



MEMORANDUM

PROJECT NO. 201122.11

DATE: 11/22/2023

PROJECT: Seward ARRC Seward Passenger Dock Inspection 2023

TO: Elizabeth Greer

CC:

FROM: Sean Baginski

SUBJECT: ARRC Seward Passenger Dock Significant Findings

Dear Liz,

PND Engineers, Inc. (PND) inspectors Taylor Mortensen and Jhon Landicho inspected Alaska Railroad's (ARRC) Seward Passenger Dock between July 5th and July 10th, 2023. Coffman Engineers, Inc. (Coffman) performed an inspection of the impressed current cathodic protection system of the Passenger Dock between July 10th and July 11th, 2023. Global Diving & Salvage, Inc. (Global) performed the underwater dive inspection between August 21st and September 12th, 2023.

This memo is to present you with the significant findings of the inspection. Significant findings include immediate action repair items, load reductions, and safety concerns. Minor deficiencies, such as loose bolts in ancillary locations, areas of minor corrosion, coating damage, etc., were identified; however, these items are not deemed to be significant findings and are not addressed in this memo. It should be noted that there will likely be additional immediate action items, which were deemed not necessary for the timing of this memo, included in the final reports. A comprehensive report for the dock is being compiled and will be provided to ARRC as soon as it is complete. See below for significant findings of the Passenger Dock with recommendations provided below each finding in *italics*.

Passenger Dock

Significant findings were identified during the inspection of the Passenger Dock and include immediate action items and load reductions. The dock was found to generally be in **Severe** condition per ASCE MOP 130 guidelines due to structural bends and buckling of the support piles as well as loss of nominal thickness exceeding 50% (globally). Localized areas of 100% section loss of piling were also observed on multiple piling. From data collected by PND and provided by Global, average section loss was found to be ~50% on the majority of the dock (Bents 7-62); however, near the abutment (Bents 1-6) the average section loss was found to be ~70%. These averages do not include areas of 100% section loss [holes in web, flange(s), or both] or complete loss of piling. Below is a list of significant findings that should be addressed immediately:

- 23 vertical support H-piles were observed to be considered complete loss of piling (Photo 3). An additional 151 vertical support H-piles were observed to have overstressing, buckling, localized 100% section loss, or have >70% section loss (measured) globally (Photos 4 and 5). These 174 piles are identified as areas of **significant concern**. Heat maps with the areas of concern are provided in Attachments.

Bents 5 and 6 were found to be the most concerning area beneath the dock (Photo 6). Video and data collected from Global showed multiple adjacent piles along the bents to be near-complete or complete section loss at/near mudline. PND was able to confirm these findings during low-tide inspection. PND cannot assume any capacity is available in the complete section loss piles. There were jacketed repairs made in these areas; however, PND and ARRC do not have details for these repairs and depth of repair is unknown. ARRC performed an inspection of the pile cap and other adjacent components and did not observe any signs of overstressing caused by shear or bending.

- *The northern portions of the west side of the dock (including gate access) shall remain closed to vehicle traffic until repairs are made.*
- *Limit the use of the remaining portions of the dock to vehicle travel, to that which is absolutely necessary until repairs are made. Based on ARRC's observation of the pile caps and adjacent components at Bents 5 and 6 (most concerning areas), continued light vehicle use is acceptable in the short term.*
- *Repairing the concerning areas beneath the terminal building supports near the abutment prior to winter is recommended to prevent further overstressing from snow loads and snow removal equipment loads. If not repaired by winter, limit snow removal means to pickup trucks with plows or approved equal equipment.*
- *Begin engineering, procurement, and permitting immediately to address all areas of significant concern.*
Note: PND has provided ARRC with repair recommendations and priority of repairs.
- *Begin engineering, procurement, and permitting immediately for temporary and permanent repair plans of Bents 5 and 6.*
Note: PND has provided ARRC with repair recommendations and priority of repairs.



Photo 1. Typical Pile Considered Complete Loss of Section (Pile 28-21)



Photo 2. Typical Localized Buckling (Bent 3 Shown)



Photo 3. Typical Localized 100% Section Loss (Bent 2 Shown)



Photo 6. Typical Bent 5 and 6 Condition (Bent 5 West Side Shown)

- Approximately 20% of the piles have been UT tested, findings within these measurements indicate widespread severe section loss in non-consistent areas. There are likely many areas of severe loss and these areas should be located for repair or avoidance to ensure safe operation of the dock.
 - *100% UT is recommended (~80% remaining) on the vertical support piles.*

Based on the observed condition of the dock and MOP 130 guidelines, it is recommended the dock be inspected on an **annual** basis. UT measurement scope should be taken similar to this inspection, each year, until 100% UT of vertical piles is obtained.

Please feel free to reach out with any questions or concerns.

Sincerely,

PND Engineers, Inc. | Anchorage Office



Sean Baginski, P.E., S.E.

Principal Engineer

Attachments:

- Seward Passenger Dock Heat Maps

UT Measurements (Envelope Reading from PND and Global)

Bent

H-Pile Row (North Side)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	H	H	H	H	59%	H	12%	H	H	47%	H	H	H	H	H	61%	H	H	H	52%	32%	12%	H	H	44%	H	H	H	H	37%	H	H
2	H	81%	H	H	H	H	H	H	67%	H	67%	H	H	H	H	H	32%	50%	44%	H	H	H	64%	36%	H	H	H	H	H	H	H	
3	H	49%	H	H	H	H	H	H	H	H	H	H	31%	H	H	H	H	H	56%	H	H	16%	H	H	67%	H	H	H	H	H	H	
4	H	H	H	19%	19%	H	H	52%	H	H	H	H	H	H	H	H	60%	36%	H	H	37%	H	H	H	H	H	41%	H	H	H	H	
5	H	62%	47%	19%	19%	H	H	H	H	68%	H	H	15%	H	H	17%	13%	H	H	H	H	H	H	21%	60%	H	H	H	H	H	H	
6	H	46%	H	59%	H	H	16%	H	50%	H	H	H	H	H	H	H	H	H	68%	H	H	28%	36%	H	H	H	H	H	H	H	H	
7	H	H	H	H	19%	H	H	H	H	80%	H	H	H	H	H	20%	34%	H	39%	33%	H	H	H	62%	H	H	7%	H	H	27%	H	
8	H	59%	H	H	19%	H	H	H	H	H	H	63%	H	H	42%	H	H	H	72%	H	H	H	H	H	H	H	H	H	H	42%	H	
9	H	H	H	H	H	H	H	56%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
10	H	71%	76%	59%	61%	H	H	H	H	62%	62%	H	H	H	H	17%	52%	34%	H	H	H	H	H	31%	H	H	H	H	H	H	H	
11	H	H	H	H	H	H	H	H	43%	H	H	H	H	H	H	H	H	H	34%	59%	50%	56%	45%	H	12%	H	H	H	H	H	H	
12	H	H	H	71%	H	H	63%	H	H	H	H	H	H	H	H	H	H	51%	H	H	H	H	24%	H	H	H	H	H	H	H	H	
13	H	58%	73%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	20%	H	H	H	H	H	H	H	
14	H	H	H	H	H	H	H	H	80%	H	81%	H	H	H	H	43%	34%	39%	H	H	61%	H	H	H	H	H	H	H	H	H	H	
15	H	H	H	72%	H	H	H	66%	H	40%	H	H	H	H	H	H	H	H	52%	H	39%	23%	36%	19%	H	H	H	H	H	H	H	
16	H	H	72%	H	H	H	H	H	H	H	H	H	H	H	24%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
17	H	H	H	71%	H	H	58%	H	H	H	20%	H	36%	H	72%	H	39%	H	H	H	H	H	H	37%	H	H	H	H	H	28%	H	
18	H	H	61%	H	H	H	H	63%	H	H	44%	H	40%	H	H	H	9%	H	70%	H	H	28%	H	H	H	H	H	H	H	H	H	
19	H	63%	70%	H	H	H	H	55%	H	66%	H	H	H	H	H	10%	H	33%	H	H	63%	H	42%	H	H	H	H	H	H	H	H	
20	H	H	H	H	H	1%	H	H	84%	H	42%	H	H	H	40%	H	H	H	59%	40%	H	46%	H	36%	H	28%	H	H	H	H	H	
21	H	72%	H	H	H	H	H	H	H	54%	H	63%	H	H	H	H	64%	H	H	H	H	50%	H	50%	15%	H	H	H	H	H	H	
22	H	H	H	H	H	H	H	H	H	H	46%	H	H	H	H	H	H	H	50%	H	H	H	H	H	H	H	H	H	H	H	H	
23	H	H	71%	H	H	H	H	71%	56%	H	H	H	H	H	H	61%	H	H	H	H	H	38%	H	H	H	H	H	51%	H	H	H	
24	H	H	H	H	H	H	H	H	H	H	H	H	28%	H	38%	H	50%	H	67%	41%	H	H	63%	54%	H	H	H	H	60%	H	H	
25	H	H	H	H	H	H	81%	H	H	H	H	52%	H	H	H	H	H	H	H	H	64%	H	H	H	H	H	H	H	H	45%	H	
26	H	70%	39%	H	H	H	H	H	82%	H	H	H	H	27%	H	56%	H	67%	H	H	H	H	23%	22%	H	H	H	H	43%	H	H	
27	H	70%	H	H	H	H	H	H	H	H	H	H	31%	H	H	H	H	H	29%	67%	H	53%	31%	H	H	H	H	H	H	H	H	
28	H	H	H	H	H	H	56%	H	75%	53%	H	H	H	H	H	48%	H	H	H	H	H	H	H	H	H	H	63%	H	H	H	H	
29	H	59%	H	H	H	H	H	H	H	H	H	58%	H	H	H	63%	47%	60%	H	H	72%	H	28%	H	H	H	H	H	H	H	H	
30	H	H	H	H	H	H	H	18%	H	H	H	H	H	H	H	H	H	H	H	H	37%	H	72%	H	H	H	59%	H	H	H	H	
31	H	49%	49%	H	H	H	63%	H	H	H	H	H	18%	H	22%	H	H	H	73%	H	H	42%	H	H	8%	H	H	H	H	H	H	

B# - ##
 Bent - Row

MATCH LINE

H-Pile Row (South Side)

Bent (continue)

H-Pile Row (South Side)	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
1	H	H	H	H	H	H	H	H	75%	H	50%	H	13%	H	H	H	H	15%	H	H	H	H	H	26%	H	H	H	H	H	H	H
2	H	H	H	H	H	H	54%	H	67%	H	H	H	H	74%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	56%	H
3	H	H	H	H	H	H	H	62%	H	62%	H	H	H	H	H	H	H	H	H	H	H	29%	H	H	H	H	H	H	H	H	H
4	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	55%	H	
5	H	H	H	H	H	H	H	H	29%	H	H	21%	26%	H	H	H	H	21%	H	H	H	H	43%	H	H	H	40%	H	H	H	H
6	H	H	H	H	H	H	82%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
7	H	H	H	H	H	H	H	H	H	20%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8	H	H	H	H	H	H	H	72%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	48%	H	H	H	H	H	H	H	H
9	H	79%	H	H	H	H	H	H	H	H	H	54%	H	50%	H	H	H	56%	H	H	H	H	H	H	H	H	H	H	H	H	H
10	H	H	H	H	H	H	H	H	28%	H	H	H	11%	H	H	H	H	23%	H	H	H	H	H	H	H	H	H	42%	H	H	H
11	H	H	37%	H	H	H	H	63%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	46%	H
12	76%	H	H	H	H	H	H	64%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	31%	H	H	H	H	H	H
13	H	H	H	H	H	H	55%	H	H	35%	49%	38%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
14	H	H	H	H	H	H	H	73%	H	H	H	H	H	50%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
15	H	H	H	H	H	H	H	H	33%	14%	H	H	21%	H	H	H	H	22%	H	H	H	H	44%	H	H	H	H	H	H	H	H
16	H	H	H	H	H	H	H	61%	H	H	H	70%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
17	H	H	H	H	25%	63%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
18	H	H	H	H	H	50%	H	H	H	71%	30%	H	37%	H	H	H	67%	H	H	H	H	H	H	H	H	H	H	H	H	H	H
19	H	H	H	H	H	H	55%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	60%	H	H	H	H
20	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
21	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	62%	H	H	H	H	H	41%	H	H	H	55%	H	H	H	H	53%
22	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
23	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	70%	H
24	H	H	H	H	H	H	H	H	H	H	H	67%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	32%
25	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	34%	H	H	H	H	H	H	H	H	H
26	H	H	H	H	H	H	42%	H	H	H	H	H	H	75%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
27	H	H	60%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
28	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
29	H	58%	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	56%	H	H	H	H

MATCH LINE

H-Pile Row (South Side)

- Notes:
- Envelope UT measurements taken from mudline, 0-ft elevation, and splash zone.
 - Excludes H-piles with 100% section loss or buckled flange (Deficiency Category 9 and above, see page 1).
 - Exclude assumptions on piles without UT measurements (i.e., Bent 1-6, 70% section loss and Bent 6-63, 50% section loss

H-Pile Capacity (kips)

		Bent																																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
H-Pile Row (North)	1	119	118	113	112	100	96	92	225	265	255	228	207	201	189	153	107	147	135	132	132	154	140	137	129	134	122	122	122	154	149	139	135	
	2	N/A	104	113	110	99	33	233	227	127	257	117	233	215	212	184	178	190	153	169	171	181	168	106	159	158	159	146	178	181	185	163		
	3	117	114	113	112	N/A	95	233	229	271	266	253	242	235	220	203	207	210	181	194	146	200	197	185	187	97	181	184	184	189	219	207	186	
	4	117	104	113	101	N/A	N/A	233	198	271	269	256	244	237	234	235	226	220	158	213	207	217	215	208	208	210	206	210	218	201	240	221	208	
	5	117	148	113	112	N/A	N/A	232	227	272	125	254	252	238	242	237	236	228	223	223	213	223	223	216	217	165	223	216	226	210	224	219	212	
	6	117	114	N/A	76	N/A	97	233	229	235	265	262	249	243	236	233	242	241	234	110	223	226	226	223	227	232	228	220	230	216	221	225	217	
	7	117	N/A	113	101	N/A	N/A	236	229	224	89	218	213	208	200	202	204	201	196	191	187	187	188	188	194	116	189	186	191	183	187	77	185	
	8	117	212	112	112	N/A	N/A	233	229	224	223	218	126	210	204	202	200	198	194	90	189	191	188	192	194	189	76	189	191	186	189	194	188	
	9	113	33	107	95	N/A	N/A	216	212	206	204	202	196	192	189	187	183	186	178	178	178	178	176	174	174	174	174	174	175	174	171	170	172	
	10	112	110	96	212	N/A	N/A	217	211	205	124	121	200	193	194	192	191	163	189	187	183	183	176	174	174	174	174	175	174	171	170	172		
	11	112	110	96	98	N/A	91	33	209	205	213	203	204	195	200	197	194	190	191	187	212	166	212	177	178	178	178	177	180	177	176	174	177	
	12	112	111	99	108	105	104	N/A	N/A	N/A	207	203	199	198	205	199	195	190	168	194	202	196	185	180	181	180	180	180	183	179	180	177	180	
	13	112	212	98	108	105	N/A	213	208	N/A	202	200	201	203	200	199	194	191	197	210	190	196	189	184	186	184	183	183	186	184	184	181	185	
	14	112	100	109	108	N/A	91	213	207	82	205	81	200	199	199	199	195	190	189	191	191	116	192	188	190	187	187	186	188	189	189	185	189	
	15	112	100	98	97	105	N/A	213	207	96	205	203	203	198	201	201	197	196	191	196	195	171	191	190	190	191	189	188	188	189	191	192	187	191
	16	112	100	99	98	N/A	91	212	207	204	201	201	200	200	197	192	195	197	194	193	197	191	190	189	190	188	188	187	189	190	191	186	190	
	17	112	76	99	110	106	103	212	206	204	201	202	202	199	202	77	200	199	196	197	193	191	189	189	190	187	187	187	188	189	190	186	189	
	18	112	N/A	141	97	105	90	213	207	123	204	202	202	199	201	197	197	203	203	201	91	190	188	188	186	186	186	188	188	188	185	187		
	19	112	143	108	106	106	103	N/A	N/A	N/A	95	206	205	201	203	200	193	199	201	198	198	189	114	186	187	185	186	186	187	188	187	184	186	
	20	118	116	114	101	113	111	N/A	93	93	93	230	228	228	225	221	222	224	221	212	217	187	185	185	184	185	185	185	N/A	187	185	183	184	
	21	118	116	104	111	N/A	99	237	234	232	199	227	225	132	226	224	222	223	130	216	218	215	161	185	184	159	185	185	185	N/A	187	184	183	183
	22	118	33	104	111	N/A	99	235	232	229	91	90	222	221	221	224	222	220	217	211	210	210	182	183	182	183	183	184	161	186	182	182	182	
	23	118	33	77	111	N/A	97	234	104	212	225	220	219	217	216	213	212	128	211	208	207	204	182	183	182	183	183	184	161	186	182	182	182	
	24	116	33	33	108	N/A	93	227	221	218	215	213	209	210	209	202	201	200	170	197	91	196	195	194	117	171	196	198	199	199	117	196	197	
	25	116	33	99	109	N/A	93	103	221	217	212	213	179	206	207	201	201	199	191	188	191	114	190	196	196	190	197	169	195	189	191	194		
	26	116	N/A	33	109	N/A	93	91	221	261	121	253	245	242	241	241	238	174	229	108	219	219	216	225	232	234	223	232	230	221	221	227		
	27	116	112	24	109	N/A	93	226	221	259	251	249	239	237	233	230	232	226	219	214	210	104	204	191	226	228	216	227	224	223	213	211	224	
	28	116	33	33	98	N/A	93	226	212	256	118	210	233	238	229	223	232	220	214	205	197	196	200	201	214	210	216	137	208	213	206	203	231	
	29	116	212	24	109	N/A	93	226	218	251	239	231	222	167	213	209	206	129	204	146	185	179	96	179	190	196	204	201	190	83	194	191	217	
	30	117	33	33	98	N/A	93	225	216	246	231	220	206	201	193	193	185	186	176	169	151	151	169	157	88	174	179	171	132	175	179	174	189	
	31	118	113	110	109	N/A	93	131	211	234	224	206	190	180	176	175	166	164	148	147	70	132	147	135	144	153	156	145	147	151	160	157	162	

B# - ##
Bent - Row

MATCH LINE

H-Pile Row (South)

Bent (continue)

		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
H-Pile Row (South Side)	1	138	145	122	141	132	136	123	114	72	123	130	148	118	139	142	134	135	147	66	151	134	137	148	136	139	132	126	157	157	158	64	
	2	161	165	162	147	132	153	133	151	73	155	146	172	146	80	150	146	150	155	63	155	151	144	155	152	165	156	164	178	185	141	77	
	3	189	193	170	174	179	194	156	119	201	114	170	197	174	174	183	169	167	180	178	186	189	174	175	188	198	185	183	191	201	189	185	
	4	210	213	213	208	207	213	209	227	212	200	208	205	204	187	189	175	197	229	224	215	208	195	203	216	223	214	203	208	213	152	189	
	5	215	214	223	218	225	226	221	231	228	220	220	97	228	224	221	220	215	233	235	229	224	223	226	231	231	227	220	227	214	209	192	
	6	220	226	216	226	230	229	110	225	235	231	227	231	230	228	229	227	229	241	238	238	239	239	240	239	234	233	231	232	217	203	196	
	7	185	192	185	184	190	194	188	193	200	192	191	192	192	192	193	194	193	194	200	197	198	199	200	201	200	198	196	194	229	221	206	198
	8	75	192	188	190	191	196	191	91	197	194	193	193	193	193	195	198	195	197	197	201	200	200	204	82	202	202	200	195	227	222	209	200
	9	172	83	175	179	176	182	176	176	182	178	176	72	177	177	180	184	183	72	180	183	186	185	186	191	187	183	181	206	198	186	N/A	
	10	177	177	177	179	184	190	182	180	185	181	180	183	186	72	186	190	188	185	180	182	188	185	196	190	188	182	183	210	199	189	185	
	11	180	179	179	180	184	189	185	111	184	184	179	73	180	75	188	190	192	189	181	184	190	188	76	191	188	182	184	212	199	191	187	
	12	87	184	182	182	182	185	186	111	186	187	185	74	189	187	184	187	191	189	182	186	191	185	187	191	187	181	187	216	201	194	184	
	13	188	187	184	184	74	184	212	188	189	181	181	72	185	185	180	183	182	187	184	184	188											

Demand/Capacity Utilization (HS-20)

Bent

H-Pile Row (North Side)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	67%	70%	64%	69%	-1%	61%	81%	33%	28%	29%	32%	35%	37%	41%	50%	74%	51%	58%	58%	59%	50%	51%	53%	55%	54%	50%	58%	59%	47%	47%	50%	53%
2	N/A	67%	65%	64%	388%	281%	32%	32%	58%	28%	63%	33%	34%	36%	41%	42%	40%	48%	45%	44%	42%	44%	69%	46%	46%	40%	47%	50%	42%	40%	40%	42%
3	54%	64%	69%	67%	N/A	141%	31%	32%	27%	28%	29%	31%	32%	33%	35%	35%	35%	40%	38%	50%	37%	38%	40%	40%	76%	34%	40%	40%	39%	35%	36%	35%
4	47%	76%	77%	73%	N/A	N/A	31%	38%	28%	29%	30%	31%	32%	32%	33%	33%	33%	48%	35%	36%	35%	36%	37%	36%	36%	31%	37%	36%	37%	34%	34%	32%
5	44%	59%	90%	66%	N/A	N/A	32%	33%	29%	62%	30%	31%	32%	32%	33%	33%	34%	34%	35%	36%	34%	35%	36%	35%	47%	29%	36%	35%	37%	34%	34%	32%
6	42%	90%	N/A	98%	N/A	270%	33%	33%	36%	30%	33%	31%	34%	33%	35%	33%	36%	34%	76%	36%	34%	35%	36%	35%	37%	30%	36%	35%	37%	35%	35%	32%
7	40%	N/A	101%	74%	N/A	N/A	36%	33%	36%	80%	38%	34%	39%	35%	40%	35%	41%	36%	42%	37%	36%	38%	39%	38%	63%	32%	39%	38%	40%	39%	94%	36%
8	36%	45%	92%	67%	N/A	N/A	38%	31%	38%	31%	39%	53%	41%	33%	42%	33%	42%	34%	93%	35%	32%	38%	39%	39%	39%	82%	39%	39%	40%	40%	39%	37%
9	28%	197%	75%	72%	N/A	N/A	38%	27%	36%	27%	37%	28%	38%	29%	39%	29%	40%	30%	41%	31%	28%	33%	35%	35%	34%	30%	34%	35%	35%	35%	34%	36%
10	25%	42%	62%	33%	N/A	N/A	34%	23%	29%	37%	47%	23%	30%	24%	30%	24%	36%	25%	31%	24%	22%	20%	24%	24%	24%	22%	24%	24%	25%	25%	24%	30%
11	24%	29%	40%	72%	N/A	127%	0%	21%	22%	19%	20%	19%	21%	21%	20%	22%	20%	22%	20%	22%	17%	22%	20%	24%	24%	22%	24%	24%	25%	25%	24%	30%
12	25%	28%	33%	47%	66%	70%	N/A	N/A	N/A	19%	18%	18%	18%	18%	18%	19%	19%	22%	19%	19%	19%	22%	23%	23%	23%	21%	23%	23%	24%	24%	23%	29%
13	30%	20%	42%	43%	35%	N/A	24%	25%	N/A	23%	22%	23%	22%	23%	22%	23%	23%	23%	23%	23%	23%	29%	31%	31%	31%	26%	31%	31%	31%	31%	31%	34%
14	34%	53%	48%	49%	N/A	117%	26%	27%	82%	27%	66%	27%	26%	27%	27%	28%	27%	28%	27%	28%	28%	33%	35%	35%	35%	28%	35%	35%	35%	35%	35%	36%
15	36%	61%	60%	59%	70%	N/A	28%	63%	32%	29%	29%	29%	29%	29%	30%	30%	30%	30%	30%	35%	30%	32%	35%	35%	35%	27%	35%	35%	35%	35%	35%	34%
16	37%	70%	62%	56%	N/A	0%	29%	30%	31%	30%	30%	30%	30%	30%	31%	31%	31%	31%	31%	31%	31%	32%	34%	34%	34%	27%	34%	34%	34%	34%	34%	33%
17	35%	108%	59%	38%	-33%	82%	30%	32%	33%	30%	30%	30%	30%	30%	77%	31%	30%	31%	31%	31%	31%	33%	35%	35%	35%	27%	35%	35%	35%	35%	35%	34%
18	34%	N/A	34%	19%	-159%	42%	30%	35%	59%	30%	29%	29%	29%	30%	30%	30%	29%	30%	30%	66%	31%	35%	35%	35%	35%	28%	35%	35%	35%	35%	35%	36%
19	31%	47%	34%	5%	-241%	14%	N/A	N/A	N/A	60%	27%	28%	27%	28%	28%	29%	28%	28%	28%	29%	30%	54%	31%	30%	30%	25%	30%	31%	31%	31%	30%	33%
20	38%	47%	38%	61%	-18%	63%	N/A	71%	75%	68%	26%	27%	27%	27%	27%	27%	27%	27%	27%	29%	29%	28%	24%	23%	22%	20%	23%	24%	23%	22%	28%	
21	39%	50%	74%	172%	N/A	198%	34%	29%	32%	34%	31%	29%	24%	30%	32%	30%	32%	30%	32%	31%	30%	35%	25%	24%	26%	21%	24%	N/A	24%	24%	23%	29%
22	42%	247%	109%	192%	N/A	220%	46%	36%	42%	90%	105%	37%	43%	37%	44%	38%	44%	38%	44%	38%	36%	42%	35%	34%	33%	29%	33%	41%	34%	34%	33%	35%
23	45%	308%	164%	160%	N/A	181%	52%	88%	52%	41%	50%	41%	51%	41%	51%	42%	88%	43%	53%	43%	40%	42%	35%	34%	33%	29%	33%	41%	34%	34%	35%	
24	42%	302%	332%	116%	N/A	134%	48%	39%	46%	40%	48%	41%	49%	41%	50%	42%	50%	49%	52%	93%	41%	44%	39%	64%	44%	32%	38%	39%	38%	65%	38%	36%
25	44%	335%	97%	89%	N/A	104%	94%	38%	41%	38%	43%	45%	44%	39%	45%	40%	45%	41%	47%	42%	41%	68%	38%	38%	37%	32%	37%	44%	37%	39%	38%	34%
26	44%	N/A	255%	72%	N/A	85%	92%	36%	34%	69%	35%	34%	36%	34%	37%	35%	51%	36%	81%	38%	37%	38%	36%	35%	35%	30%	34%	35%	36%	35%	31%	
27	43%	88%	311%	65%	N/A	77%	34%	34%	30%	31%	32%	32%	33%	33%	34%	33%	34%	35%	37%	37%	73%	37%	41%	34%	34%	29%	34%	35%	34%	36%	36%	30%
28	43%	264%	226%	71%	N/A	75%	32%	35%	29%	63%	35%	32%	32%	33%	33%	33%	34%	35%	36%	38%	38%	37%	37%	35%	35%	30%	56%	36%	35%	37%	36%	30%
29	42%	37%	293%	65%	N/A	76%	32%	34%	29%	30%	31%	33%	44%	34%	34%	35%	56%	36%	49%	40%	41%	76%	41%	38%	38%	31%	37%	39%	89%	38%	38%	31%
30	44%	227%	227%	76%	N/A	79%	33%	35%	30%	32%	33%	36%	36%	38%	38%	40%	39%	42%	43%	49%	49%	44%	47%	84%	43%	36%	43%	56%	43%	42%	42%	35%
31	44%	65%	69%	70%	N/A	82%	57%	35%	31%	33%	36%	39%	41%	42%	42%	45%	45%	49%	50%	104%	56%	50%	55%	52%	49%	41%	51%	51%	49%	46%	47%	42%

B# - ##
Bent - Row

MATCH LINE

H-Pile Row (South Side)

Notes:

- 1. AASHTO LRFD Gov. Load Case (1.25DL + 1.75LL)
- Note: HS-20 was given a 15%IM per AASHTO

Bent (continue)

H-Pile Row (South Side)	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
1	52%	61%	58%	51%	54%	53%	58%	63%	99%	58%	55%	48%	61%	52%	50%	53%	53%	49%	109%	48%	53%	52%	48%	53%	52%	54%	57%	45%	46%	56%	105%	
2	42%	51%	46%	50%	56%	48%	56%	49%	101%	48%	51%	43%	51%	92%	49%	51%	49%	48%	118%	48%	49%	51%	48%	49%	45%	47%	45%	42%	40%	63%	86%	
3	35%	43%	43%	42%	41%	38%	47%	62%	37%	65%	43%	37%	42%	42%	40%	44%	44%	41%	41%	40%	39%	42%	42%	39%	37%	40%	40%	39%	37%	44%	33%	
4	32%	40%	36%	37%	37%	36%	36%	33%	36%	38%	36%	37%	37%	41%	40%	43%	39%	33%	34%	35%	36%	39%	37%	35%	34%	35%	37%	37%	36%	56%	32%	
5	32%	40%	34%	35%	34%	34%	35%	33%	33%	35%	35%	79%	34%	34%	35%	35%	36%	33%	32%	33%	34%	34%	34%	33%	33%	34%	35%	34%	36%	41%	32%	
6	32%	40%	37%	35%	35%	35%	73%	35%	34%	35%	35%	35%	35%	35%	35%	35%	35%	33%	34%	34%	33%	33%	33%	33%	34%	34%	35%	34%	37%	42%	33%	
7	36%	43%	40%	40%	39%	38%	39%	38%	37%	39%	39%	39%	39%	39%	38%	38%	38%	37%	38%	37%	37%	37%	37%	37%	37%	37%	38%	38%	38%	43%	37%	
8	93%	44%	40%	40%	40%	38%	39%	83%	38%	39%	39%	39%	39%	39%	38%	39%	38%	38%	38%	38%	38%	38%	38%	37%	92%	37%	37%	38%	39%	33%	44%	42%
9	36%	80%	34%	34%	34%	33%	34%	34%	33%	34%	34%	83%	34%	34%	33%	33%	33%	83%	33%	33%	32%	32%	32%	31%	32%	33%	33%	29%	30%	38%	N/A	
10	30%	25%	25%	24%	24%	23%	24%	24%	24%	24%	24%	24%	24%	23%	60%	24%	23%	23%	24%	24%	24%	23%	24%	22%	23%	23%	24%	21%	22%	26%	36%	
11	29%	25%	24%	24%	23%	22%	23%	38%	23%	23%	24%	58%	24%	57%	23%	22%	22%	23%	23%	23%	22%	23%	56%	22%	23%	23%	20%	21%	25%	32%		
12	72%	35%	32%	31%	31%	31%	31%	52%	31%	31%	31%	78%	30%	31%	31%	31%	30%	30%	32%	31%	30%	31%	31%	30%	31%	30%	31%	32%	27%	28%	34%	34%
13	36%	41%	36%	36%	90%	36%	31%	36%	35%	37%	37%	92%	36%	36%	37%	37%	37%	36%	36%	36%	35%	37%	37%	35%	36%	37%	35%	30%	33%	40%	36%	
14	34%	41%	36%	36%	35%	35%	36%	76%	35%	36%	37%	93%	37%	41%	36%	37%	36%	35%	35%	36%	36%	36%	36%	36%	36%	36%	36%	37%	35%	41%	35%	
15	33%	41%	35%	35%	34%	34%	35%	34%	86%	36%	36%	86%	36%	35%	35%	36%	35%	35%	34%	35%	35%	35%	35%	35%	35%	35%	35%	30%	32%	40%	34%	
16	35%	42%	36%	36%	35%	35%	58%	36%	35%	35%	77%	92%	36%	36%	36%	37%	35%	36%	35%	36%	36%	36%	36%	36%	36%	36%	36%	37%	36%	41%	36%	
17	36%	42%	36%	36%	89%	58%	36%	36%	35%	36%	37%	37%	91%	36%	36%	37%	36%	36%	35%	36%	36%	36%	36%	36%	36%	37%	37%	37%	36%	36%	42%	37%
18	83%	35%	31																													

H-Pile Capacity (kips)

		Bent																																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
H-Pile Row (North)	1	119	450	450	450	N/A	N/A	450	225	265	255	228	207	201	189	153	107	147	135	132	132	154	140	137	129	134	122	122	122	154	149	139	135	
	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	227	127	257	117	233	215	212	184	178	190	153	169	171	181	168	106	159	158	159	146	178	181	185	163		
	3	117	N/A	N/A	N/A	N/A	N/A	N/A	229	271	266	253	242	235	220	203	207	210	181	194	146	200	197	185	187	97	181	184	184	189	219	207	186	
	4	117	450	450	450	N/A	N/A	450	198	271	269	256	244	237	234	235	226	220	158	213	207	217	215	208	208	210	206	210	218	201	240	221	208	
	5	117	N/A	N/A	N/A	N/A	N/A	N/A	227	272	125	254	252	238	242	237	236	228	223	223	213	223	223	216	217	165	232	228	220	230	216	224	219	212
	6	117	N/A	N/A	N/A	N/A	N/A	N/A	229	235	265	262	249	243	236	233	242	241	234	110	223	226	226	223	227	232	228	220	230	216	221	225	217	
	7	117	450	450	450	N/A	N/A	450	229	224	89	218	213	208	200	202	204	201	196	191	187	187	188	188	194	116	189	186	191	183	187	77	185	
	8	117	N/A	N/A	N/A	N/A	N/A	N/A	229	224	223	218	126	210	204	202	200	198	194	90	189	191	188	192	194	189	76	189	191	186	189	194	188	
	9	113	N/A	N/A	N/A	N/A	N/A	N/A	212	206	204	202	196	192	189	187	183	186	178	178	178	178	176	174	174	174	174	174	175	174	171	170	172	
	10	112	450	450	450	450	N/A	450	211	205	124	121	200	193	194	192	191	163	189	187	183	183	176	174	174	174	174	174	175	174	171	170	172	
	11	112	N/A	N/A	N/A	N/A	N/A	N/A	209	205	213	203	204	195	200	197	194	190	191	187	212	166	212	177	178	178	178	177	180	177	176	174	177	
	12	112	N/A	N/A	N/A	N/A	450	N/A	N/A	N/A	207	203	199	198	205	199	195	190	168	194	202	196	185	180	181	180	180	180	183	179	180	177	180	
	13	112	450	450	450	450	N/A	450	208	N/A	202	200	201	203	200	199	194	191	197	210	190	196	189	184	186	184	183	183	186	184	184	181	185	
	14	112	N/A	N/A	N/A	N/A	N/A	213	207	82	205	81	200	199	199	199	195	190	189	191	191	116	192	188	190	187	187	186	188	189	189	185	189	
	15	112	N/A	N/A	N/A	N/A	N/A	213	96	205	203	203	198	201	201	197	196	191	196	195	171	191	190	190	191	189	188	188	188	189	191	192	187	191
	16	112	450	450	450	450	N/A	450	207	204	201	201	200	200	197	192	195	197	194	193	197	191	190	189	190	188	188	187	189	190	191	186	190	
	17	112	N/A	N/A	N/A	N/A	450	212	206	204	201	202	202	199	202	77	200	199	196	197	193	191	189	189	190	187	187	187	188	189	190	186	189	
	18	112	N/A	N/A	N/A	N/A	N/A	213	207	123	204	202	202	199	201	197	197	203	203	201	91	190	188	188	188	186	186	186	188	188	188	185	187	
	19	112	450	450	450	450	450	450	450	450	206	205	201	203	200	193	199	201	198	198	189	114	186	187	185	186	186	187	188	187	184	186		
	20	118	N/A	N/A	N/A	N/A	111	N/A	93	93	93	230	228	228	225	225	221	222	224	221	212	217	187	185	185	184	185	185	187	187	185	183	184	
	21	118	N/A	N/A	N/A	N/A	99	237	234	232	199	227	225	132	226	224	222	223	130	216	218	215	161	185	184	159	185	185	N/A	187	184	183	183	
	22	118	450	450	450	450	99	450	232	229	91	90	222	221	221	224	222	220	217	211	210	210	182	183	182	183	183	184	161	186	182	182	182	
	23	118	N/A	N/A	N/A	N/A	97	234	104	212	225	220	219	217	216	213	212	128	211	208	207	204	182	183	182	183	183	184	161	186	182	182	182	
	24	116	N/A	N/A	N/A	N/A	93	227	221	218	215	213	209	210	209	202	201	200	170	197	91	196	195	194	117	171	196	198	199	199	117	196	197	
	25	116	450	450	450	450	93	450	221	217	212	213	179	206	207	201	201	199	191	188	191	114	194	190	196	196	190	197	169	195	189	191	194	
	26	116	N/A	N/A	N/A	N/A	93	91	221	261	121	253	245	242	241	241	238	174	229	108	219	219	216	225	232	234	223	232	230	221	221	227		
	27	116	N/A	N/A	N/A	N/A	93	226	221	259	251	249	239	237	233	230	232	226	219	214	210	104	204	191	226	228	216	227	224	223	213	211	224	
	28	116	450	450	450	450	93	450	212	256	118	210	233	238	229	223	232	220	214	205	197	196	200	201	214	210	216	137	208	213	206	203	231	
	29	116	N/A	N/A	N/A	N/A	93	226	218	251	239	231	222	167	213	209	206	129	204	146	185	179	96	179	190	196	204	201	190	83	194	191	217	
	30	117	N/A	N/A	N/A	N/A	93	225	216	246	231	220	206	201	193	193	185	186	176	169	151	151	169	157	88	174	179	171	132	175	179	174	189	
	31	118	450	450	450	450	93	450	211	234	224	206	190	180	176	175	166	164	148	147	70	132	147	135	144	153	156	145	147	151	160	157	162	

B# - ##
Bent - Row

MATCH LINE

H-Pile Row (South)

Bent (continue)

		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
H-Pile Row (South Side)	1	138	145	122	141	132	136	123	114	450	123	130	148	118	139	142	134	135	147	450	151	134	137	148	136	139	132	126	157	157	158	64	
	2	161	165	162	147	132	153	133	151	73	155	146	172	146	80	150	146	150	155	63	155	151	144	155	152	165	156	164	178	185	141	77	
	3	189	193	170	174	179	194	156	119	201	114	170	197	174	174	183	169	167	180	178	186	189	174	175	188	198	185	183	191	201	189	185	
	4	210	213	213	208	207	213	209	227	212	200	208	205	204	187	189	175	197	229	224	215	208	195	203	216	223	214	203	208	213	152	189	
	5	215	214	223	218	225	226	221	231	228	220	220	97	228	224	221	220	215	233	235	229	224	223	226	231	231	227	220	227	214	209	192	
	6	220	226	216	226	230	229	110	225	235	231	227	231	230	230	228	229	227	229	241	238	238	239	239	240	239	234	233	231	232	217	203	196
	7	185	192	185	184	190	194	188	193	200	192	191	192	192	193	194	193	194	200	197	198	199	200	201	200	198	196	194	229	221	206	198	
	8	75	192	188	190	191	196	191	91	197	194	193	193	193	195	198	195	197	197	201	200	200	204	82	202	202	200	195	227	222	209	200	
	9	172	83	175	179	176	182	176	176	182	178	176	72	177	177	180	184	183	72	180	183	186	185	186	191	187	183	181	206	198	186	N/A	
	10	177	177	177	179	184	190	182	180	185	181	180	183	186	72	186	190	188	185	180	182	188	185	196	190	188	182	183	210	199	189	185	
	11	180	179	179	180	184	189	185	111	184	184	179	73	180	75	188	190	192	189	181	184	190	188	76	191	188	182	184	212	199	191	187	
	12	87	184	182	182	182	185	186	111	186	187	185	450	189	187	184	187	191	189	182	186	191	185	187	191	187	181	187	216	201	194	184	
	13	188	187	184	184	74	184	212	188	189	181	181	72	185	185	180	183	182	187	184	184	188	183	183	191	187	180	189	219	205	196	179	

Demand/Capacity Utilization (HS-20)

Bent

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
1	68%	32%	30%	59%	N/A	N/A	59%	33%	28%	29%	32%	35%	37%	41%	50%	74%	51%	58%	58%	59%	50%	63%	65%	68%	66%	63%	71%	72%	58%	59%	61%	53%	
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	32%	58%	28%	63%	33%	34%	36%	41%	42%	40%	48%	45%	44%	42%	51%	81%	54%	54%	48%	55%	58%	49%	47%	47%	42%	
3	54%	N/A	N/A	N/A	N/A	N/A	N/A	32%	27%	28%	29%	31%	32%	33%	35%	35%	35%	40%	38%	50%	37%	43%	45%	45%	86%	40%	46%	46%	44%	39%	41%	35%	
4	47%	52%	52%	81%	N/A	N/A	83%	38%	28%	29%	30%	31%	32%	32%	33%	33%	33%	48%	35%	36%	35%	40%	41%	41%	41%	36%	41%	40%	42%	38%	39%	32%	
5	44%	N/A	N/A	N/A	N/A	N/A	N/A	33%	29%	62%	30%	31%	32%	32%	33%	33%	34%	34%	35%	36%	34%	39%	40%	40%	53%	34%	41%	39%	42%	38%	39%	32%	
6	42%	N/A	N/A	N/A	N/A	N/A	N/A	33%	36%	30%	33%	31%	34%	34%	33%	35%	33%	36%	34%	76%	36%	34%	40%	41%	40%	40%	35%	41%	40%	42%	40%	39%	32%
7	41%	51%	59%	57%	N/A	N/A	72%	33%	36%	80%	33%	34%	39%	35%	40%	35%	41%	36%	42%	37%	36%	44%	44%	44%	72%	38%	45%	44%	45%	44%	107%	36%	
8	37%	N/A	N/A	N/A	N/A	N/A	N/A	31%	38%	31%	39%	53%	41%	33%	42%	33%	42%	34%	93%	35%	32%	44%	45%	44%	44%	95%	45%	44%	46%	45%	44%	37%	
9	28%	N/A	N/A	N/A	N/A	N/A	N/A	27%	36%	27%	37%	28%	38%	29%	39%	29%	40%	30%	41%	31%	28%	37%	39%	39%	38%	34%	39%	39%	39%	38%	36%		
10	25%	32%	43%	32%	46%	N/A	60%	23%	29%	38%	47%	23%	30%	24%	30%	24%	36%	25%	31%	24%	23%	21%	26%	26%	25%	23%	25%	26%	26%	25%	30%		
11	23%	N/A	N/A	N/A	N/A	N/A	N/A	20%	22%	19%	20%	19%	21%	19%	21%	20%	22%	20%	22%	17%	23%	21%	26%	26%	25%	23%	25%	26%	26%	25%	30%		
12	24%	N/A	N/A	N/A	N/A	37%	N/A	N/A	N/A	19%	18%	18%	18%	18%	18%	19%	19%	22%	19%	19%	20%	24%	25%	25%	24%	22%	24%	25%	25%	25%	29%		
13	29%	32%	30%	26%	3%	N/A	10%	24%	N/A	23%	22%	23%	22%	23%	22%	23%	23%	23%	23%	24%	33%	35%	35%	35%	30%	35%	35%	36%	36%	35%	34%		
14	33%	N/A	N/A	N/A	N/A	N/A	24%	27%	82%	27%	65%	27%	26%	27%	27%	28%	27%	28%	27%	28%	46%	39%	41%	41%	42%	35%	42%	42%	41%	41%	42%	36%	
15	36%	N/A	N/A	N/A	N/A	N/A	27%	62%	32%	29%	29%	29%	29%	29%	30%	30%	30%	30%	30%	35%	30%	39%	41%	41%	42%	34%	42%	41%	41%	41%	42%	34%	
16	37%	41%	41%	42%	13%	N/A	14%	30%	32%	30%	30%	30%	30%	30%	31%	31%	31%	31%	31%	31%	31%	38%	40%	40%	41%	33%	41%	41%	40%	40%	41%	33%	
17	36%	N/A	N/A	N/A	N/A	36%	33%	33%	33%	30%	30%	30%	30%	30%	77%	31%	30%	31%	31%	31%	31%	40%	41%	41%	42%	34%	42%	41%	41%	41%	42%	34%	
18	35%	N/A	N/A	N/A	N/A	N/A	38%	37%	60%	30%	29%	29%	29%	30%	30%	30%	29%	30%	30%	66%	31%	41%	42%	41%	41%	34%	42%	41%	41%	41%	41%	36%	
19	33%	40%	40%	41%	13%	20%	0%	0%	0%	13%	27%	28%	27%	28%	28%	29%	28%	28%	28%	29%	30%	62%	36%	35%	35%	30%	35%	36%	35%	35%	33%		
20	38%	N/A	N/A	N/A	N/A	69%	N/A	82%	76%	68%	26%	27%	27%	27%	27%	27%	27%	27%	27%	29%	29%	29%	25%	24%	23%	21%	24%	26%	24%	24%	28%		
21	37%	N/A	N/A	N/A	N/A	70%	33%	31%	32%	34%	31%	29%	27%	30%	32%	30%	32%	30%	54%	52%	31%	31%	37%	27%	25%	24%	23%	21%	24%	25%	29%		
22	40%	58%	72%	59%	21%	82%	21%	36%	41%	89%	105%	36%	43%	37%	44%	38%	44%	38%	44%	38%	36%	46%	39%	38%	37%	33%	38%	46%	38%	37%	35%		
23	44%	N/A	N/A	N/A	N/A	92%	48%	87%	52%	40%	50%	41%	51%	41%	51%	42%	88%	43%	53%	43%	40%	50%	44%	72%	50%	38%	43%	44%	44%	74%	43%	36%	
24	41%	N/A	N/A	N/A	N/A	90%	45%	38%	46%	40%	48%	41%	49%	41%	50%	42%	50%	49%	52%	93%	41%	50%	44%	44%	72%	50%	38%	43%	44%	44%	43%	36%	
25	44%	57%	64%	57%	21%	89%	21%	38%	41%	38%	43%	45%	44%	39%	45%	40%	45%	41%	47%	42%	41%	77%	44%	43%	43%	37%	42%	50%	43%	44%	34%		
26	43%	N/A	N/A	N/A	N/A	84%	91%	35%	34%	69%	35%	34%	36%	34%	37%	35%	51%	36%	81%	38%	37%	42%	40%	39%	39%	34%	39%	40%	39%	41%	31%		
27	43%	N/A	N/A	N/A	N/A	81%	34%	34%	30%	31%	32%	32%	33%	33%	34%	33%	34%	35%	37%	37%	73%	42%	46%	39%	39%	34%	39%	39%	39%	41%	40%	30%	
28	43%	52%	51%	52%	16%	80%	16%	35%	29%	63%	35%	32%	32%	33%	33%	33%	34%	35%	36%	38%	38%	43%	42%	40%	40%	34%	63%	41%	40%	41%	30%		
29	42%	N/A	N/A	N/A	N/A	79%	32%	34%	29%	30%	31%	33%	44%	34%	34%	35%	56%	36%	49%	40%	41%	87%	47%	44%	43%	36%	42%	44%	102%	43%	43%	31%	
30	44%	N/A	N/A	N/A	N/A	81%	33%	35%	30%	32%	33%	36%	36%	38%	38%	40%	39%	42%	43%	49%	49%	50%	54%	95%	49%	41%	49%	64%	49%	48%	48%	35%	
31	44%	30%	30%	30%	17%	82%	17%	35%	31%	33%	36%	39%	41%	42%	42%	45%	45%	49%	50%	104%	56%	59%	64%	60%	57%	49%	59%	59%	57%	54%	55%	42%	

B# - ##
Bent - Row

MATCH LINE

H-Pile Row (South Side)

H-Pile Row (North Side)

Notes:

- 1. AASHTO LRFD Gov. Load Case (1.25DL + 1.75LL)
- Note: HS-20 was given a 15%IM per AASHTO

Bent (continue)

	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
1	52%	61%	72%	62%	67%	65%	71%	77%	20%	72%	68%	60%	75%	63%	62%	65%	65%	60%	20%	58%	66%	64%	60%	65%	63%	67%	70%	56%	56%	56%	105%	
2	42%	51%	53%	59%	65%	56%	65%	57%	118%	56%	59%	50%	59%	108%	57%	59%	58%	56%	138%	56%	57%	60%	56%	57%	52%	55%	53%	49%	47%	63%	86%	
3	35%	43%	49%	48%	47%	43%	54%	71%	42%	74%	50%	43%	48%	48%	46%	50%	50%	47%	47%	45%	45%	48%	48%	45%	42%	45%	46%	44%	42%	44%	33%	
4	32%	40%	40%	41%	42%	40%	41%	38%	41%	43%	41%	42%	42%	46%	45%	49%	44%	38%	38%	40%	41%	44%	42%	40%	38%	40%	42%	41%	40%	56%	32%	
5	32%	40%	39%	40%	39%	38%	39%	38%	38%	39%	39%	90%	38%	39%	39%	39%	40%	37%	37%	38%	39%	39%	38%	38%	38%	38%	39%	38%	40%	41%	32%	
6	32%	40%	42%	40%	40%	40%	83%	40%	39%	39%	40%	39%	40%	40%	40%	40%	40%	38%	38%	38%	38%	38%	38%	38%	39%	39%	39%	42%	42%	42%	33%	
7	36%	43%	46%	46%	44%	44%	45%	44%	42%	44%	44%	44%	44%	44%	44%	44%	44%	42%	43%	43%	43%	43%	42%	42%	42%	43%	43%	44%	37%	38%	43%	37%
8	93%	44%	46%	45%	45%	44%	45%	94%	44%	44%	44%	44%	44%	44%	44%	44%	44%	43%	43%	43%	43%	42%	104%	42%	43%	43%	44%	38%	39%	42%	42%	
9	36%	80%	38%	38%	38%	37%	38%	38%	37%	38%	38%	93%	38%	38%	37%	37%	37%	93%	37%	37%	36%	36%	36%	35%	36%	37%	37%	33%	34%	38%	N/A	
10	30%	25%	26%	26%	25%	24%	25%	26%	25%	26%	26%	25%	25%	64%	25%	24%	25%	25%	26%	25%	24%	25%	24%	24%	24%	25%	25%	22%	23%	26%	36%	
11	29%	25%	25%	25%	25%	24%	24%	41%	25%	25%	25%	62%	25%	61%	24%	24%	24%	24%	25%	25%	24%	24%	60%	24%	24%	25%	25%	21%	23%	25%	32%	
12	72%	35%	36%	36%	36%	35%	35%	59%	35%	35%	36%	15%	35%	35%	36%	35%	34%	35%	36%	35%	34%	36%	35%	34%	36%	35%	34%	36%	35%	34%	34%	
13	36%	41%	43%	43%	106%	43%	37%	42%	42%	43%	43%	109%	42%	42%	44%	43%	43%	42%	43%	43%	42%	43%	43%	41%	42%	43%	41%	36%	38%	40%	36%	
14	34%	41%	42%	42%	42%	41%	42%	90%	41%	42%	43%	17%	43%	49%	43%	44%	43%	42%	42%	42%	43%	42%	42%	43%	43%	42%	44%	42%	36%	38%	41%	35%
15	33%	41%	41%	42%	41%	41%	41%	41%	42%	40%	42%	103%	42%	41%	42%	43%	41%	41%	41%	41%	41%	42%	42%	42%	42%	41%	41%	36%	38%	40%	34%	
16	35%	42%	42%	42%	42%	42%	69%	43%	41%	42%	91%	109%	42%	42%	43%	44%	42%	42%	42%	42%	43%	43%	43%	43%	43%	43%	44%	42%	37%	39%	41%	36%
17	36%	42%	42%	42%	104%	68%	42%	42%	41%	42%	43%	43%	106%	43%	42%	43%	42%	42%	41%	42%	42%	43%	43%	43%	43%	43%	42%	43%	37%	39%	42%	37%
18	83%	35%	36%	36%	35%	14%	35%	36%	35%	35%	76%	36%	36%	36%	35%																	