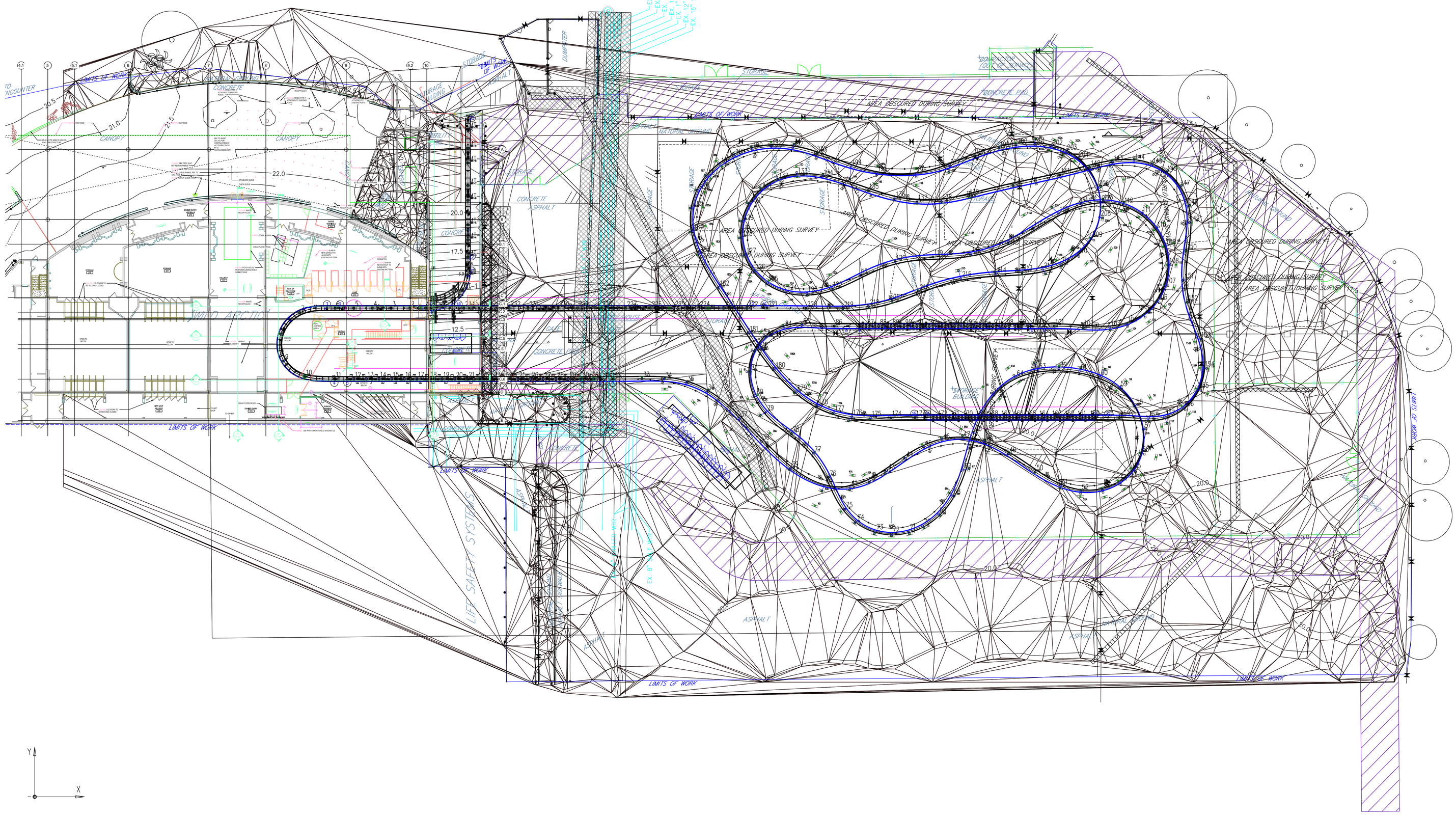
Rev.	Date	Name	Change
D	20191218	STE/RZ	re-init with new layout; old history dropped
E	20200109	STE/RZ	adjusted helix of maintenance track
F	27.01.2020	STE_RK	Preliminary foundation loads
G	10.03.2020	STE_RK	General update of the entire track
H	01.08.2022	AR_BAM	Position of station plan moved and updated



RADIUS CONNECTION POINTS

POINT	COORDINATES [M] X	Y	ANGLE TO THE AXIS X	LENGTH IN PLAN
1	63.6787	78.5743	180.0000	0.0000
2	49.1041	78.5743	180.0000	14.5746
3	47.0041	78.5743	180.0000	2.1000
4	48.1987	67.1743	0.0000	22.8131
5	50.2889	67.1743	0.0000	2.0902
6	90.9388	67.1743	0.0000	40.6499
7	93.0291	67.1743	0.0000	2.0903
8	130.5627	75.6620	0.0000	217.4024
9	132.6627	75.6620	0.0000	2.1000
10	160.2477	75.6620	0.0000	27.5850
11	162.3477	75.6620	0.0000	2.1000
12	172.6800	60.9803	180.0000	236.7469
13	170.5800	60.9803	180.0000	2.1000
14	143.5600	60.9803	180.0000	27.0200
15	141.4600	60.9803	180.0000	2.1000
16	117.3709	78.5743	180.0000	192.5245
17	115.2709	78.5743	180.0000	2.1000
18	68.1787	78.5743	180.0000	47.0922
19	63.6787	78.5743	180.0000	4.5000
20	63.6787	78.5743	0.0000	52.3109
21	69.6787	84.5743	90.0000	9.4248
22	69.6787	86.9040	90.0000	2.3297
23	69.6787	109.1340	90.0000	22.2300

TOTAL : 933.9845 [M]

CENTER POINTS OF CIRCLES

-	POINT FROM POINT TO POINT	COORDINATES [M] X	Y	CENTER ANGLE	[M]	RADIUS	SENSE OF ROTATION
M1	20 - 21	63.6787	84.5743	90.0000		6.0000	L

ALL MEASUREMENTS IN METER

INGENEURBUERO STENGEL GmbH
Steel construction
Structural dynamic analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +4989/745517-0
Fax: +4989/745517-44

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Remarks: STE_Prj 1912

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: rz	Company ID: STE	Date: 2020-01-09	
Checked by:		Date:	
Project: Family Launch Coaster Sea World San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:250	Size: A0
Subject: Layout / 3D	File Name: 5224-01-0001H.DWG	Next Assembly No.:	
	Drawing No.: 5224-01-0001	Sheets: 1	Rev.: H

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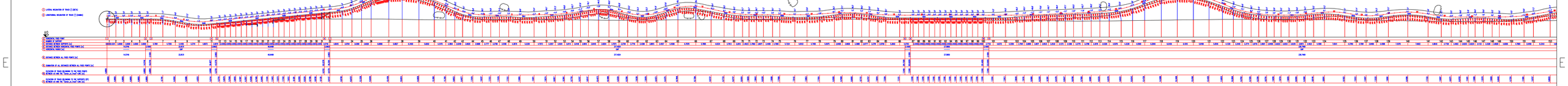
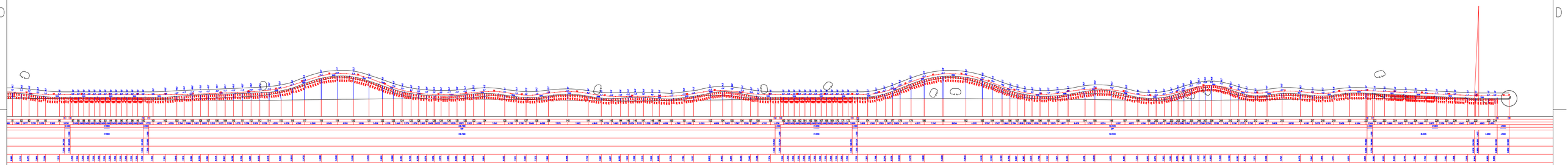
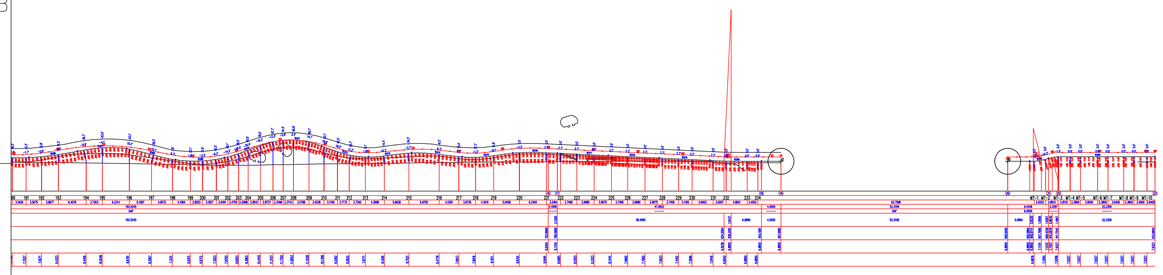
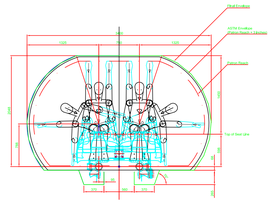
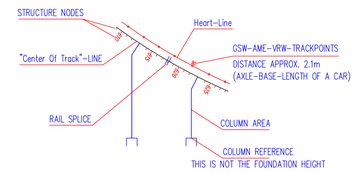
Rev.	Date	Name	Change
D	20191218	STE/RZ	re-init with new layout; old history dropped
E	20200109	STE/RZ	adjusted helix of maintenance track
F	27.01.2020	STE_RK	Preliminary foundation loads
G	09.03.2020	STE_RK	General update of the entire track
H	30.03.2020	STE_RK	Virtual cross ties (28BL) removed
I	05.11.2020	STE_AD	Update column 7,8,9,11,17,19











TRACKLENGTH 854.1008 M (WITHOUT MAINTENANCE TRACK)
ALL MEASUREMENTS IN METER

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Structural engineering
Amusement rides
Custom software
Neuwieninger Str. 24
81475 Munich
Germany
Phone: +4989/874517-0
Fax: +4989/874517-44

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Remarks: STE_Prj. 1912

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: FZ	Company ID: STE	Date: 2020-01-09	
Checked by:		Date:	
Project: Family Launch Coaster Sea World San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:500	Size: A0
Subject: Track Profile	File Name: 5224-01-0002I.DWG	Next Assembly No.:	
	Drawing No.: 5224-01-0002	Sheets: 1	Rev.: I

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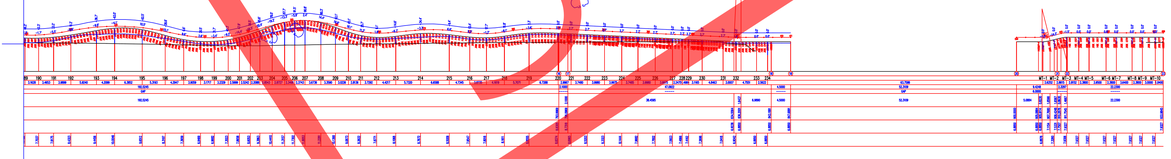
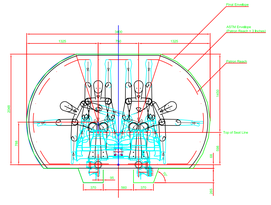
Rev.	Date	Name	Change
D	20191218	STE/RZ	re-init with new layout; old history dropped
E	20200109	STE/RZ	adjusted helix of maintenance track
F	27.01.2020	STE_RK	Preliminary foundation loads



SUPERSEDED



ALL MEASUREMENTS IN METER

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: RZ	Company ID: STE	Date: 2020-01-09	
Checked by:		Date:	
Project: Family Launch Coaster Sea World San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:500	Size: A0
Subject: Track Profile	File Name: 5224-01-0002F.DWG	Next Assembly No.:	
	Drawing No.: 5224-01-0002	Sheets: 1	Rev.: F

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Consulting
Custom software

Nesselwanger Str. 24
87616 Marktoberdorf
Germany
Phone: ++49(0)8345617-0
Fax: ++49(0)8345617-44

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Remarks: STE_Prj 1912

Rev.	Date	Name	Change
B	27.01.2020	STE_RK	Preliminary foundation loads
C	28.01.2020	STE_RK	NoGo-Zones added
D	09.03.2020	STE_RK	General update of the entire track
E	04.11.2020	STE_AD	Update columns 7,8,9,11,17 and 19; correction SW1 to SW4;
			added missing footing details

INTERFACE POINT COORDINATES

SPR-NAM	SPR-NO	NOD-NO	COL-PHI	X[m]	Y[m]	Z[m]	TYPE
1	725	7253	-90.000	62.844	78.574	4.530	552
2	2	47	-90.000	60.310	78.574	4.530	542
3	3	67	-90.000	57.310	78.574	4.500	542
4	4	87	-90.000	54.310	78.574	4.500	542
5	5	107	-90.000	51.310	78.574	4.500	542
6	6	127	-90.000	48.310	78.574	4.500	552
7	7	147	115.966	42.641	77.855	4.700	543
8	8	167	-15.997	39.389	74.474	4.500	542
9	9	187	31.881	39.917	70.051	4.500	542
10	10	207	-105.849	43.417	67.520	4.100	532
11	11	227	90.000	48.260	67.174	4.500	542
12	12	247	90.000	51.357	67.174	4.300	551
13	13	267	90.000	53.388	67.174	4.300	551
14	14	287	90.000	55.418	67.174	4.300	551
15	15	307	90.000	57.449	67.174	4.300	551
16	16	327	90.000	59.479	67.174	4.300	551
17	750	7514	90.000	61.510	67.174	4.500	552
19	751	7534	90.000	65.570	67.174	4.123	552
1A	726	7254	-90.000	62.044	78.574	4.530	552
20	20	407	90.000	67.601	67.174	3.923	551
21	21	427	90.000	69.632	67.174	3.923	551
22	740	7408	90.000	71.444	67.174	5.037	553
24	741	7400	90.000	75.723	67.174	6.114	553
25	25	507	90.000	77.753	67.174	6.561	551
26	26	527	90.000	79.784	67.174	6.561	551
27	27	547	90.000	81.814	67.174	6.561	551
28	28	567	90.000	83.845	67.174	6.561	551
29	29	587	90.000	85.875	67.174	6.713	551
30	30	607	90.000	87.906	67.174	6.763	522
31	755	7564	90.000	89.936	67.174	6.763	522
32	756	7573	90.000	93.010	67.174	6.763	522
33	33	667	91.537	97.669	67.426	6.866	542
34	34	687	88.977	101.351	67.267	6.866	552
35	35	707	81.901	104.958	66.743	6.866	552
36	36	727	40.391	108.345	65.388	6.866	542
37	700	7002	46.061	111.242	58.633	6.831	542
38	705	7051	-135.996	114.170	54.548	6.741	542
39	39	787	56.555	121.360	52.616	6.617	542
40	40	807	-115.060	125.476	46.798	6.564	542
41	41	827	-101.575	131.061	49.349	6.573	542
42	42	847	122.303	134.247	50.521	6.579	552
43	43	867	124.817	136.819	51.956	6.585	552
44	44	887	122.936	139.780	54.546	6.608	552
45	45	907	116.929	142.730	56.649	6.622	552
46	46	927	102.547	145.828	57.696	6.632	543
47	47	947	87.608	149.202	58.076	6.624	552
48	48	967	73.335	152.768	57.367	6.595	542
49	49	987	57.637	156.722	55.358	6.562	552
50	50	1007	55.971	160.831	52.094	6.561	542
51	51	1027	-107.491	164.904	49.651	6.561	552
52	52	1047	-93.531	168.233	49.322	6.561	542
53	53	1067	-72.841	172.062	48.171	6.561	542
54	54	1087	-52.932	175.254	49.447	6.561	542
55	55	1107	-32.992	177.940	51.700	6.561	542
56	56	1127	-14.259	180.359	54.603	6.526	542
57	57	1147	8.343	181.250	59.517	6.452	542
58	58	1167	28.799	179.374	64.192	6.400	542
59	59	1187	43.232	175.558	66.800	6.386	542
60	60	1207	-106.188	172.148	68.739	6.397	542
61	61	1227	-98.830	168.221	68.979	6.417	552
62	62	1247	-94.272	164.756	69.305	6.442	552
63	63	1267	-86.206	160.769	69.786	6.447	542
64	64	1287	128.783	158.331	66.719	6.506	542
65	65	1307	144.232	152.504	65.889	6.561	542
66	66	1327	-14.951	150.892	58.634	6.604	542
67	67	1347	-19.241	150.270	52.770	6.598	552
68	68	1367	-32.836	147.854	48.346	6.588	542
69	69	1387	-40.285	145.626	45.221	6.580	553
70	70	1407	-59.646	143.002	43.240	6.574	543
71	71	1427	-74.383	140.651	42.272	6.570	543
72	72	1447	-91.061	137.795	41.955	6.566	543
73	73	1467	-107.135	135.042	42.300	6.564	543
74	74	1487	-126.762	131.879	43.998	6.564	552
75	75	1507	-147.547	129.635	45.851	6.567	542
76	76	1527	25.675	127.657	51.338	6.595	553
77	77	1547	-140.366	125.390	55.386	6.644	542
78	78	1567	52.989	121.688	58.408	6.707	553
79	79	1587	-135.857	116.706	61.320	6.791	542
80	80	1607	-158.086	116.272	64.620	6.820	542
81	81	1627	179.652	113.537	68.350	6.847	542
82	82	1647	155.032	114.493	72.260	6.821	542
83	83	1667	133.816	116.765	74.767	6.799	542
84	84	1687	113.612	120.336	75.749	6.761	543
85	85	1707	89.966	123.346	76.035	6.728	542
86	86	1727	89.173	128.603	75.674	6.413	552
87	87	1747	90.000	133.683	75.662	6.210	551
88	88	1767	90.000	135.723	75.662	6.210	551
89	89	1787	90.000	137.763	75.662	6.210	551
90	90	1807	90.000	139.803	75.662	6.210	551
91	91	1827	90.000	141.843	75.662	6.210	551
92	92	1847	90.000	143.883	75.662	6.210	551
93	93	1867	90.000	145.923	75.662	6.210	551
94	94	1887	90.000	147.963	75.662	6.210	551
95	95	1907	90.000	150.003	75.662	6.210	551
96	96	1927	90.000	152.043	75.662	6.210	551
97	97	1947	90.000	154.083	75.662	6.210	551
98	98	1967	90.000	156.123	75.662	6.210	551
99	99	1987	90.000	158.163	75.662	6.210	551
100	100	2007	90.000	160.203	75.662	6.210	551
101	101	2027	-90.454	163.975	75.657	6.403	542
102	102	2047	85.585	168.593	75.280	6.361	542
103	103	2067	-79.097	172.961	75.067	6.326	552
104	104	2087	-68.131	176.059	74.925	6.302	542
105	105	2107	-52.359	179.197	76.355	6.275	542
106	106	2127	-34.745	181.708	78.835	6.241	542
107	107	2147	-17.455	183.236	81.864	6.185	542
108	108	2167	1.480	183.558	85.546	6.131	542
109	109	2187	19.224	183.150	89.061	6.082	542
110	110	2207	36.692	181.563	92.250	6.025	542
111	111	2227	55.208	178.842	94.966	6.014	542
112	112	2247	73.271	175.197	95.618	6.104	552
113	113	2267	91.421	171.817	96.123	6.104	552
114	114	2287	-76.383	168.255	95.508	6.120	552
115	115	2307	-64.609	163.583	94.751	6.202	542
116	116	2327	-58.355	160.451	91.312	6.300	542
117	117	2347	-60.282	156.541	88.970	6.363	542
118	118	2367	-76.919	150.530	87.047	6.432	542
119	119	2387	92.475	144.462	86.788	6.522	542
120	120	2407	-73.541	138.378	86.159	6.561	542
121	121	2427	-63.770	132.920	83.857	6.642	542
122	122	2447	-76.796	128.377	81.547	6.709	542
123	123	2467	-72.764	124.272	80.627	6.713	542
124	124	2487	-95.695	120.966	82.214	6.713	542
125	125	2507	-118.848	118.034	82.974	6.724	542
126	126	2527	-138.064	115.861	84.643	6.713	552
127	127	2547	-157.401	113.900	86.962	6.713	553
128	128	2567	-175.463	113.277	89.854	6.713	543
129	129	2587	167.950	113.482	92.574	6.713	553
130	130	2607	148.751	114.625	95.503	6.713	552

INTERFACE POINT COORDINATES

SPR-NAM	SPR-NO	NOD-NO	COL-PHI	X[m]	Y[m]	Z[m]	TYPE
131	131	2627	129.444	116.627	97.926	6.701	553
132	132	2647	110.144	119.070	100.390	6.658	542
133	133	2667	92.852	122.503	101.317	6.618	542
134	134	2687	79.396	126.774	100.085	6.585	552
135	135	2707	70.993	134.014	97.467	6.509	552
136	136	2727	78.594	138.155	95.948	6.458	542
137	137	2747	86.997	141.858	95.383	6.321	542
138	138	2767	94.154	145.835	95.485	6.386	542
139	139	2787	101.929	150.247	96.322	6.310	543
140	140	2807	102.548	157.349	98.286	6.189	553
141	141	2827	103.186	164.857	99.959	6.066	553
142	142	2847	103.196	169.629	101.343	5.992	542
143	143	2867	99.270	173.292	102.347	5.937	542
144	144	2887	83.006	176.842	102.572	5.889	552
145	145	2907	68.129	179.787	101.918	5.859	543
146	146	2927	52.590	182.189	100.633	5.837	543
147	147	2947	33.547	184.470	98.306	5.889	543
148	148	2967	16.109	185.751	95.079	5.951	552
149	149	2987	-3.170	186.036	92.325	5.940	552
150	150	3007	171.692	185.167	87.773	5.822	553
151	151	3027	1.156	184.605	83.007	6.153	552
152	152	3047	12.722	185.164	79.464	6.206	552
153	153	3067	20.660	187.678	73.616	6.257	542
154	154	3087	-4.899	188.725	68.852	6.332	542
155	155	3107	-23.420	188.623	64.835	6.409	542
156	156	3127	-46.270	185.667	61.562	6.437	542
157	157	3147	-80.280	182.151	60.036	6.446	552
158	158	3167	-91.241	179.144	60.438	6.431	542
159	159	3187	-90.995	174.440	60.968	6.413	552
160	160	3207	-90.000	169.560	60.980	6.210	551
161	161	3227	-90.000	167.520	60.980	6.210	551
162	162	3247	-90.000	165.480	60.980	6.210	551
163	163	3267	-90.000	163.440	60.980	6.210	551
164	164	3287	-90.000	161.400	60.980	6.210	551
165	165	3307	-90.000	159.360	60.980	6.210	551
166	166	3327	-90.000	157.320	60.980	6.210	551
167	167	3347	-90.000	155.280	60.980	6.210	551
168	168	3367	-90.000	153.240	60.980	6.210	551
169	169	3387	-90.000	151.200	60.980	6.210	551
170	170	3407	-90.000	149.160	60.980	6.210	551
171	171	3427	-90.000	147.120	60.980	6.210	551
172	172	3447	-90.000	145.080	60.980	6.210	551
173	173	3467	-90.000	141.580	60.980	6.410	542
174	174	3487	-88.609	137.689	60.937	6.497	542
175	175	3507	-89.726	134.295	60.725	6.682	542
176	176	3527	-94.078	130.873	60.462	6.692	552
177	177	3547	-101.120	128.329	61.583	6.704	542
178	178	3567	-109.362	125.654	62.677	6.713	542
179	179	3587	-151.048	122.173	64.965	6.757	542
180	180	3607	-135.348	118.753	68.659	6.798	542
181	181	3627	-145.670	114.668	74.518	6.827	542
182	182	3647	-149.346	109.863	81.731	6.782	542
183	183	3667	-143.305	106.590	87.110	6.735	542
184	184	3687	-158.242	105.411	90.797	6.719	542
185	185	3707	-177.523	105.372	94.663	6.713	542
186	186	3727	165.776	106.302	97.576	6.713	542
187	187	3747	150.696	107.822	99.906	6.713	552
188	188	3767	135.624	110.516	101.352	6.713	542
189	189	3787	121.591	112.379	103.388	6.708	553
190	190	3807	106.668	115.265	104.438	6.659	552
191	191	3827	94.170	118.424	105.231	6.611	542
192	192	3847	82.195	122.112	104.962	6.579	542
193	193	3867	72.922	125.867	103.612	6.567	552
194	194	3887	68.821	131.114	99.368	6.549	542
195	195	3907	-97.092	135.179	98.544	6.465	542
196	196	3927	-88.969	141.776	98.335	6.378	543
197	197	3947	113.884	146.997	100.390	6.266	552
198	198	3967	110.295	151.144	103.011	6.151	552
199	199	3987	102.922	155.012	104.458	6.031	542
200	200	4007	99.129	157.773	105.147	5.977	552
201	201	4027	91.259	160.992	105.738	5.951	542
202	202	4047	64.357	163.214	103.923	5.951	542
203	203	4067	53.120	165.324	103.095	5.965	542
204	710	7110	43.541	170.119	104.928	5.939	553
206	712	7125	17.120	175.109	99.233	6.003	552
208	714	7135	169.217	176.162	92.217	6.177	552
209	209	4187	-29.854	173.038	87.953	6.198	542
210	210	4207	-41.686	169.169	85.743	6.272	542
211	211	4227	-48.655	165.132	85.344	6.313	552
212	212	4247	-80.751	162.581	84.073	6.339	542
213	213	4267	-85.626	158.780	84.147	6.368	542
214	214	4287	-87.208	154.389	84.392	6.409	552
215	215	4307	-79.880	148.561	84.633	6.483	543
216	216	4327	-67.697	142.050	81.486	6.561	552
217	217	4347	-74.207	137.941	79.493	6.622	552
218	218	4367	-80.958	134.144	78.607	6.675	552
219	219	4387	-86.900	129.972	78.286	6.713	552
220	220	4407	-90.597	124.014	78.539	6.713	552
221	221	4427	-90.003	117.774	78.574	6.763	542
222	745	7463	-90.000	114.528	78.574	6.560	542
223	746	7473	-90.000	110.780	78.574	6.800	542
224	717	7150	-90.000	108.282	78.574	6.815	553
225	718	7151	-90.000	102.034	78.574	6.815	553
226	226	4527	-90.000	99.036	78.574	6.865	552
227	227	4547	-90.000	95.038	78.574	6.713	552
228	228	4567	-90.000	91.040	78.574	6.763	532
229	229	4587	-90.000	87.295	78.574	6.713	552
230	230	4607	-90.000	84.178	78.574	6.248	542
231	231	4627	-90.000	79.332	78.574	6.032	542
232	232	4647	-90.000	76.331	78.574	5.865	542
233	233	4667	-90.000	71.469	78.574	5.037	542
234	720	7203	-90.000	69.014	78.574	4.928	552
34A	1034	688	88.977	101.321	65.545	6.866	542
36A	1036	728	40.392	105.989	63.383	6.866	542
37A	701	7004	46.061	115.440	62.990	6.831	542
38A	706	7053	-135.996	118.230	58.469	6.741	542
40A	1040	808	-115.060	126.583	49.164	6.573	542
41A	1041	828	-101.575	131.539	51.686	6.592	542
42A	1042	848	122.303	133.447	51.786	6.589	542
52A	1052	1048	-93.531	168.169	48.275	6.561	542
53A	1053	1068	-72.841	171.616	49.616	6.561	542
54A	1054	1088	-52.932	174.192	50.853	6.561	542
55A	1055	1108	-32.992	176.268	52.785	6.541	542
56A	1056	1128	-14.259	177.765	55.262	6.508	542
57A	1057	1148	8.343	178.396	59.098	6.450	542
58A	1058	1168	28.799	176.858	62.808	6.409	542
59A	1059	1188	43.232	173.943	65.283	6.405	542
64A	1064	1288	128.783	156.547	68.939	6.529	542
65A	1065	1308	144.232	155.176	63.964	6.561	542
66A	1066	1328	-14.951	148.959	59.150	6.628	542
68A	1068	1368	-32.836	147.022	48.884	6.588	542
80A	1080	1608	-158.086	114.675	63.978	6.837	542
81A	1081	1628	179.652	115.142	68.340	6.833	542
82A	1082	1648	155.032	115.844	71.631	6.821	542
83A	1083	1668	133.816	117.633	73.862	6.799	542
104A	1104	2088	-68.131	175.581	76.115	6.302	542
105A	1105	2108	-52.359	178.316	77.497	6.275	542
106A	1106	2128	-34.745	180.442	79.713	6.238	542
107A	1107	2148	-17.455	181.685	82.351	6.190	542

INTERFACE POINT COORDINATES

SPR-NAM	SPR-NO	NOD-NO	COL-PHI	X[m]	Y[m]	Z[m]	TYPE
SW1			0.00	64.4787	80.0743	5.635	
SW2			0.00	67.3787	80.0743	5.635	
SW3			0.00	64.4787	77.0743	5.635	
SW4			0.00	67.3787	77.0743	5.635	

INTERFACE POINT COORDINATES

SPR-NAM	SPR-NO	NOD-NO	COL-PHI	X[m]	Y[m]	Z[m]	TYPE
MT-1	235	4707	180.000	148.335	68.787	81.428	5.240	542
MT-2	236	4727	180.000	171.899	69.641	83.889	5.582	542
MT-3	237	4747	180.000	180.000	69.679	86.749	5.921	542
MT-4	238	4767	180.000	180.000	69.679	89.564	6.263	542
MT-5	239	4787	180.000	180.000	69.679	91.944	6.409	542
MT-6	240	4807	180.000	180.000	69.679	95.894	6.409	542
MT-7	241	4827	180.000	180.000	69.679	98.274	6.409	542
MT-8	242	4847	180.000	180.000	69.679	101.914	6.409	542
MT-9	243	4867	180.000	180.000	69.679	104.294	6.409	542
MT-10	244	4887	180.000	180.000	69.679	107.294	6.409	542

ALL MEASUREMENTS IN METER

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT	REMARKS

INGENIEURBUERO STENGEL GmbH
Steel and Fatigue analysis Mechanical engineering Amusement rides Custom software
Rosenkavalier Str. 24 81475 Munich Germany Phone: +4989874551-0 Fax: +4989874551-44

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Remarks: STE_Prj. 1912

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 13.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing–No. (EEC):		
Project No.: 5224	Weight [kg]:	Scale: 1:133	Size: A0
Subject: Interface points at column footings	File Name: 5224-01-0003E.DWG	Next Assembly No.:	
	Drawing No.: 5224-01-0003	Sheets: 2 of 2	Rev.: E

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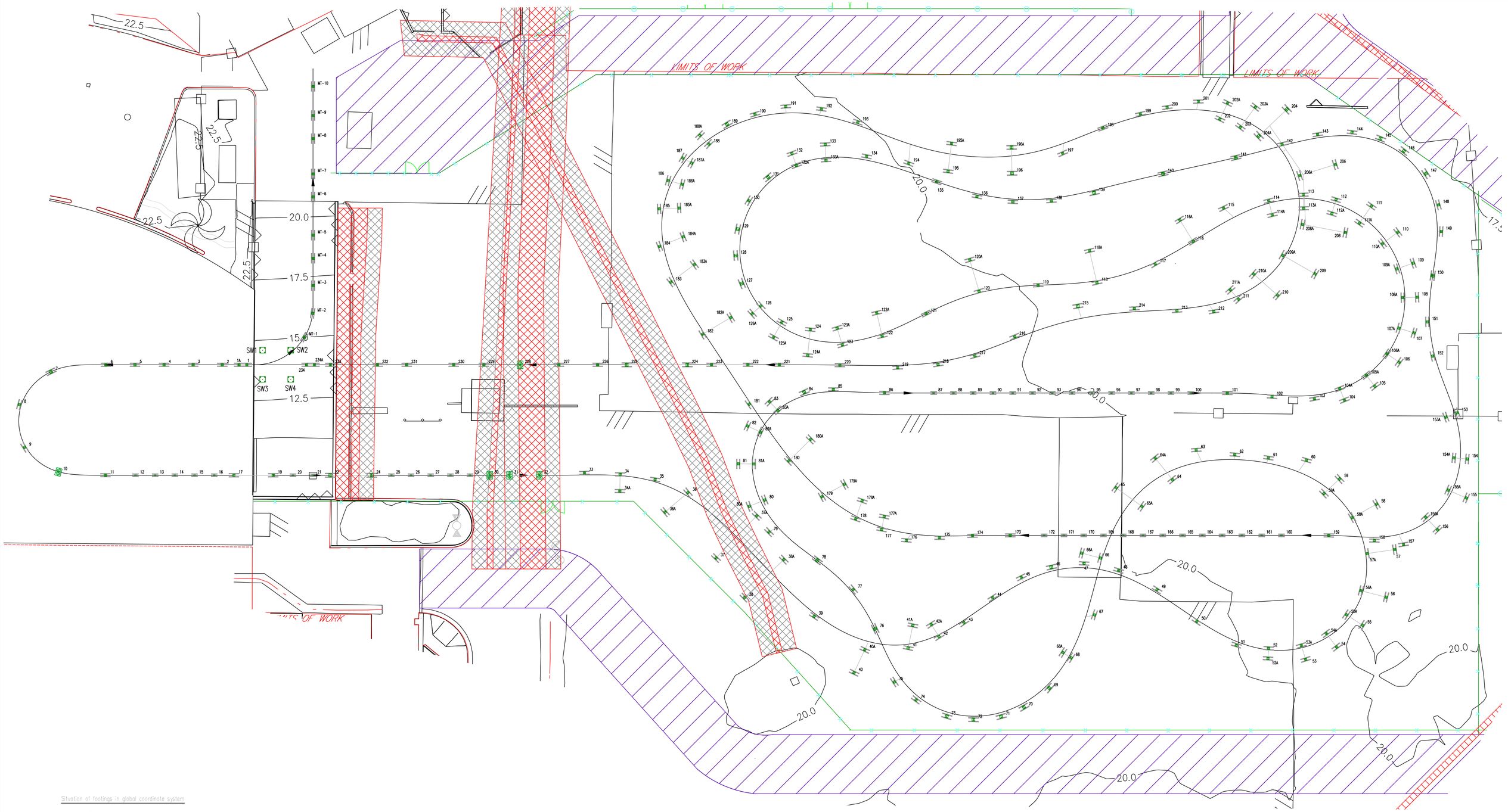
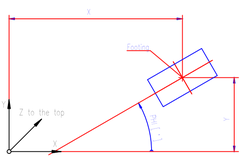
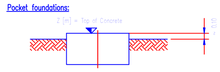
Rev.	Date	Name	Change
B	27.01.2020	STE_RK	Preliminary foundation loads
C	28.01.2020	STE_RK	NoGo-Zones added
D	09.03.2020	STE_RK	General update of the entire track
E	04.11.2020	STE_AD	Update columns 7,8,9,11,17 and 19; correction SW1 to SW4; added missing footing details



Situation of footings in global coordinate system

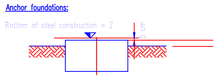


Pocket foundations:



Because of risk of corrosion at the steel columns, the foundations must be out of the soil > 0.10 m.
Maximum tolerances in X- and Y-direction = ± 5 mm
Maximum tolerances in Z-direction = ± 5 mm

Anchor foundations:



Maximum tolerances for Anchor in X and Y-direction = ± 1.5 mm
Maximum tolerances for Anchor in Z-direction = ± 1.5 mm

SPR-NAM – Spring name
SPR-NO – Spring number
NOD-NO – Node number

Interface point coordinates

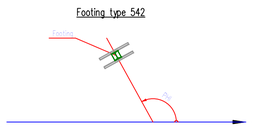
X [m] X-coordinate of interface point, refers to the IAR/STE coordinate system in meter.
Y [m] Y-coordinate of interface point, refers to the IAR/STE coordinate system in meter.
Z [m] Z-coordinate (height) of interface point, refers to the IAR/STE coordinate system in meter.
PHI angle for orientation of footing refers to the X-axis of the global coordinate system

All angles in degree.

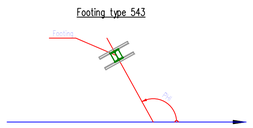
Footing type 522

Footing type 532

Footing type 542

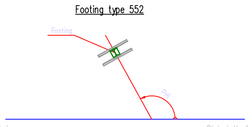


Footing type 543

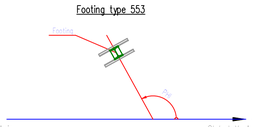


Footing type 551

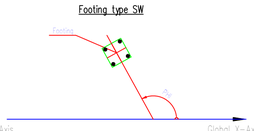
Footing type 552



Footing type 553



Footing type SW



ALL MEASUREMENTS IN METER

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 13.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:133	Size: A0
Subject: Interface points at column footings	File Name: 5224-01-0003E.DWG	Next Assembly No.:	
	Drawing No.: 5224-01-0003	Sheets: 1 of 2	Rev.: E

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Amusement engineering
Amusement rides
Custom software
Rosenheimer Str. 24
81476 Munich
Germany
Phone: +49(89)74507-0
Fax: +49(89)74507-44

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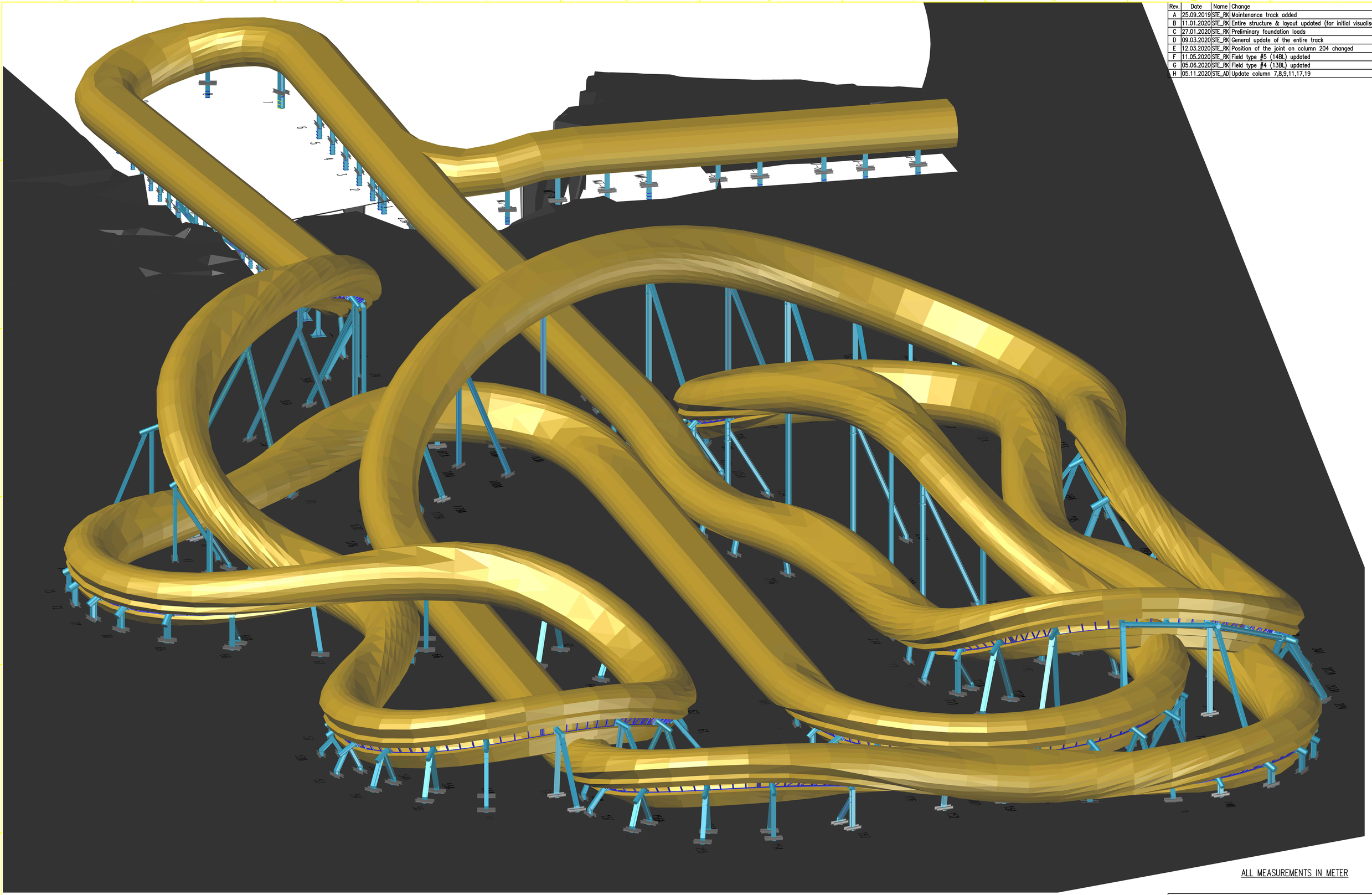
Rev.	Date	Name	Change
A	25.09.2019	STE_RK	Maintenance track added
B	11.01.2020	STE_RK	Entire structure & layout updated (for initial visualisation only)
C	27.01.2020	STE_RK	Preliminary foundation loads
D	09.03.2020	STE_RK	General update of the entire track
E	12.03.2020	STE_RK	Position of the joint on column 204 changed
F	11.05.2020	STE_RK	Field type #5 (14BL) updated
G	05.06.2020	STE_RK	Field type #4 (13BL) updated
H	05.11.2020	STE_AD	Update column 7,8,9,11,17,19



ALL MEASUREMENTS IN METER

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
custom software

Nesselwanger Str. 24
81476 Munich
Germany
Phone: +4989874551-0
Fax: +4989874551-44

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Remarks: STE_Proj. 1912

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 13.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EDO):		
Project No.: 5224	Weight [kg]:	Scale: 1:200	Size: A0
Subject: 3D structure	File Name: 5224-01-0004H.DWG	Next Assembly No.:	
	Drawing No.: 5224-01-0004	Sheets: 1	Rev.: H

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Rev.	Date	Name	Change

Stress relief heat treatment

The splice traverses of the following track splices have to be subjected to a stress relief heat treatment:

Table 1: Stress relief heat treatment at splice

Splice
20SS35
20SS39
20SS42
20SS45
20SS47
20SS49
20SS80
20SS87
20SS90
20SS97
20SS104
20SS109
20SS124
20SS135
20SS137
20SS144

The support traverses of the following track supports have to be subjected to a stress relief heat treatment:

Table 3: Stress relief heat treatment at support

Support
56
61
69
74

Slip surface grade

All track splice contact surfaces with primer only according to 5.2 except the following:

Table 2: Slip surface grade at splice

Splice	Slip surface grade
none	

All track support head plate contact surfaces with primer only according to 5.2 except the following:

Table 4: Slip surface grade at support

Support	Slip surface grade
56	Friction point (56.01)

Horizontal diagonals

Following track elements have to be equipped partially or completely with horizontal diagonals (pos. no. 210) acc. to drawing 02-7004:

Table 5: Horizontal diagonals need to be added for the following track elements.

Track element	From track traverse – to track traverse
TE021	20SS47 – 20SS49
TE022	20SS49 – 20SS52
TE023	20SS52 – 20SS54
TE024	20SS54 – 12BL 312
TE030	20ST67 – 20SS67
TE031	20SS67 – 12BL 399
TE035	20ST74 – 20SS75
TE036	20SS75 – 25ST77
TE042	20ST96 – 20SS97
TE043	20SS97 – 23ST99
TE046	20ST108 – 20SS109
TE047	20SS109 – 23ST111
TE054	20ST135 – 20SS137
TE055	20SS137 – 23ST137

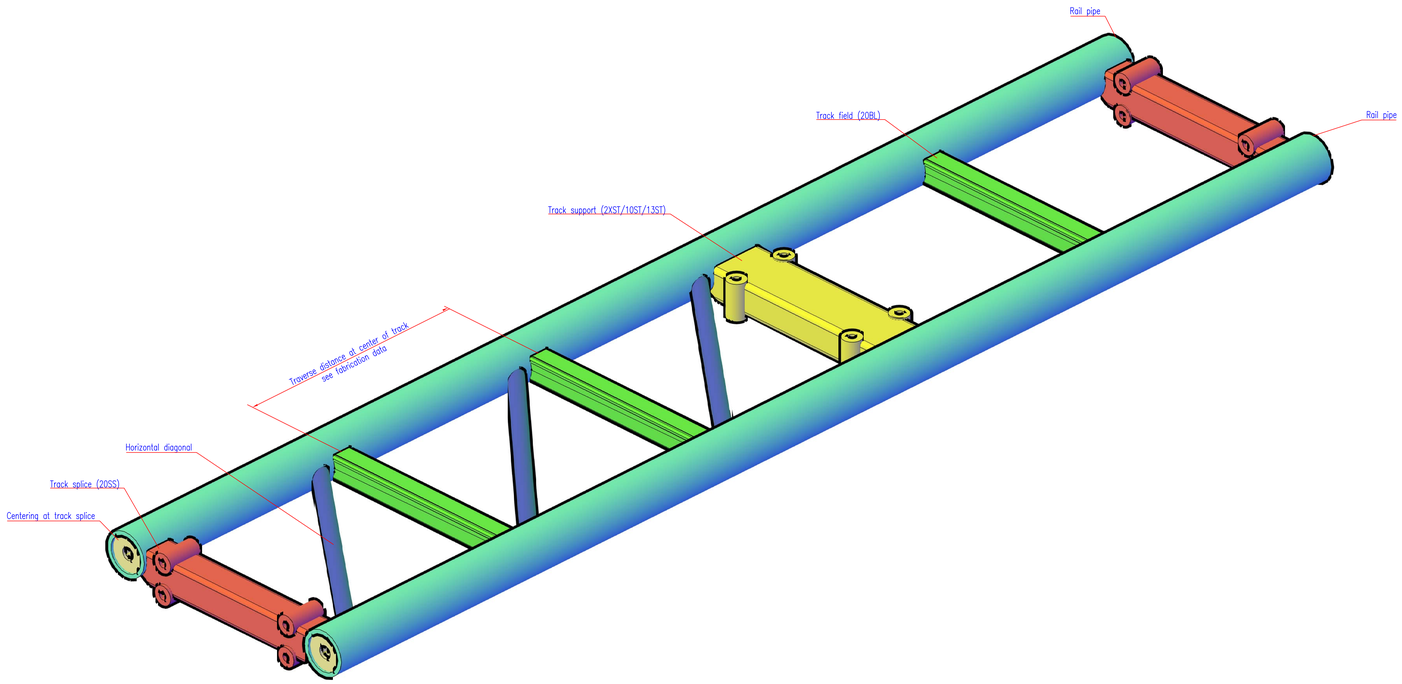
Field traverse type

All track elements use "Standard field traverse – RHS 70x70x4.0 mm" (pos. no. 220) acc. to drawing 02-7001 except the following:

Table 6: Reinforced field traverse

Track element	From track splice – to track splice	Cross section profile
none	–	70x70x6.3

Track overview – not to scale



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≥960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

4. HEAT TREATMENT
4A STRESS RELIEVING OF WELDED PARTS OR ITEMS IN THE HEAT TREATMENT FURNACE TO BE DEFINED AS FOLLOWS: ITEM NO(S). STRESS RELIEVING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
4B STRESS RELIEVE HEAT TREATMENT AFTER WELDING & BEFORE FINAL MACHINING:
STRESS RELIEVING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-I007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY [illegible] ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

Parts

Pos.-no.	Part name	Section	Material	Standard	Approx. part weight	Parts per item	Approx. total weight
	Rail pipe	CHS 139.7 x t, for wall thickness see fabrication data	S355J2H	DIN EN 10210-1 seamless			
						total weight per ITEM:	

Drawing reference

Element name	Drawing no.
Field type #1 (20BL)	02-7001
Support type #1 (2XST/10ST/13ST)	02-7002
Splice type #1 (20SS)	02-7003
Horizontal diagonals	02-7004
Assembly	02-7005
Centering at track splice	02-7901

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Amusement technology
Amusement rides
Custom software
Brandenburger Str. 24
81476 Munich
Germany
Phone: +4989/745017-0
Fax: +4989/745017-44

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Remarks: STE_Prj: 1912

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_BK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: TWO PIPE TRACK Overview	File Name: 5224-02-7000.DWG	Next Assembly No.:	
	Drawing No.: 5224-02-7000	Sheets: 1 of 1	Rev.:

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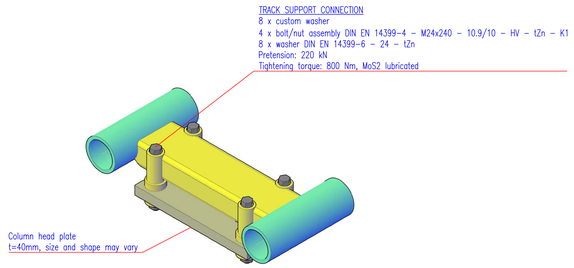
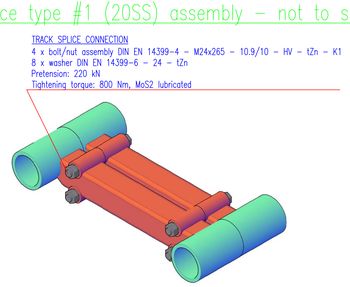
Rev.	Date	Name	Change

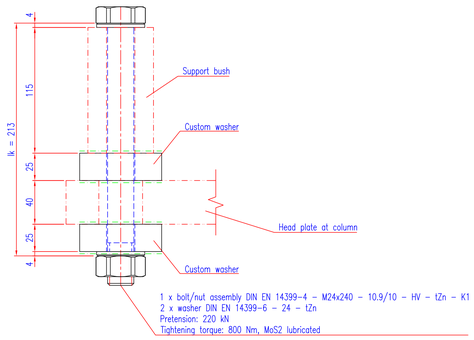
Track support type #1 (2XST/10ST/13ST) assembly – not to scale



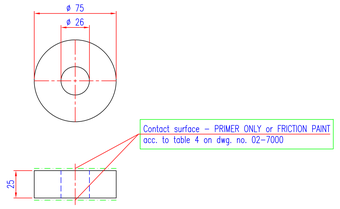
Track splice type #1 (2OSS) assembly – not to scale



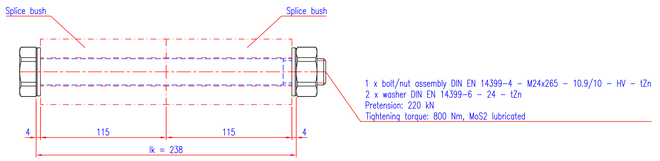
TRACK SUPPORT bolt



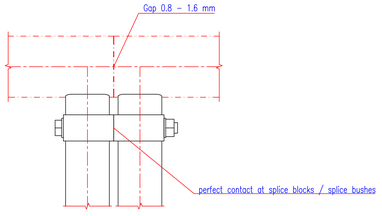
Custom washer



TRACK SPLICE bolt



Track splice contact rule – scale: 1:5



Recommended fasteners at TRACK SUPPORT TYPE #1 (20ST/10ST/13ST) CONNECTION						
Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Custom washer	Plate t=25	S355JR	DIN EN 10025-2	0.76	8	6.08
Bolt/nut assembly	M24x240		DIN EN 14399-4 – 10.9/10 – HV – tZn – K1	1.13	4	4.52
Washer	24		DIN EN 14399-6 – tZn	0.03	8	0.24
				total weight per ITEM [kg]:		10.84

Recommended fasteners at TRACK SPLICE TYPE #1 (20SS) CONNECTION						
Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Bolt/nut assembly	M24x265		DIN EN 14399-4 – 10.9/10 – HV – tZn – K1	1.21	8	9.68
Washer	24		DIN EN 14399-6 – tZn	0.03	16	0.48
				total weight per ITEM [kg]:		10.16

General specifications see dwg. no. 02-7000

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK | Company ID: STE | Date: 10.09.2019
Checked by: | Date:
Project: Family Launch Coaster, SeaWorld San Diego
Orig. Drawing-No. (EEO):
Project No.: 5224
Weight [kg]: | Scale: 1:2 | Size: A0
Subject: TWO PIPE TRACK Assembly
File Name: 5224-02-7005.DWG | Next Assembly No.:
Drawing No.: 5224-02-7005 | Sheets: 1 of 1 | Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: ++49(0)8745517-0
Fax: ++49(0)8745517-44

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Remarks: STE_Prj: 1912

Rev.	Date	Name	Change

Stress relief heat treatment

The splice traverses of the following track splices have to be subjected to a stress relief heat treatment:

Table 1: Stress relief heat treatment at splice
Splice
none

The support traverses of the following track supports have to be subjected to a stress relief heat treatment:

Table 3: Stress relief heat treatment at support
Support
none

Slip surface grade

All track splice contact surfaces with primer only according to 5.2 except the following:

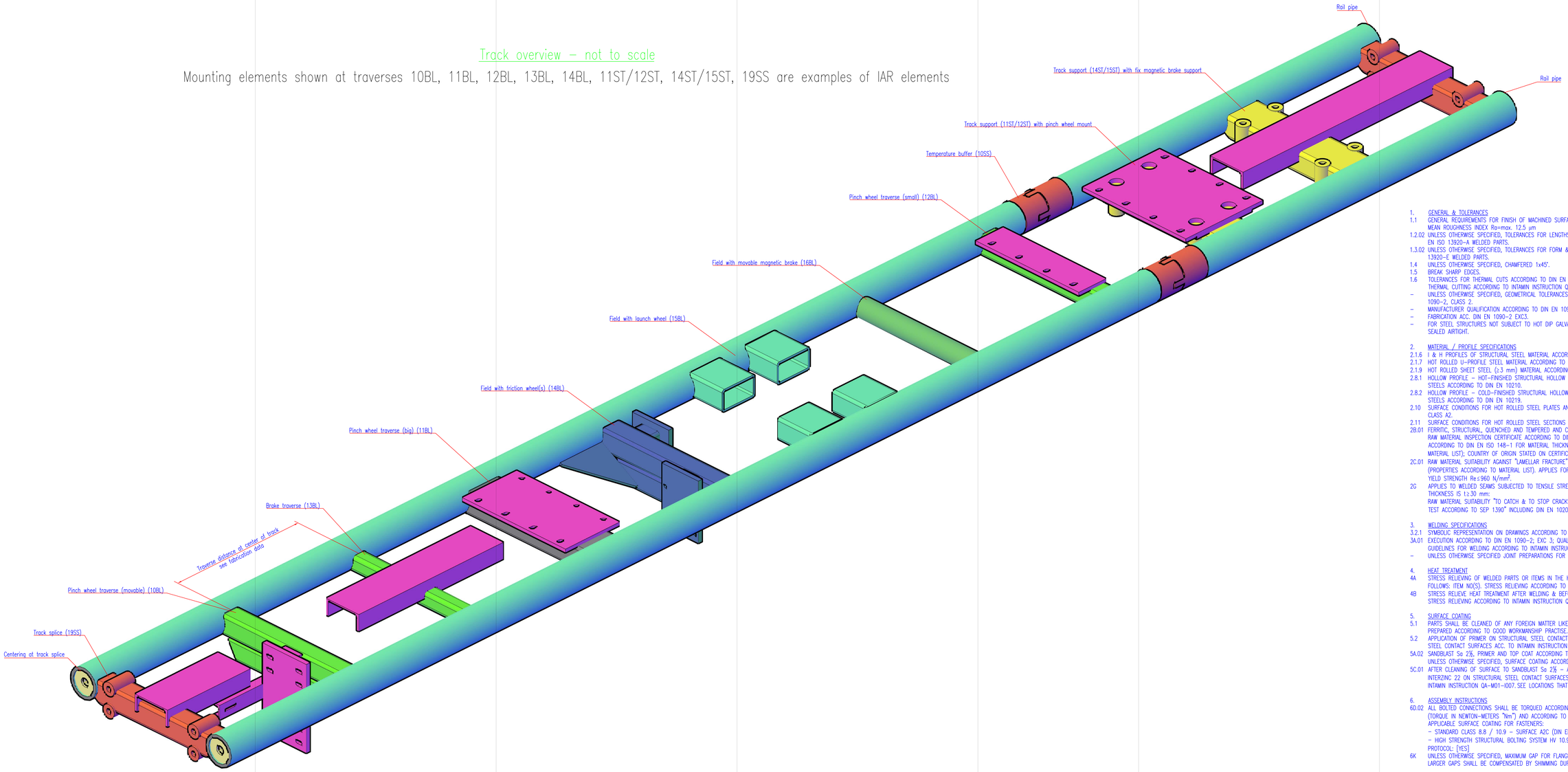
Table 2: Slip surface grade at splice	
Splice	Slip surface grade
none	

All track support head plate contact surfaces with primer only according to 5.2 except the following:

Table 4: Slip surface grade at support	
Support	Slip surface grade
none	Friction paint (56-01)

Track overview – not to scale

Mounting elements shown at traverses 10BL, 11BL, 12BL, 13BL, 14BL, 11ST/12ST, 14ST/15ST, 19SS are examples of IAR elements



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm: RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

4. HEAT TREATMENT
4A STRESS RELIEVING OF WELDED PARTS OR ITEMS IN THE HEAT TREATMENT FURNACE TO BE DEFINED AS FOLLOWS: ITEM NO(S). STRESS RELIEVING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
4B STRESS RELIEVE HEAT TREATMENT AFTER WELDING & BEFORE FINAL MACHINING:
STRESS RELIEVING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY -.-.-.-.- ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: (YES)
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

Bolt connection at track splice type #2 and support type #1 and #2 similar to drawing 02-7005 (2PT assembly)

Drawing reference		
Element name	Drawing no.	Comment
Field type #1 (10BL)	02-7051	Field with pinch wheel (movable)
Field type #2 (11BL)	02-7052	Field with pinch wheel (big)
Field type #3 (12BL)	02-7053	Field with pinch wheel (small)
Field type #4 (13BL)	02-7054	Field with fix magnetic brake support
Field type #5 (14BL)	02-7055	Field with friction wheel(s)
Field type #6 (15BL)	02-7056	Field with launch wheel
Field type #7 (16BL)	02-7057	Field with movable magnetic brake
Support type #1 (11ST/12ST)	02-7058	Support with pinch wheel
Support type #2 (14ST/15ST)	02-7059	Support with fix magnetic brake support
Splice type #1 (10SS)	02-7060	Temperature splice
Splice type #2 (19SS)	02-7061	Splice with fix magnetic brake support
Centering at track splice	02-7901	

Parts						
Pos.-no.	Part name	Section	Material	Standard	Approx. part weight	Parts per item	Approx. total weight
	Rail pipe	CHS 139.7 x t, for wall thickness see fabrication data	S355J2H	DIN EN 10210-1 seamless			
						total weight per ITEM:	

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego		
Project No.: 5224	Orig. Drawing-No. (EEO):	
Weight [kg]: –	Scale: –	Size: A0
Subject: INSTALLATION TRACK	File Name: 5224-02-7050.DWG	Next Assembly No.:
Overview	Drawing No.: 5224-02-7050	Sheets: 1 of 1
		Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Dynamic fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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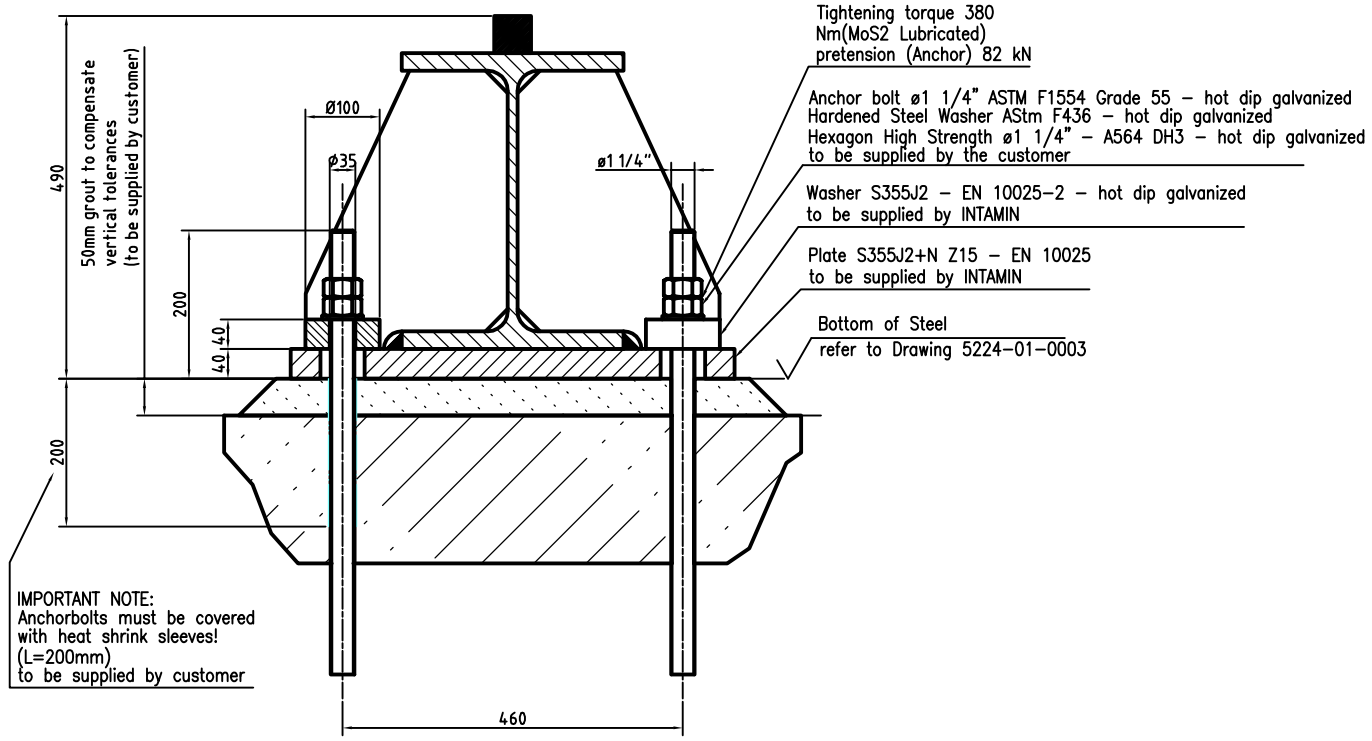
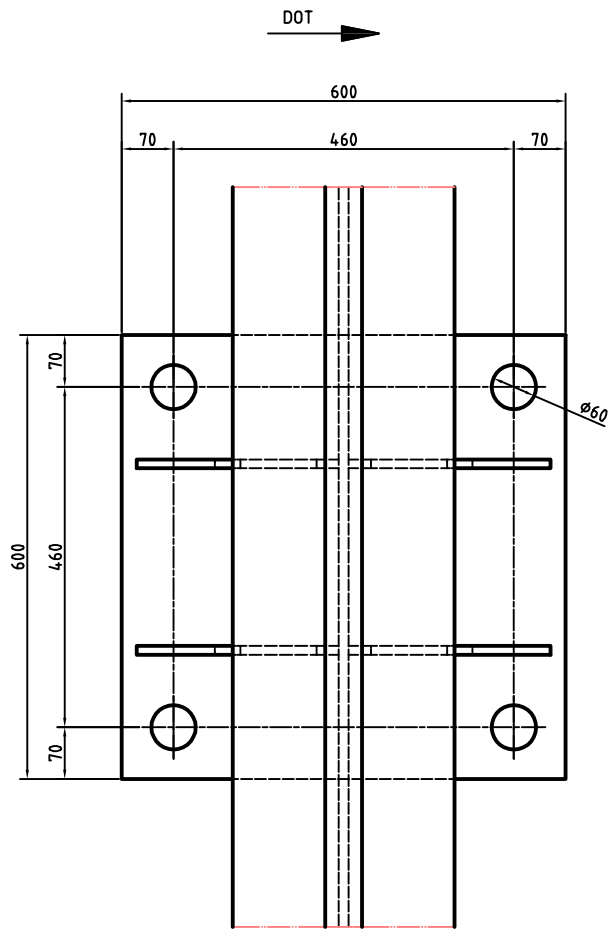
Remarks: STE_Prj: 1912





Foundation specification

RECOMMENDED ANCHOR BOLTS BY Intamin
Alternative anchor bolts, nuts and template washers may be used. In any case, the anchor prestress must be identical to the value specified in this drawing. Other anchor diameters affect the diameter of the drilled hole in the custom washer and the adjustability of the footing.
If set nuts are used to level a column during erection, the base plate has to be shimmed and the set nuts have to be lowered before pouring the grout.

Adjustability:
Total horizontal adjustability: SQRT(x^2+y^2): ±14 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

Tolerances:
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is defined for x, y, z coordinates with ± 1.5mm.

Foundation design:
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundation and subsoil, including but not limited to concrete and grout grade, anchor nuts and washers (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of Intamin Amusement Rides and has to be done by third party. All statements here are just recommendationsAnchors, nuts, washers, embedding into the concrete and the foundations themselves have to be dimensioned and done by third–party. All given statements are just recommendations.

Loads:
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Intamin Amusement Rides. The foundation loads act at the load application point indicated in this drawing.

Required minimum concrete / grout specifications
The assumed values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required. The minimum specifications comprise but are not limited to:

Concrete
Concrete specifications acc. DIN EN 1992–1–1
Reinforced concrete, minimum strength classification C25/30
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application. Reinforcement with at least 4.0 cm protective concrete coverage.

Grout
The space between steel and concrete has to be completely filled up with a rigid, non–shrinking, and pressure resistant grout with the following minimum requirements:
- formulated for deep section grouting (for concrete case foundations only)
- non–shrinking type, shrinking compensation and expansion
- free flow to fill even narrow gaps
- high bond strength to steel and concrete
- good fatigue and impact resistance
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck} =30 N/mm² at the time of first load application / prestressing.

Detail design, dimensions, reinforcement, material specification / definition and calculation to be provided by third party.

Asymmetric washers to be provided by Intamin. Anchor rods, nuts and washers to be provided by third party.

Rev.	Date	Name	Change
A	12.11.2020	AR–MR	Removed "all statements here are just recommendations" from
			foundation design. Updated Anchors torque from 460 Nm to 38 Nm

1. GENERAL / TOLERANCES
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSION ACCORDING TO EN ISO 13920–A (WELDED PARTS).
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO EN ISO 13920–E (WELDED PARTS).
1.5 BREAK SHARP EDGES.

2. MATERIAL SPECIFICATIONS
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163–2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163–3 CLASS C1.
2B.01 FERRITIC STEELS, STRUCTURAL STEELS, CASE HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE acc. DIN EN 10204 – 3.1 incl. IMPACT TEST acc. EN ISO 148–1 FOR MATERIAL THICKNESSES 6 ≤ t ≤ 150 mm (K > 27J at –20°C); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t ≥ 30 mm:. RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" – TO BE APPROVED BY "WELD BEAD BEND TEST acc. SEP 1390" INCL. EN 10204–3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO ISO 2553 – System A.
3A.01 EXECUTION acc. DIN EN 1090–2; EXC 3; IMPERFECTION LEVEL B; ISO 5817 (Fe)
- QUALIFICATION TEST OF WELDERS: ACCORDING DIN EN 287–1 / ISO 9606–1 AND DIN EN 1418 ISO 14732: STEELS
- SPECIFICATION AND WELDING PROCEDURES QUALIFICATION (WPQ) FOR METALLIC MATERIAL ACC. DIN EN ISO 15614–1
- WELDING COORDINATION – TASKS AND RESPONSIBILITIES ACCORDING DIN EN ISO 14731.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA–M01–I007.

6. ASSEMBLY DRAWINGS
6k UNLESS OTHERWISE SPECIFIED, MAX. GAP FOR FLANGE CONNECTIONS ≤0,5mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NON DESTRUCTIVE TESTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE LEVELS FOR INDICATIONS acc. ISO 17635. SUPPLEMENTARY VOLUMETRIC TESTING AND SURFACE TESTING IS REQUIRED AS DEFINED IN EN 1090–2 / –3. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME

ITEM NO(S):	WELD QUALITY LEVEL: ISO 5817 (Fe) ISO 10042 (Al)	EXTEND NDT:	PROTOCOL:
ALL	B	100%VT	YES
BUTT WELDS	B	20%MT+20%UT	YES
FILLET WELDS	B	10%MT	YES

7E ACCEPTANCE CRITERIA FOR EXAMINATION OF WELDED SEAMS:

WELD QUALITY LEVEL ISO 5817 / EN 1090	VT ISO 5817 (Fe) ISO 10042 (Al)	PT EN ISO 23277	MT EN ISO 23278	UT EN ISO 11666	RT EN 12517/1 (Fe) EN 12517/2 (Al)
B / EXC 3	LEVEL B	LEVEL 2x	LEVEL 2x	11666-2	12517 / 1-1
C / EXC 2	LEVEL C	LEVEL 2x	LEVEL 2x	11666-3	15517 / 1-2

Weight approx. 32kg

Pos.	Object	Material	Quantity	Unit	Remarks

INTAMIN Int. Corp. AMUSEMENT RIDES Est.

Drawn by: IAR_MR	Date: 11.03.2020
Checked by:	Date:
Subject: Family Launch Coaster	Partlist: / Rev.:
	Next Assembly No: / Size: A1
Part: Footing Type SW	File No.: 5224–03–0002A / Scale: 1:5
	Drawing No.: 5224–03–0002 / Rev.: A
	Drawing No.:(EEO)

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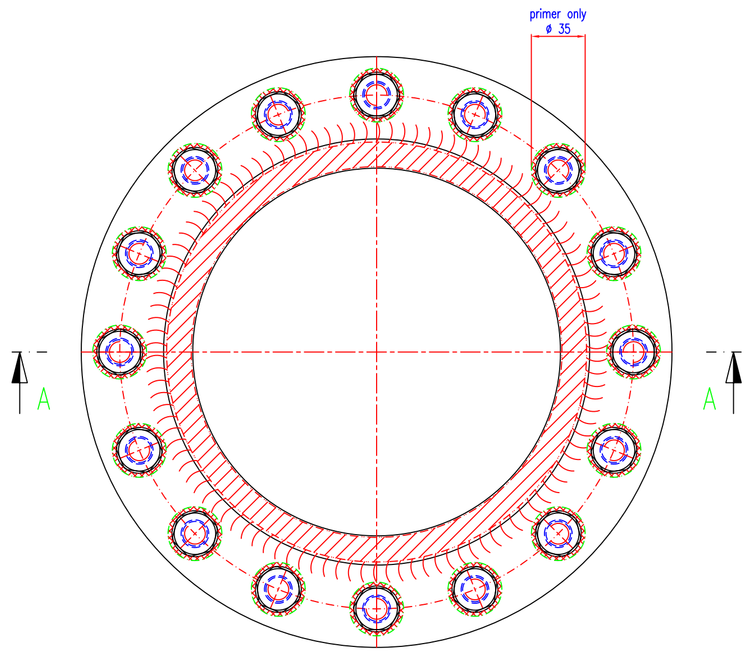
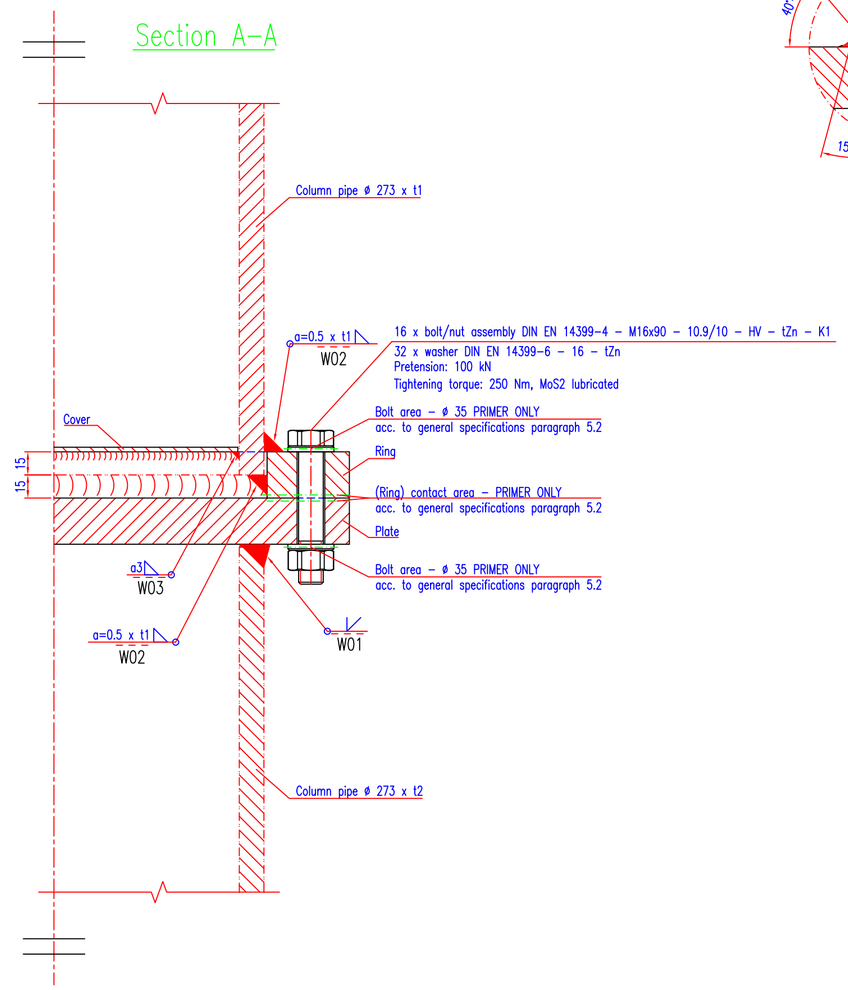
Rev.	Date	Name	Change

ITEM 2X_3
Column flange ø 273

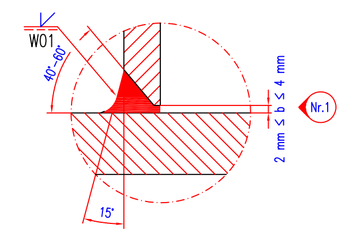


Section A-A

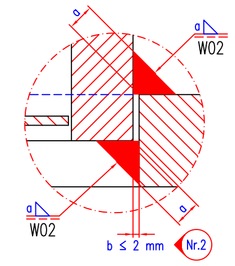


Details for welding

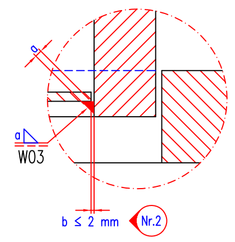
Butt weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.9 HOT ROLLED SHEET STEEL (≥3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm: RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY –·–·–·– ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004. APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S.):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W01	B	100 % VT + 20 % MT + 20 % UT	YES
W02	B	100 % VT + 20 % MT	YES
W03	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 2X	LEVEL 2

Ring – scale: 1:5

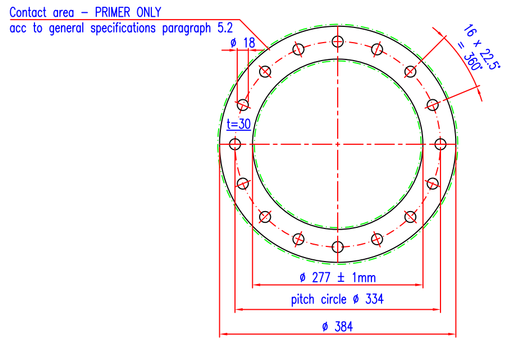
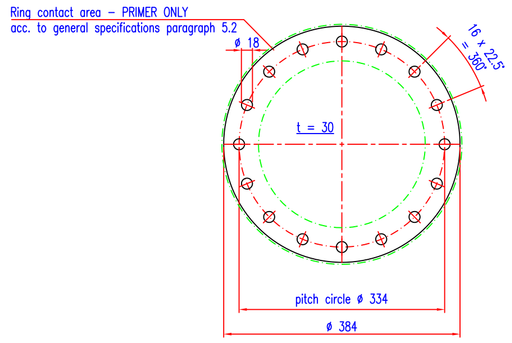
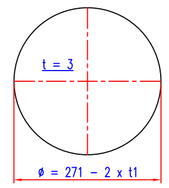


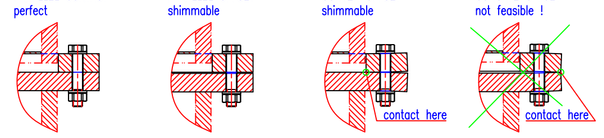
Plate – scale: 1:5



Cover – scale: 1:5

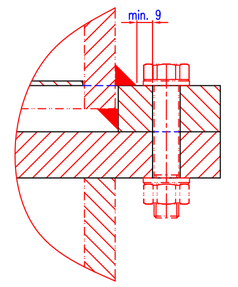


Flange connections before preloading bolts



Bolt to weld clearance

Minimum distance between weld transition and edge of bolt hole to avoid contact between HV-washer and welding seam:



Ports						
Part name	Section	Material	Standard	Approx. part weight	Parts per item	Approx. total weight
Ring	Plate t=30	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 – grid 100 mm.	12.12	1	12.12
Plate	Plate t=30	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 – grid 100 mm.	26.31	1	26.31
Cover	Plate t=3	S235JR	DIN EN 10025-2	1.10	1	1.10
					approx. weight per ITEM [kg]:	39.53

Recommended fasteners						
Part name	Section	Material	Standard	Approx. part weight	Parts per item	Approx. total weight
Bolt/nut assembly	M16x90		DIN EN 14399-4 – 10.9/10 – HV – tZn – K1	0.224	16	3.58
Washer	16		DIN EN 14399-6 – tZn	0.015	32	0.48
					approx. weight per ITEM [kg]:	4.06

INGENIEURBUERO STENGEL GmbH
Wasserburger Str. 24
81379 Munich
Phone: +49(89)745171-0
Fax: +49(89)745171-44

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Remarks: STE_PRJ 1912

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Project: Family Launch Coaster, SeaWorld San Diego
Project No.: 5224
Subject: Column flange ø 273.0
ITEM 2X_3

Drawn by: STE_RK | Company ID: STE | Date: 02.03.2020
Checked by: | Date:
Orig. Drawing-No. (EEO):
Weight [kg]: | Scale: 1:2 | Size: A0
File Name: 5224-03-0132.DWG | Next Assembly No.:
Drawing No.: 5224-03-0132 | Sheets: 1 of 1 | Rev.:

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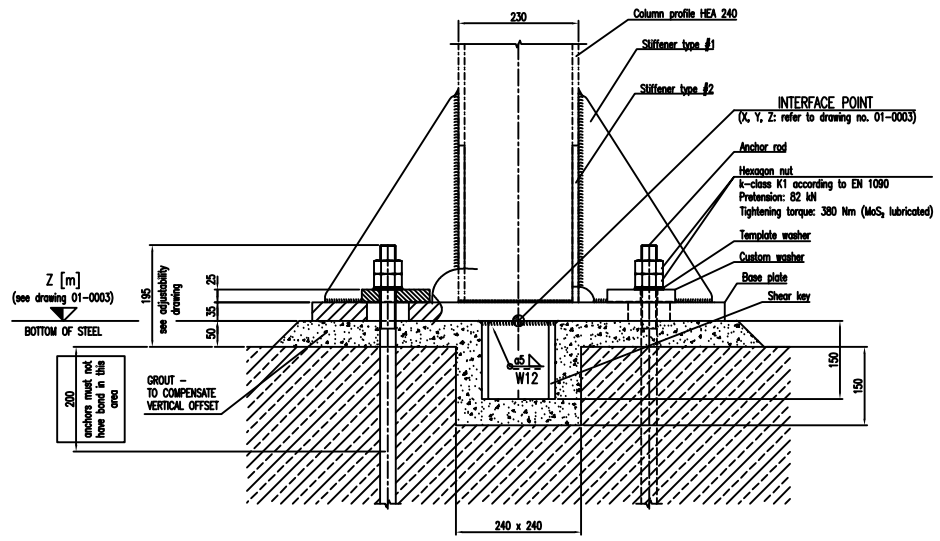
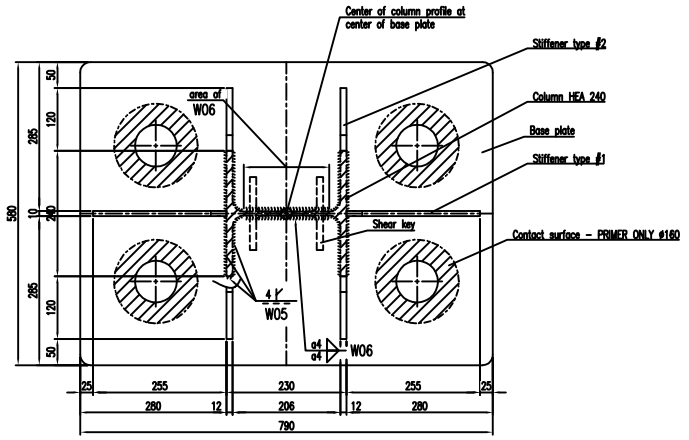
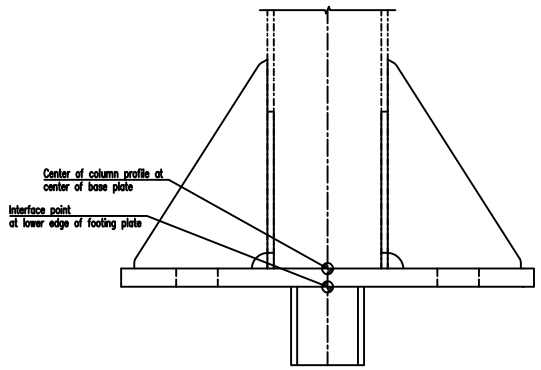
Rev.	Date	Name	Change
A	11.03.2020	AR-MR	Added dimensions pocket for shear key
B	06.11.2020	STE_AD	Removed "all statements here are just recommendations" from foundation design.

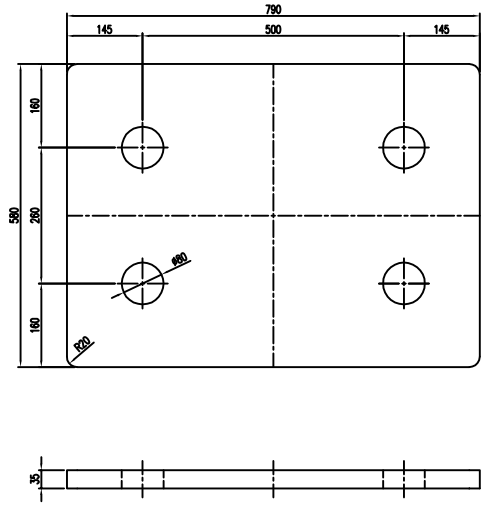
Column footing type #522 (Item 102_12)





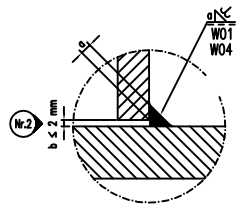


Base plate

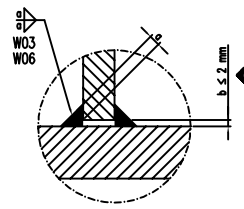


Details for welding

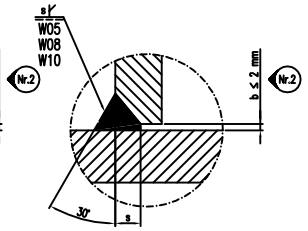
Fillet weld, special grade:
Quality level for imperfections "B" according to DIN EN ISO 5817. Welding joint and transition notch free. Dressed according to IIW recommendations 1823-07:2008 3.5.3.



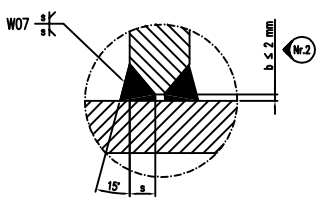
Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



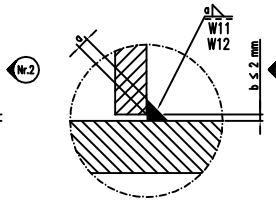
HY-weld.
Quality level for imperfections "B" according to DIN EN ISO 5817.



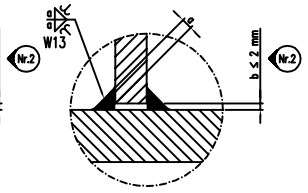
Double HY-weld.
Quality level for imperfections "B" according to DIN EN ISO 5817.



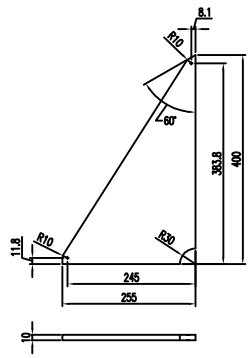
Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



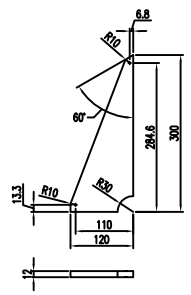
Double fillet weld, special grade:
Quality level for imperfections "B" according to DIN EN ISO 5817. Welding joint and transition notch free. Dressed according to IIW recommendations 1823-07:2008 3.5.3.



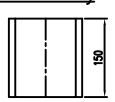
Stiffener type #1



Stiffener type #2

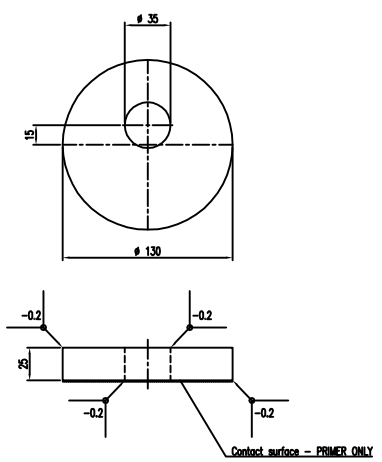


Shear key

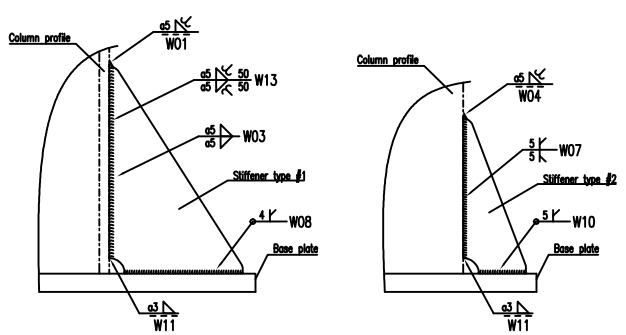


Custom washer – scale 1:2

Excentrically drilled hole. Adjust hole if alternative anchors are used.



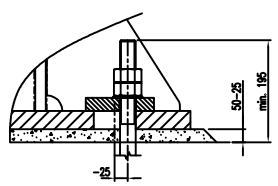
Stiffener welding detail



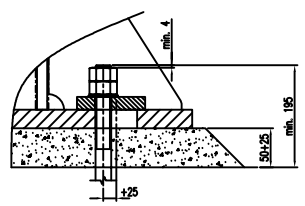
Adjustability of footings

Other anchor diameters affect the adjustability of the footing. For the recommended anchor, the adjustability is:
- Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
- Vertical adjustability: Δz: ± 25 mm

Shown with max. horizontal offset of −25 mm and max. vertikal offset of −25 mm



Shown with max. horizontal offset of +25 mm and max. vertikal offset of +25 mm



Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	Plate t=35	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 – grid 100 mm.	120.27	1	120.27
Stiffener type #1	Plate t=10	S355J2	DIN EN 10025-2	4.24	2	8.48
Stiffener type #2	Plate t=12	S355J2	DIN EN 10025-2	1.87	4	7.48
Shear key	HEB 140	S235JR	DIN EN 10025-2	5.06	1	5.06
Custom washer	Plate t=25	S355JR	DIN EN 10025-2	2.45	4	9.80
				total weight per ITEM [kg]:		151.09

Recommended anchoring		
Part name	Specification	Parts per item
Anchor rod	ø 1 1/4" ASTM F1554 Grade 55	4
Heavy hex nut	ø 1 1/4" – A564 DH3	8
Hardened steel washer	ASTM F436	4

Foundation specification

RECOMMENDED ANCHOR BOLTS BY Ingenieurbüro Stengel GmbH
Alternative anchor bolts, nuts and template washers may be used. In any case, the anchor prestress must be identical to the value specified in this drawing. Other anchor diameters affect the diameter of the drilled hole in the custom washer and the adjustability of the footing. If set nuts are used to level a column during erection, the base plate has to be shimmed and the set nuts have to be lowered before pouring the grout.

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non-shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck} =30 N/mm² at the time of first load application / prestressing.

1 GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
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1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
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– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2 MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm: RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3 WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5 SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-I007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF ACCONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY ~~~~~ ON THE DRAWINGS!

6 ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004. APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7 NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W01	B	100 % VT + 20 % MT	YES
W03	B	100 % VT + 20 % MT	YES
W04	B	100 % VT + 20 % MT	YES
W05	B	100 % VT + 20 % MT	YES
W06	B	100 % VT + 20 % MT	YES
W07	B	100 % VT + 20 % MT	YES
W08	B	100 % VT + 20 % MT	YES
W10	B	100 % VT + 20 % MT	YES
W11	B	100 % VT + 20 % MT	YES
W12	B	100 % VT + 20 % MT	YES
W13	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	UT-TESTING	
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 2X	LEVEL 2

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 02.03.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego		Orig. Drawing-No. (EED):	
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Footing type #522 Item 102_12	File Name: 5224-03-0522B.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0522	Sheets: 1 of 1	Rev.: B

INGENIEURBUERO STENGEL GmbH
Steel construction
Silos and hopper vessels
Machine and plant engineering
Custom-built

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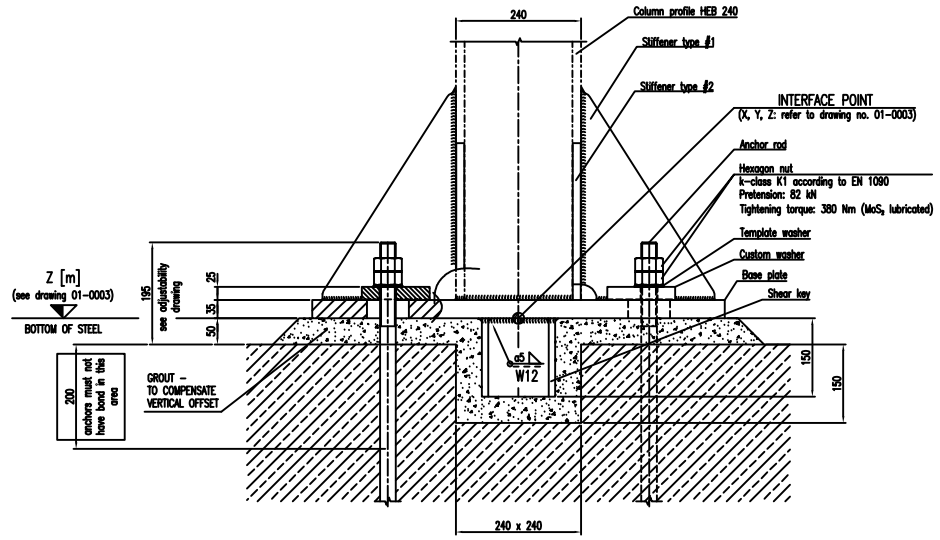
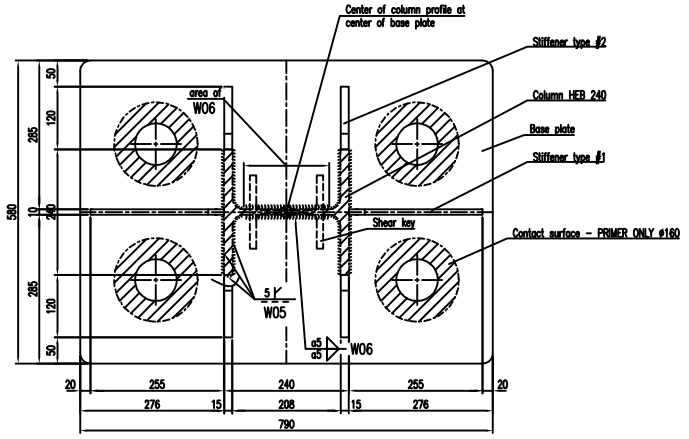
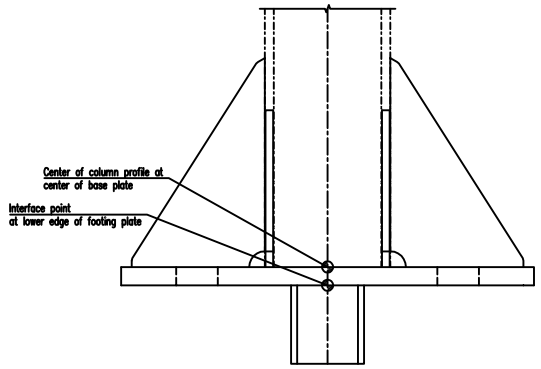
Template: STE_PRJ 2012

Rev.	Date	Name	Change
A	11.03.2020	AR–MR	Added dimensions pocket for shear key
B	06.11.2020	STE_AD	Removed"all statements here are just recommendations" from foundation design.

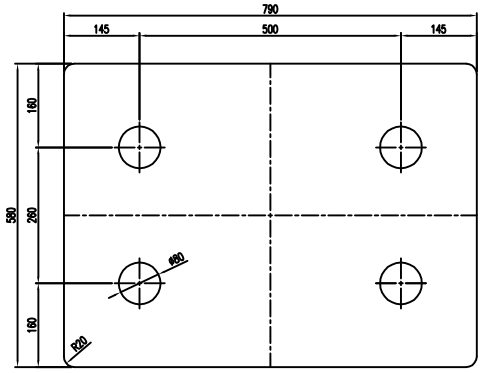
Column footing type #532
(Item 112_12)



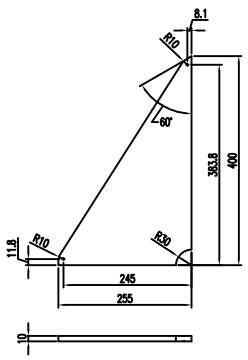




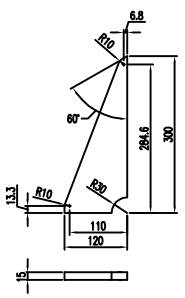
Base plate



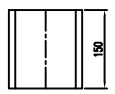
Stiffener type #1



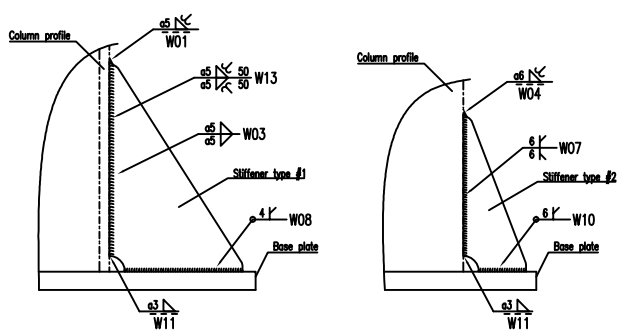
Stiffener type #2



Shear key

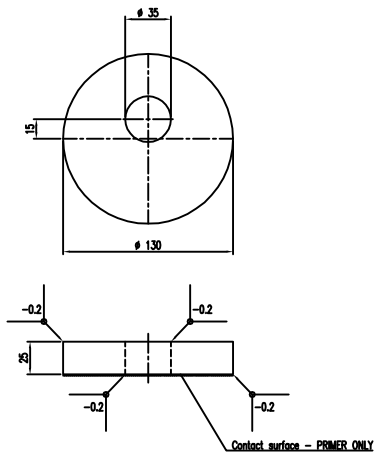


Stiffener welding detail



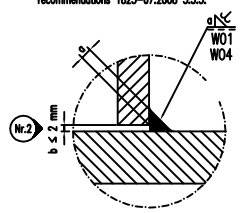
Custom washer – scale 1:2

Excentrically drilled hole. Adjust hole if alternative anchors are used.

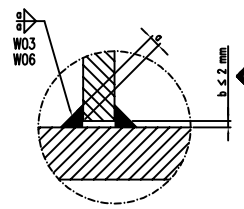


Details for welding

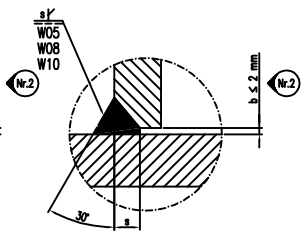
Fillet weld, special grade:
Quality level for imperfections "B" according to DIN EN ISO 5817. Welding joint and transition notch free. Dressed according to IIW recommendations 1823–07:2008 3.5.3.



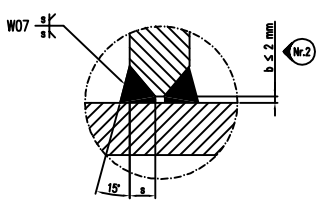
Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



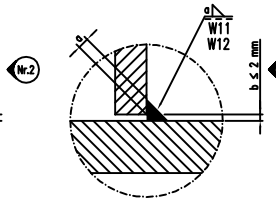
HY–weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



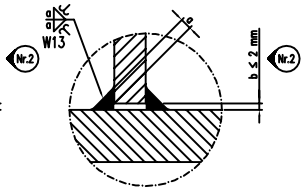
Double HY–weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



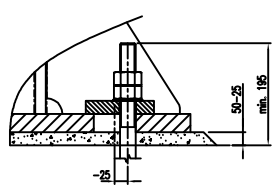
Double fillet weld, special grade:
Quality level for imperfections "B" according to DIN EN ISO 5817. Welding joint and transition notch free. Dressed according to IIW recommendations 1823–07:2008 3.5.3.



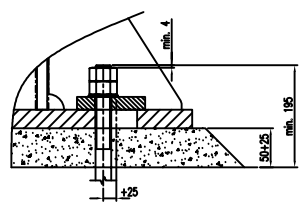
Adjustability of footings

Other anchor diameters affect the adjustability of the footing. For the recommended anchor, the adjustability is:
- Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
- Vertical adjustability: Δz: ± 25 mm

Shown with max. horizontal offset of –25 mm and max. vertikal offset of –25 mm



Shown with max. horizontal offset of +25 mm and max. vertikal offset of +25 mm



Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	Plate t=35	S355J2+N	DIN EN 10025–2 + DIN EN 10164–Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 – grid 100 mm.	120.27	1	120.27
Stiffener type #1	Plate t=10	S355J2	DIN EN 10025–2	4.24	2	8.48
Stiffener type #2	Plate t=15	S355J2	DIN EN 10025–2	2.33	4	9.32
Shear key	HEB 140	S235JR	DIN EN 10025–2	5.06	1	5.06
Custom washer	Plate t=25	S355JR	DIN EN 10025–2	2.45	4	9.80
				total weight per ITEM [kg]:		152.93

Recommended anchoring		
Part name	Specification	Parts per item
Anchor rod	# 1 1/4" ASTM F1554 Grade 55	4
Heavy hex nut	# 1 1/4" – A564 DH3	8
Hardened steel washer	ASTM F436	4

Foundation specification

RECOMMENDED ANCHOR BOLTS BY Ingenieurbüro Stengel GmbH
Alternative anchor bolts, nuts and template washers may be used. In any case, the anchor prestress must be identical to the value specified in this drawing. Other anchor diameters affect the diameter of the drilled hole in the custom washer and the adjustability of the footing. If set nuts are used to level a column during erection, the base plate has to be shimmed and the set nuts have to be lowered before pouring the grout.

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992–1–1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck}=25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non–shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck}=30 N/mm² at the time of first load application / prestressing.

1 GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12,5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920–A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920–E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013–441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA–M01–I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090–2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090–1 EXC3
– FABRICATION ACC. DIN EN 1090–2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2 MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163–2 CLASS A2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE–HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148–1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm: RAW MATERIAL SUITABILITY "TO CATCH ⊥ TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204–3.1 INSPECTION CERTIFICATE.

3 WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090–2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA–M01–I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5 SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA–M01–I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA–M01–I007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF ACZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA–M01–I007. SEE LOCATIONS THAT ARE MARKED BY –––––– ON THE DRAWINGS!

6 ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON–METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA–M01–I004. APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE ACC (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7 NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W01	B	100 % VT + 20 % MT	YES
W03	B	100 % VT + 20 % MT	YES
W04	B	100 % VT + 20 % MT	YES
W05	B	100 % VT + 20 % MT	YES
W06	B	100 % VT + 20 % MT	YES
W07	B	100 % VT + 20 % MT	YES
W08	B	100 % VT + 20 % MT	YES
W10	B	100 % VT + 20 % MT	YES
W11	B	100 % VT + 20 % MT	YES
W12	B	100 % VT + 20 % MT	YES
W13	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT–EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT–TESTING	MT–TESTING	UT–TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 2X	LEVEL 2

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 02.03.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing–No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Footing type #532 Item 112_12	File Name: 5224–03–0532B.DWG	Next Assembly No.:	
	Drawing No.: 5224–03–0532	Sheets: 1 of 1	Rev.: B

INGENIEURBUERO STENGEL GmbH
Beratende Ingenieure für Maschinenbau, Anlagenbau, Stahlbau, Anlagenbau, Fördertechnik, Lastaufnahmemittel, Sonderbau
Dreidemannger Str. 24 D-45359 Essen
Phone: +49(0)201/8217-0 Fax: +49(0)201/8217-44

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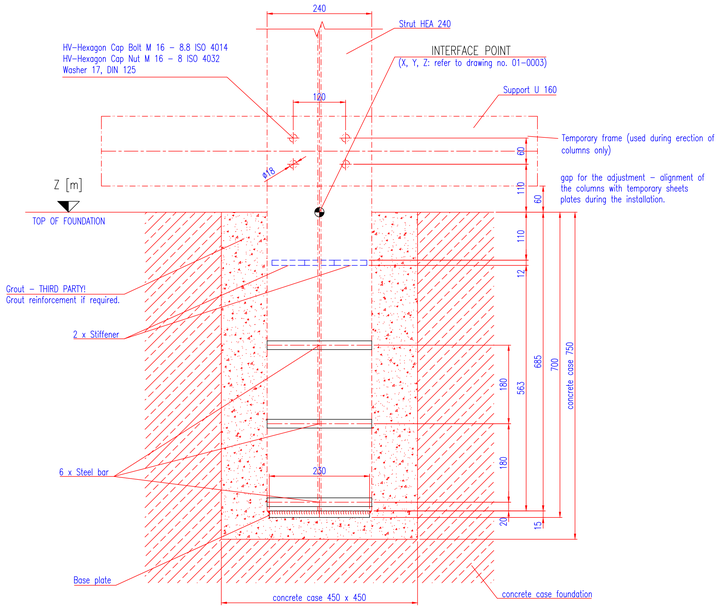
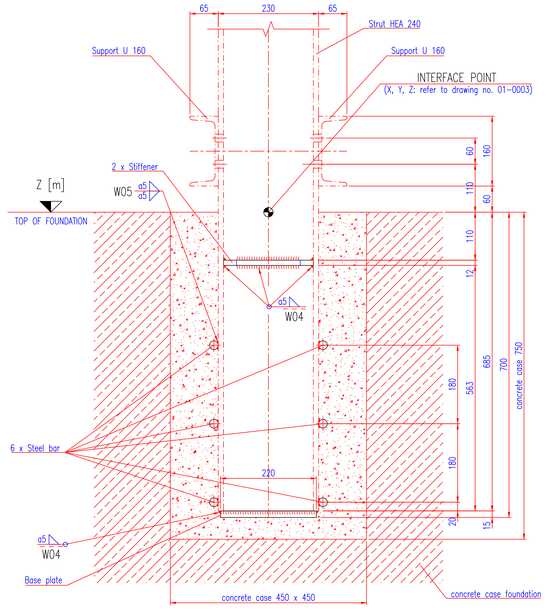
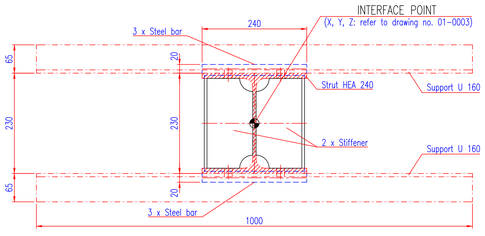
Remarks: STE_PM 1910

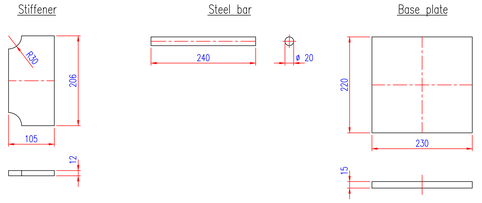
Rev.	Date	Name	Change

Column footing type #542
(Item 102_11)



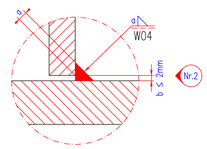




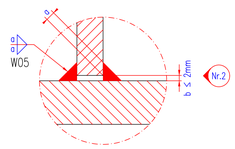


Details for welding

Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Foundation specification

RECOMMENDED ANCHOR BOLTS BY Ingenieurbüro Stengel GmbH
Alternative anchor bolts, nuts and template washers may be used. In any case, the anchor prestress must be identical to the value specified in this drawing. Other anchor diameters affect the diameter of the drilled hole in the custom washer and the adjustability of the footing.
If set nuts are used to level a column during erection, the base plate has to be shimmed and the set nuts have to be lowered before pouring the grout.

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors, nuts and washers (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party. All statements here are just recommendations.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the load application point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1
Reinforced concrete, minimum strength classification C25/30
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for concrete case foundations only)
- Non-shrinking type
- Free flow to fill even narrow gaps
- High bond strength to both steel and concrete
- Good fatigue and impact resistance
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck} =30 N/mm² at the time of first load application / prestressing.

1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441.
– THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS:
RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

4. HEAT TREATMENT
4A STRESS RELIEVING OF WELDED PARTS OR ITEMS IN THE HEAT TREATMENT FURNACE TO BE DEFINED AS FOLLOWS: ITEM NO(S). STRESS RELIEVING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
4B STRESS RELIEVE HEAT TREATMENT AFTER WELDING & BEFORE FINAL MACHINING:
STRESS RELIEVING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT.
UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZING 697 OR INTERZING 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY ------- ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S).:	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W04, W05	B	100% VT + 20% MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	plate t = 15	S355J2	DIN EN 10025-2	5.96	1	5.96
Stiffener	plate t = 12	S355J2	DIN EN 10025-2	1.90	2	3.80
Steel bar	Round ø 20	S355J2	DIN EN 10025-2	0.59	6	3.54
				approx. weight per ITEM [kg]:		13.30

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INGENIEURBUERO STENGEL GmbH
Steel construction
Welded and fatigue analysis
Machine design, welding
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Tel.: +49(0)7145517-0
Fax: +49(0)7145517-44

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Remarks: STE_PAJ 1912

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Column footing type #542 Item 102_11	File Name: 5224-03-0542.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0542	Sheets: 1 of 1	Rev.:

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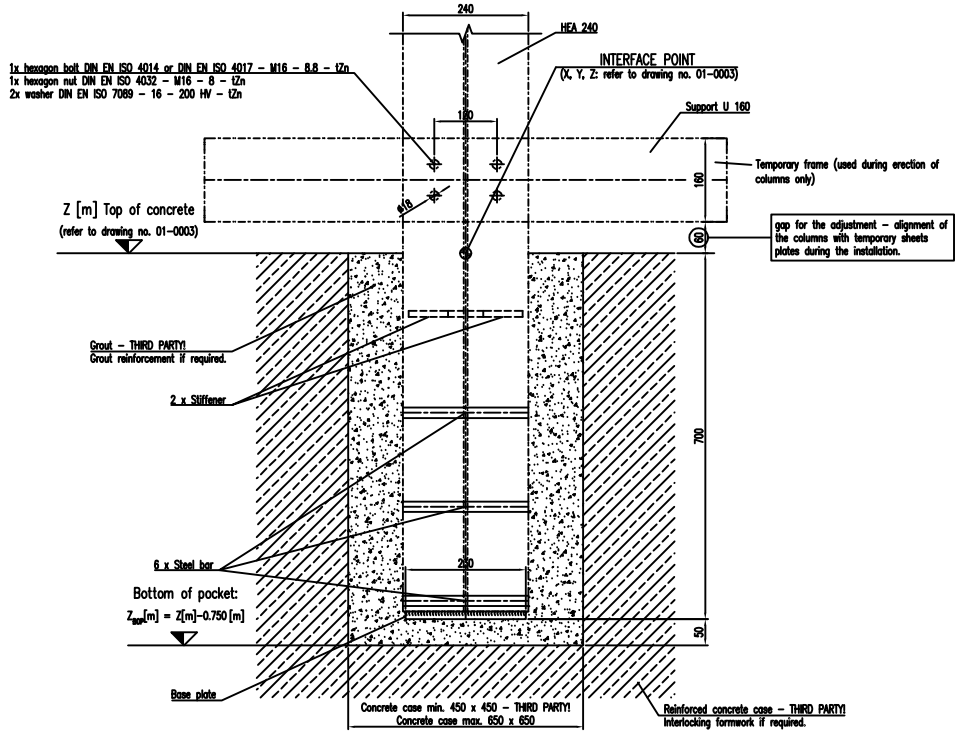
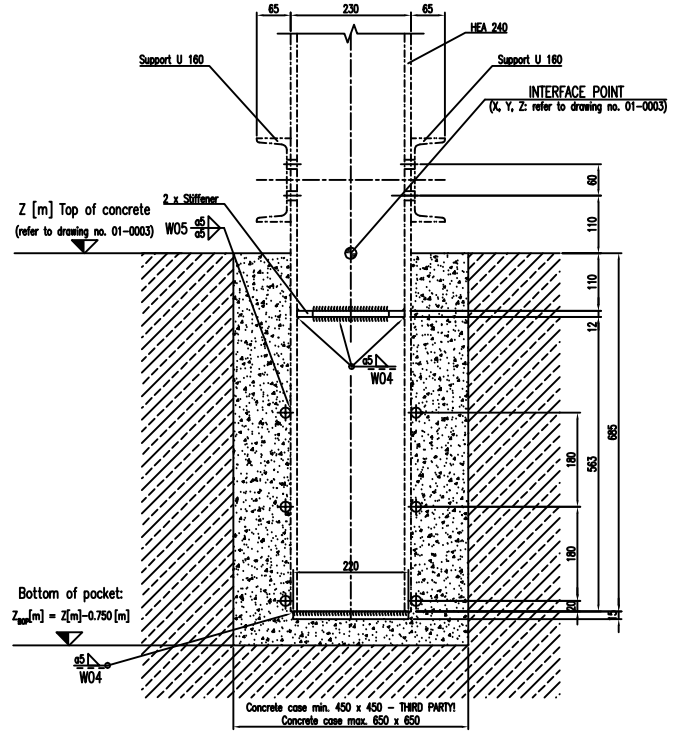
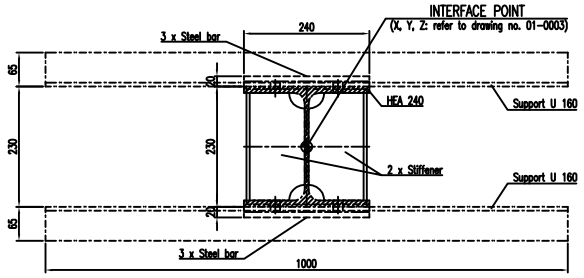
Rev.	Date	Name	Change
A	02.03.2020	STE_RK	Bolts of the temporary frames updated.
B	06.11.2020	STE_AD	Top of Foundation now is Top of Concrete, removed "all
			statements here are just recommendations" from foundation
			design. Added min and max pocket dimensions and bottom
			of pocket z level. Added adjustability and tolerance of pocket
			tables

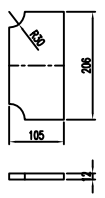
Column footing type #542
Item 102_11



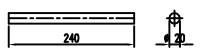




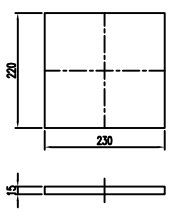
Stiffener



Steel bar

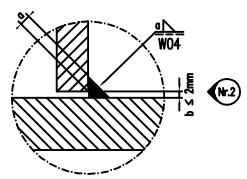


Base plate

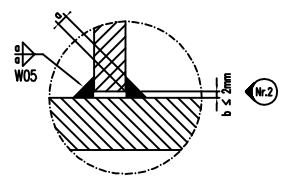


Details for welding

Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Adjustability of column footing in concrete case		
horizontal adjustability:	Δx	± 25 mm
	Δy	± 25 mm
total horizontal adjustability:	$\sqrt{\Delta x^2 + \Delta y^2}$	≤ 25 mm
vertical adjustability:	Δz	± 25 mm

Positioning tolerance of concrete case		
horizontal tolerance:	Δx	± 5 mm
	Δy	± 5 mm
total horizontal tolerance:	$\sqrt{\Delta x^2 + \Delta y^2}$	≤ 5 mm
vertical tolerance:	bottom of pocket ± 5 mm	

Foundation specification

ADJUSTABILITY
Total horizontal adjustability: SQRT(z^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non-shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck} =30 N/mm² at the time of first load application / prestressing.

1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441.
THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS:
RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≥960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204–3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY –––– ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W04, W05	B	100% VT + 20% MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	plate t = 15	S355J2	DIN EN 10025-2	5.96	1	5.96
Stiffener	plate t = 12	S355J2	DIN EN 10025-2	1.90	2	3.80
Steel bar	Round ø 20	S355J2	DIN EN 10025-2	0.59	6	3.54
				approx. weight per ITEM [kg]:		13.30

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Column footing type #542 Item 102_11	File Name: 5224-03-0542B.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0542	Sheets: 1 of 1	Rev.: B

INGENIEURBUERO STENGEL GmbH
Steel construction, Steel and fatigue analysis, Structural engineering, Consulting, Custom solutions
Dornbracher Str. 34, 21335 Lüneburg, Germany, Phone +49(0)4131/8977-0, Fax +49(0)4131/8977-44
Remote ME_PM 1910

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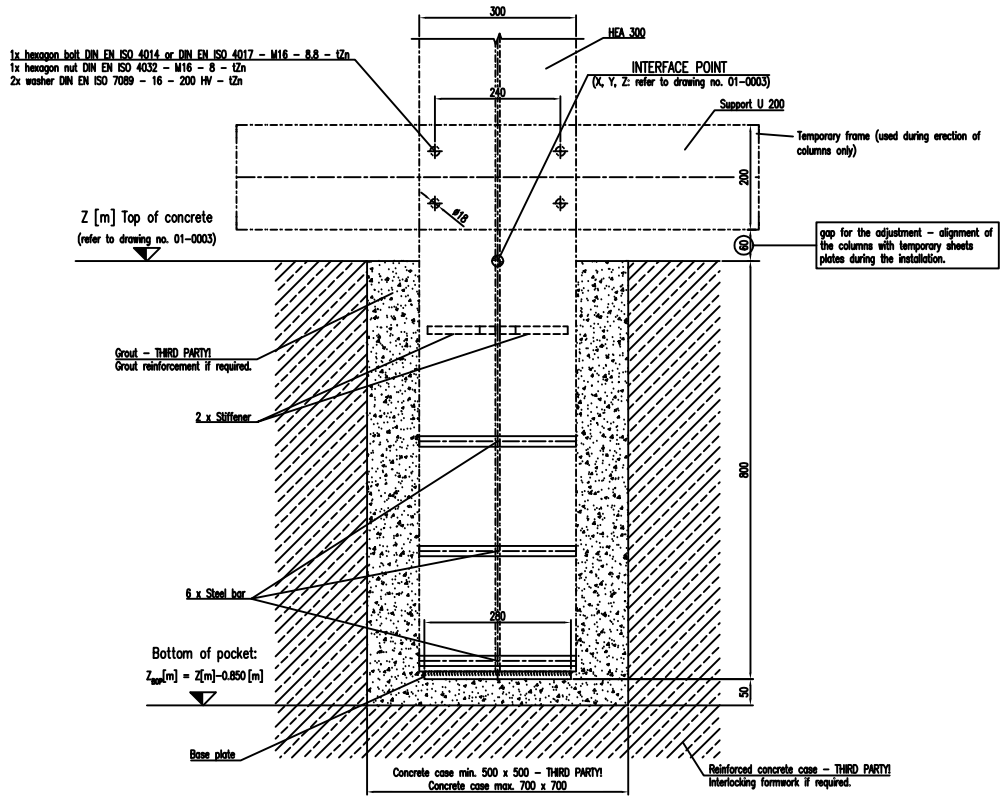
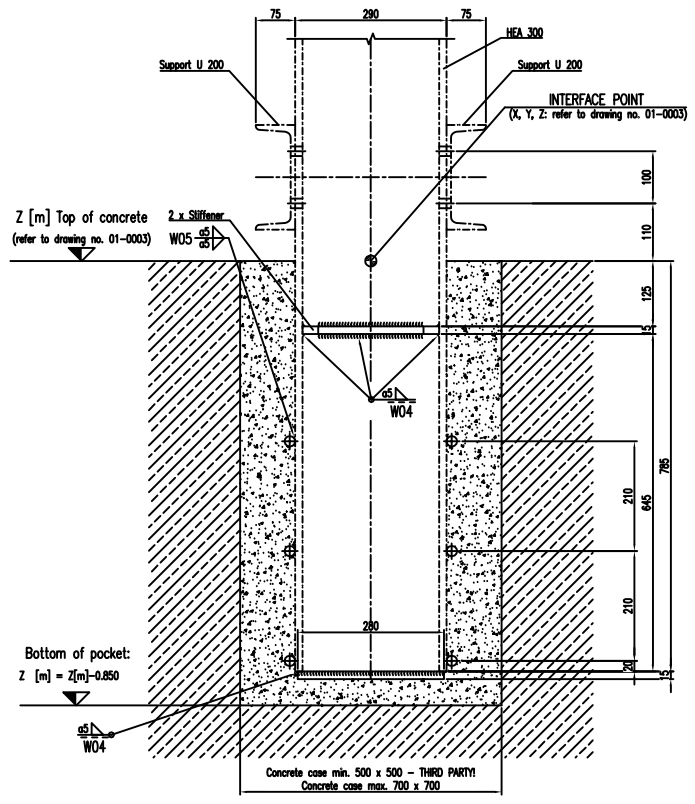
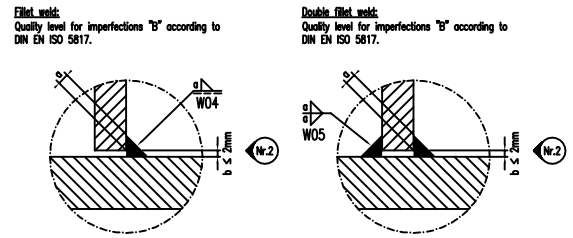
Rev.	Date	Name	Change
A	02.03.2020	STE_RK	Bolts of the temporary frames updated.
B	06.11.2020	STE_AD	Removed "all statements here are just recommendations"
			from foundation design design. Added min and max pocket
			dimensions.

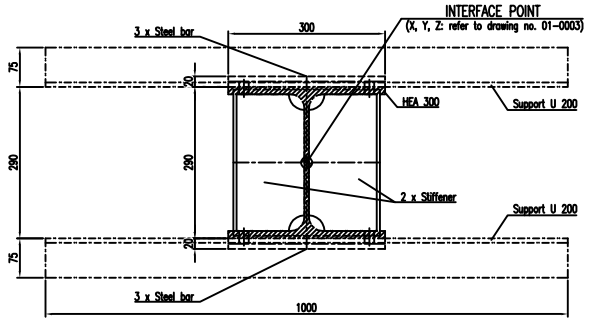
Column footing type #543
Item 103_11



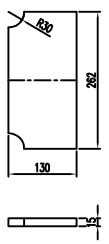


Details for welding

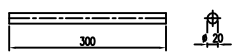




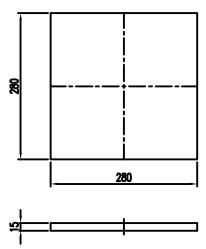
Stiffener



Steel bar



Base plate



Adjustability of column footing in concrete case		
horizontal adjustability:	Δx	± 25 mm
	Δy	± 25 mm
total horizontal adjustability:	$\sqrt{\Delta x^2 + \Delta y^2}$	≤ 25 mm
vertical adjustability:	Δz	± 25 mm

Positioning tolerance of concrete case		
horizontal tolerance:	Δx	± 5 mm
	Δy	± 5 mm
total horizontal tolerance:	$\sqrt{\Delta x^2 + \Delta y^2}$	≤ 5 mm
vertical tolerance:	bottom of pocket	± 5 mm

Foundation specification

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non-shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck}=30 N/mm² at the time of first load application / prestressing.

1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441.
THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS:
RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT.
UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY ——— ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W04, W05	B	100% VT + 20% MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	Plate t = 15	S355J2	DIN EN 10025-2	9.23	1	9.23
Stiffener	Plate t = 15	S355J2	DIN EN 10025-2	3.84	2	7.68
Steel bar	Round ø 20	S355J2	DIN EN 10025-2	0.74	6	4.44
				approx. weight per ITEM [kg]:		21.35

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 12.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEC):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Column footing type #543 Item 103_11	File Name: 5224-03-0543B.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0543	Sheets: 1 of 1	Rev.: B

INGENIEURBUERO STENGEL GmbH
Steel construction
Mass and fatigue analysis
Structural dynamics
Structural engineering
Custom solutions
Brandstrasse 36, 24 21 Kiel, Germany
Phone +49(0)431/6617-0
Fax +49(0)431/6617-44

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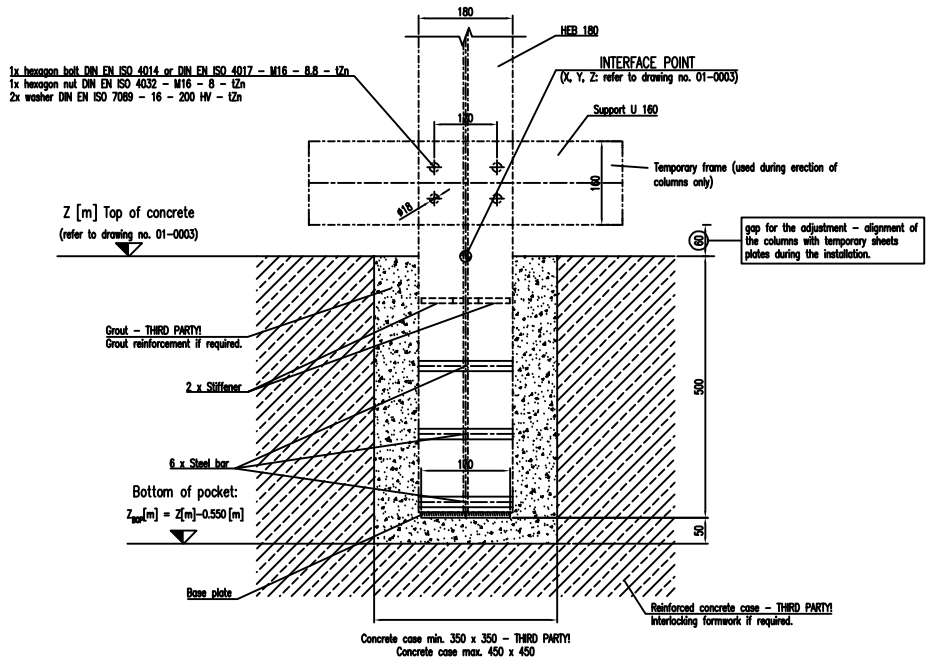
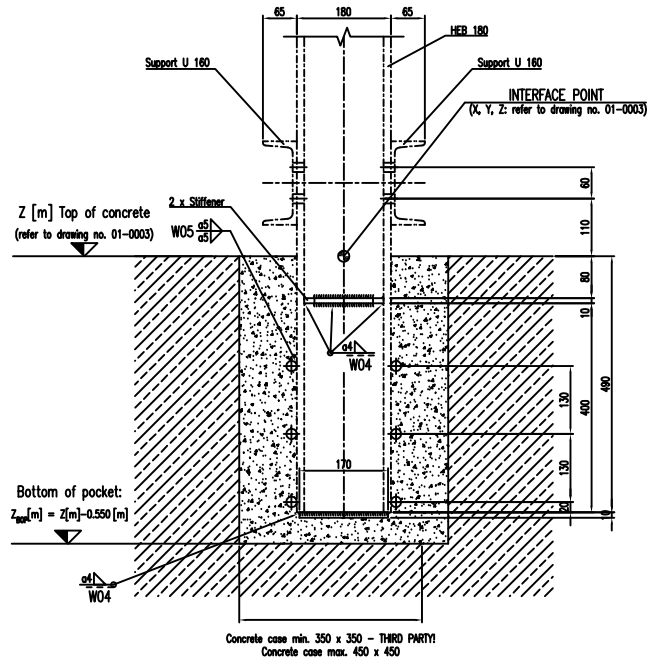
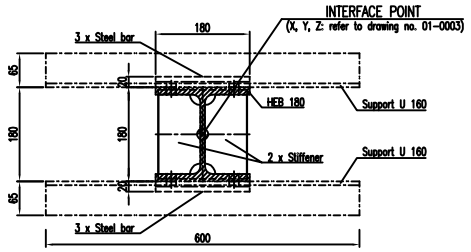
Template: STE_PM 1910

Rev.	Date	Name	Change
A	02.03.2020	STE_RK	Length & bolts of the temporary frame updated.
B	06.11.2020	STE_AD	Top of Foundation now is Top of Concrete, removed "all statements here are just recommendations" from foundation design. Added min and max pocket dimensions and bottom of pocket z level. Added adjustability and tolerance of pocket tables

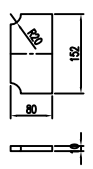
Column footing type #551
Item 111_11



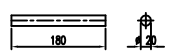




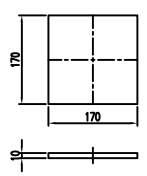
Stiffener



Steel bar

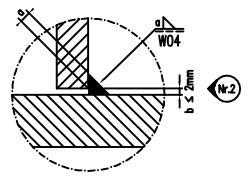


Base plate

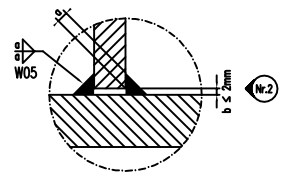


Details for welding

Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Adjustability of column footing in concrete case

horizontal adjustability:	Δx	± 25 mm
	Δy	± 25 mm
total horizontal adjustability:	$\sqrt{\Delta x^2 + \Delta y^2}$	≦ 25 mm
vertical adjustability:	Δz	± 25 mm

Positioning tolerance of concrete case

horizontal tolerance:	Δx	± 5 mm
	Δy	± 5 mm
total horizontal tolerance:	$\sqrt{\Delta x^2 + \Delta y^2}$	≦ 5 mm
vertical tolerance:	bottom of pocket ± 5 mm	

Foundation specification

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck}=25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non-shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck}=30 N/mm² at the time of first load application / prestressing.

1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS:
RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤ts400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-A001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-I007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY –·–·– ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
WO4, WO5	B	100% VT + 20% MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	plate t = 10	S355J2	DIN EN 10025-2	2.27	1	2.27
Stiffener	plate t = 10	S355J2	DIN EN 10025-2	0.91	2	1.82
Steel bar	Round ø 20	S355J2	DIN EN 10025-2	0.44	6	2.64
				approx. weight per ITEM [kg]:		6.73

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Column footing type #551 Item 111_11	File Name: 5224-03-0551B.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0551	Sheets: 1 of 1	Rev.: B

INGENIEURBUERO STENGEL GmbH
Landsberger Str. 24
82515 Wolfratshausen
Germany
Phone: +49(0)8171-9
Fax: +49(0)8171-44

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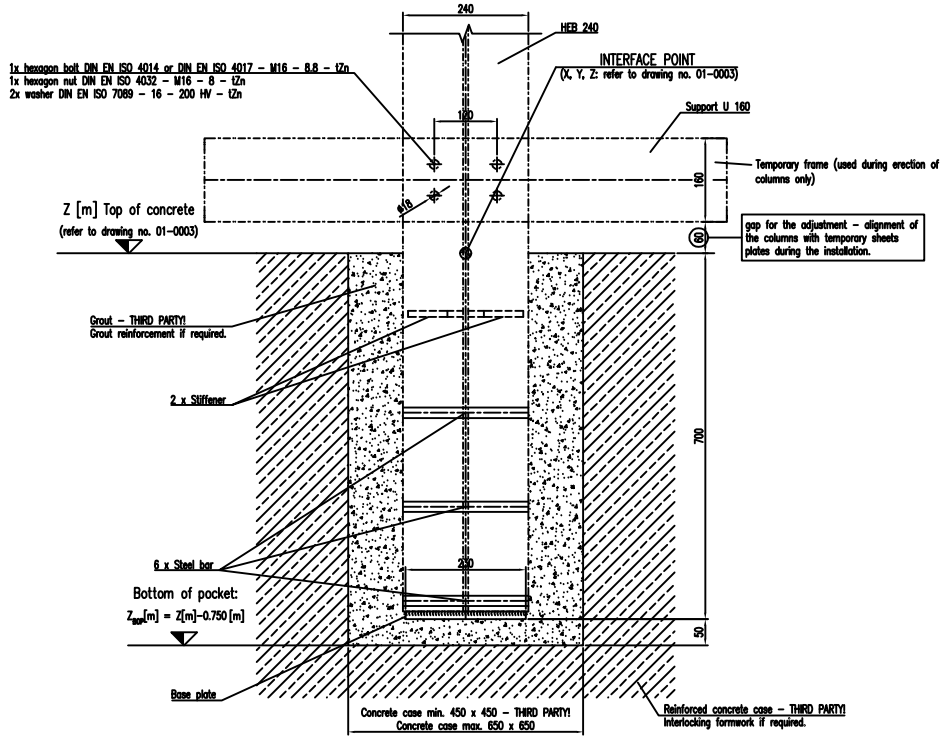
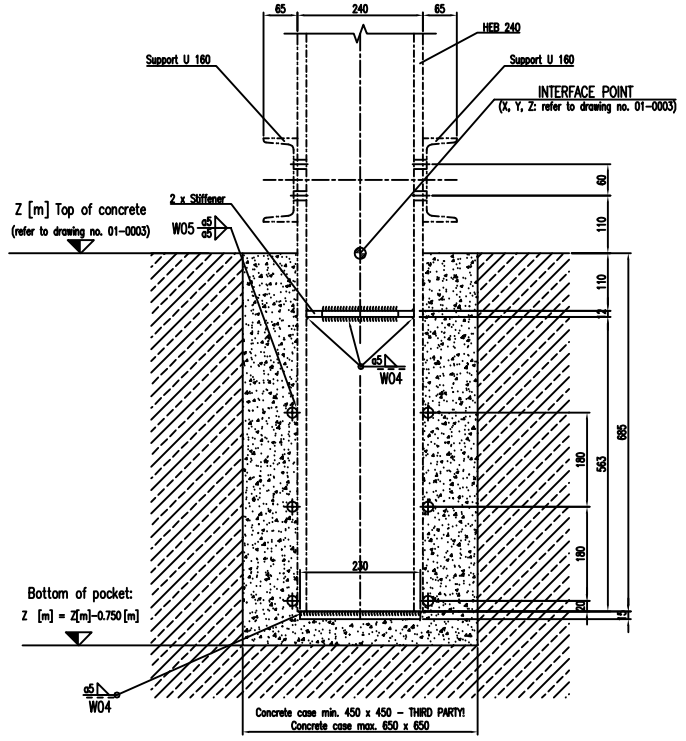
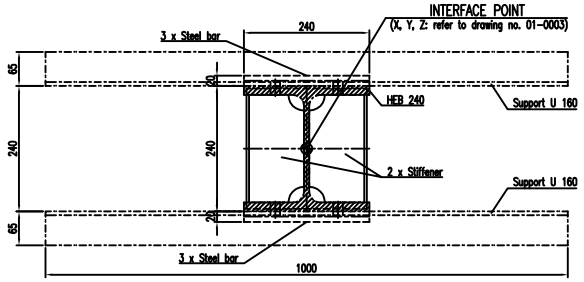
Rev.	Date	Name	Change
A	02.03.2020	STE_RK	Bolts of the temporary frames updated.
B	06.11.2020	STE_AD	Top of Foundation now is Top of Concrete, removed "all statements here are just recommendations" from foundation design. Added min and max pocket dimensions and bottom of pocket z level. Added adjustability and tolerance of pocket tables

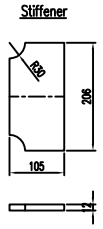
Column footing type #552
Item 112_11



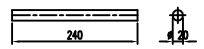




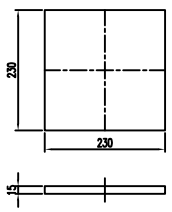
Stiffener



Steel bar

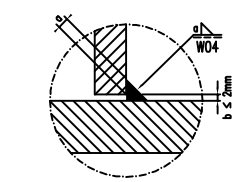


Base plate

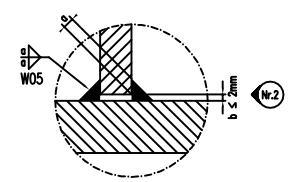


Details for welding

Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Adjustability of column footing in concrete case		
horizontal adjustability:	Δ x	± 25 mm
	Δ y	± 25 mm
total horizontal adjustability:	$\sqrt{\Delta x^2 + \Delta y^2}$	≦ 25 mm
vertical adjustability:	Δ z	± 25 mm

Positioning tolerance of concrete case		
horizontal tolerance:	Δ x	± 5 mm
	Δ y	± 5 mm
total horizontal tolerance:	$\sqrt{\Delta x^2 + \Delta y^2}$	≦ 5 mm
vertical tolerance:	bottom of pocket	± 5 mm

Foundation specification

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non-shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck}=30 N/mm² at the time of first load application / prestressing.

1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441.
THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS:
RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≥960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥.30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT.
UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY ——— ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W04, W05	B	100% VT + 20% MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	plate t = 15	S355J2	DIN EN 10025-2	6.23	1	6.23
Stiffener	plate t = 12	S355J2	DIN EN 10025-2	1.90	2	3.80
Steel bar	Round ø 20	S355J2	DIN EN 10025-2	0.59	6	3.54
				approx. weight per ITEM [kg]:		13.57

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Column footing type #552 Item 112_11	File Name: 5224-03-0552B.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0552	Sheets: 1 of 1	Rev.: B

INGENIEURBÜRO STENGEL GmbH
Steel construction, Mass and fatigue analysis, Structural dynamics, Measurement technology, Custom solutions
Dornbirner Str. 34, 2104 Hohe Wand, Austria
Phone +43(0)2257-8 Fax +43(0)2257-44

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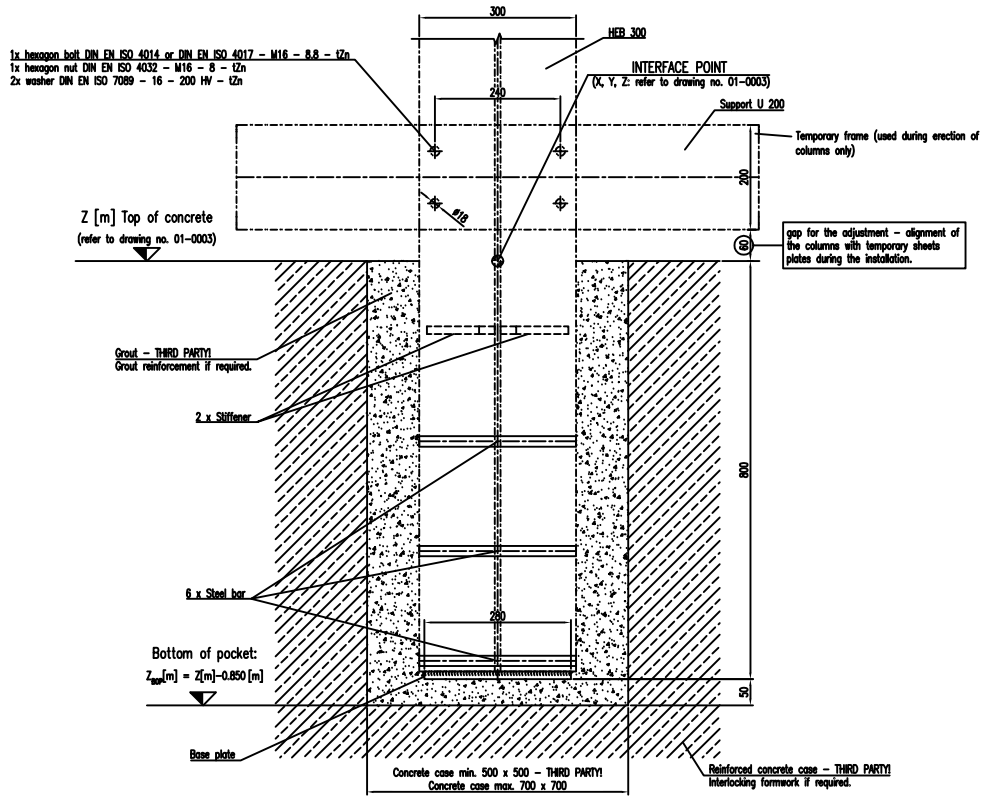
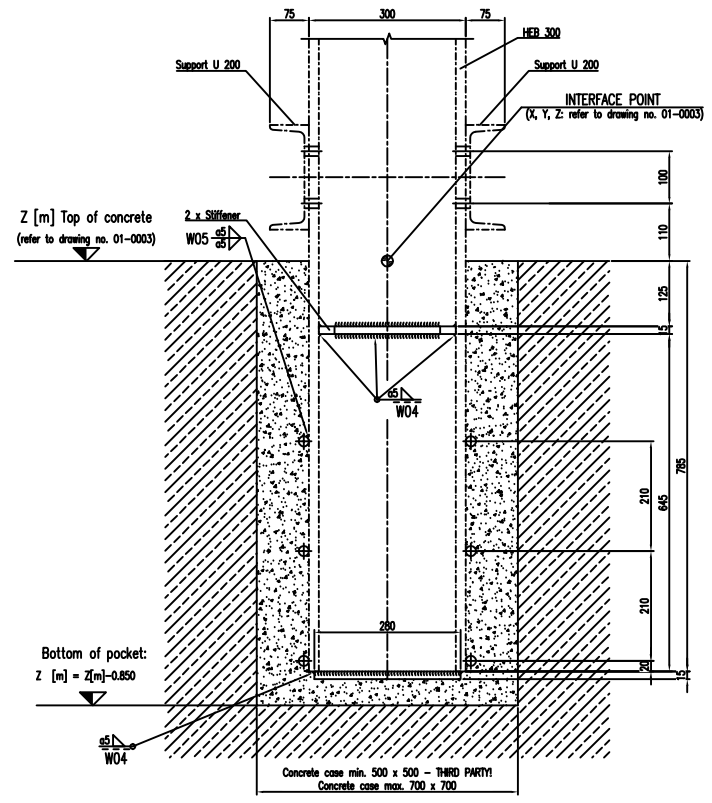
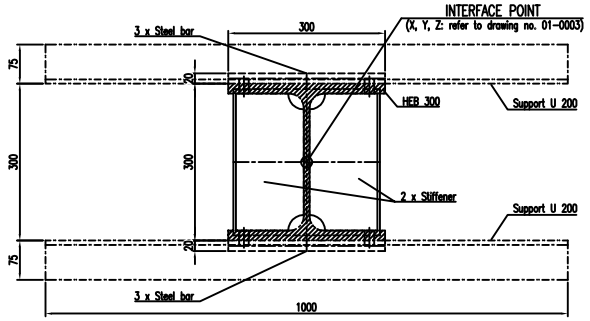
Template: STE_PM 1910

Rev.	Date	Name	Change
A	02.03.2020	STE_RK	Bolts of the temporary frames updated.
B	06.11.2020	STE_AD	Top of Foundation now is Top of Concrete, removed "all statements here are just recommendations" from foundation design. Added min and max pocket dimensions and bottom of pocket z level. Added adjustability and tolerance of pocket tables

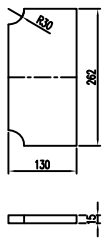
Column footing type #553
Item 113_11



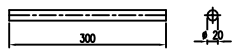




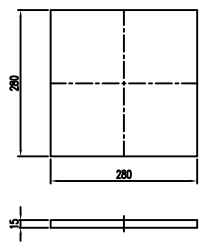
Stiffener



Steel bar

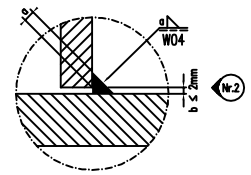


Base plate

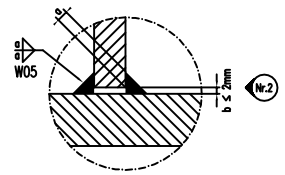


Details for welding

Fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Adjustability of column footing in concrete case		
horizontal adjustability:	Δ x Δ y	± 25 mm ± 25 mm
total horizontal adjustability:	$\sqrt{\Delta x^2 + \Delta y^2} \leq$	25 mm
vertical adjustability:	Δ z	± 25 mm

Positioning tolerance of concrete case		
horizontal tolerance:	Δ x Δ y	± 5 mm ± 5 mm
total horizontal tolerance:	$\sqrt{\Delta x^2 + \Delta y^2} \leq$	5 mm
vertical tolerance:	bottom of pocket ± 5 mm	

Foundation specification

ADJUSTABILITY
Total horizontal adjustability: SQRT(x^2+y^2): 25 mm
Vertical adjustability: Δz: ± 25 mm
The adjustability of the footings is not a tolerance. It shall compensate inaccuracies of both concrete and steel work as well as displacements due to temperature variation during erection.

TOLERANCES
The foundation positions are defined by x, y, z coordinates. The allowed tolerances for setting the foundations and especially for setting the anchor bolts is ± 1,5mm for the x, y and z coordinate.

FOUNDATION DESIGN
The foundation design and dimensioning, comprising the strength / fatigue demonstration of the foundations and subsoil, including but not limited to concrete and grout grade, anchors (if any), embedding, load transmission from steel to grout and grout to concrete, failure cones, concrete and grout pressures and reinforcement of concrete and grout (if any), is not in the scope of work of Ingenieurbüro Stengel GmbH and has to be done by third party.

LOADS
All forces and moments acting on the foundations have to be taken from the foundation load listings provided by Ingenieurbüro Stengel GmbH. The foundation loads act at the interface point indicated in this drawing.

REQUIRED MINIMUM CONCRETE / GROUT SPECIFICATIONS
All values are minimum requirements and do not replace a detailed selection of the materials with respect to site and load requirements. Higher material grades may be required according to applicable standards. The minimum specifications comprise (but are not limited to):

Concrete
Concrete specifications acc. DIN EN 1992-1-1.
Reinforced concrete, minimum strength classification C25/30.
Minimum compressive strength of concrete f_{ck} =25 N/mm² at the time of first load application.

Grout
The space between steel and concrete has to be completely filled up with grout with the following minimum requirements:
- Formulated for deep section grouting (for pocket foundations only).
- Non-shrinking type.
- Free flow to fill even narrow gaps.
- High bond strength to both steel and concrete.
- Good fatigue and impact resistance.
- Minimum compressive strength of grout at the time of load application must be observed and depends on curing time, strength development and other factors. It must not be less than f_{ck}=30 N/mm² at the time of first load application / prestressing.

1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441.
– THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.7 HOT ROLLED U-PROFILE STEEL MATERIAL ACCORDING TO DIN EN 10279.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.8.1 HOLLOW PROFILE – HOT-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10210.
2.8.2 HOLLOW PROFILE – COLD-FINISHED STRUCTURAL HOLLOW SECTIONS OF NON-ALLOY AND FINE GRAIN STEELS ACCORDING TO DIN EN 10219.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS:
RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204–3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe)
– GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT.
UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-I007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY ——— ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S):	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W04, W05	B	100% VT + 20% MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Base plate	plate t = 15	S355J2	DIN EN 10025-2	9.23	1	9.23
Stiffener	plate t = 15	S355J2	DIN EN 10025-2	3.84	2	7.68
Steel bar	Round ø 20	S355J2	DIN EN 10025-2	0.74	6	4.44
				approx. weight per ITEM [kg]:		21.35

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEC):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A0
Subject: Column footing type #553 Item 113_11	File Name: 5224-03-0553B.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0553	Sheets: 1 of 1	Rev.: B

INGENIEURBUERO STENGEL GmbH
Strahlenberger Str. 24
D-63067 Offenbach
Phone: +49(0)69/82017-0
Fax: +49(0)69/82017-44
Stress and fatigue analysis
Structural engineering
Consulting
Custom solutions

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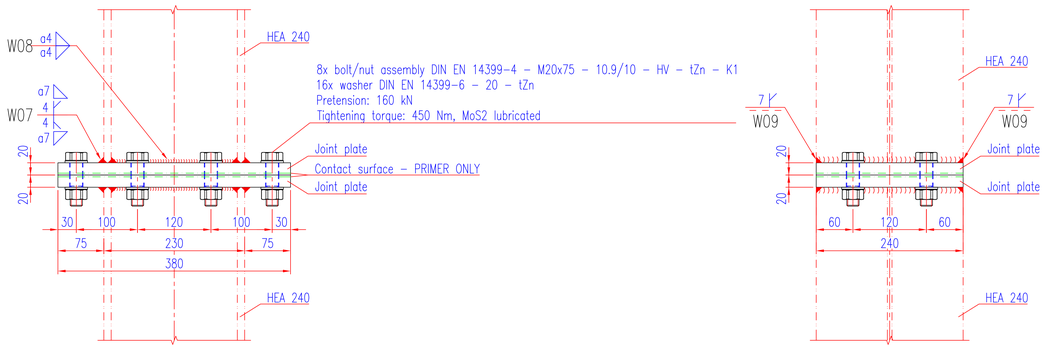
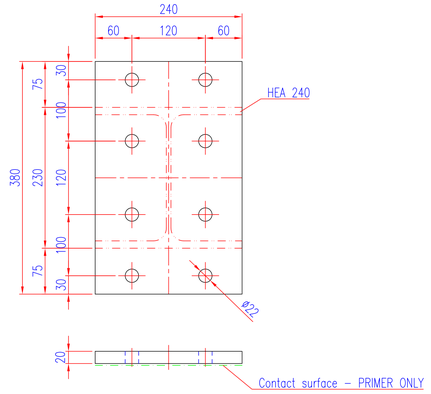
Template: STE_PM 1910

Rev.	Date	Name	Change

ITEM 102_3
HEA 240 joint

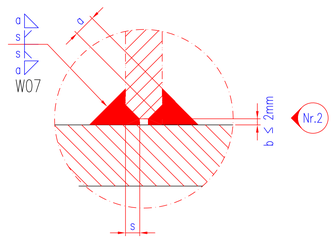


Joint plate

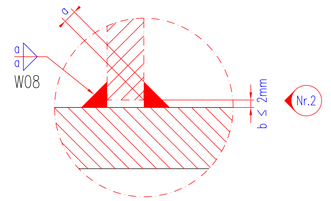


Details for welding

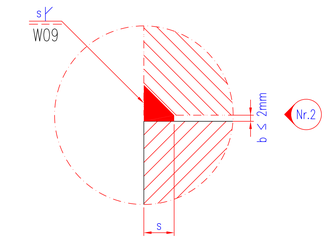
Double HY-weld with fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



HY-butt weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
- UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
- MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
- FABRICATION ACC. DIN EN 1090-2 EXC3.
- FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 - 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15≤t≤400 mm WITH YIELD STRENGTH Re≤960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t≥30 mm: RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 - SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
- UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ - APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY -·-·-·- ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004. APPLICABLE SURFACE COATING FOR FASTENERS:
- STANDARD CLASS 8.8 / 10.9 - SURFACE A2C (DIN EN ISO 4042)
- HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 - SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S).:	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W07, W08, W09	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Joint plate	Plate t = 20	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 - grid 100 mm.	13.84	2	27.68
Bolt/nut assembly	M20x75		DIN EN 14399-4 - 10.9/10 - HV - tZn - K1	0.32	8	2.56
Washer	20		DIN EN 14399-6 - tZn	0.02	16	0.32
					approx. weight per ITEM [kg]:	30.56

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_Prj: 1912

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A1
Subject: HEA 240 joint ITEM 102_3	File Name: 5224-03-0702.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0702	Sheets:	Rev.:

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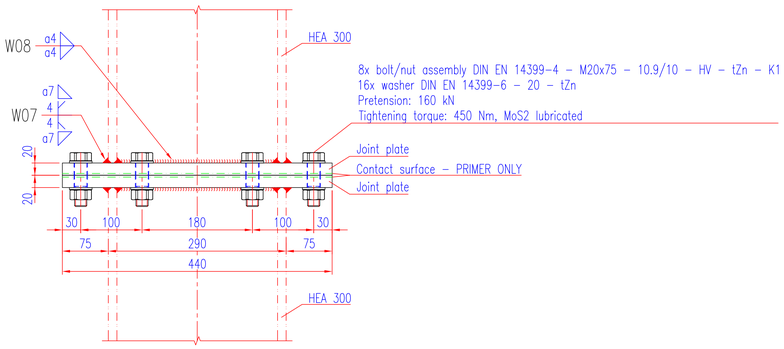
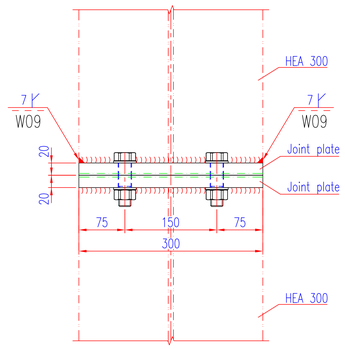
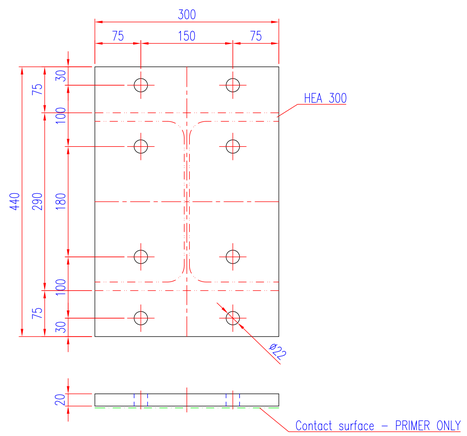
Rev.	Date	Name	Change

ITEM 103_3
HEA 300 joint



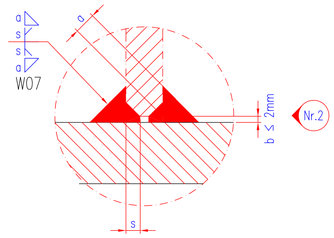


Joint plate

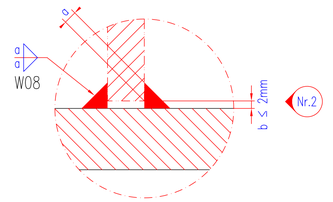


Details for welding

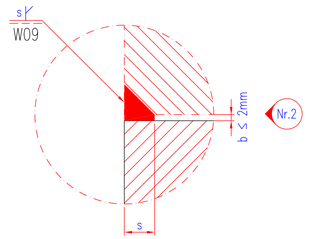
Double HY-weld with fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



HY-butt weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15 ≤ t ≤ 400 mm WITH YIELD STRENGTH Re ≤ 960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t ≥ 30 mm: RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY –·–·–·– ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004. APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S).:	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W07, W08, W09	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Joint plate	Plate t = 20	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 – grid 100 mm.	20.25	2	40.50
Bolt/nut assembly	M20x75		DIN EN 14399-4 – 10.9/10 – HV – tZn – K1	0.32	8	2.56
Washer	20		DIN EN 14399-6 – tZn	0.02	16	0.32
					approx. weight per ITEM [kg]:	43.38

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_Prj: 1912

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A1
Subject: HEA 300 joint ITEM 103_3	File Name: 5224-03-0703.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-0703	Sheets:	Rev.:

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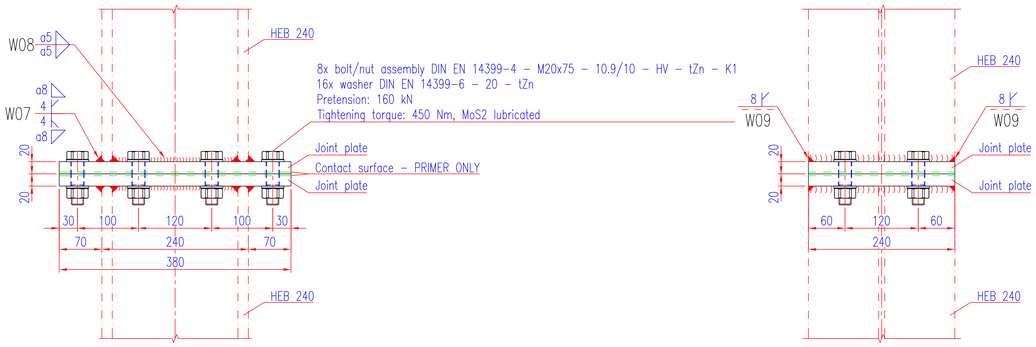
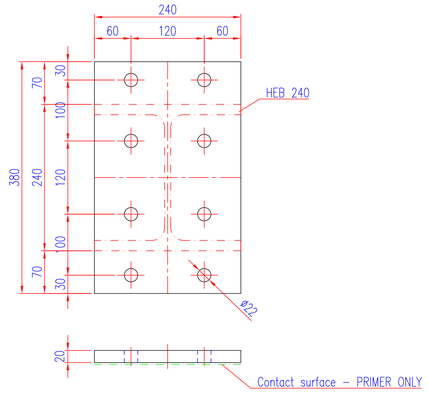
Rev.	Date	Name	Change

ITEM 112_3
HEB 240 joint

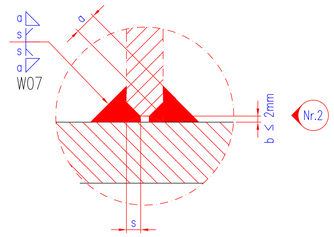


Joint plate

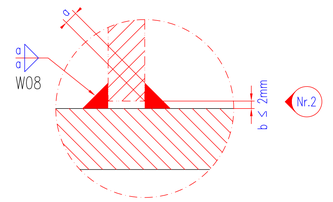


Details for welding

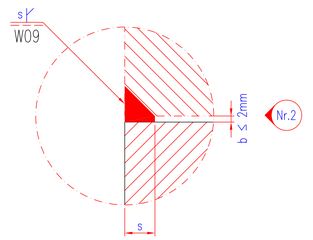
Double HY-weld with fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



HY-butt weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
– MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
– FABRICATION ACC. DIN EN 1090-2 EXC3.
– FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.9 HOT ROLLED SHEET STEEL (≥ 3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 – 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15 ≤ t ≤ 400 mm WITH YIELD STRENGTH Re ≤ 960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t ≥ 30 mm:
RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 – SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
– UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-I007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ – APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY -·-·-·- ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
– STANDARD CLASS 8.8 / 10.9 – SURFACE A2C (DIN EN ISO 4042)
– HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 – SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm.
LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S).:	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W07, W08, W09	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Joint plate	Plate t = 20	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 - grid 100 mm.	13.84	2	27.68
Bolt/nut assembly	M20x75		DIN EN 14399-4 - 10.9/10 - HV - tZn - K1	0.32	8	2.56
Washer	20		DIN EN 14399-6 - tZn	0.02	16	0.32
					approx. weight per ITEM [kg]:	30.56

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_Prj: 1912

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A1
Subject: HEB 240 joint	File Name: 5224-03-0712.DWG	Next Assembly No.:	
ITEM 112_3	Drawing No.: 5224-03-0712	Sheets:	Rev.:

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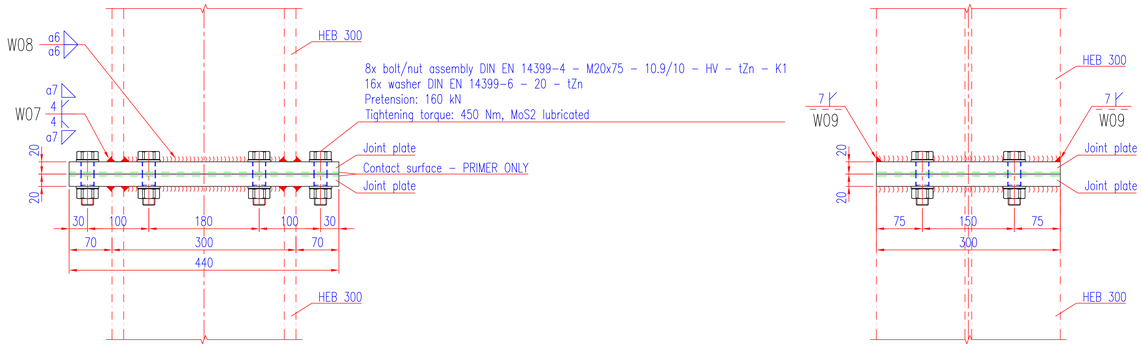
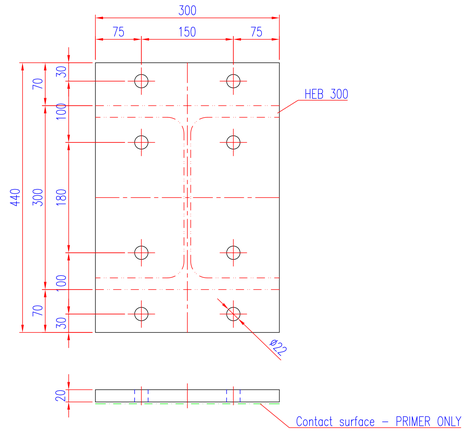
Rev.	Date	Name	Change

ITEM 91_3
HEB 300 joint

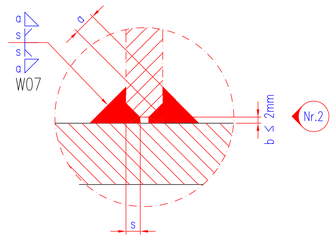


Joint plate

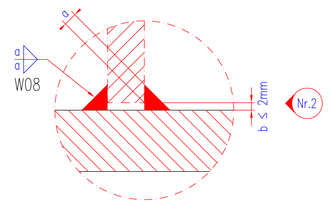


Details for welding

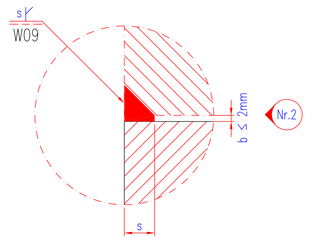
Double HY-weld with fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



Double fillet weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



HY-butt weld:
Quality level for imperfections "B" according to DIN EN ISO 5817.



1. GENERAL & TOLERANCES
1.1 GENERAL REQUIREMENTS FOR FINISH OF MACHINED SURFACES ACCORDING TO DIN EN ISO 1302: MEAN ROUGHNESS INDEX Ra=max. 12.5 µm
1.2.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR LENGTHS & ANGULAR DIMENSIONS ACCORDING TO DIN EN ISO 13920-A WELDED PARTS.
1.3.02 UNLESS OTHERWISE SPECIFIED, TOLERANCES FOR FORM & LOCATION ACCORDING TO DIN EN ISO 13920-E WELDED PARTS.
1.4 UNLESS OTHERWISE SPECIFIED, CHAMFERED 1x45°.
1.5 BREAK SHARP EDGES.
1.6 TOLERANCES FOR THERMAL CUTS ACCORDING TO DIN EN ISO 9013-441. THERMAL CUTTING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
- UNLESS OTHERWISE SPECIFIED, GEOMETRICAL TOLERANCES FOR STEEL STRUCTURES ACCORDING DIN EN 1090-2, CLASS 2.
- MANUFACTURER QUALIFICATION ACCORDING TO DIN EN 1090-1 EXC3
- FABRICATION ACC. DIN EN 1090-2 EXC3.
- FOR STEEL STRUCTURES NOT SUBJECT TO HOT DIP GALVANIZATION; ALL ENCLOSED SPACES SHALL BE SEALED AIRTIGHT.

2. MATERIAL / PROFILE SPECIFICATIONS
2.1.6 I & H PROFILES OF STRUCTURAL STEEL MATERIAL ACCORDING TO DIN EN 10034.
2.1.9 HOT ROLLED SHEET STEEL (≥3 mm) MATERIAL ACCORDING TO DIN EN 10029.
2.10 SURFACE CONDITIONS FOR HOT ROLLED STEEL PLATES AND WIDE FLATS ACCORDING TO DIN EN 10163-2 CLASS A2.
2.11 SURFACE CONDITIONS FOR HOT ROLLED STEEL SECTIONS ACCORDING TO DIN EN 10163-3 CLASS C2.
2B.01 FERRITIC, STRUCTURAL, QUENCHED AND TEMPERED AND CASE-HARDENING STEELS: RAW MATERIAL INSPECTION CERTIFICATE ACCORDING TO DIN EN 10204 - 3.1 INCLUDING IMPACT TEST ACCORDING TO DIN EN ISO 148-1 FOR MATERIAL THICKNESSES t ≥ 6 mm (PROPERTIES ACCORDING TO MATERIAL LIST); COUNTRY OF ORIGIN STATED ON CERTIFICATE.
2C.01 RAW MATERIAL SUITABILITY AGAINST "LAMELLAR FRACTURE" TO BE APPROVED BY DIN EN 10164-Z15; (PROPERTIES ACCORDING TO MATERIAL LIST). APPLIES FOR MATERIAL THICKNESS 15 ≤ t ≤ 400 mm WITH YIELD STRENGTH Re ≤ 960 N/mm².
2G APPLIES TO WELDED SEAMS SUBJECTED TO TENSILE STRESS OR BENDING TENSILE STRESS IF MATERIAL THICKNESS IS t ≥ 30 mm: RAW MATERIAL SUITABILITY "TO CATCH & TO STOP CRACKS" TO BE APPROVED BY "WELD BEAD BEND TEST ACCORDING TO SEP 1390" INCLUDING DIN EN 10204-3.1 INSPECTION CERTIFICATE.

3. WELDING SPECIFICATIONS
3.2.1 SYMBOLIC REPRESENTATION ON DRAWINGS ACCORDING TO DIN EN ISO 2553 - SYSTEM A.
3A.01 EXECUTION ACCORDING TO DIN EN 1090-2; EXC 3; QUALITY LEVEL B; DIN EN ISO 5817 (Fe) GUIDELINES FOR WELDING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I001.
- UNLESS OTHERWISE SPECIFIED JOINT PREPARATIONS FOR STEEL ACCORDING TO DIN EN ISO 9692.

5. SURFACE COATING
5.1 PARTS SHALL BE CLEANED OF ANY FOREIGN MATTER LIKE FILTH, GREASE AND OIL RESIDUE AND PREPARED ACCORDING TO GOOD WORKMANSHIP PRACTISE.
5.2 APPLICATION OF PRIMER ON STRUCTURAL STEEL CONTACT SURFACES. NO TOP COATING ON STRUCTURAL STEEL CONTACT SURFACES ACC. TO INTAMIN INSTRUCTION QA-M01-I007.
5A.02 SANDBLAST Sa 2½, PRIMER AND TOP COAT ACCORDING TO THE SPECIFICATION IN THE CONTRACT. UNLESS OTHERWISE SPECIFIED, SURFACE COATING ACCORDING INTAMIN INSTRUCTION QA-M01-007.
5C.01 AFTER CLEANING OF SURFACE TO SANDBLAST Sa 2½ - APPLICATION OF AKZONOBEL INTERZINC 697 OR INTERZINC 22 ON STRUCTURAL STEEL CONTACT SURFACES (FRICTION PAINT), COATING ACCORDING TO INTAMIN INSTRUCTION QA-M01-I007. SEE LOCATIONS THAT ARE MARKED BY -·-·-·- ON THE DRAWINGS!

6. ASSEMBLY INSTRUCTIONS
6D.02 ALL BOLTED CONNECTIONS SHALL BE TORQUED ACCORDING TO THE VALUES SPECIFIED ON THE DRAWING (TORQUE IN NEWTON-METERS "Nm") AND ACCORDING TO INTAMIN INSTRUCTION QA-M01-I004.
APPLICABLE SURFACE COATING FOR FASTENERS:
- STANDARD CLASS 8.8 / 10.9 - SURFACE A2C (DIN EN ISO 4042)
- HIGH STRENGTH STRUCTURAL BOLTING SYSTEM HV 10.9 - SURFACE FZ (DIN EN ISO 10684)
PROTOCOL: [YES]
6K UNLESS OTHERWISE SPECIFIED, MAXIMUM GAP FOR FLANGE CONNECTIONS ≤ 0.5 mm. LARGER GAPS SHALL BE COMPENSATED BY SHIMMING DURING ASSEMBLY.

7. NDT (NON DESTRUCTIVE TESTING) OF WELDED SEAMS & MACHINED PARTS
7A.01 INTERFACE OF QUALITY LEVELS AND ACCEPTANCE CRITERIA FOR INDICATIONS ACCORDING TO DIN EN ISO 17635. ALL NDT SHALL BE PERFORMED AFTER FINAL HEAT TREATMENT, RESPECTING THE DELAY TIME.

ITEM NO(S).:	WELD QUALITY LEVEL	EXTENT NDT	PROTOCOL
W07, W08, W09	B	100 % VT + 20 % MT	YES

7E ACCEPTANCE CRITERIA FOR NDT-EXAMINATION OF WELDED SEAM QUALITY LEVELS:

WELD QUALITY LEVEL	VT-TESTING	MT-TESTING	UT-TESTING
DIN EN ISO 5817	DIN EN ISO 5817	DIN EN ISO 23278	DIN EN ISO 11666
B / EXC3	LEVEL B	LEVEL 1	LEVEL 2

Parts

Part name	Section	Material	Standard	Approx. part weight [kg]	Parts per item	Approx. total weight
Joint plate	Plate t = 20	S355J2+N	DIN EN 10025-2 + DIN EN 10164-Z15. Preheat before welding. Inspection of internal flaws using ultrasonic testing according to DIN EN 10160 class S2/E3 - grid 100 mm.	20.25	2	40.50
Bolt/nut assembly	M20x75		DIN EN 14399-4 - 10.9/10 - HV - tZn - K1	0.32	8	2.56
Washer	20		DIN EN 14399-6 - tZn	0.02	16	0.32
					approx. weight per ITEM [kg]:	43.38

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_Prj: 1912

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_RK	Company ID: STE	Date: 10.09.2019	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: 1:5	Size: A1
Subject: HEB 300 joint	File Name: 5224-03-0713.DWG	Next Assembly No.:	
ITEM 113_3	Drawing No.: 5224-03-0713	Sheets:	Rev.:

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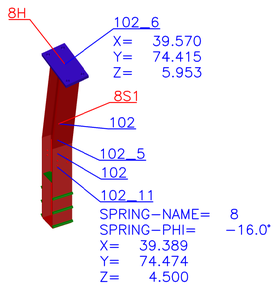
Rev.	Date	Name	Change
A	02.NOV.20	STE_ad	Column 7,8 shortened by 200mm

Column 8



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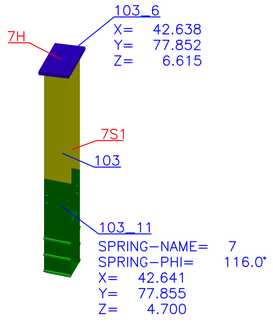

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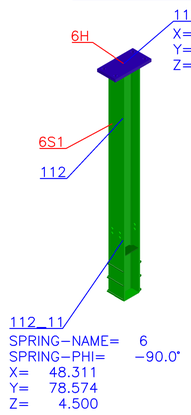

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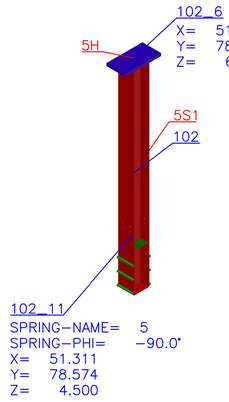

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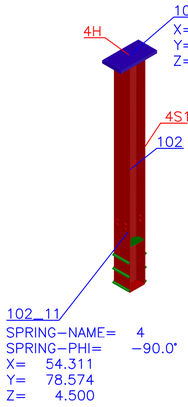

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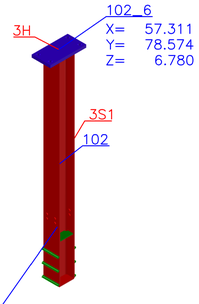

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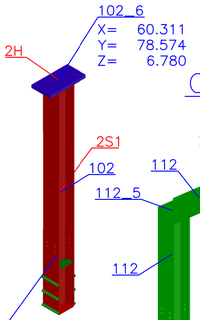
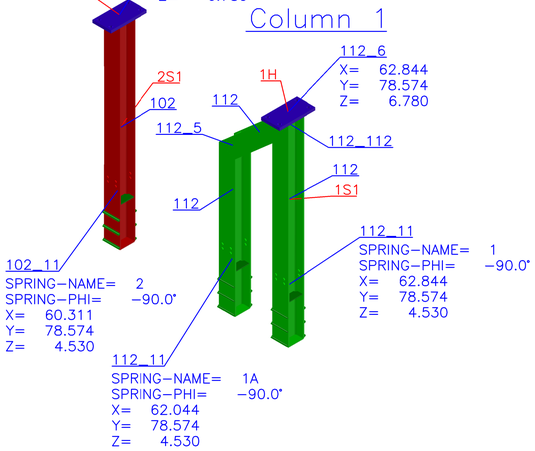
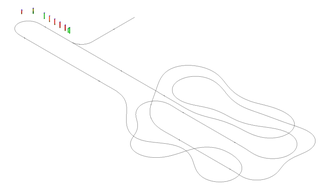


Column 1





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_AB	Company ID: STE	Date: 02.03.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):	
Project No.: 5224	Weight [kg]:	Scale: – / Size: A0
Subject: COLUMNS 1 to 8	File Name: 5224-03-1001A.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1001	Sheets: 1 of 1 / Rev.: A

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Amusement Rides
Custom software
Rosenkavalier Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_PAU 19/12

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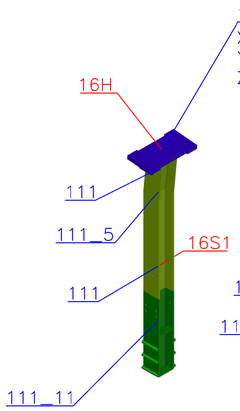
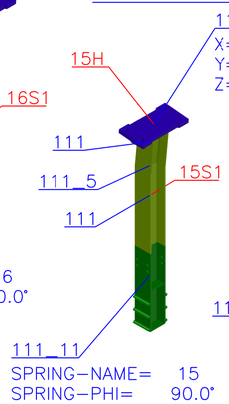
Rev.	Date	Name	Change
A	03.NOV.20	STE_ad	Column 9,11 shortened by 200mm

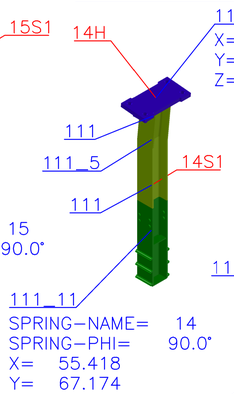
Column 16



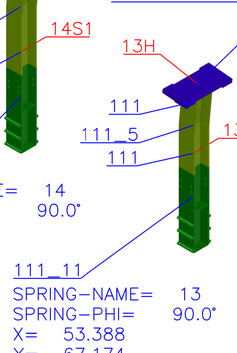
Column 15



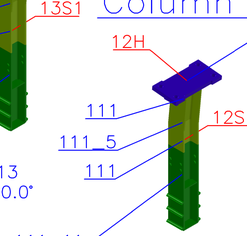
Column 14



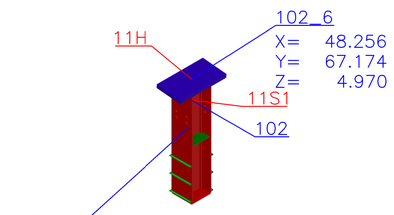
Column 13



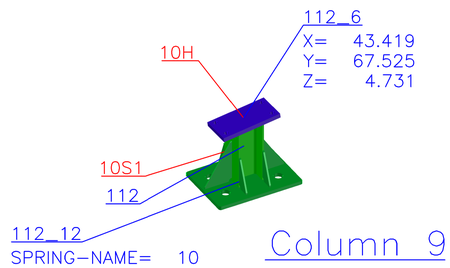
Column 12



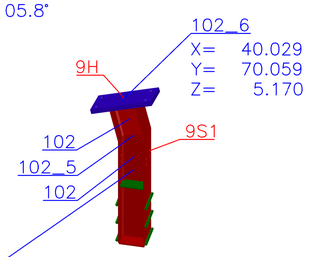
Column 11

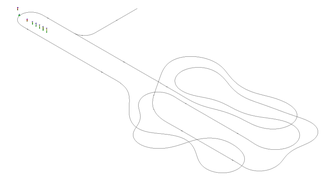


Column 10



Column 9





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 02.03.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):	
Project No.: 5224	Weight [kg]:	Scale: / Size: A0
Subject: COLUMNS 9 to 16	File Name: 5224-03-1002A.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1002	Sheets: 1 of 1 / Rev.: A

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Structural engineering
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(0)8745/17-0
Fax: +49(0)8745/17-44

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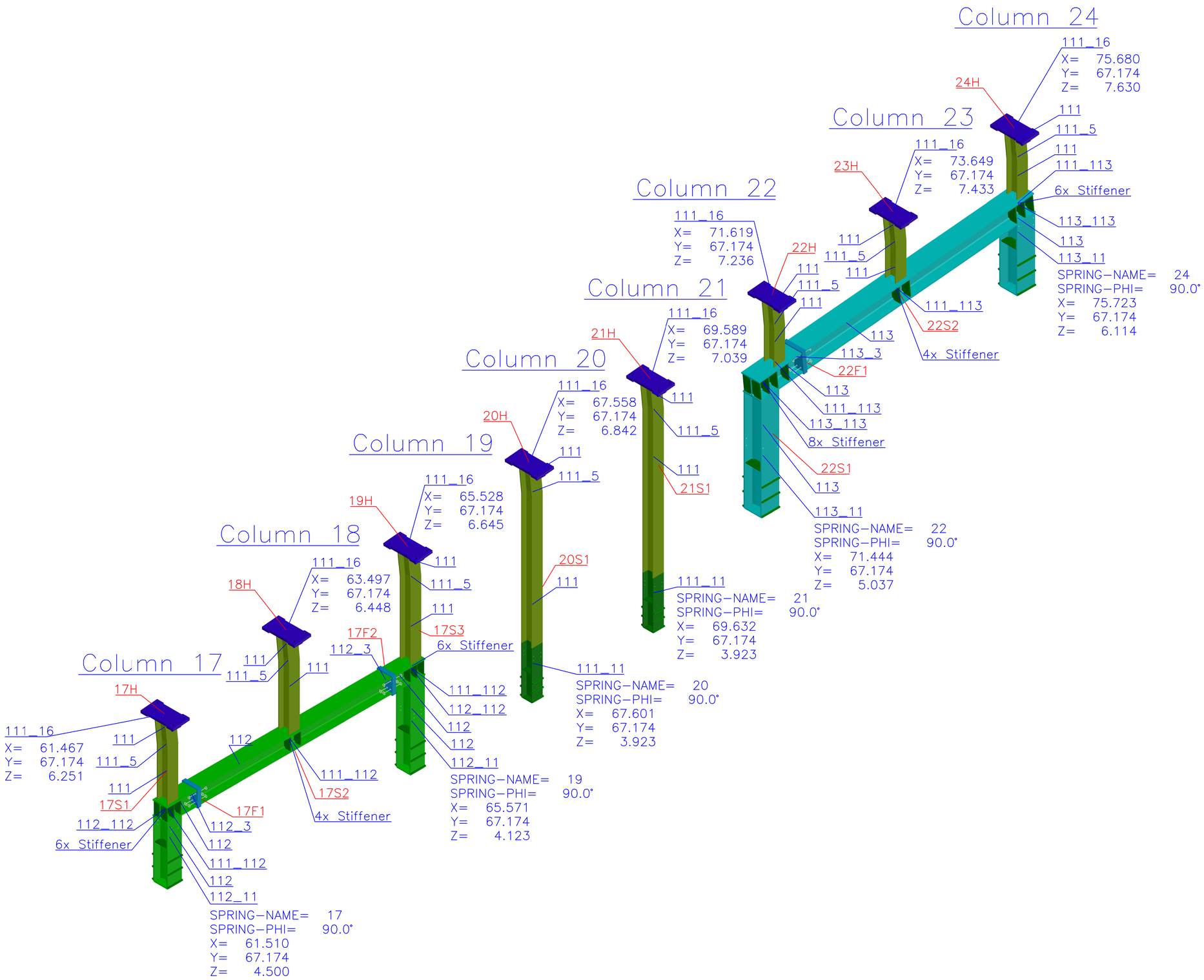
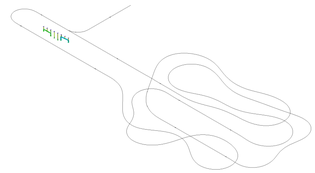
Rev.	Date	Name	Change
A	05.NOV.20	STE_AD	Column 17,19 shortened by 200mm





Attention – insert additional stiffeners as shown.

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 02.03.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego			
Project No.: 5224	Orig. Drawing-No. (EEO):		
	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 17 to 24	File Name: 5224-03-1003A.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1003	Sheets: 1 of 1	Rev.: A

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Steel construction
Stress and fatigue analysis
Mechanical engineering
Structural engineering
Custom software
Hasselbrunger Str. 24
81479 Munich
Germany
Phone: +49(89)74567-0
Fax: +49(89)74567-49

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Rev.	Date	Name	Change

Column 32

32H

102_6
X= 93.006
Y= 67.174
Z= 9.310

102_102

102

31S2

102

102_3

31F1

102_12
SPRING-NAME= 32
SPRING-PHI= 90.0°
X= 93.010
Y= 67.174
Z= 6.763

Column 31

102_10
X= 89.893
Y= 67.174
Z= 9.008

31H

102

102_5

31S1

102

102

102_102

102_12
SPRING-NAME= 31
SPRING-PHI= 90.0°
X= 89.936
Y= 67.174
Z= 6.763

Column 30

30H

102_10
X= 87.863
Y= 67.174
Z= 8.811

102

102_5

102

30S1

102_12
SPRING-NAME= 30
SPRING-PHI= 90.0°
X= 87.906
Y= 67.174
Z= 6.763

Column 29

29H

111_16
X= 85.832
Y= 67.174
Z= 8.614

111

111_5

111

29S1

111_11
SPRING-NAME= 29
SPRING-PHI= 90.0°
X= 85.875
Y= 67.174
Z= 6.713

Column 28

28H

111_16
X= 83.802
Y= 67.174
Z= 8.418

111

111_5

28S1

111

111_11
SPRING-NAME= 28
SPRING-PHI= 90.0°
X= 83.845
Y= 67.174
Z= 6.561

Column 27

27H

111_16
X= 81.771
Y= 67.174
Z= 8.221

111

111_5

27S1

111

111_11
SPRING-NAME= 27
SPRING-PHI= 90.0°
X= 81.814
Y= 67.174
Z= 6.561

Column 26

26H

111_16
X= 79.741
Y= 67.174
Z= 8.024

111

111_5

26S1

111

111_11
SPRING-NAME= 26
SPRING-PHI= 90.0°
X= 79.784
Y= 67.174
Z= 6.561

Column 25

25H

111_16
X= 77.710
Y= 67.174
Z= 7.827

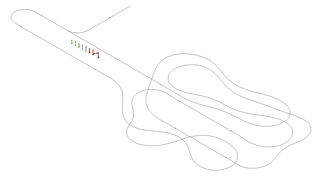
111

111_5

111

25S1

111_11
SPRING-NAME= 25
SPRING-PHI= 90.0°
X= 77.753
Y= 67.174
Z= 6.561



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 02.03.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 25 to 32	File Name: 5224-03-1004.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1004	Sheets: 1 of 1	Rev.:

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Steel construction
Stress and fatigue analysis
Amusement rides
Custom software
Rosenkranger Str. 24
81476 Munich
Germany
Phone: +49(89)74051?-0
Fax: +49(89)74051?-44

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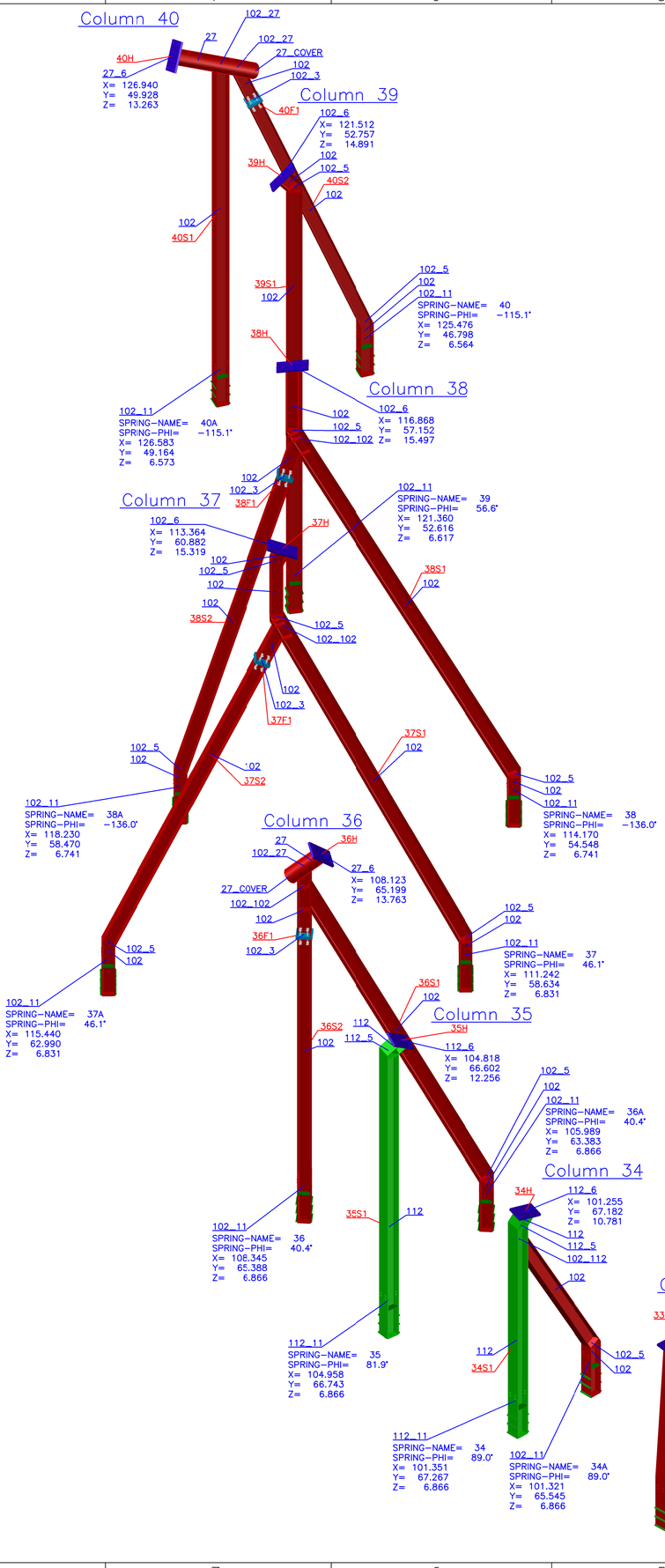
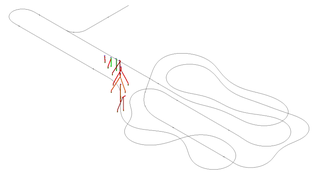


Rev.	Date	Name	Change



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 25.02.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego		
Project No.: 5224	Orig. Drowing-No. (EEO): –		
	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 33 to 40	File Name: 5224-03-1005.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1005	Sheets: 1 of 1	Rev.:

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Steel construction
Stress and fatigue analysis
Structural engineering
Amusement rides
Custom software
Nussenberger Str. 24
81476 Munich
Germany
Phone: +4989/74515-0
Fax: +4989/74515-44

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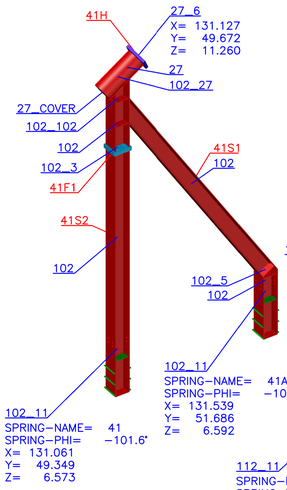
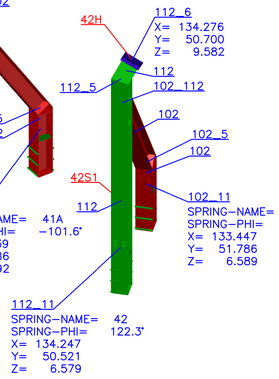
Rev.	Date	Name	Change

Column 41



Column 42



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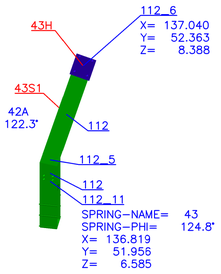

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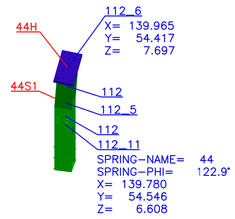

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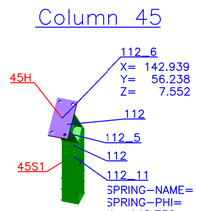

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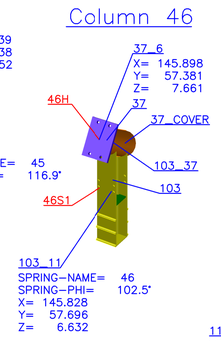
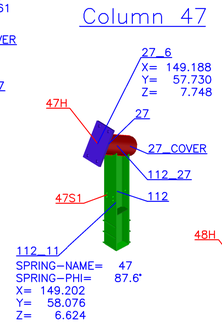


Column 47



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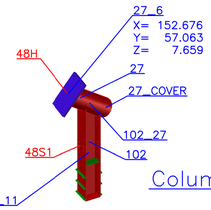
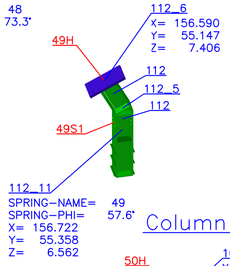
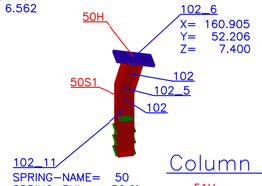


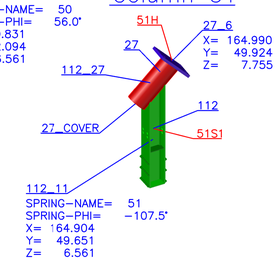
Column 49

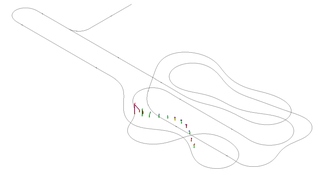


Column 50



Column 51





For footing types refer to drawing no. 03–0001 and following drawings
For further details refer to drawing no. 03–0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 19.02.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing–No. (EEO):	
Project No.: 5224	Weight [kg]: –	Scale: – / Size: A0
Subject: COLUMNS 41 to 51	File Name: 5224–03–1006.DWG	Next Assembly No.:
	Drawing No.: 5224–03–1006	Sheets: 1 of 1 / Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Structural engineering
Custom software
Nassauerweg Str. 24
81476 Munich
Germany
Phone: +49(89)74051?-0
Fax: +49(89)74051?-44

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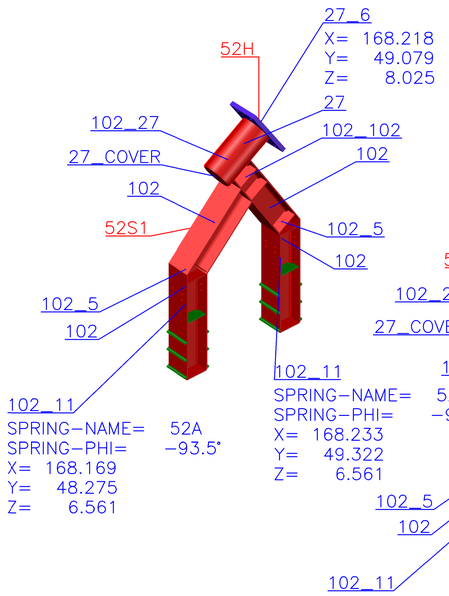
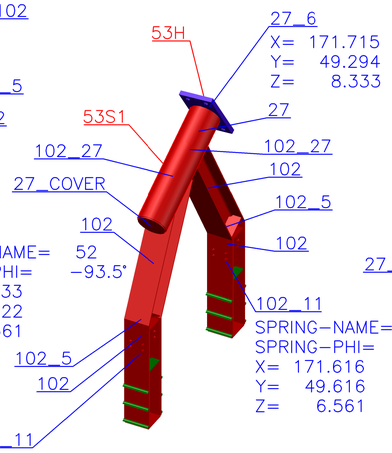
Rev.	Date	Name	Change

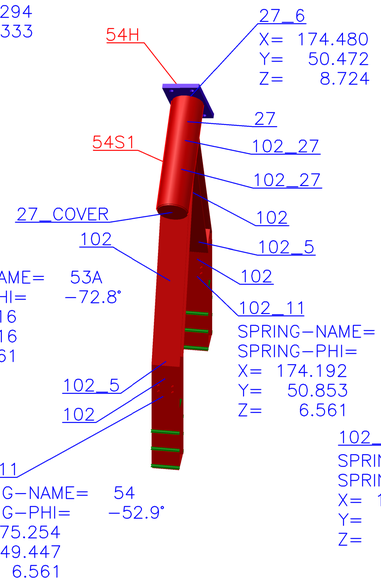
Column 52



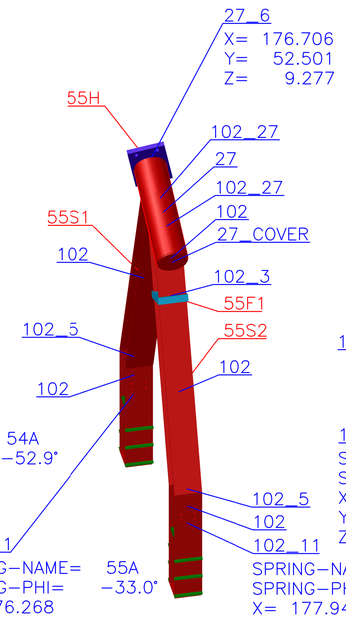
Column 53



Column 54



Column 55



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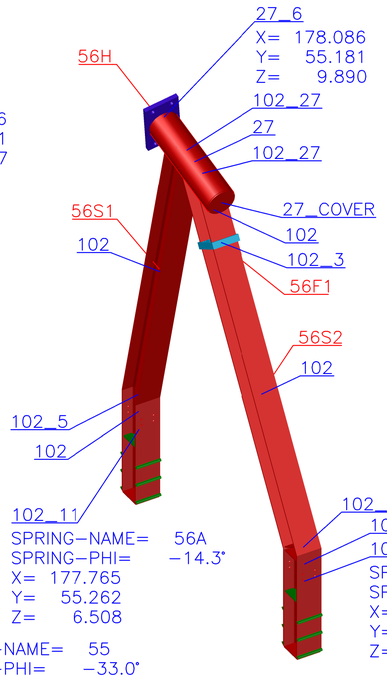
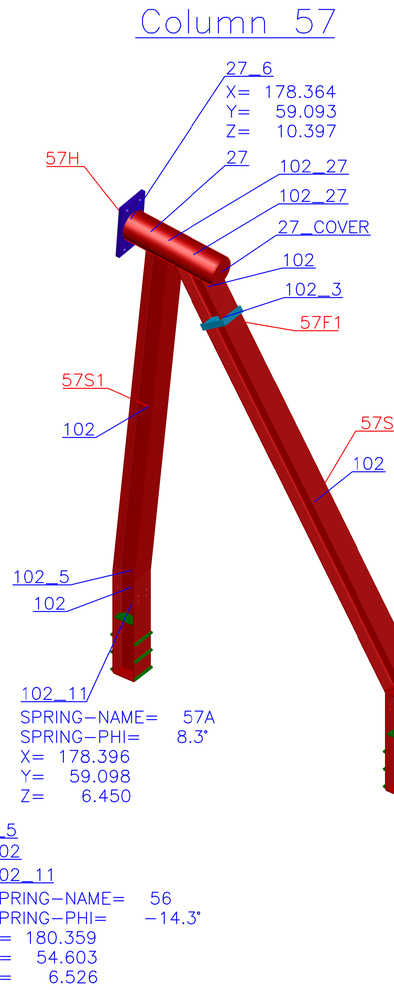
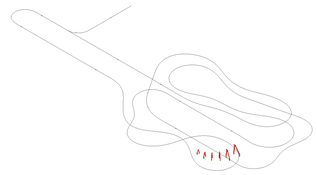


Column 57





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 19.02.2020
Checked by:		Date:

Project: Family Launch Coaster, SeaWorld San Diego
Project No.: 5224
Orig. Drawing-No. (EEO):
Weight [kg]: –
Scale: –
Size: A0
Subject: COLUMNS 52 to 57
File Name: 5224-03-1007.DWG
Next Assembly No.:
Drawing No.: 5224-03-1007
Sheets: 1 of 1
Rev.:

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Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesselwanger Str. 24
87478 Weitnau
Germany
Phone: +49(0)8376/9517-0
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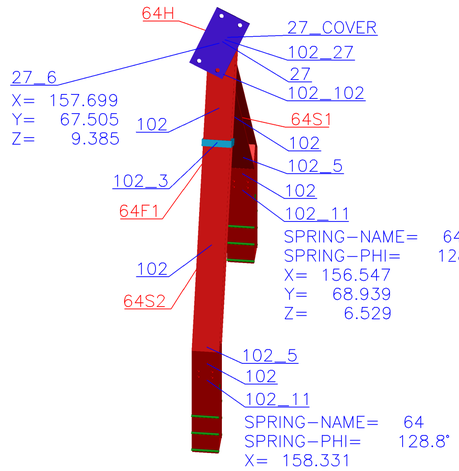
Rev.	Date	Name	Change

Column 64



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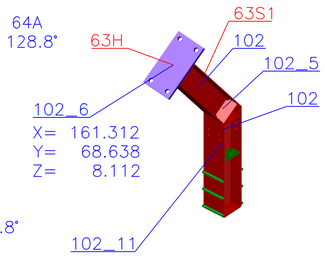

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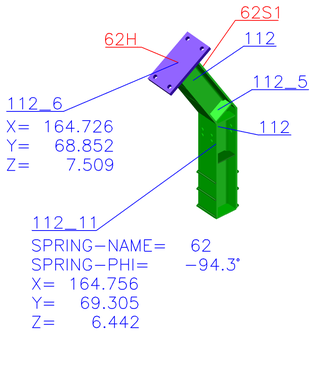

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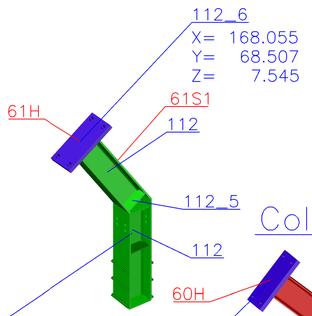

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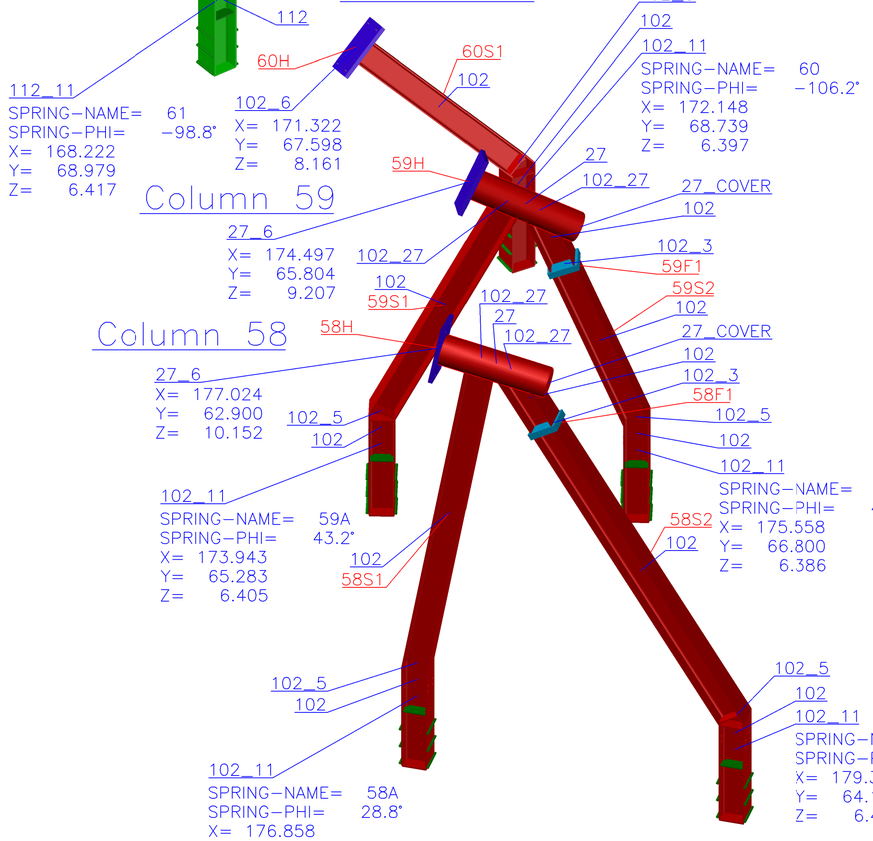

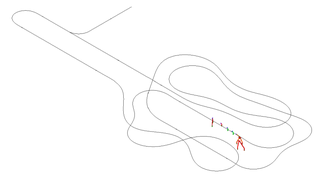

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 19.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EED):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 58 to 64	File Name: 5224-03-1008.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1008	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel and lattice projects
Mechanical engineering
Amusement rides
Custom software
Swabianweg Str. 24
81476 Munich
Germany
Phone: +49(89)745017-0
Fax: +49(89)745017-44

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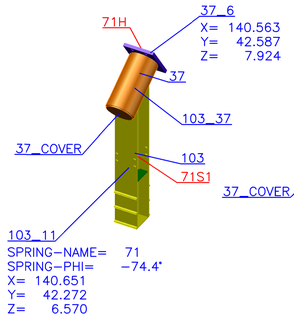
Rev.	Date	Name	Change

Column 71



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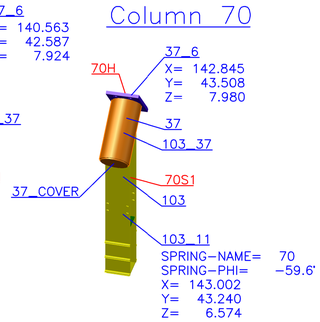

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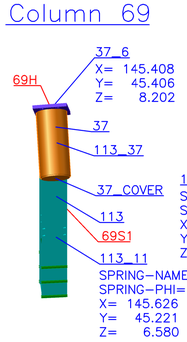

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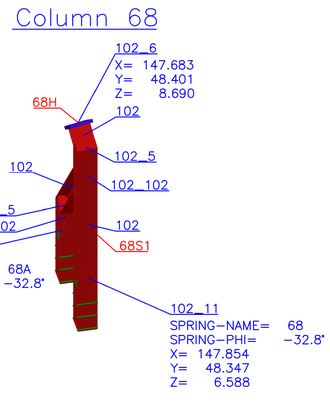

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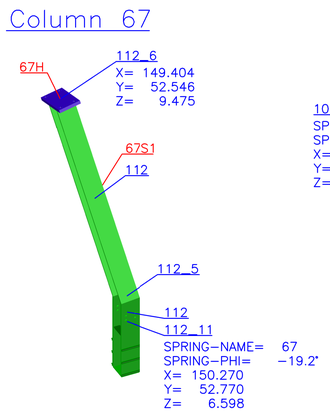

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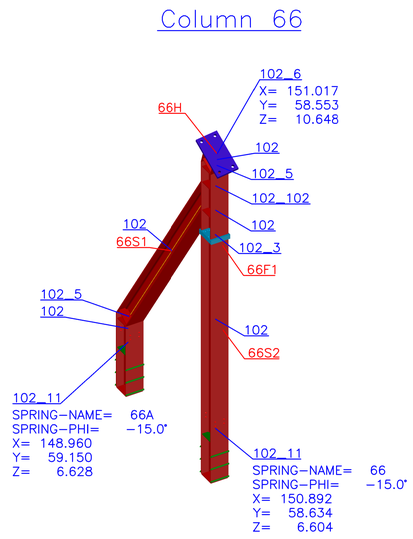

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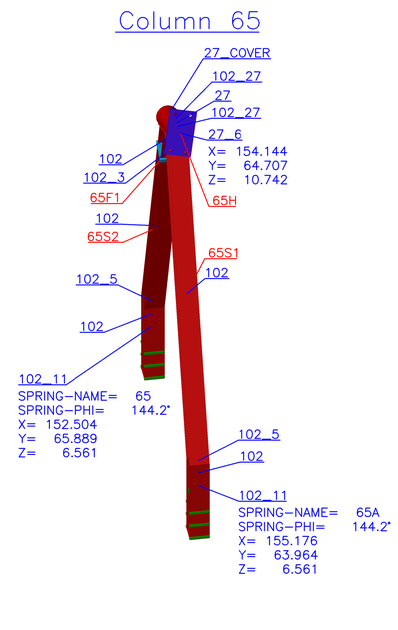

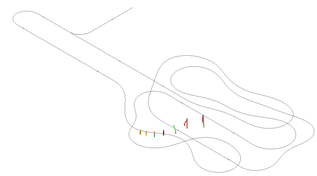

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Project: Family Launch Coaster, SeaWorld San Diego
Project No.: 5274
Subject: COLUMNS 65 to 71

Drawn by: STE_NB | Company ID: STE | Date: 19.02.2020
Checked by: | Date:
Orig. Drawing-No. (EEO):
Weight [kg]: - | Scale: - | Size: A0
File Name: 5224-03-1009.DWG | Next Assembly No.:
Drawing No.: 5224-03-1009 | Sheets: 1 of 1 | Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Structural fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Hessenringer Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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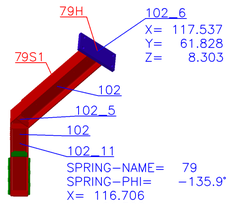
Rev.	Date	Name	Change

Column 79



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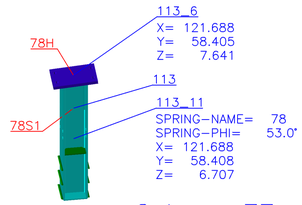

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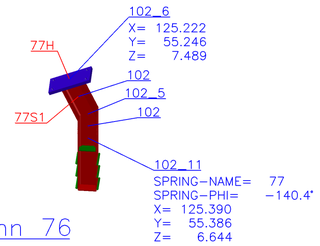

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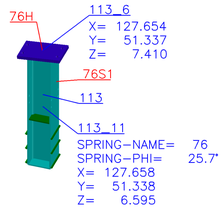

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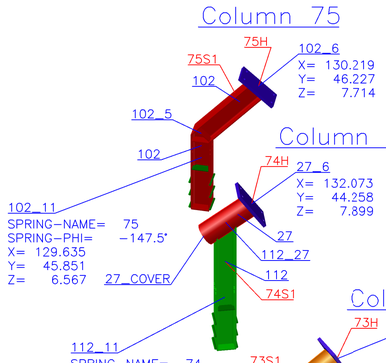

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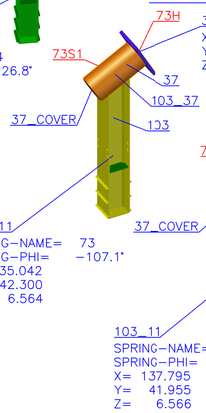
Column 73



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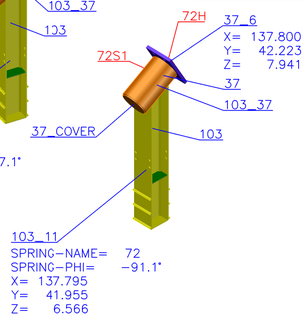

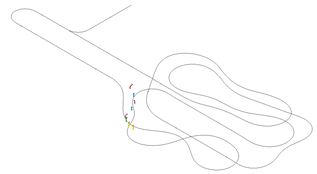

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 19.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: --	Size: A0
Subject: COLUMNS 72 to 79	File Name: 5224-03-1010.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1010	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Structural dynamic analysis
Vibration and fatigue
Amusement rides
Custom software
Nesselwanger Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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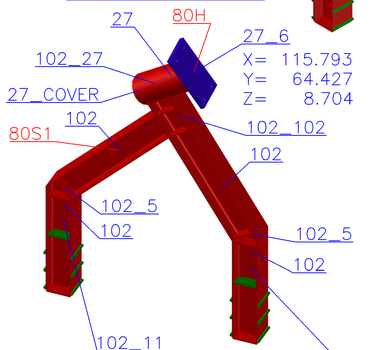
Rev.	Date	Name	Change

Column 80



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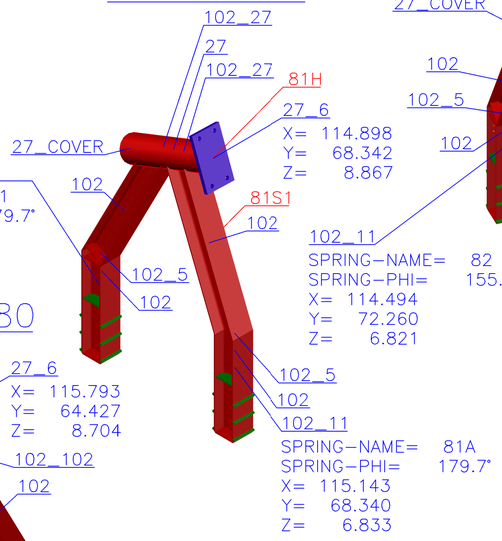

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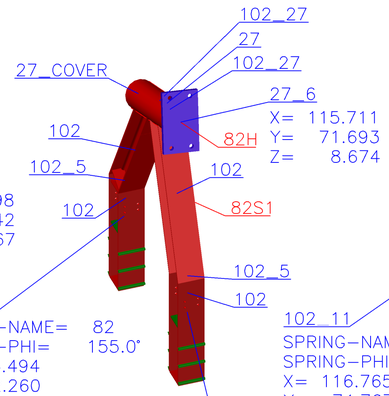

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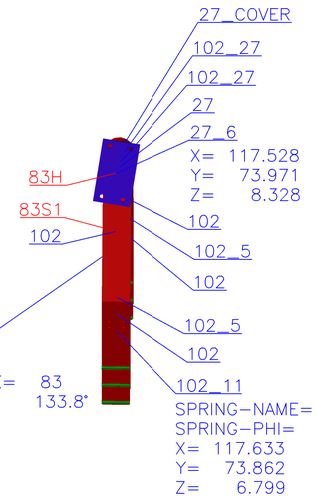

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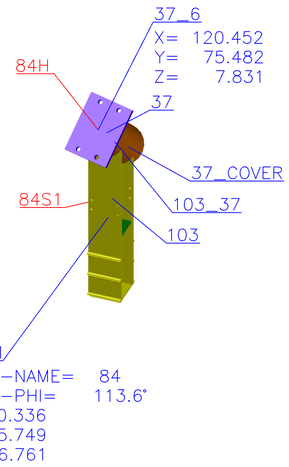

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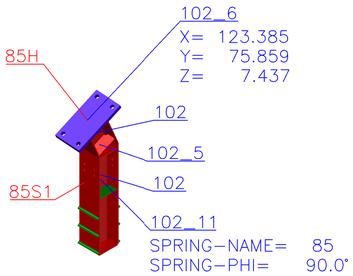

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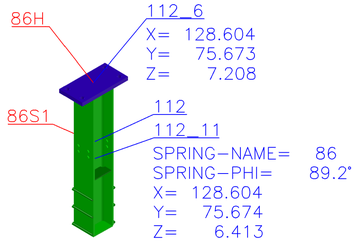

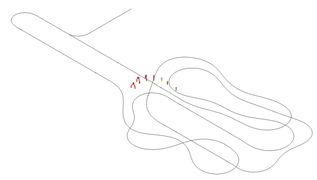

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB		Company ID: STE	Date: 19.02.2020
Checked by:			Date:
Project: Family Launch Coaster, SeaWorld San Diego		Orig. Drawing-No. (EEO):	
Project No.: 5224		Weight [kg]:	Scale: – / Size: A0
Subject: COLUMNS 80 to 86		File Name: 5224-03-1011.DWG	Next Assembly No.:
		Drawing No.: 5224-03-1011	Sheets: 1 of 1 / Rev.:

INGENIEURBUERO STENGEL GmbH
Steel and bridge analysis
Mechanical engineering
Amusement rides
Custom software
Tassilostrasse Str. 24
81479 Munich
Germany
Phone: +4989/745517-0
Fax: +4989/745517-44

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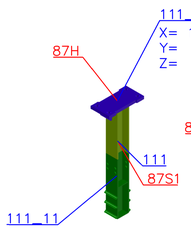
Rev.	Date	Name	Change

Column 87



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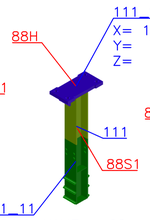

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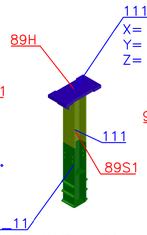

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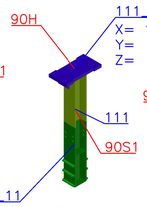

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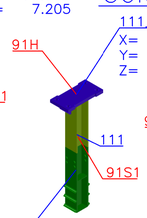

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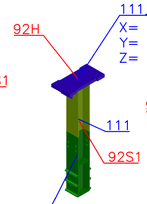

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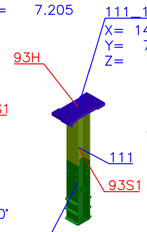

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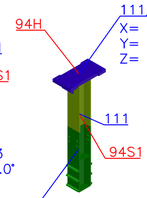
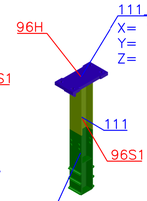


Column 95

Column 96



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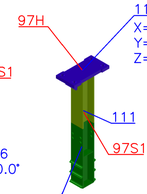

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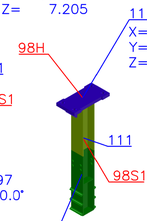

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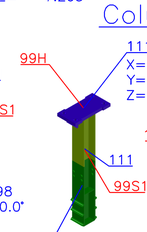
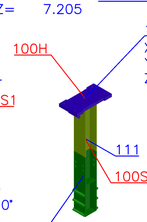
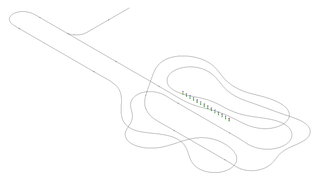


Column 100





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 20.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego			
Project No.: 5224	Orig. Drawing-No. (EEO): –	Weight [kg]:	Scale: –
Subject: COLUMNS 87 to 100	File Name: 5224-03-1012.DWG	Size: A0	Next Assembly No.:
	Drawing No.: 5224-03-1012	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software
Nesenbergstr. Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_PRJ 1912

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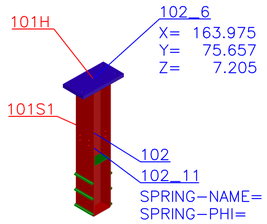
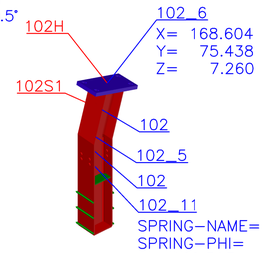
Rev.	Date	Name	Change

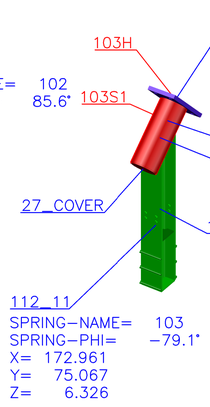
Column 101



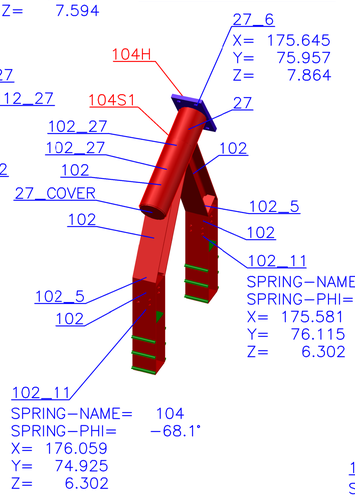
Column 102



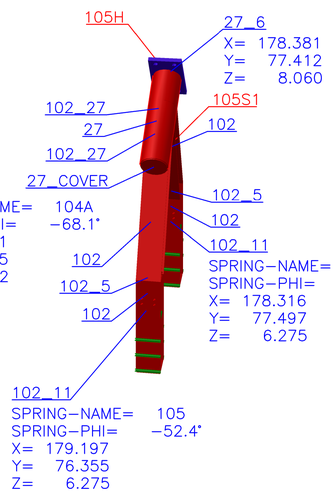
Column 103



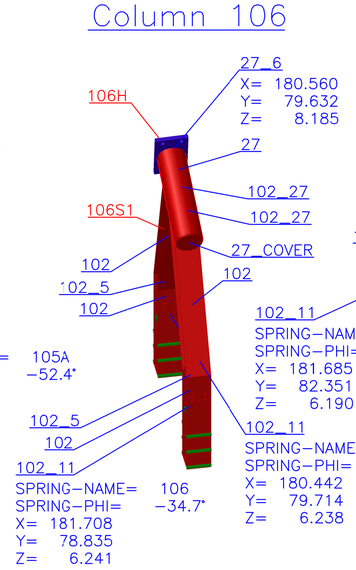
Column 104



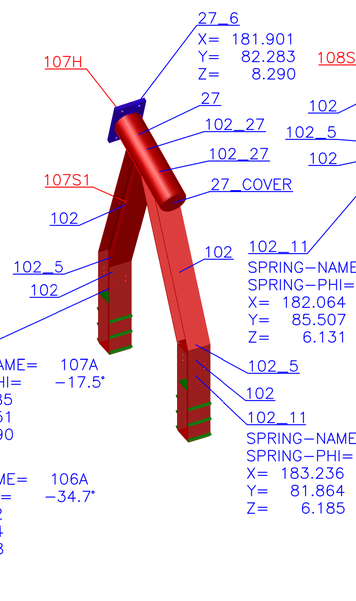
Column 105



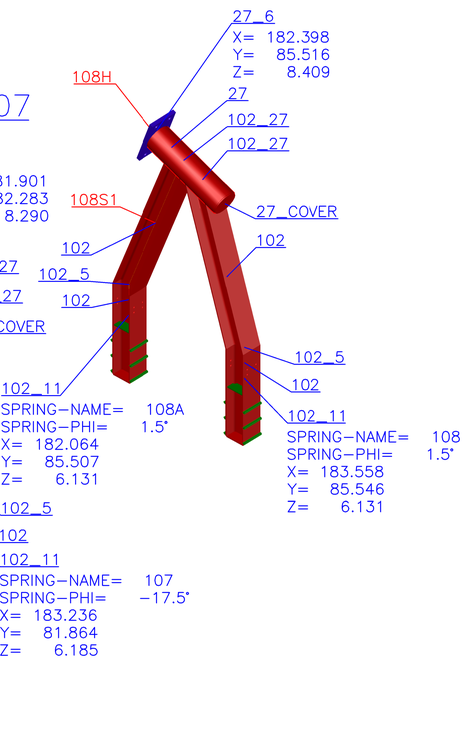
Column 106

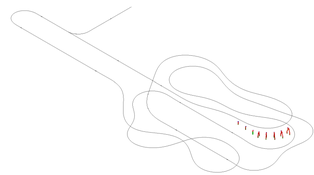


Column 107



Column 108





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 20.02.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):	
Project No.: 5224	Weight [kg]:	Scale: – / Size: A0
Subject: COLUMNS 101 to 108	File Name: 5224-03-1013.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1013	Sheets: 1 of 1 / Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Structural design analysis
Mechanical engineering
Amusement rides
Custom software
Heisenbergstr. Str. 24
81476 Munich
Germany
Phone: ++49(0)7455 17-0
Fax: ++49(0)7455 17-44

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Remarks: STE_PRJ: 1012

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Rev.	Date	Name	Change

Column 114

114H
112
112_6
X= 168.321
Y= 95.331
Z= 9.148
112_5
112_112
112
114S1
112
112_11
SPRING-NAME= 114
SPRING-PHI= -76.4°
X= 168.255
Y= 95.509
Z= 6.120
112_5
112
112_11
SPRING-NAME= 114A
SPRING-PHI= -76.4°
X= 168.610
Y= 94.040
Z= 6.149

Column 113

27_6
X= 171.824
Y= 95.816
Z= 8.957
27
113H
112_27
27_COVER
112_112
112
113S1
112
112_5
112
112_11
SPRING-NAME= 113A
SPRING-PHI= 91.4°
X= 171.852
Y= 94.721
Z= 6.104
112_11
SPRING-NAME= 113
SPRING-PHI= 91.4°
X= 171.817
Y= 96.123
Z= 6.104
112_11
SPRING-NAME= 112A
SPRING-PHI= 73.3°
X= 174.764
Y= 94.179
Z= 6.035
112_11
SPRING-NAME= 112
SPRING-PHI= 73.3°
X= 175.197
Y= 95.618
Z= 6.104

Column 112

27_6
X= 175.100
Y= 95.296
Z= 8.843
27
112H
112_27
27_COVER
112_112
112S1
112
112_5
112
102_5
102
102_27
102_11
SPRING-NAME= 111A
SPRING-PHI= 55.2°
X= 177.607
Y= 93.189
Z= 6.057
27_6
X= 181.877
Y= 88.617
Z= 8.524

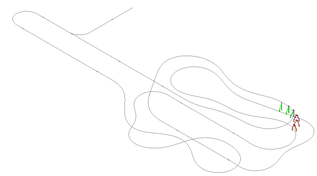
Column 111

27_6
X= 178.041
Y= 93.813
Z= 8.743
111H
102_27
27
102_27
27_COVER
102
111F1
102_3
111S2
102
27_6
X= 180.444
Y= 91.417
Z= 8.633
110H
27
102_27
102_5
102
27_COVER
102
110S1
102_11
SPRING-NAME= 111
SPRING-PHI= 55.2°
X= 178.842
Y= 94.966
Z= 6.014
102_5
102
102_11
SPRING-NAME= 110
SPRING-PHI= 36.7°
X= 181.563
Y= 92.250
Z= 6.025
102_11
SPRING-NAME= 110A
SPRING-PHI= 36.7°
X= 179.983
Y= 91.073
Z= 6.063

Column 110

Column 109

102_5
102
102_11
SPRING-NAME= 109
SPRING-PHI= 19.2°
X= 183.150
Y= 89.061
Z= 6.082
102_11
SPRING-NAME= 109A
SPRING-PHI= 19.2°
X= 181.458
Y= 88.471
Z= 6.102



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 20.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 109 to 114	File Name: 5224-03-1014.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1014	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Welding engineering
Amusement rides
Custom software
Neuperlinger Str. 24
81476 Munich
Germany
Phone: ++49(89)745017-0
Fax: ++49(89)745017-44

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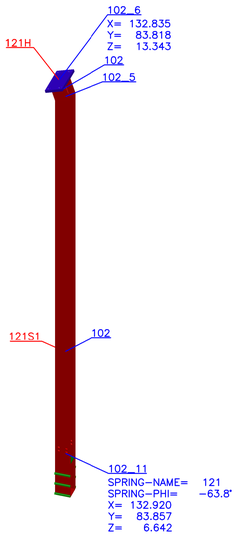
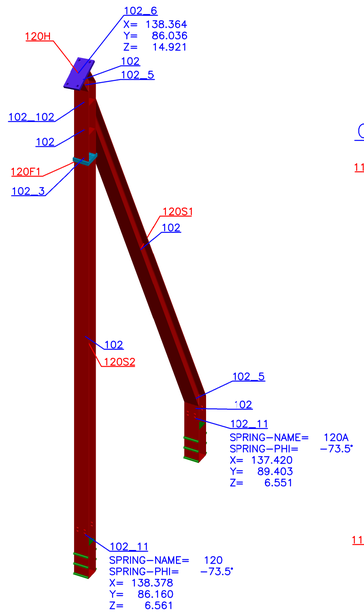
Rev.	Date	Name	Change

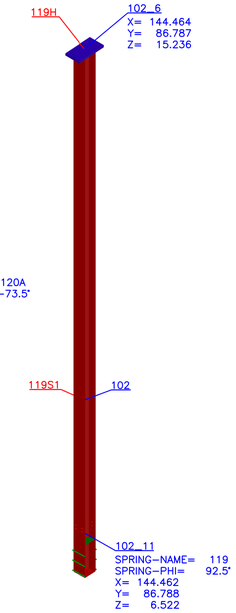
Column 121



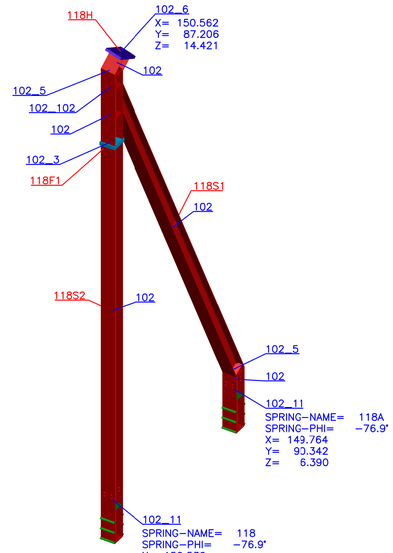
Column 120



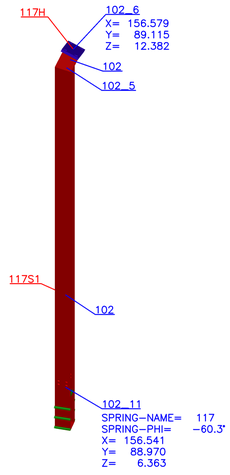
Column 119



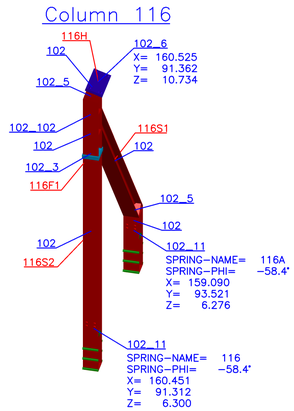
Column 118



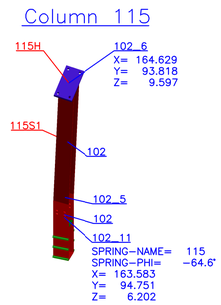
Column 117

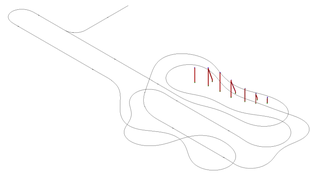


Column 116



Column 115





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 20.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]: –	Scale: –	Size: A0
Subject: COLUMNS 115 to 121	File Name: 5224-03-1015.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1015	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Finite element modelling
Amusement industry
Custom software
Hessenkroger Str. 24
81539 Munich
Germany
Phone: ++49(0)8745517-0
Fax: ++49(0)8745517-44

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Rev.	Date	Name	Change

Column 129

37_COVER
113_37
37
37_6
X= 113.827
Y= 92.501
Z= 7.825
129H
113
129S1
113_11
SPRING-NAME= 129
SPRING-PHI= 167.9°
X= 113.482
Y= 92.574
Z= 6.713

Column 128

37_COVER
103_37
37
128H
37_6
103
X= 113.628
Y= 89.882
Z= 7.878
128S1
103_11
SPRING-NAME= 128
SPRING-PHI= -175.5°
X= 113.277
Y= 89.854
Z= 6.713

Column 127

113_37
37
127H
37_COVER
37_6
X= 114.223
Y= 87.097
Z= 8.023
127S1
113
113_11
SPRING-NAME= 127
SPRING-PHI= -157.4°
X= 113.900
Y= 86.962
Z= 6.713

Column 126

27_6
X= 115.697
Y= 84.495
Z= 8.285
126H
27
112_27
27_COVER
102_112
102
126S1
112
112_5
112
112_11
SPRING-NAME= 126
SPRING-PHI= -138.1°
X= 115.861
Y= 84.643
Z= 6.713
125H
27_6
X= 117.798
Y= 82.545
Z= 8.667
102_5
102
102_11
SPRING-NAME= 126A
SPRING-PHI= -138.1°
X= 114.971
Y= 83.843
Z= 6.713
27
27_COVER
102_27
102_102

Column 125

102
102
102_5
102
125S1
102_5
102
102_11
SPRING-NAME= 125A
SPRING-PHI= -118.8°
X= 117.174
Y= 81.413
Z= 6.745
27_COVER
102_11
SPRING-NAME= 125
SPRING-PHI= -118.8°
X= 118.034
Y= 82.974
Z= 6.724

Column 124

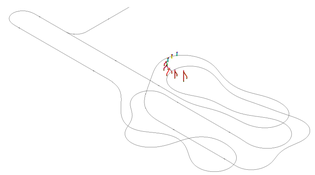
124H
27_6
X= 120.861
Y= 81.158
Z= 9.317
27
102_27
102
102_102
102_3
124F1
102
124S2
102_5
102
102
124S1
102_11
SPRING-NAME= 124
SPRING-PHI= -95.7°
X= 120.966
Y= 82.214
Z= 6.713
102_5
102
102_11
SPRING-NAME= 124A
SPRING-PHI= -95.7°
X= 120.702
Y= 79.565
Z= 6.728

Column 123

123H
27_6
X= 124.211
Y= 80.827
Z= 10.214
27
102_27
102_102
27_COVER
102
102_5
102
102_11
SPRING-NAME= 123A
SPRING-PHI= -72.8°
X= 123.737
Y= 82.355
Z= 6.713
102
123S1
102_11
SPRING-NAME= 123
SPRING-PHI= -72.8°
X= 124.272
Y= 80.627
Z= 6.713

Column 122

122H
102_6
X= 128.245
Y= 81.676
Z= 11.580
102
102_5
102
102_102
122F1
102_3
102
122S1
102
122S2
102_5
102
102_11
SPRING-NAME= 122A
SPRING-PHI= -76.8°
X= 127.817
Y= 83.932
Z= 6.693
102_11
SPRING-NAME= 122
SPRING-PHI= -76.8°
X= 128.377
Y= 81.547
Z= 6.709



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 20.02.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):	
Project No.: 5224	Weight [kg]:	Scale: – / Size: A0
Subject: COLUMNS 122 to 129	File Name: 5224-03-1016.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1016	Sheets: 1 of 1 / Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Amusement ride testing
Amusement rides
Custom software
Rosenmorgel Str. 24
81474 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Remarks: STE_PN: 1913

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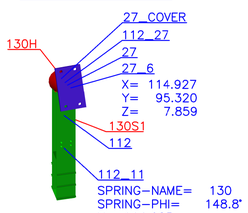
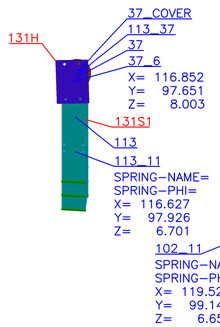
Rev.	Date	Name	Change

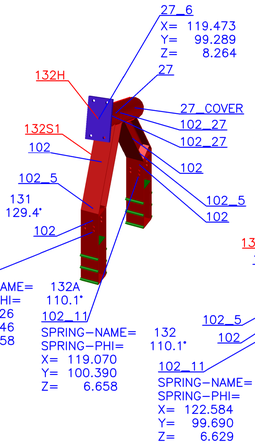
Column 130



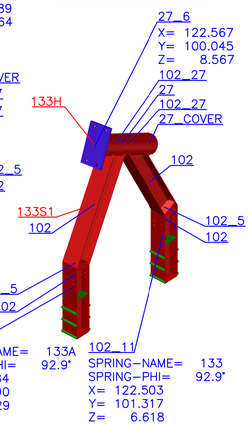
Column 131



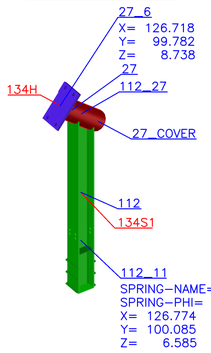
Column 132



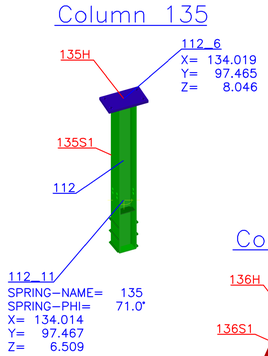
Column 133



Column 134



Column 135



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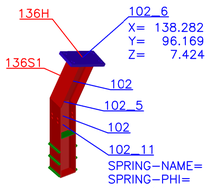

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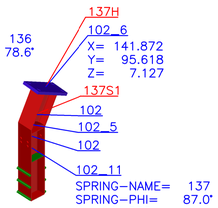

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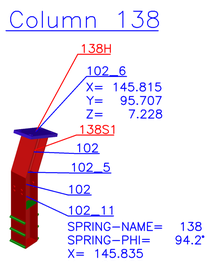

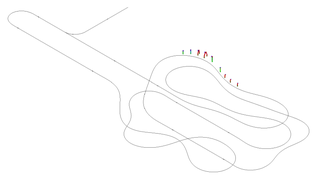

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 20.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 130 to 138	File Name: 5224-03-1017.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1017	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Mechanical engineering
Amusement rides
Custom software
Hessenringer Str. 24
61476 Muldal
Germany
Phone: +49(0)6745517-0
Fax: +49(0)6745517-44

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Remarks: STE_PRJ 1912

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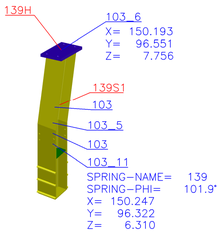
Rev.	Date	Name	Change

Column 139



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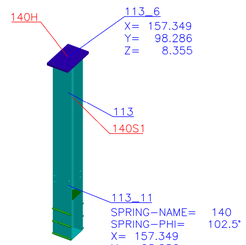

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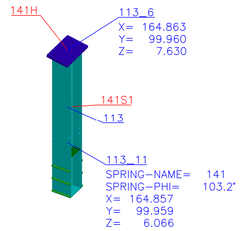

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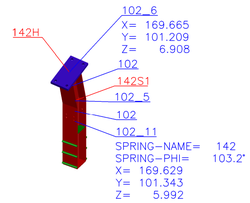

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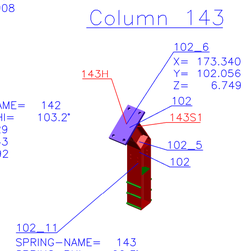

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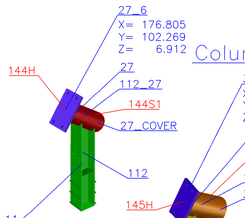

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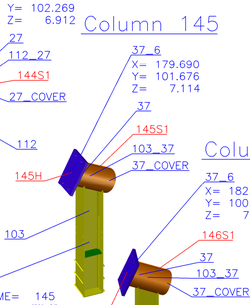

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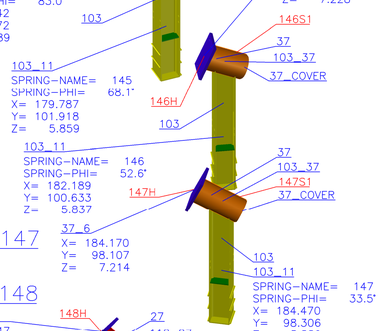
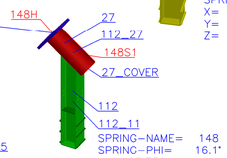


Column 147

Column 148



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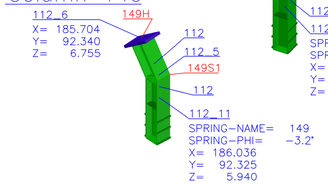

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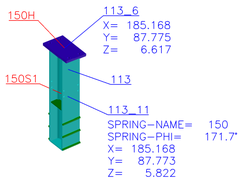

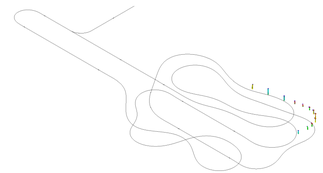

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020
Checked by:		Date:

Project:
Family Launch Coaster, SeaWorld San Diego

Orig. Drawing-No. (EEO):

Project No.: 5224	Weight [kg]: -	Scale: - / Size: A0
Subject: COLUMNS 139 to 150	File Name: 5224-03-1018.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1018	Sheets: 1 of 1 / Rev.:

INGENIEURBÜRO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Crane engineering
Amusement rides
Custom software
Tessenbergstr. Str. 24
81476 Munich
Germany
Phone: ++49(0)74557-0
Fax: ++49(0)74557-49

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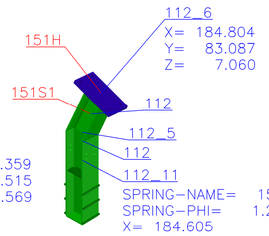
Rev.	Date	Name	Change

Column 151



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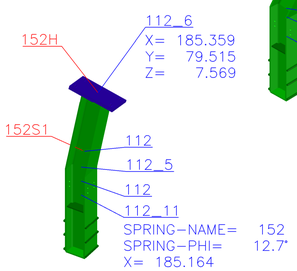

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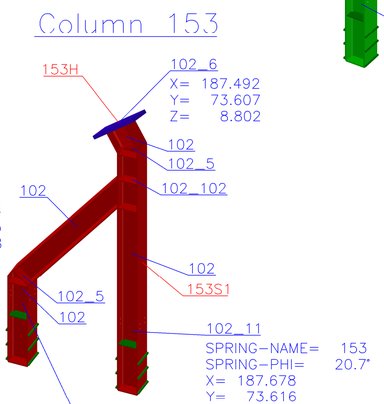

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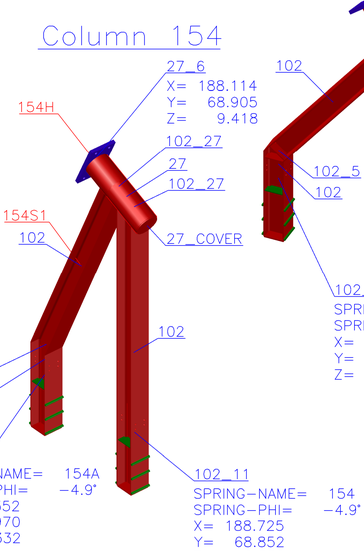

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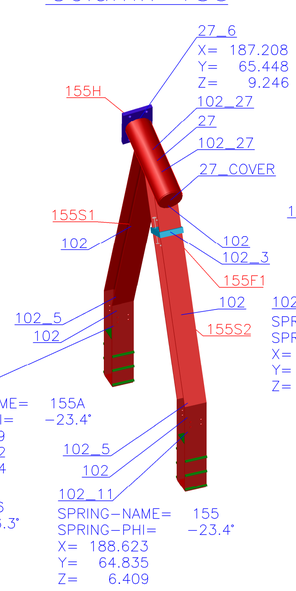

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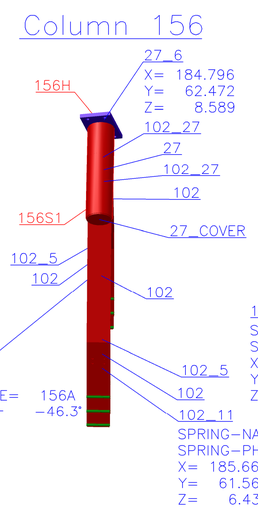
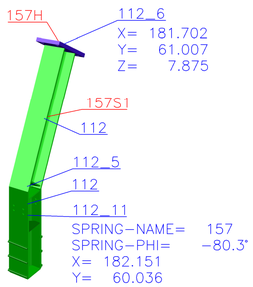


Column 157



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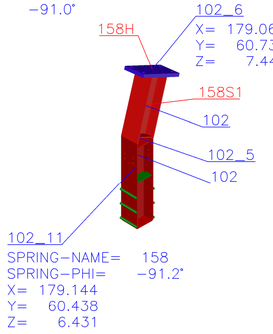

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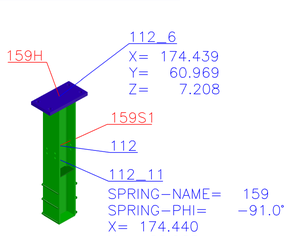

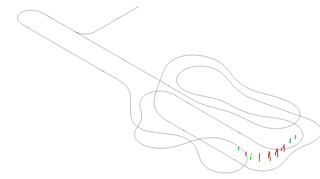

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EED):	
Project No.: 5224	Weight [kg]:	Scale: – / Size: A0
Subject: COLUMNS 151 to 159	File Name: 5224-03-1019.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1019	Sheets: 1 of 1 / Rev.:

INGENIEURBUERO STENGEL GmbH
Stress and fatigue analysis
Mechanical engineering
Amusement rides
Custom software

Heidemannger Str. 24
81479 Munich
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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Rev.	Date	Name	Change

Column 172

111_16
X= 145.080
Y= 60.980
Z= 7.205

172H
111
172S1

111_11
SPRING-NAME= 172
SPRING-PHI= -90.0°
X= 145.080
Y= 60.980
Z= 6.210

Column 171

111_16
X= 147.120
Y= 60.980
Z= 7.205

171H
111
171S1

111_11
SPRING-NAME= 171
SPRING-PHI= -90.0°
X= 147.120
Y= 60.980
Z= 6.210

Column 170

111_16
X= 149.160
Y= 60.980
Z= 7.205

170H
111
170S1

111_11
SPRING-NAME= 170
SPRING-PHI= -90.0°
X= 149.160
Y= 60.980
Z= 6.210

Column 169

111_16
X= 151.200
Y= 60.980
Z= 7.205

169H
111
169S1

111_11
SPRING-NAME= 169
SPRING-PHI= -90.0°
X= 151.200
Y= 60.980
Z= 6.210

Column 168

111_16
X= 153.240
Y= 60.980
Z= 7.205

168H
111
168S1

111_11
SPRING-NAME= 168
SPRING-PHI= -90.0°
X= 153.240
Y= 60.980
Z= 6.210

Column 167

111_16
X= 155.280
Y= 60.980
Z= 7.205

167H
111
167S1

111_11
SPRING-NAME= 167
SPRING-PHI= -90.0°
X= 155.280
Y= 60.980
Z= 6.210

Column 166

111_16
X= 157.320
Y= 60.980
Z= 7.205

166H
111
166S1

111_11
SPRING-NAME= 166
SPRING-PHI= -90.0°
X= 157.320
Y= 60.980
Z= 6.210

Column 165

111_16
X= 159.360
Y= 60.980
Z= 7.205

165H
111
165S1

111_11
SPRING-NAME= 165
SPRING-PHI= -90.0°
X= 159.360
Y= 60.980
Z= 6.210

Column 164

111_16
X= 161.400
Y= 60.980
Z= 7.205

164H
111
164S1

111_11
SPRING-NAME= 164
SPRING-PHI= -90.0°
X= 161.400
Y= 60.980
Z= 6.210

Column 163

111_16
X= 163.440
Y= 60.980
Z= 7.205

163H
111
163S1

111_11
SPRING-NAME= 163
SPRING-PHI= -90.0°
X= 163.440
Y= 60.980
Z= 6.210

Column 162

111_16
X= 165.480
Y= 60.980
Z= 7.205

162H
111
162S1

111_11
SPRING-NAME= 162
SPRING-PHI= -90.0°
X= 165.480
Y= 60.980
Z= 6.210

Column 161

111_16
X= 167.520
Y= 60.980
Z= 7.205

161H
111
161S1

111_11
SPRING-NAME= 161
SPRING-PHI= -90.0°
X= 167.520
Y= 60.980
Z= 6.210

Column 160

111_16
X= 169.560
Y= 60.980
Z= 7.205

160H
111
160S1

111_11
SPRING-NAME= 160
SPRING-PHI= -90.0°
X= 169.560
Y= 60.980
Z= 6.210

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 160 to 172	File Name: 5224-03-1020.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1020	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Plant engineering
Custom software

Heidemannstr. Str. 24
81479 Munich
Germany
Phone: ++49(0)7145117-0
Fax: ++49(0)7145117-44

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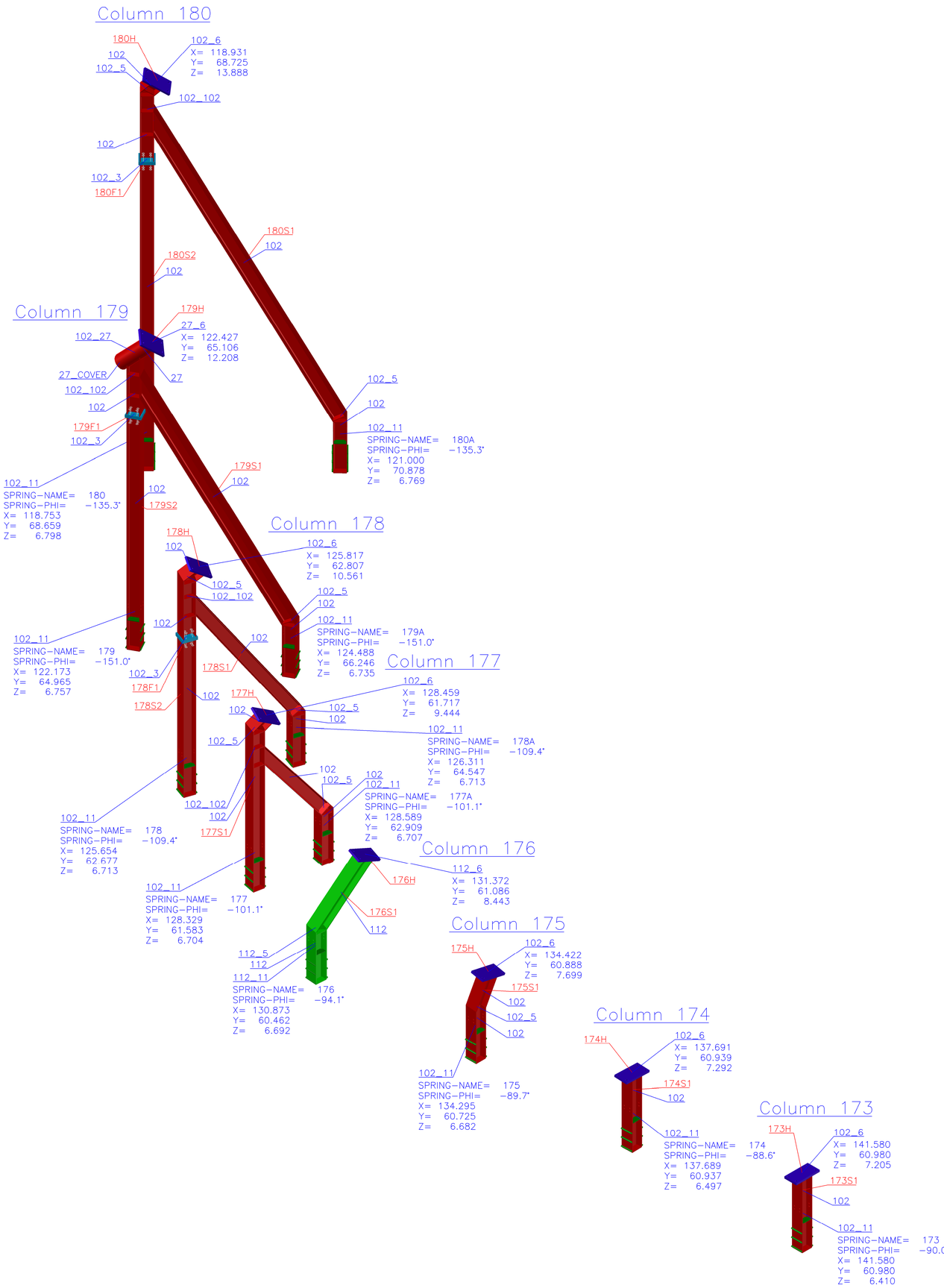
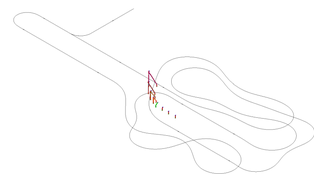
Rev.	Date	Name	Change





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego			
Project No.: 5224	Orig. Drawing-No. (EEO):		
Weight [kg]:	Scale: –	Size: A0	
Subject: COLUMNS 173 to 180	File Name: 5224-03-1021.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1021	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Mechanical rides
Custom software
Rosenkranzgasse Str. 24
81476 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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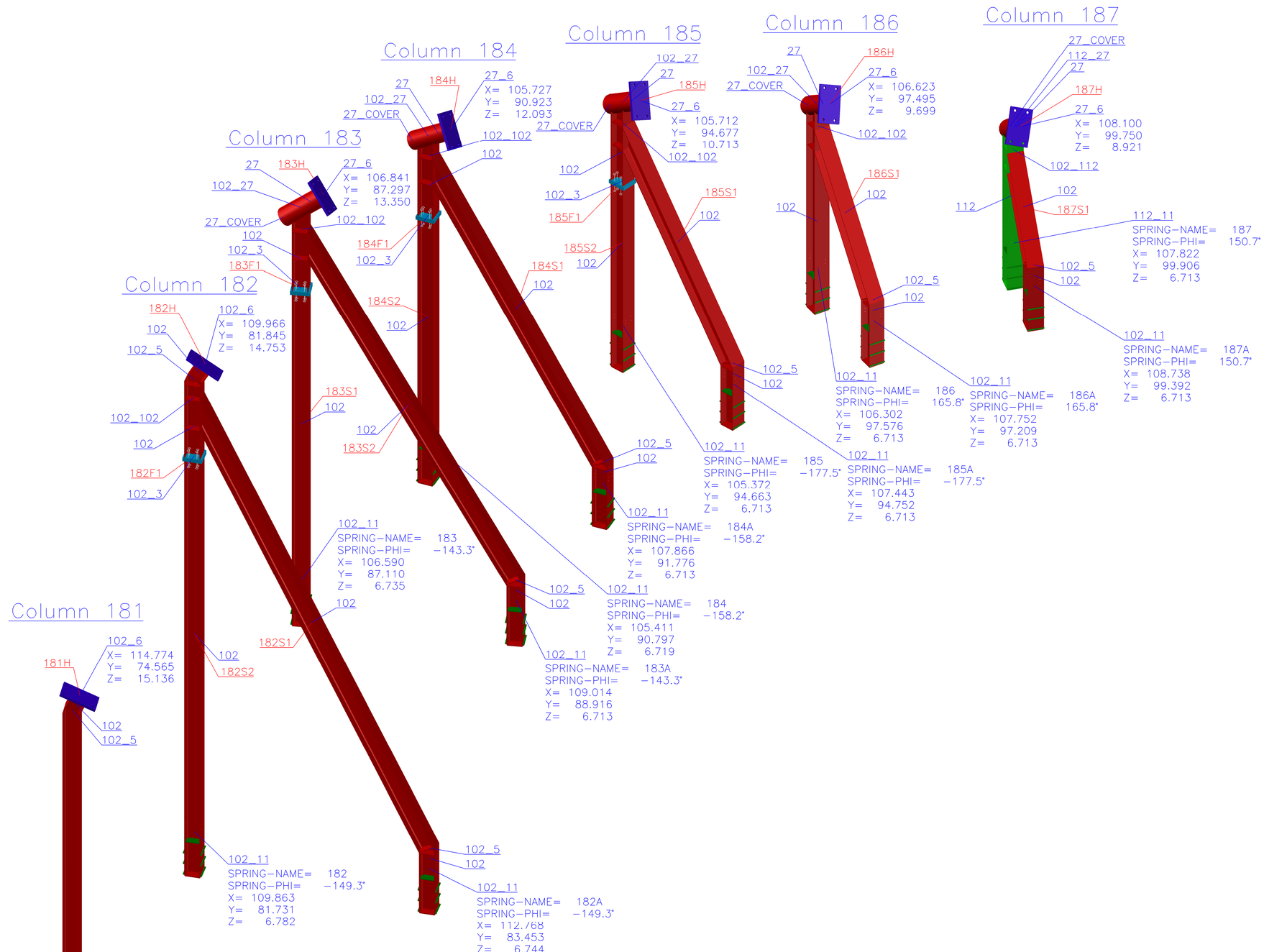
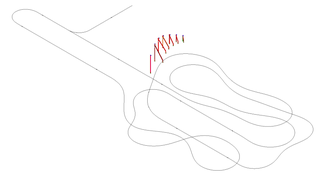
Rev.	Date	Name	Change





For tooling types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 181 to 187	File Name: 5224-03-1022.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1022	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Structural engineering
Amusement rides
Custom software
Rosenkranzer Str. 24
81475 Munich
Germany
Phone: +49(89)745017-0
Fax: +49(89)745017-44

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Remote: STE_PIU 1912

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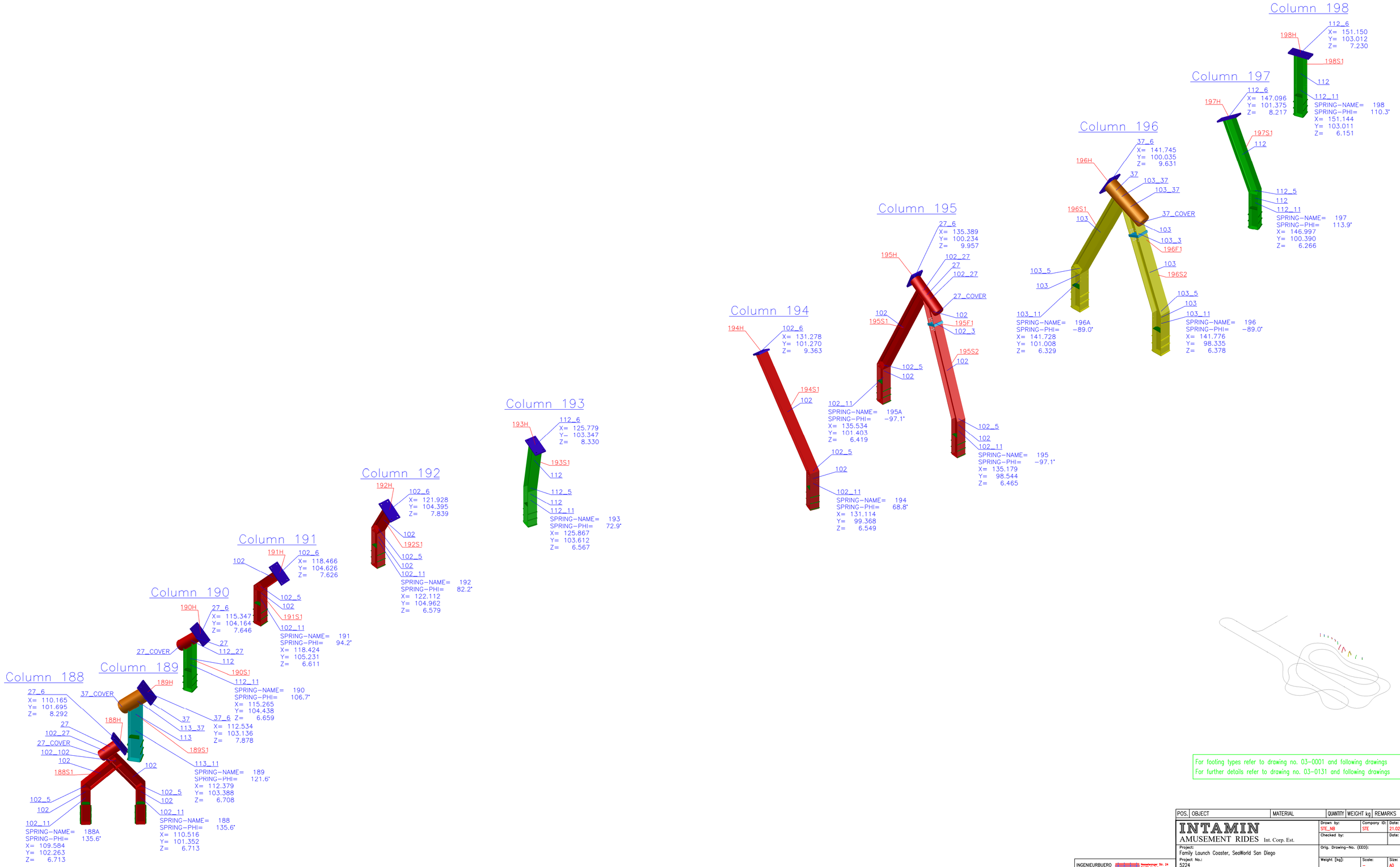
Rev.	Date	Name	Change



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020
Checked by:		Date:
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):	
Project No.: 5224	Weight [kg]:	Scale: – / Size: A0
Subject: COLUMNS 188 to 198	File Name: 5224-03-1023.DWG	Next Assembly No.:
	Drawing No.: 5224-03-1023	Sheets: 1 of 1 / Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Structural and fatigue analysis
Welding engineering
Amusement rides
Custom software

Rosenheimer Str. 24
81476 Munich
Germany
Phone: +49(89)745017-0
Fax: +49(89)745017-44

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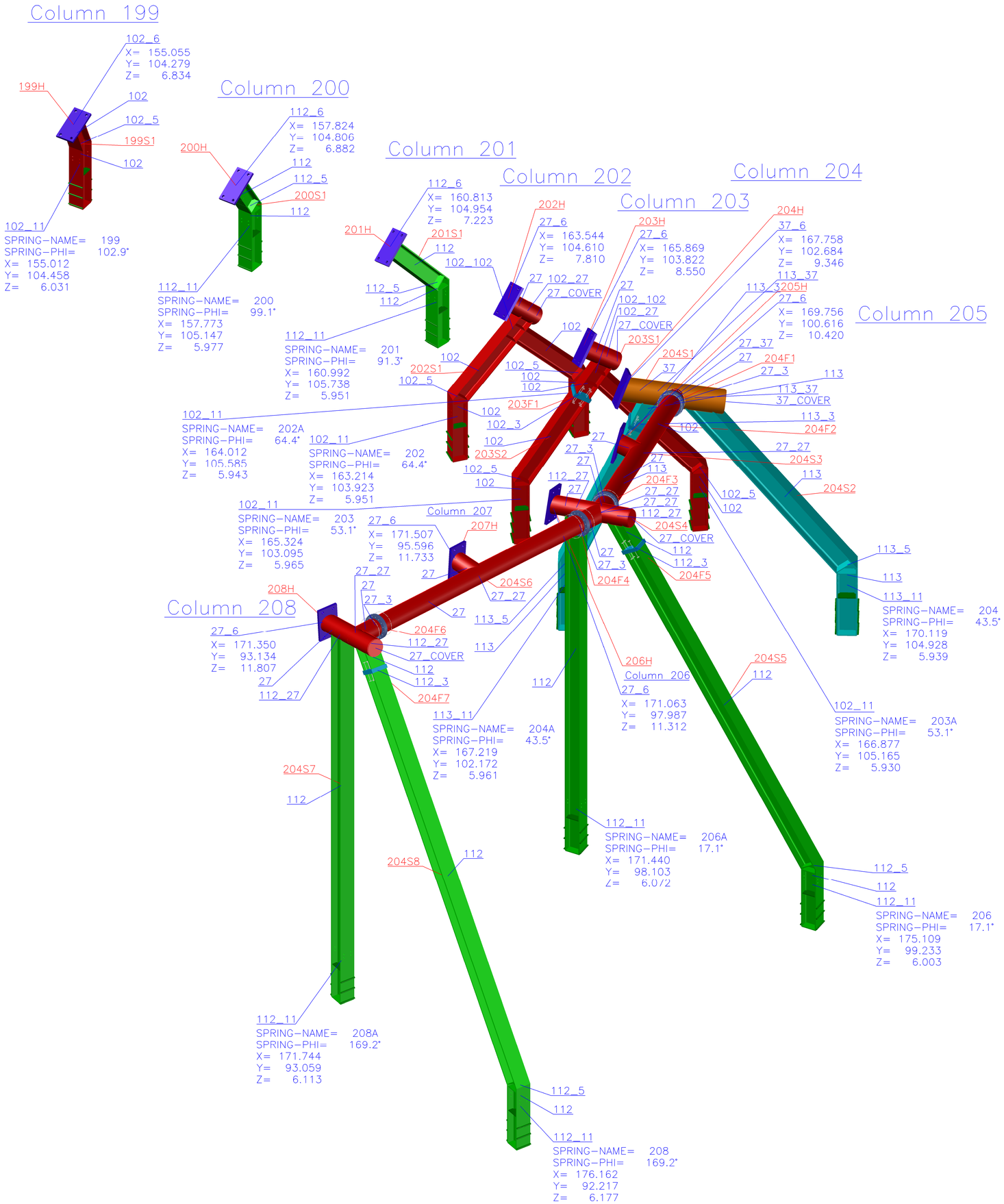
Remarks: STE_PNJ 1812

Rev.	Date	Name	Change
A	12.03.2020	STE_RK	Position of the joint on column 204 changed.



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 199 to 208	File Name: 5224-03-1024A.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1024	Sheets: 1 of 1	Rev.: A

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Amusement rides
Custom software
Steinmetzstr. Str. 24
91478 Markt
Germany
Phone: +49(0)9745517-0
Fax: +49(0)9745517-49

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Remarks: STE_PM_1912

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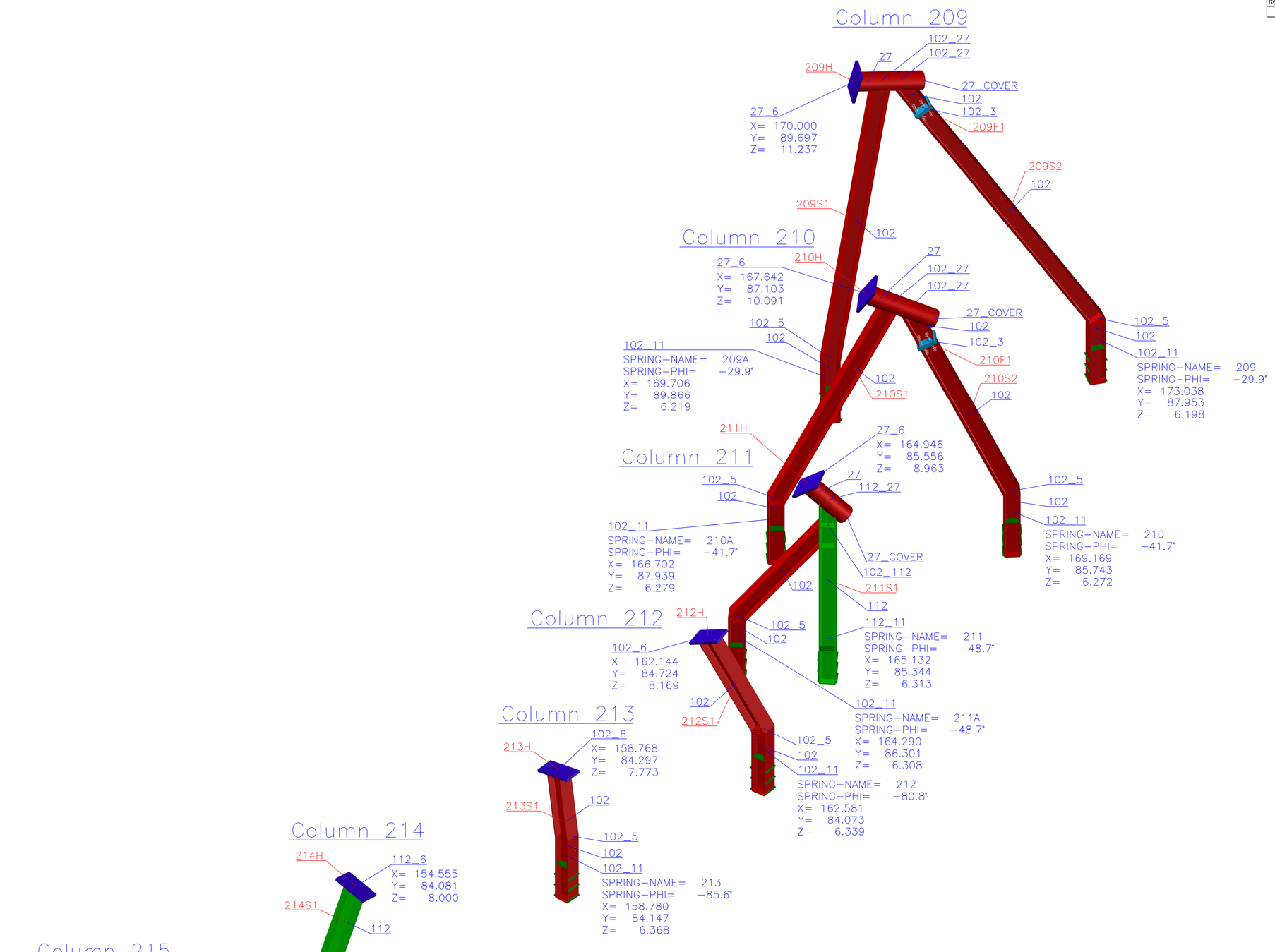
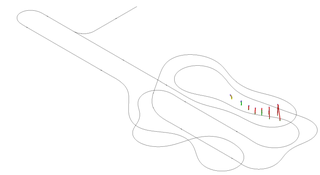
Rev.	Date	Name	Change





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 21.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]: –	Scale: –	Size: A0
Subject: COLUMNS 209 to 215	File Name: 5224-03-1025.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1025	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Mechanical engineering
Structural style
Custom software
Nassaustrasse Str. 24
81475 Munich
Germany
Phone: +49(0)8745517-0
Fax: +49(0)8745517-44
Remarks: STE_PAU 1912

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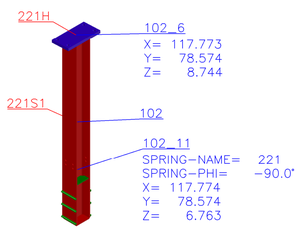
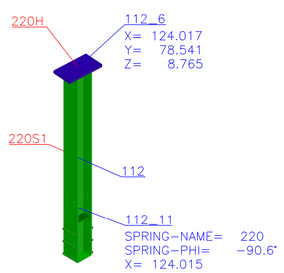
Rev.	Date	Name	Change

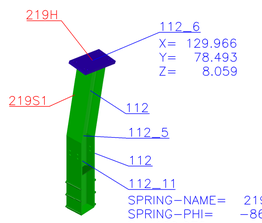
Column 221



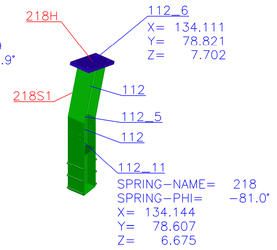
Column 220



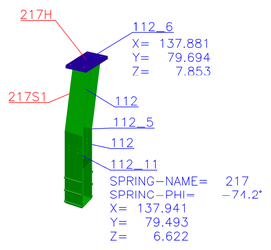
Column 219



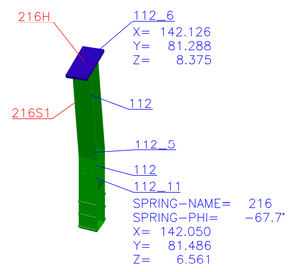
Column 218

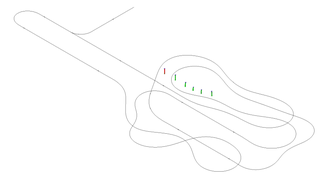


Column 217



Column 216





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 25.02.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS 216 to 221	File Name: 5224-03-1026.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1026	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel and hollow profile structures
Mechanical engineering
Amusement rides
Custom software
Neandertalstr. Str. 24
D-41379 Mönchengladbach
Phone: ++49(0)2161/4501-0
Fax: ++49(0)2161/4501-44

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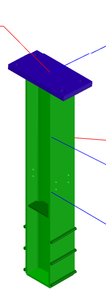
Rev.	Date	Name	Change

Column 226



226H

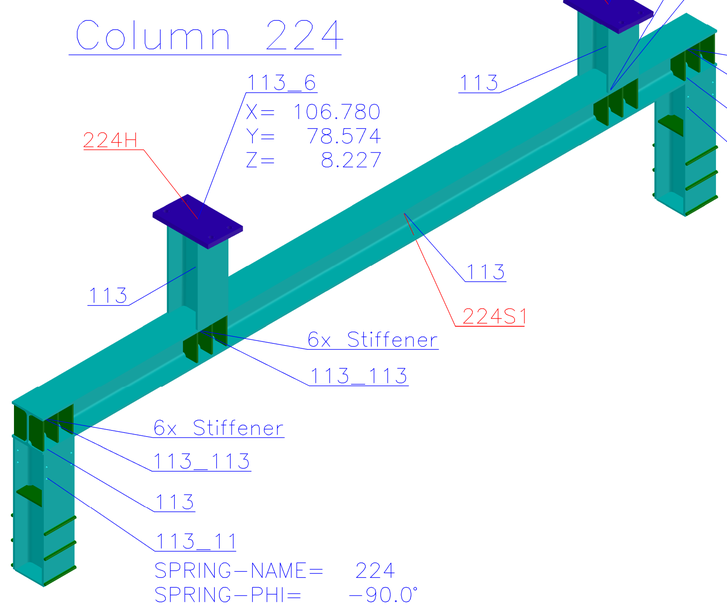
112_11
X= 99.034
Y= 78.574
Z= 7.863

226S1

112

112_6
SPRING-NAME= 226
SPRING-PHI= -90.0°
X= 99.036
Y= 78.574
Z= 6.865

Column 225



225H

113_6
X= 102.783
Y= 78.574
Z= 8.040

6x Stiffener

113_113

6x Stiffener

113_113

113

113_11
SPRING-NAME= 225
SPRING-PHI= -90.0°
X= 102.035
Y= 78.574
Z= 6.815

Column 224

224H

113_6
X= 106.780
Y= 78.574
Z= 8.227

113

113

224S1

6x Stiffener

113_113

6x Stiffener

113_113

113

113_11
SPRING-NAME= 224
SPRING-PHI= -90.0°
X= 108.282
Y= 78.574
Z= 6.815

Column 223

223H

102_6
X= 110.778
Y= 78.574
Z= 8.415

222S2

102

102_102

102

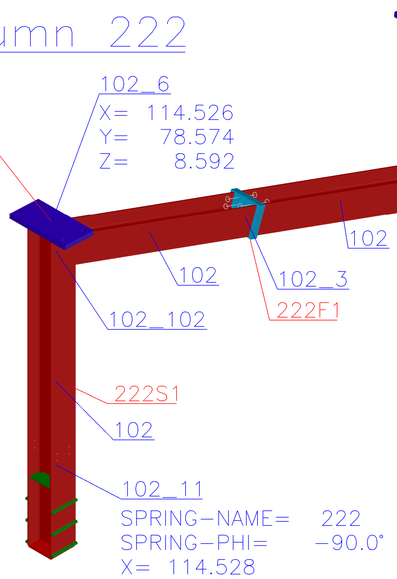
102_3

222F1

102_102

102_11
SPRING-NAME= 223
SPRING-PHI= -90.0°
X= 110.780
Y= 78.574
Z= 6.800

Column 222



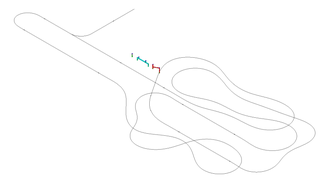
222H

102_6
X= 114.526
Y= 78.574
Z= 8.592

222S1

102

102_11
SPRING-NAME= 222
SPRING-PHI= -90.0°
X= 114.528
Y= 78.574
Z= 6.560



Attention - insert additional stiffeners as shown.

For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 02.03.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]: -	Scale: -	Size: A0
Subject: COLUMNS 222 to 226	File Name: 5224-03-1027.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1027	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Structural engineering
Amusement rides
Custom software
Neuötzinger Str. 24
81475 Munich
Germany
Phone: +49(89)745517-0
Fax: +49(89)745517-44

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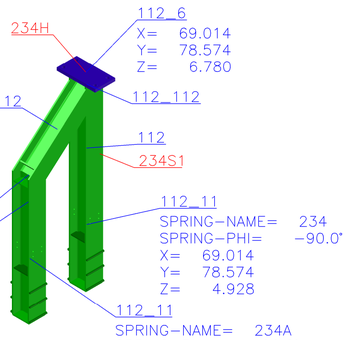
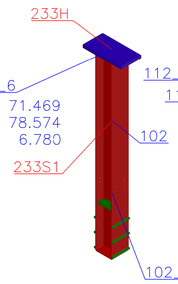
Rev.	Date	Name	Change

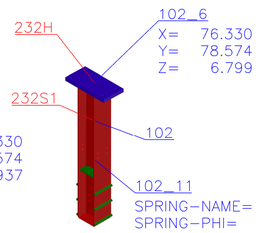
Column 234



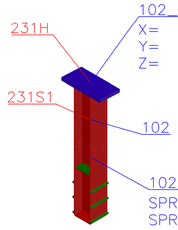
Column 233



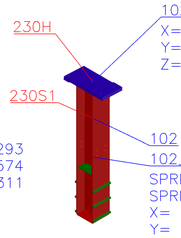
Column 232



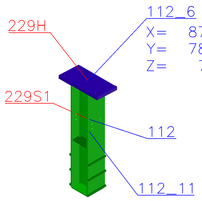
Column 231



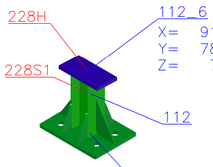
Column 230



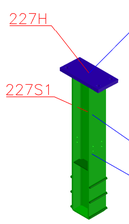
Column 229

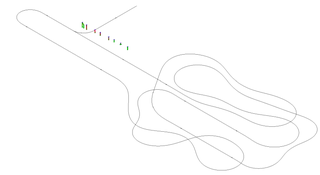


Column 228



Column 227





For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 02.03.2020
Checked by:		Date:

Project: Family Launch Coaster, SeaWorld San Diego
Project No.: 5224
Subject: COLUMNS 227 to 234
Orig. Drawing-No. (EEO):
Weight [kg]: –
Scale: –
Size: A0
File Name: 5224-03-1028.DWG
Next Assembly No.:
Drawing No.: 5224-03-1028
Sheets: 1 of 1
Rev.:

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Steel construction
Static and dynamic analysis
Mechanical engineering
Amusement rides
Custom software
Hesselohestr. Str. 24
81479 Munich
Germany
Phone +49(89)745517-0
Fax +49(89)745517-44

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Remarks: STE_JAU_1912

Rev.	Date	Name	Change

Column MT-10

MT-10H
102_6
X= 69.679
Y= 107.294
Z= 7.828
MT-10S1
102
102_11
SPRING-NAME= MT-10
SPRING-PHI= 180.0°
X= 69.679
Y= 107.294
Z= 6.409

Column MT-9

MT-9H
102_6
X= 69.679
Y= 104.294
Z= 7.828
MT-9S1
102
102_11
SPRING-NAME= MT-9
SPRING-PHI= 180.0°
X= 69.679
Y= 104.294
Z= 6.409

Column MT-8

MT-8H
102_6
X= 69.679
Y= 101.914
Z= 7.828
MT-8S1
102
102_11
SPRING-NAME= MT-8
SPRING-PHI= 180.0°
X= 69.679
Y= 101.914
Z= 6.409

Column MT-7

MT-7H
102_6
X= 69.679
Y= 98.274
Z= 7.828
MT-7S1
102
102_11
SPRING-NAME= MT-7
SPRING-PHI= 180.0°
X= 69.679
Y= 98.274
Z= 6.409

Column MT-6

MT-6H
102_6
X= 69.679
Y= 95.894
Z= 7.828
MT-6S1
102
102_11
SPRING-NAME= MT-6
SPRING-PHI= 180.0°
X= 69.679
Y= 95.894
Z= 6.409

Column MT-5

MT-5H
102_6
X= 69.679
Y= 91.944
Z= 7.828
MT-5S1
102
102_11
SPRING-NAME= MT-5
SPRING-PHI= 180.0°
X= 69.679
Y= 91.944
Z= 6.409

Column MT-4

MT-4H
102_6
X= 69.679
Y= 89.564
Z= 7.828
MT-4S1
102
102_11
SPRING-NAME= MT-4
SPRING-PHI= 180.0°
X= 69.679
Y= 89.564
Z= 6.263

Column MT-3

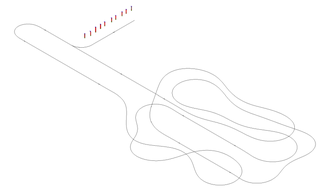
MT-3H
102_6
X= 69.679
Y= 86.748
Z= 7.826
MT-3S1
102
102_11
SPRING-NAME= MT-3
SPRING-PHI= 180.0°
X= 69.679
Y= 86.749
Z= 5.921

Column MT-2

MT-2H
102_6
X= 69.626
Y= 83.781
Z= 7.224
102
102_5
MT-2S1
102
102_11
SPRING-NAME= MT-2
SPRING-PHI= 171.9°
X= 69.641
Y= 83.889
Z= 5.582

Column MT-1

MT-1H
102_6
X= 68.787
Y= 81.427
Z= 6.783
MT-1S1
102
102_11
SPRING-NAME= MT-1
SPRING-PHI= 148.3°
X= 68.788
Y= 81.428
Z= 5.240



For footing types refer to drawing no. 03-0001 and following drawings
For further details refer to drawing no. 03-0131 and following drawings

POS.	OBJECT	MATERIAL	QUANTITY	WEIGHT kg	REMARKS

INTAMIN
AMUSEMENT RIDES Int. Corp. Est.

Drawn by: STE_NB	Company ID: STE	Date: 02.03.2020	
Checked by:		Date:	
Project: Family Launch Coaster, SeaWorld San Diego	Orig. Drawing-No. (EEO):		
Project No.: 5224	Weight [kg]:	Scale: –	Size: A0
Subject: COLUMNS MT-1 to MT-10	File Name: 5224-03-1029.DWG	Next Assembly No.:	
	Drawing No.: 5224-03-1029	Sheets: 1 of 1	Rev.:

INGENIEURBUERO STENGEL GmbH
Steel construction
Stress and fatigue analysis
Amusement rides
Amusement rides
Custom software
Nisselmayer Str. 24
81476 Munich
Germany
Phone: ++49(89)745517-0
Fax: ++49(89)745517-44

No measurements may be taken from this drawing, unless otherwise clearly indicated.
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