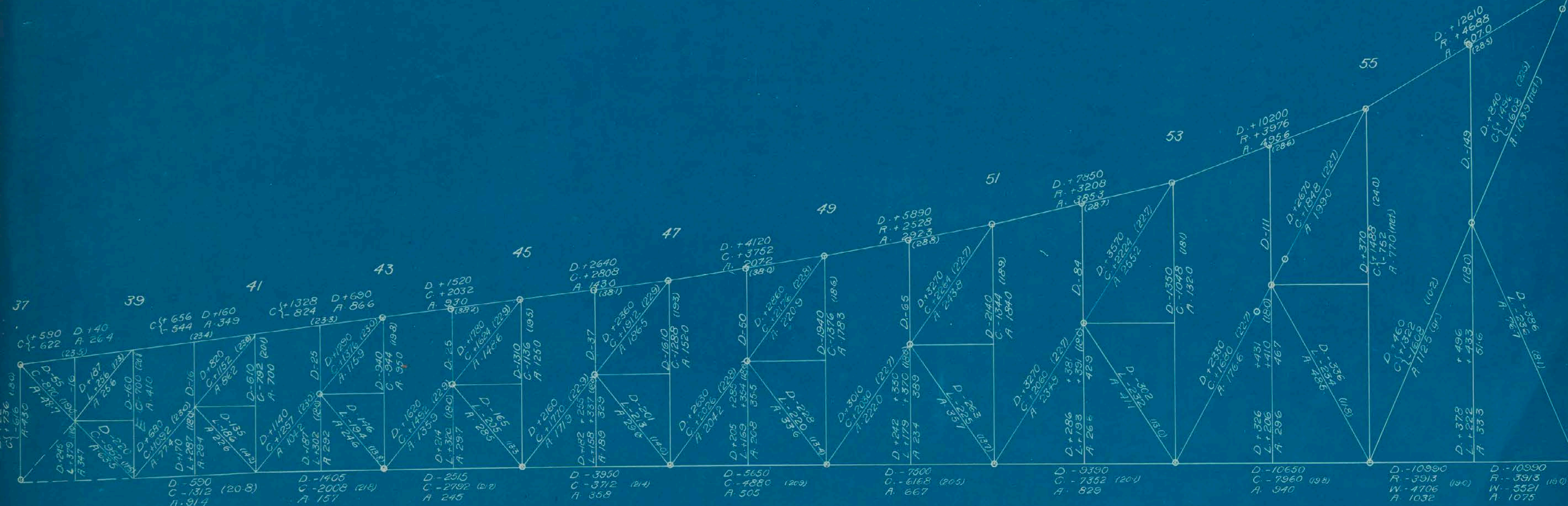
BLACKWELL'S ISLAND BRIDGE
STRESS AND SECTION SHEET
MANHATTAN CANTILEVER ARM

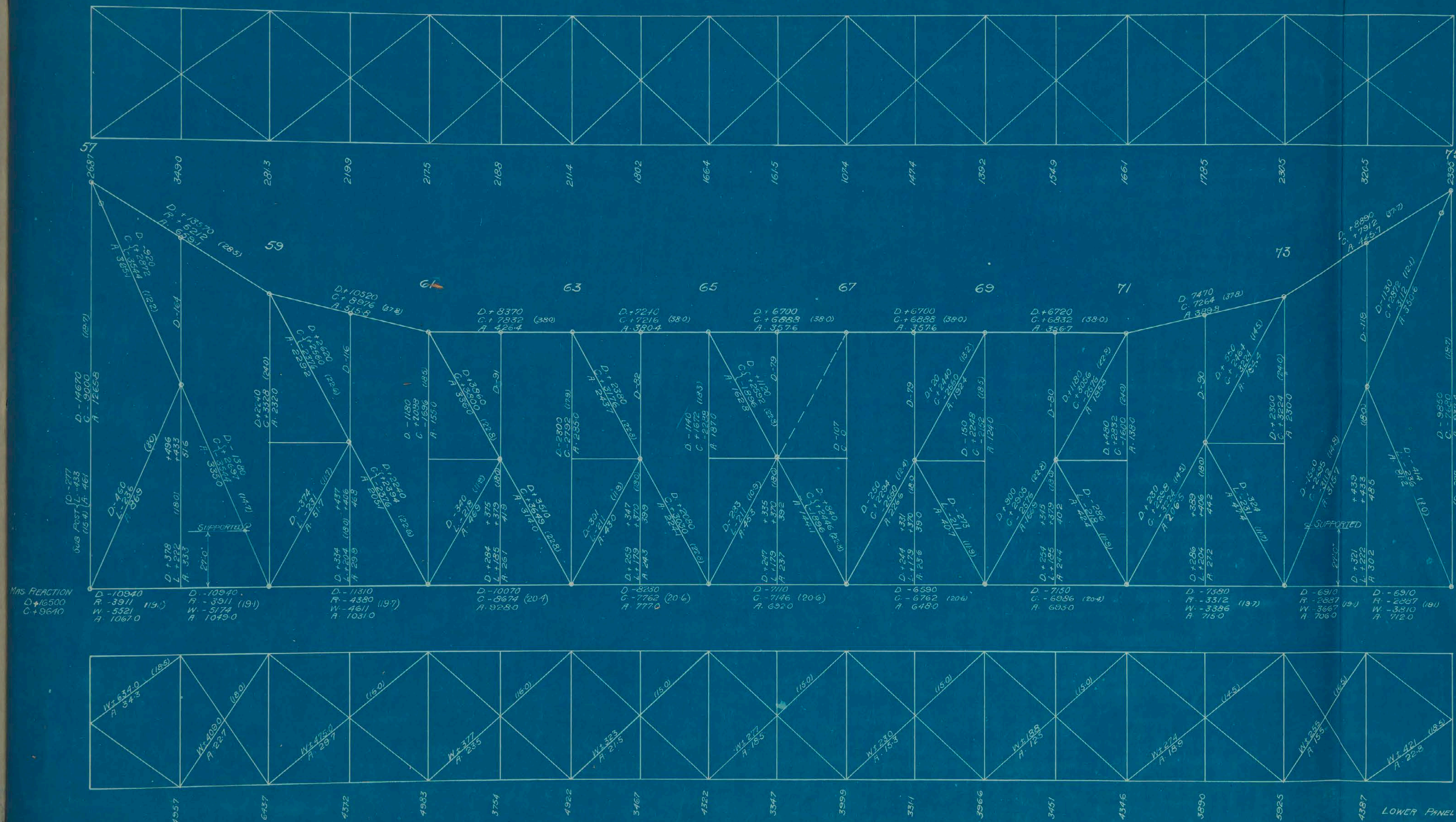
Scale 1" = 30'



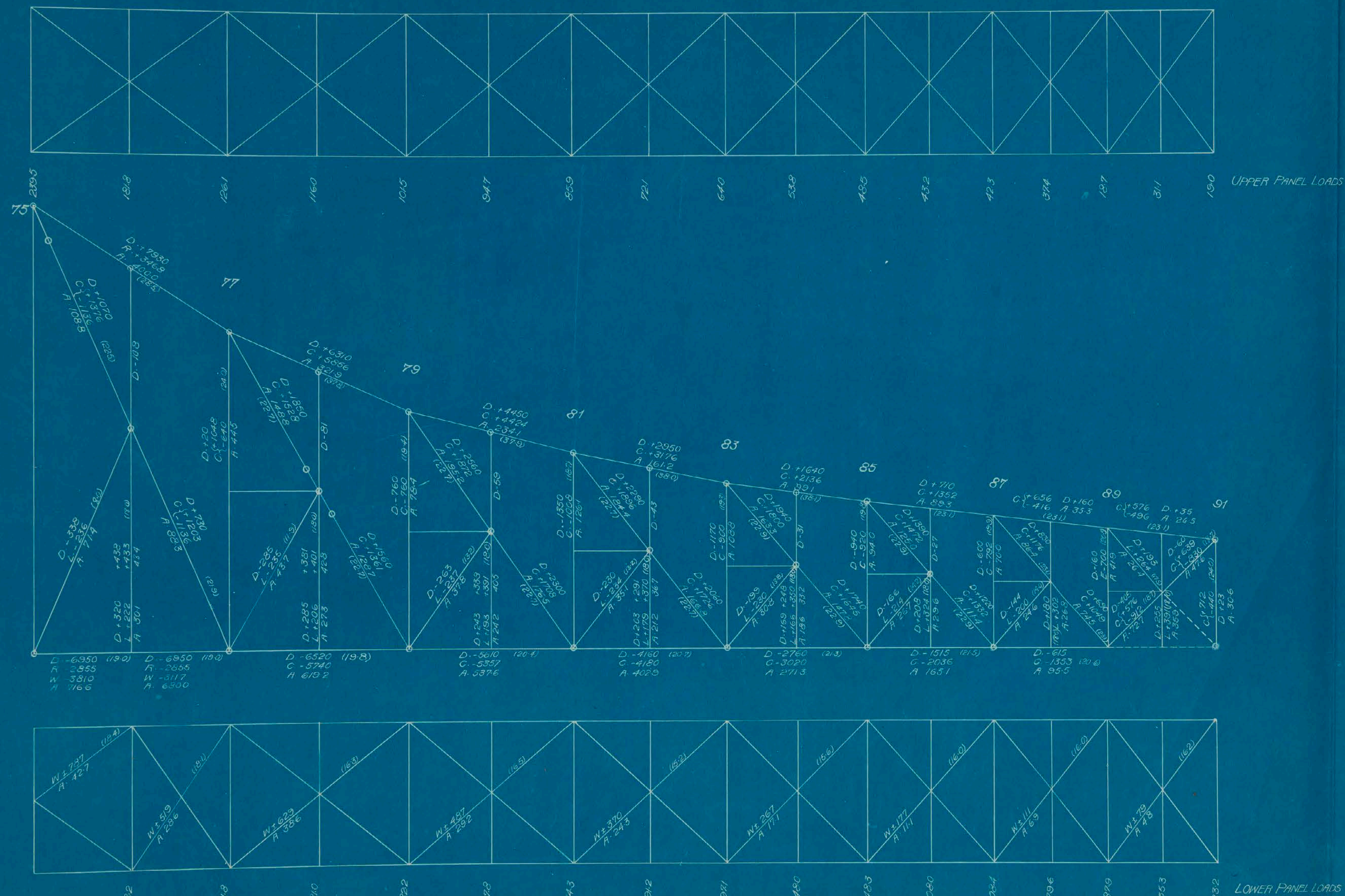
136 33.9 241 33.4 428 39.5 46.9 43.8 59.1 61.9 78.4 81.8 103.7 103.8 128.9 130.1 151.9 159.3 173.3 211.9 5268.7

UPPER PANEL LOADS





Stresses are given in 1000 lb. units.
 D. indicates stress due to dead load.
 W. " " " " Wind.
 R. " " " " Working Load of 8000 lb. per lin. ft.
 C. indicates stress due to Congested Load of 16000 lb. per lin. ft.
 L. indicates stress due to maximum live load concentration.
 A. indicates required area in sq. in.
 Allowed unit stress shown in brackets.

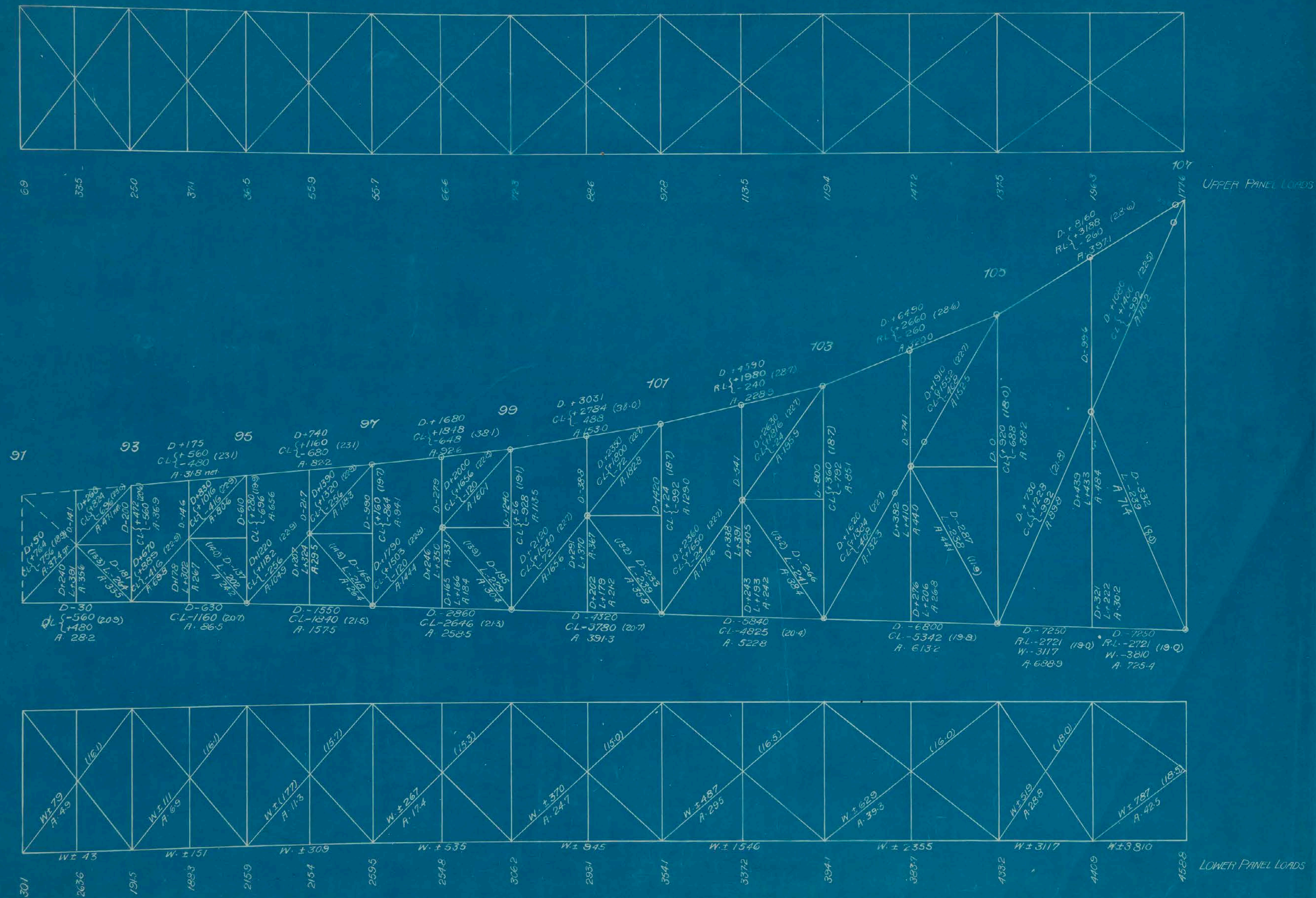


BLACKWELL'S ISLAND BRIDGE

STRESS AND SECTION SHEET

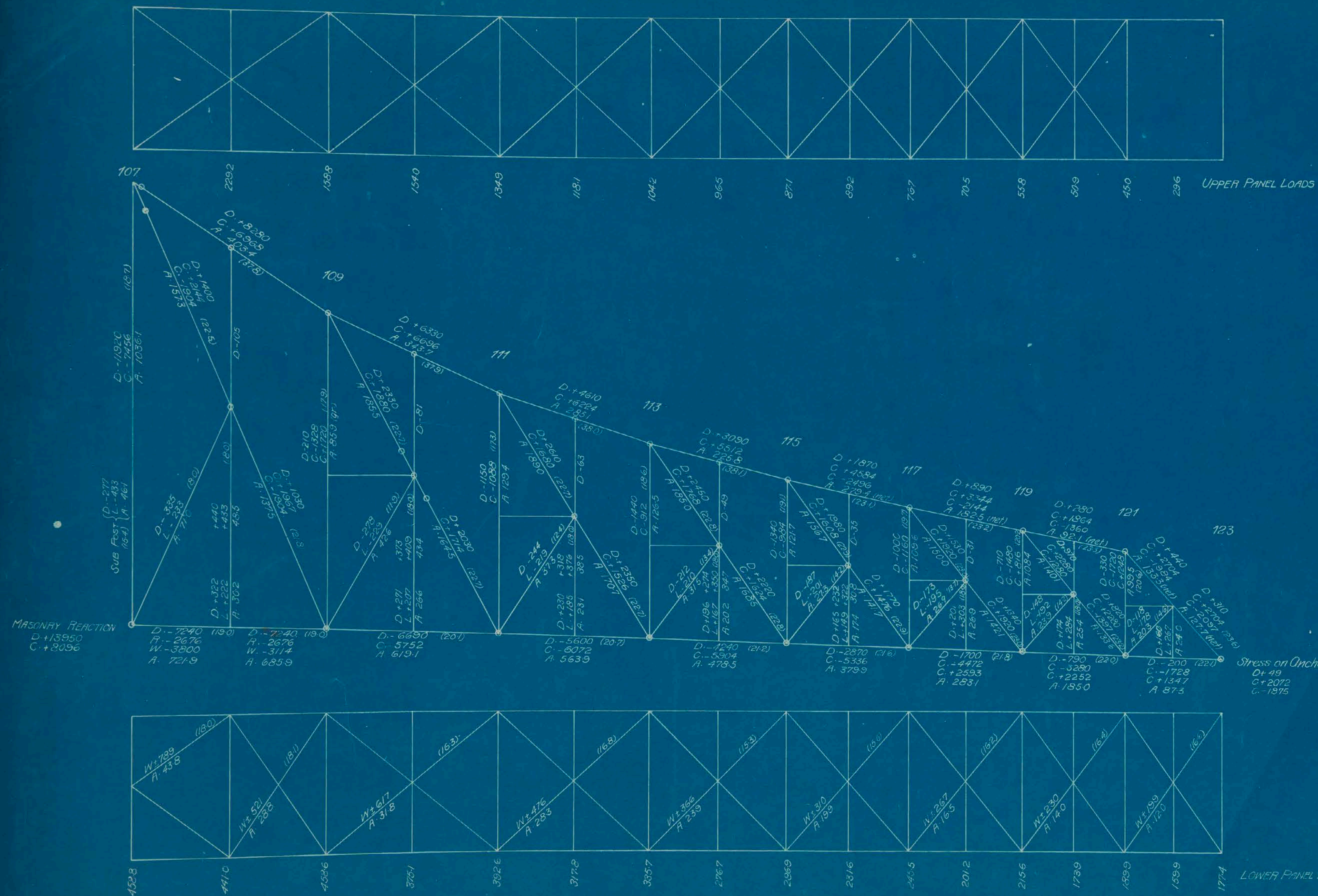
ISLAND CANTILEVER ARM EAST

Scale 1" = 30'



Stresses are given in 1000 lb. units.
D. indicates stress due to dead load.
R.L. " " " Working Load of 3000 p.l. ft.
C.L. " " " Congested " " 16000 " "
W. " " " Wind.
L. " " " Max. Live Load Concentration.
A. " Required Area in sq. in.
Allowed unit stress shown in brackets.

BLACKWELL'S ISLAND BRIDGE
STRESS AND SECTION SHEET
QUEEN'S CANTILEVER ARM
— Scale 1" = 30' —



BLACKWELL'S ISLAND BRIDGE

STRESS AND SECTION SHEET

QUEENS ANCHOR ARM

Scale 1"=30'

BLACKWELL'S ISLAND BRIDGE

Live Load Stresses in UPPER CHORD due to 1000 lbs. p.l.f. per truss. Stresses in 1000 lb. units. Tension + Compression -

	Maximum for Continuous Load		Absolute Maximum		STRESS DUE TO PARTIAL LOAD, CONTINUOUS BETWEEN PANEL POINTS INDICATED															
					Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.
3-5	+366	-185	+377	-210	/		-185	17		+253	37		+113	57		-24	75		+7	91
5-7	+649	-290	+668	-334	/		-290	"		+449	"		+200	"		-42	"		+13	"
7-9	+885	-338	+912	-399	/		-338	"		+612	"		+273	"		-58	"		+18	"
9-11	+1066	-332	+1098	-405	/		-332	"		+737	"		+329	"		-70	"		+21	"
11-13	+1205	-280	+1241	-362	/		-280	"		+833	"		+372	"		-79	"		+24	"
13-15	+1297	-188	+1336	-277	/		-188	"		+897	"		+400	"		-85	"		+26	"
15-17	+1349	-88	+1389	-159	/		-88	"		+933	"		+416	"		-88	"		+27	"
17-19	+1194	-84	+1233	-88	/		+72	"	0	19	+723	"	+399	"		-84	"		+26	"
19-21	+1024	-83	+1067	-91	/		+72	"	-4	21	+561	"	+395	"		-83	"		+26	"
21-23	+836	-80	+887	-98	/		+68	"	-15	24	+407	"	+376	"		-80	"		+24	"
23-25	+664	-75	+736	-116	/		+64	"	-38	26	+285	"	+353	"		-75	"		+23	"
25-27	+501	-67	+590	-134	/		+58	"	-64	29	+184	"	+317	"		-67	"		+21	"
27-29	+378	-88	+454	-147	/		+49	"	-88	31	+108	"	+270	"		-57	"		+18	"
29-31	+267	-97	+327	-144	/		+39	"	-97	33	+54	"	+213	"		-45	"		+14	"
31-33	+174	-93	+216	-126	/		+27	"	-93	35	+23	"	+151	"		-32	"		+10	"
33-35	+86	-62	+109	-80	/		+15	"	-62	36	+6	"	+80	"		-17	"		+5	"
35-37					/			"			"			"			"			"
37-39	+82	-68	+100	-91	/		-15	"		+77	"	+5	38	-68	"	+17	"		-5	"
39-41	+82	-68	+100	-91	/		-15	"		+77	"	+5	38	-68	"	+17	"		-5	"
41-43	+166	-103	+200	-146	/		-28	"		+145	"	+21	39	-103	"	+33	"		-10	"
43-45	+254	-110	+302	-170	/		-39	"		+203	"	+51	41	-110	"	+46	"		-14	"
45-47	+351	-95	+411	-171	/		-49	"		+253	"	+98	43	-95	"	+57	"		-18	"
47-49	+469	-73	+540	-162	/		-58	"		+298	"	+171	45	-73	"	+68	"		-21	"
49-51	+632	-64	+679	-143	/		-64	"		+332	"	+269	47	-44	"	+75	"		-23	"
51-53	+802	-68	+825	-125	/		-68	"		+353	"	+389	50	-20	"	+80	"		-25	"
53-55	+994	-72	+1004	-117	/		-72	"		+372	"	+543	53	-6	"	+85	"		-26	"
55-57	+1172	-74	+1176	-115	/		-74	"		+378	"	+708	55	0	"	+86	"		-27	"
57-59	+1303	-92	+1395	-177	/		-76	"		+389	"		+907	"		-92	"		+68	"
59-61	+1122	-223	+1345	-309	/		-65	"		+334	"		+780	"		-223	"		+157	"
61-63	+979	-289	+1268	-375	/		-54	"		+278	"		+647	"		-289	"		+233	"
63-65	+902	-328	+1230	-415	/		-45	"		+233	"		+541	"		-328	"		+310	"
65-67	+861	-331	+1192	-420	/		-36	"		+187	"		+436	"		-331	"		+386	"
67-69	+861	-331	+1192	-420	/		-36	"		+187	"		+436	"		-331	"		+386	"
69-71	+854	-298	+1152	-388	/		-27	"		+141	"		+328	"		-298	"		+464	"
71-73	+908	-234	+1142	-329	/		-19	"		+96	"		+225	"		-234	"		+557	"
73-75	+989	-111	+1100	-208	/		-8	"		+43	"		+101	"		-111	"		+648	"
75-77	+867	-88	+872	-136	/		+3	"		-14	"		-32	"		+66	"	-2	77	+498
77-79	+732	-88	+743	-142	/		+3	"		-14	"		-32	"		+66	"	-8	79	+368
79-81	+553	-81	+579	-146	/		+3	"		-13	"		-29	"		+60	"	-23	82	+236
81-83	+397	-72	+446	-156	/		+2	"		-11	"		-26	"		+54	"	-47	84	+139
83-85	+267	-65	+312	-152	/		+2	"		-9	"		-21	"		+43	"	-65	86	+68
85-87	+169	-72	+200	-132	/		+1	"		-6	"		-14	"		+30	"	-72	88	+29
87-89	+82	-52	+99	-85	/		+1	"		-3	"		-8	"		+16	"	-52	90	+7
89-91	+82	-52	+99	-85	/		+1	"		-3	"		-8	"		+16	"	-52	90	+7
91-93					/			"			"			"			"			"
93-95	+70	-60	+103	-77	/		-1	"		+3	"		+8	"		-16	"		+65	"
95-97	+145	-85	+206	-116	/		-1	"		+6	"		+15	"		-30	"		+122	"
97-99	+231	-81	+318	-126	/		-2	"		+9	"		+21	"		-43	"		+173	"
99-101	+348	-61	+446	-117	/		-2	"		+11	"		+26	"		-54	"		+216	"
101-103	+495	-60	+571	-96	/		-2	"		+13	"		+29	"		-60	"		+241	"
103-105	+665	-65	+724	-82	/		-3	"		+14	"		+31	"		-65	"		+262	"
105-107	+797	-65	+844	-70	/		-3	"		+14	"		+31	"		-65	"		+261	"
107-109	+871	-66	+917	-120	/		-3	"		+14	"		+32	"		-66	"		+266	"
109-111	+837	-167	+881	-234	/		-3	"		+13	"		+31	"		-64	"		+255	"
111-113	+778	-255	+818	-316	/		-2	"		+12	"		+28	"		-59	"		+237	"
113-115	+689	-306	+725	-360	/		-2	"		+11	"		+25	"		-52	"		+210	"
115-117	+573	-312	+603	-358	/		-2	"		+9	"		+21	"		-44	"		+175	"
117-119	+418	-268	+440	-301	/		-1	"		+7	"		+15	"		-32	"		+128	"
119-121	+234	-171	+247	-190	/		-1	"		+4	"		+9	"		-18	"		+71	"

BLACKWELL'S ISLAND BRIDGE

Live Load Stresses in LOWER CHORD due to 1000 lbs. p.l.f. per truss. Stresses in 1000 lb. units. Tension + Compression -

+172 -338

	Maximum for Continuous Load		Absolute Maximum		STRESS DUE TO PARTIAL LOAD, CONTINUOUS BETWEEN PANEL POINTS INDICATED															
					Pt.		Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.	Pt.
1-3	+183	-359	+207	-370			+183	17		-248	37		-111	57		+23	75		-7	91
3-5	+284	-637	+328	-656			+284	"		-440	"		-197	"		+42	"		-13	"
5-7	+332	-865	+390	-891			+332	"		-598	"		-267	"		+56	"		-17	"
7-9	+322	-1035	+393	-1066			+322	"		-716	"		-319	"		+68	"		-21	"
9-11	+267	-1148	+345	-1182			+267	"		-794	"		-354	"		+75	"		-23	"
11-13	+172	-1179	+252	-1215			+172	"		-815	"		-364	"		+77	"		-24	"
13-15	+73	-1114	+132	-1147			+56	"		-770	"		-344	"		+73	"		-22	"
15-17	+63	-1019	+66	-1048			-54	"		-667	"		-298	"		+63	"		-19	"
17-19	+63	-1019	+66	-1048			-54	"		-667	"		-298	"		+63	"		-19	"
19-21	+74	-1040	+77	-1074			-63	"	0 19	-629	"		-348	"		+74	"		-23	"
21-23	+80	-970	+86	-1009			-68	"	+3 21	-531	"		-374	"		+80	"		-24	"
23-25	+78	-819	+97	-871			-67	"	+16 24	-399	"		-369	"		+78	"		-24	"
25-27	+74	-657	+115	-729			-63	"	+38 26	-282	"		-350	"		+74	"		-23	"
27-29	+67	-499	+134	-587			-57	"	+64 29	-183	"		-316	"		+67	"		-21	"
29-31	+88	-377	+147	-453			-49	"	+88 31	-108	"		-269	"		+57	"		-18	"
31-33	+97	-266	+144	-326			-39	"	+97 33	-54	"		-212	"		+45	"		-14	"
33-35	+92	-173	+125	-215			-27	"	+92 35	-22	"		-151	"		+32	"		-10	"
35-37	+61	-85	+79	-108			-15	"	+61 36	-5	"		-80	"		+17	"		-5	"
37-39								"			"			"			"			"
39-41	+101	-164	+144	-198			+28	"		-144	"	-20 39	+101	"		-33	"		+10	"
41-43	+108	-251	+168	-299			+39	"		-201	"	-50 41	+108	"		-46	"		+14	"
43-45	+34	-349	+170	-408			+49	"		-252	"	-97 43	+94	"		-57	"		+18	"
45-47	+72	-464	+160	-534			+57	"		-294	"	-170 45	+72	"		-67	"		+21	"
47-49	+63	-621	+141	-668			+63	"		-326	"	-265 47	+44	"		-74	"		+23	"
49-51	+67	-782	+122	-804			+67	"		-344	"	-379 49	+19	"		-78	"		+24	"
51-53	+68	-930	+110	-939			+68	"		-348	"	-509 51	+6	"		-79	"		+24	"
53-55	+64	-1005	+98	-1008			+64	"		-324	"	-607 53	0	"		-74	"		+23	"
55-57	+54	-987	+83	-990			+54	"		-278	"	-646	"			-63	"		+19	"
57-59	+54	-987	+83	-990			+54	"		-278	"	-646	"			-63	"		+19	"
59-61	+79	-1105	+151	-1184			+64	"		-330	"	-770	"			+79	"		-57	"
61-63	+215	-1094	+299	-1309			+63	"		-326	"	-758	"			+215	"		-153	"
63-65	+289	-979	+375	-1268			+54	"		-278	"	-647	"			+289	"		-233	"
65-67	+328	-902	+415	-1230			+45	"		-233	"	-541	"			+328	"		-310	"
67-69	+298	-854	+388	-1152			+27	"		-141	"	-329	"			+298	"		-463	"
69-71	+228	-883	+320	-1111			+18	"		-94	"	-219	"			+228	"		-541	"
71-73	+94	-838	+176	-932			+7	"		-36	"	-85	"			+94	"		-550	"
73-75	+64	-731	+97	-733			-2	"		+10	"	+23	"			-48	"		-463	"
75-77	+64	-731	+97	-733			-2	"		+10	"	+23	"			-48	"		-463	"
77-79	+74	-728	+114	-731			-2	"		+12	"	+27	"			-55	"	+1 77	-418	"
79-81	+80	-669	+130	-679			-2	"		+13	"	+29	"			-60	"	+8 79	-338	"
81-83	+78	-535	+142	-561			-2	"		+12	"	+28	"			-59	"	+24 82	-229	"
83-85	+71	-390	+153	-438			-2	"		+11	"	+25	"			-53	"	+46 84	-138	"
85-87	+65	-266	+152	-311			-2	"		+9	"	+21	"			-43	"	+65 86	-68	"
87-89	+71	-167	+131	-198			-1	"		+6	"	+14	"			-30	"	+71 88	-27	"
89-91								"			"		"				"			"
91-93	+60	-70	+77	-103			+1	"		-3	"	-8	"			+16	"		-65	"
93-95	+84	-145	+115	-205			+1	"		-6	"	-14	"			+30	"		-132	"
95-97	+81	-230	+126	-317			+2	"		-9	"	-21	"			+43	"		-171	"
97-99	+61	-343	+116	-441			+2	"		-11	"	-26	"			+53	"		-213	"
99-101	+59	-485	+94	-558			+2	"		-12	"	-28	"			+59	"		-236	"
101-103	+60	-615	+76	-670			+3	"		-13	"	-29	"			+60	"		-243	"
103-105	+56	-678	+60	-719			+2	"		-12	"	-27	"			+56	"		-222	"
105-107	+48	-689	+50	-722			+2	"		-10	"	-23	"			+48	"		-191	"
107-109	+48	-689	+50	-722			+2	"		-10	"	-23	"			+48	"		-191	"
109-111	+55	-719	+99	-757			+2	"		-12	"	-26	"			+55	"		-219	"
111-113	+152	-759	+212	-799			+2	"		-12	"	-28	"			+58	"		-232	"
113-115	+242	-738	+300	-777			+2	"		-12	"	-27	"			+56	"		-225	"
115-117	+295	-667	+348	-702			+2	"		-11	"	-24	"			+51	"		-203	"
117-119	+305	-559	+349	-588			+2	"		-9	"	-20	"			+42	"		-171	"
119-121	+263	-410	+295	-432			+1	"		-7	"	-15	"			+31	"		-125	"
121-123	+168	-230	+186	-242			+1	"		-4	"	-8	"			+17	"		-70	"

+157 -216 for truss 48' deep at portals

BLACKWELL'S ISLAND BRIDGE

Live Load Stresses in **DIAGONALS** due to 1000 lbs. p. l. f. per truss. Stresses in 1000 lb. units. Tension + Compression -

+517 -262

		Maximum for Continuous Load	Absolute Maximum	STRESS DUE TO PARTIAL LOAD, CONTINUOUS BETWEEN PANEL POINTS INDICATED															
				Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt
1-3	+532	-269	+548	-306															
3-5	+434	-171	+456	-200															
5-7	+365	-105	+408	-130															
7-9	+296	-55	+360	-74															
9-11	+292	-22	+320	-36															
11-13	+238	-4	+243	-7															
13-15	+246	-140	+255	-144															
15-17	+278	-378	+304	-390															
17-19	+187	-218	+214	-252															
19-21	+225	-68	+237	-84															
21-23	+274	-2	+275	-2															
23-25	+282	-7	+286	-8															
25-27	+273	-11	+284	-17															
27-29	+245	-15	+265	-29															
29-31	+213	-24	+238	-44															
31-33	+179	-40	+206	-62															
33-35	+151	-63	+182	-87															
35-37	+129	-93	+163	-120															
37-39	+98	-119	+132	-145															
39-41	+144	-69	+169	-100															
41-43	+172	-45	+194	-72															
43-45	+203	-26	+222	-50															
45-47	+239	-14	+256	-35															
47-49	+272	-10	+278	-21															
49-51	+283	-6	+285	-11															
51-53	+278	-2	+278	-3															
53-55	+231	-65	+247	-78															
55-57	+187	-201	+222	-229															
57-59	+359	-443	+411	-728															
59-61	+320	-297	+349	-300															
61-63	+475	-239	+518	-279															
63-65	+397	-237	+462	-299															
65-67	+324	-237	+419	-329															
67-69	+305	-320	+370	-388															
69-71	+382	-322	+423	-366															
71-73	+308	-403	+332	-406															
73-75	+359	-389	+412	-714															
75-77	+172	-142	+211	-163															
77-79	+191	-60	+212	-70															
79-81	+234	-4	+235	-7															
81-83	+237	-12	+240	-21															
83-85	+225	-21	+238	-44															
85-87	+184	-26	+204	-64															
87-89	+147	-46	+169	-89															
89-91	+72	-114	+118	-138															
91-93	+103	-87	+151	-112															
93-95	+127	-52	+169	-74															
95-97	+165	-32	+203	-52															
97-99	+207	-15	+232	-30															
99-101	+225	-9	+235	-13															
101-103	+227	-3	+230	-4															
103-105	+194	-51	+204	-72															
105-107	+175	-124	+195	-163															
107-109	+268	-238	+287	-251															
109-111	+235	-86	+242	-90															
111-113	+210	-3	+215	-6															
113-115	+221	-21	+249	-31															
115-117	+201	-50	+261	-65															
117-119	+241	-100	+286	-119															
119-121	+285	-160	+309	-183															
121-123	+347	-254	+366	-281															

+338 -248

for turn 48' deep at Portac

4486. Jan 26, 1904.

BLACKWELL'S ISLAND BRIDGE

Live Load Stresses in VERTICALS due to 1000 lbs. p. l. f. per truss. Stresses in 1000 lb. units. Tension + Compression -

	Maximum for Continuous Load				Absolute Maximum		STRESS DUE TO PARTIAL LOAD, CONTINUOUS BETWEEN PANEL POINTS, INDICATED																		
					Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt				
3	+ 163	- 323	+ 185	- 332	/		+ 163	17	- 224	37		- 99	57	+ 21	75	- 6	91	- 3	107	+ 1	123				
5	+ 109	- 279	+ 128	- 293	/	- 6	3	+ 109	17	- 193	37		- 86	57	+ 18	75	- 5	91	- 3	107	+ 1	123			
7	+ 64	- 221	+ 79	- 250	/	- 23	6	+ 64	17	- 153	37		- 68	57	+ 14	75	- 4	91	- 2	107	+ 1	123			
9	+ 29	- 177	+ 40	- 210	/	- 49	9	+ 29	17	- 109	37		- 48	57	+ 11	75	- 3	91	- 1	107	0	123			
11	+ 5	- 134	+ 8	- 140	/	- 89	11	+ 5	17	- 35	37		- 15	57	+ 3	75	- 1	91	0	107	0	123			
13	+ 121	- 143	+ 124	- 151	/		- 143	17	+ 84	37		+ 37	57	- 8	75	+ 2	91	+ 1	107	0	123				
15	+ 344	- 176	+ 354	- 199	/		- 176	17	+ 238	37		+ 106	57	- 22	75	+ 7	91	+ 3	107	- 1	123				
17	+ 45	- 1171	+ 47	- 1191	/		- 234	17	- 727	37		- 210	57	+ 45	75	- 13	91	- 7	107	+ 2	123				
19	+ 204	- 96	+ 233	- 121	/		+ 20	17	- 96	27	+ 88	37		+ 116	57	- 24	75	+ 7	91	+ 2	107				
21	+ 62	- 131	+ 76	- 141	/		+ 9	17	- 131	33	+ 14	37		+ 48	57	- 10	75	+ 3	91	+ 2	107				
23	+ 2	- 169	+ 2	- 170	/		- 1	17	0	23	- 160	37		- 8	57	+ 2	75	- 1	91	0	107				
25	+ 6	- 174	+ 8	- 179	/		- 5	17	+ 2	25	- 143	37		- 28	57	+ 6	75	- 2	91	- 1	107				
27	+ 10	- 166	+ 18	- 178	/		- 8	17	+ 8	27	- 120	37		- 46	57	+ 10	75	- 3	91	- 1	107				
29	+ 16	- 148	+ 29	- 165	/		- 11	17	+ 16	29	- 89	37		- 59	57	+ 12	75	- 4	91	- 2	107				
31	+ 29	- 129	+ 45	- 149	/		- 13	17	+ 29	31	- 59	37		- 70	57	+ 15	75	- 5	91	- 2	107				
33	+ 44	- 108	+ 61	- 129	/		- 14	17	+ 44	34	- 30	37		- 78	57	+ 16	75	- 5	91	- 2	107				
35	+ 65	- 90	+ 84	- 114	/		- 15	17	+ 65	36	- 6	37		- 84	57	+ 18	75	- 6	91	- 3	107				
37	+ 92	- 77	+ 113	- 103	/		- 17	17		+ 86	37	+ 6	38	- 77	57	+ 20	75	- 6	91	- 3	107				
39	+ 1	- 1	+ 1	- 1	/		0	17		+ 1	37	+ 0	38	- 1	57	0	75	0	91	0	107				
41	+ 47	- 99	+ 68	- 116	/		+ 14	17		- 70	37	- 29	40	+ 47	57	- 16	75	+ 5	91	+ 2	107				
43	+ 31	- 118	+ 49	- 133	/		+ 12	17		- 62	37	- 56	43	+ 31	57	- 14	75	+ 4	91	+ 2	107				
45	+ 18	- 142	+ 35	- 156	/		+ 11	17		- 55	37	- 87	45	+ 18	57	- 13	75	+ 4	91	+ 2	107				
47	+ 8	- 161	+ 21	- 169	/		+ 8	17		- 43	37	- 116	47	+ 8	57	- 10	75	+ 3	91	+ 2	107				
49	+ 5	- 172	+ 11	- 175	/		+ 5	17		- 26	37	- 143	49	+ 3	57	- 6	75	+ 2	91	+ 1	107				
51	+ 1	- 168	+ 2	- 168	/		+ 1	17		- 7	37	- 159	51	0	57	- 2	75	+ 1	91	0	107				
53	+ 56	- 131	+ 68	- 145	/		- 9	17		+ 45	37	+ 13	41	- 131	57	+ 10	75	- 3	91	- 2	107				
55	+ 186	- 94	+ 211	- 127	/		- 21	17		+ 108	37	+ 78	47	- 94	57	+ 24	75	- 8	91	- 4	107				
57	+ 218	- 1125	+ 251	- 1145	/		+ 33	17		- 171	37		- 655	57	- 299	75	+ 148	91	+ 70	107	- 20	123			
59	+ 416	- 253	+ 669	- 301	/		- 24	17		+ 122	37		+ 285	57	- 253	75	+ 178	91	+ 84	107	- 24	123			
61	+ 261	- 212	+ 267	- 240	/		+ 2	17		- 9	37		- 20	57	+ 4	61	- 187	75	+ 177	91	+ 84	107			
63	+ 209	- 349	+ 263	- 406	/		+ 16	17		- 84	37		- 197	57	+ 38	64	- 106	75	+ 142	91	+ 67	107			
65	+ 209	- 286	+ 289	- 369	/		+ 16	17		- 84	37		- 197	57	+ 64	66	- 69	75	+ 142	91	+ 67	107			
67	+ 0	0			/			17			37			57				91			107				
69	+ 281	- 269	+ 341	- 326	/		- 16	17		+ 84	37		+ 197	57	- 101	68	+ 41	75	- 142	91	- 67	107			
71	+ 354	- 200	+ 359	- 224	/		- 21	17		+ 106	37		+ 248	57	- 181	71	+ 3	75	- 15	91	- 7	107			
73	+ 403	- 253	+ 656	- 302	/		- 21	17		+ 107	37		+ 250	57		- 253	75	+ 203	91	+ 96	107	- 28	123		
75	+ 293	- 960	+ 336	- 977	/		- 17	17		+ 88	37		+ 205	57		- 288	75	- 522	91	- 150	107	+ 43	123		
77	+ 131	- 80	+ 150	- 117	/		+ 1	17		- 4	37		- 9	57	+ 18	75	- 80	84	+ 47	91	+ 84	107			
79	+ 52	- 95	+ 61	- 113	/		0	17		- 2	37		- 4	57	+ 9	75	- 95	88	+ 10	91	+ 42	107			
81	+ 3	- 126	+ 6	- 127	/		0	17		+ 1	37		+ 1	57	- 3	75	+ 1	81	- 112	91	- 12	107			
83	+ 9	- 125	+ 20	- 131	/		0	17		+ 2	37		+ 3	57	- 7	75	+ 6	83	- 91	91	- 33	107			
85	+ 16	- 115	+ 40	- 131	/		- 1	17		+ 3	37		+ 6	57	- 12	75	+ 15	85	- 62	91	- 56	107			
87	+ 31	- 99	+ 60	- 115	/		- 1	17		+ 3	37		+ 7	57	- 15	75	+ 31	87	- 33	91	- 66	107			
89	+ 1	- 1	+ 1	- 1	/		0	17		0	37		0	57	0	75	- 1	90	0	91	+ 1	107			
91	+ 89	- 55	+ 108	- 92	/		+ 1	17		- 4	37		- 9	57	+ 18	75	- 55	90	+ 7	91	+ 82	107			
93	+ 59	- 70	+ 76	- 102	/		+ 1	17		- 3	37		- 8	57	+ 16	75		- 65	91	- 5	92	+ 59	107		
95	+ 35	- 87	+ 50	- 116	/		+ 1	17		- 3	37		- 7	57	+ 14	75		- 58	91	- 29	94	+ 35	107		
97	+ 20	- 108	+ 33	- 133	/		+ 1	17		- 3	37		- 6	57	+ 12	75		- 48	91	- 60	97	+ 20	107		
99	+ 7	- 116	+ 14	- 130	/		0	17		- 2	37		- 3	57	+ 7	75		- 29	91	- 87	99	+ 7	107		
101	+ 3	- 124	+ 3	- 126	/		0	17		- 1	37		- 1	57	+ 3	75		- 10	91	- 111	101	0	107		
103	+ 45	- 99	+ 63	- 108	/		0	17		+ 2	37		+ 4	57	- 9	75		+ 37	91	+ 8	94	- 99	107		
105	+ 115	- 86	+ 152	- 105	/		- 1	17		+ 4	37		+ 9	57	- 18	75		+ 72	91	+ 43	97	- 86	107		
107	+ 37	- 932	+ 39	- 958	/		+ 2	17		- 8	37		- 18	57	+ 37	75		- 149	91		- 543	107	- 240	123	
109	+ 215	- 166	+ 226	- 183	/		- 1	17		+ 3	37		+ 8	57	- 16	75		+ 66	91		+ 149	107	- 166	123	
111	+ 74	- 136	+ 78	- 142	/		0	17		+ 1	37		+ 3	57	- 6	75		+ 23	91		+ 51	107	- 136	123	
113	+ 5	- 114	+ 8	- 121	/		0	17		- 1	37		- 1	57	+ 3	75		- 10	91		- 23	107	+ 5	113	
115	+ 28	- 123	+ 36	- 157	/		0	17		- 2	37		- 4	57	+ 8	75		- 31	91		- 71	107	+ 28	115	
117	+ 59	- 145	+ 70	- 174	/		0	17		- 2	37		- 5	57	+ 11	75		- 44	91		- 101	107	+ 59	117	
119	+ 102	- 185	+ 117	- 199	/		+ 1	17		- 3	37		- 7	57	+ 14	75		- 57	91		- 128	107	+ 102	120	
121	+ 156	- 215	+ 173	- 226	/		+ 1	17		- 3	37		- 8	57	+ 16	75		- 66	91		- 149	107		+ 156	123