BergerABAM

210 East 13th Street, Suite 300, Vancouver, Washington 98660-3231
360/823-6100 • 360/823-6101 Fax • www.abam.com

17 June 2016

Mr. Stephen Posner
Energy Facility Site Evaluation Council
Washington Utilities and Transportation Commission
P.O. Box 43172
Olympia, WA 98504-3172

Subject: Vancouver Energy
EFSEC Application No. 2013-01, Docket No. EF131590
Response to EFSEC Data Request 10 – Responses to Items SA-27 through SA-29

Dear Mr. Posner:

On behalf of Tesoro Savage Petroleum Terminal, LLC (the Applicant), BergerABAM is providing a response to the Energy Facility Site Evaluation Council's (EFSEC) Draft EIS Data Request 10, items SA 27 to -29, provided to the Applicant on 1 June 2016. Please note that the response to Item SA-30 will be provided under separate cover.

Please feel free to contact me at 206/431-2373, or irina.makarow@abam.com, if you have any questions about this submittal. We look forward to further coordination with you, your staff, and EFSEC's consultants.

Sincerely,

Irina Makarow
Senior Environmental Project Manager

IM:nb
Attachments

cc: Kelly Flint, Savage Companies
Jay Derr, Van Ness Feldman

Code	Data Request Item	Applicant Response
Seismic Analysis		
SA-27	Provide the results of any calculation effort that documents the applicant's assertion that during the design seismic event, potential instability of the slope below the dock (i.e. below the Ordinary High Water Level where no ground improvement is planned) will not adversely affect the piles supporting the dock and the dock structure itself. The calculation should confirm that the magnitude of pile and dock structure deformation during the seismic event will be less than that which may cause disruption/spillage of flow of petroleum from the shoreline piping system to a docked vessel. The analysis methodology and tools should be sufficient to clearly assess the geotechnical and structural performance of the soil-structure systems at the location in question.	Please refer to Attachment 1.
SA 28	Provide a more detailed description and explanation of the analyses/calculations that have been performed by the applicant to assure that when ground improvement efforts are limited to the tank foundation only, petroleum product spills will be contained within the containment system described in the design, including the ability of the berm and membrane liner to withstand the anticipated vertical and lateral displacements resulting from liquefaction during the design seismic event.	Please refer to Attachment 2 below for the figures associated with this response. Figure 1 illustrates the remaining capacity of the secondary containment berm in terms of containing the volume of 110% of the maximum volume of oil contained in one tank (i.e. 380,000 bbl) and the volume of stormwater from a 24 hour - 100 year storm. Under these conditions the berm will still have 9 1/8" of freeboard. The geotechnical report by GRI dates Dec. 20, 2013 (Revised April 17, 2015) (submitted to EFSEC April 20, 2015), pg. 10, "… we estimate liquefaction-induced settlements will be on the order of… 6 to 10 in. in Area 300…" No lateral deformation is expected during an earthquake. If all the non-ground improved area, which includes under the berm on inside the tank storage area, settle the conservative maximum of 10", there still exists sufficient storage capacity to hold catastrophic failure of one tank and the design rain storm. See Figure 2. In discussion with a HDPE and LLDPE manufacturer they feel there are options to employ and test to ensure the material will move/stretch in a design seismic event with 6-10 inches of vertical movement. The Applicant will work with the manufacturer on the appropriate design for the Facility, which will be provided to EFSEC as part of the final construction drawings to be

Code	Data Request Item	Applicant Response
	The details should include the thickness and properties of the membrane liner, the methods of attachment of the liner to the berm on one side and the tank/foundation on the other side of the containment area, and the estimated vertical and lateral deformations across the containment area.	submitted for EFSEC review before the beginning of construction. The liner material will be a HDPE 60 mil thick product, or similar type product, which is common for these types of applications across the country. Although the exact product has not been selected yet, some sample specifications for this type of material are also provided in Attachment 2. Figures 3 and 4 show how the liner will be terminated in both the berm and at the ring wall.
SA-29	Provide additional demonstration that the ground improvement scheme is effective, including estimates of potential ground displacements. It is recognized that the purpose of the proposed ground improvement scheme at the Area 400 terminal site is to limit earthquake-induced displacements of the pipeline, dock and other structures. […]	See Attachment 3.

IM:nb
Attachments

Attachment 1: Structural Calculations – Preliminary Pile Check for Slope Instability.

STRUCTURAL CALCULATIONS – PRELIMINARY
PILE CHECK FOR SLOPE INSTABILITY

VANCOUVER ENERGY
RESPONSE TO EFSEC DATA REQUEST No. 10 – SA-27
VANCOUVER, WASHINGTON

BergerABAM

Submitted to
Vancouver Energy
Vancouver, WA

A13.0267.00

15 June 2016

	ITEM	NO. OF PAGES
1	SUMMARY	1
2	SAP MODEL FIGURES	5
3	TRESTLE PILES - SAP OUTPUT	36
4	TRESTLE PILES - CHECK	3
5	PLATFORM PILES - SAP OUTPUT	28
6	PLATFORM PILES - CHECK	2

SA-27 requested that calculation results be provided to document that piles will not be adversely affected by the potential slope instability during the design seismic event.

A reference for this section is, "Geotechnical Investigation, Tesoro Savage Vancouver Energy Distribution Terminal - Dock Facility, Port of Vancouver, USA", dated 5 September 2014.

The following pages include the SAP modeling output for the load case with soil movement against the piles (combined with 25% inertial seismic loads) and resulting pile checks, with potential pile strengthening locations noted.

Project	POV Berth 13 and 14	Sheet	of
	Vancouver	Job Number	A130267
Subject	platform piles under lateral	Designer	G. Sheng
	spreading & EQ w/ GI option	Date	06/15/16

The existing trestle abutment was supported by 4- 18"OD steel pipe piles with slightly batter slope towarding sides. In order to utilize the trestle structure to restrain the movements of the platform transversely, total 4 pairs of 24"OD battered steel pipe piles are proposed to replace the existing piles. 4 piles are battered toward landside and toward waterside respectively. The ground improvement is proposed around the abutment to limit the abutment not move more than 2 inches by lateral spreading earth pressures during design earthquakes.

Summary of the SAP modeling analysis results:

Loading: Lateral Spreading + 25% Design Earthquake+dead (with improved ground at abutment)

Displacement:

at abutment -	2.4"
at waterside of platform -	2.3"

Max axial load of existing dock batter pile (18"OD):

In tension -	192 kips	<	350 kips	ok
In compression -	191 kips	<	400 kips	ok

Check dock/platform plumb piles (18"OD):

Bending M, k-ft	42.60
axial P, kips	217.50
Combined stress check:	0.95

(see next pages for the detailed combined force check)

Max bending moments under trestle (18"OD):

Bent #	1	2	3	4	5
Bending M, k-ft	282.80	147.00	182.50	156.40	90.10
axial P, kips	27.30	40.50	26.50	29.60	16.80
Combined stress check:	1.07	0.62	0.72	0.63	0.38
after retrofit of the pile:	0.67	n/a	n/a	n/a	n/a

(see next pages for the detailed combined force check)

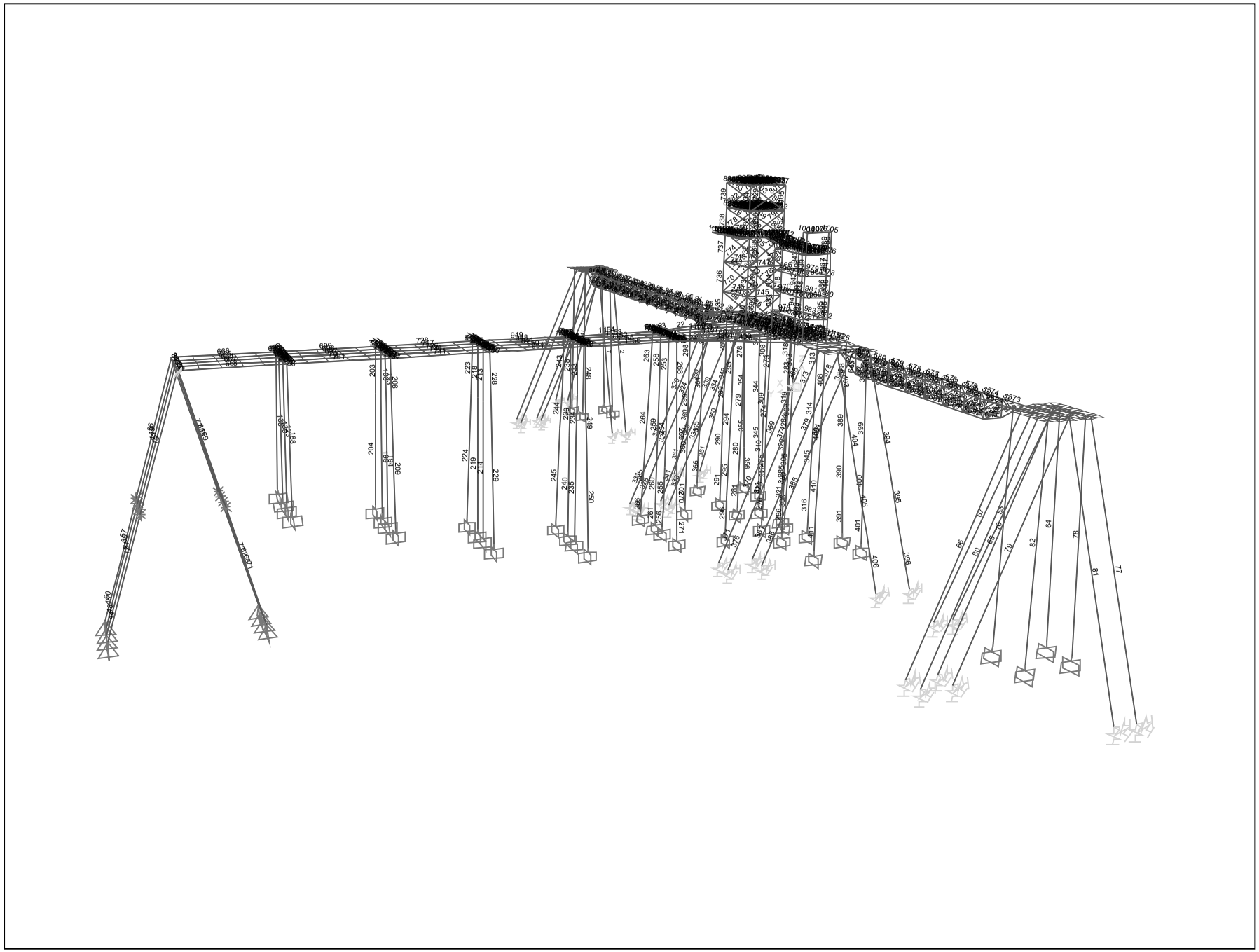
Piles in Bent 1 are 7% over stressed in combined axial and flexural action. Use a retrofit method to insert a 14"ODx3/8"wall pile into the existing 18"OD pile and fill the gap with high strength grout. The combined stress for the retrofited pile is reduced to 0.67 and the pile is sufficient.

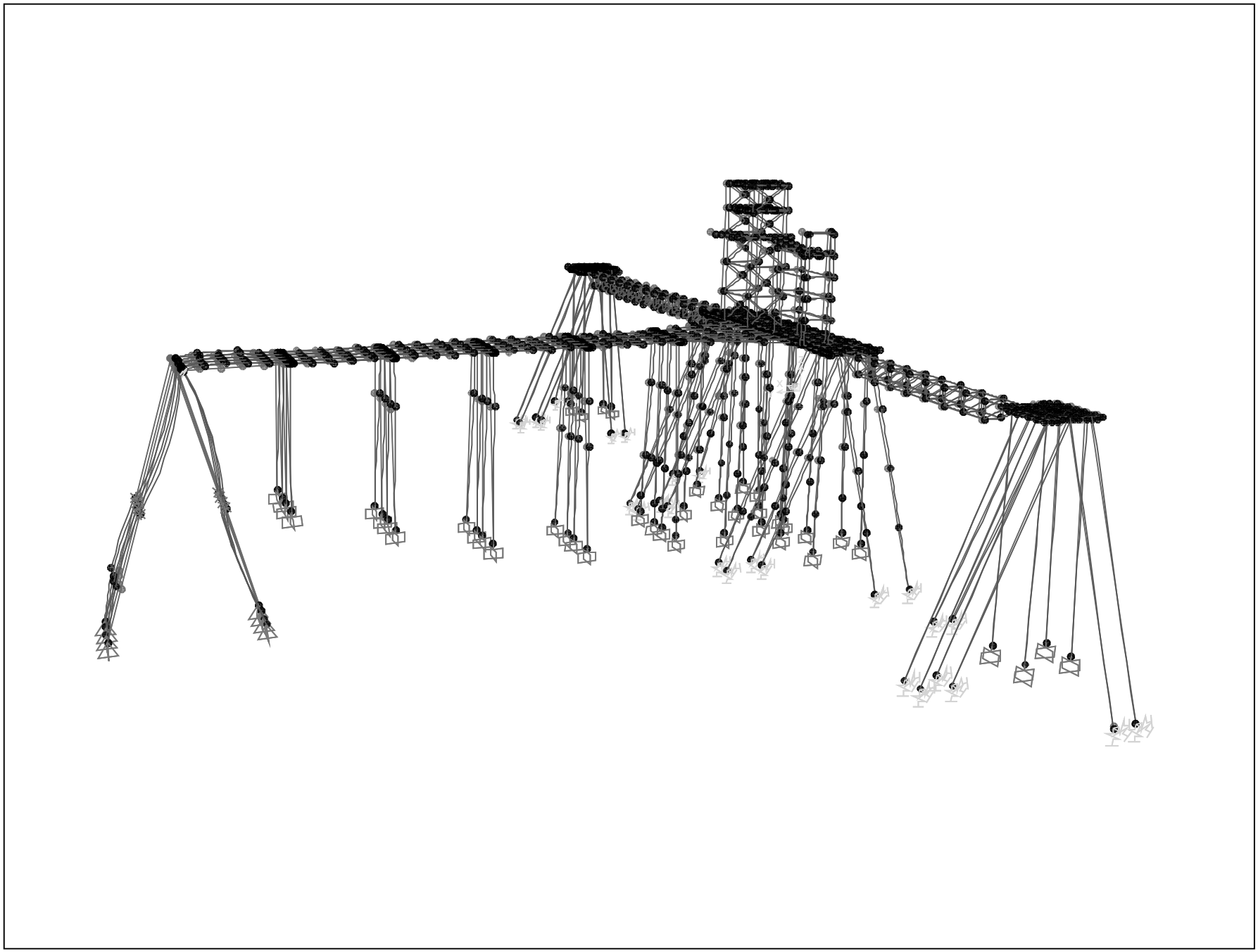
Attachments:

Figures - 3D model; deformed dock & trestle; platform piles
SAP analysis outputs - Existing platform pile reactions
SAP analysis outputs - Existing trestle pile reactions

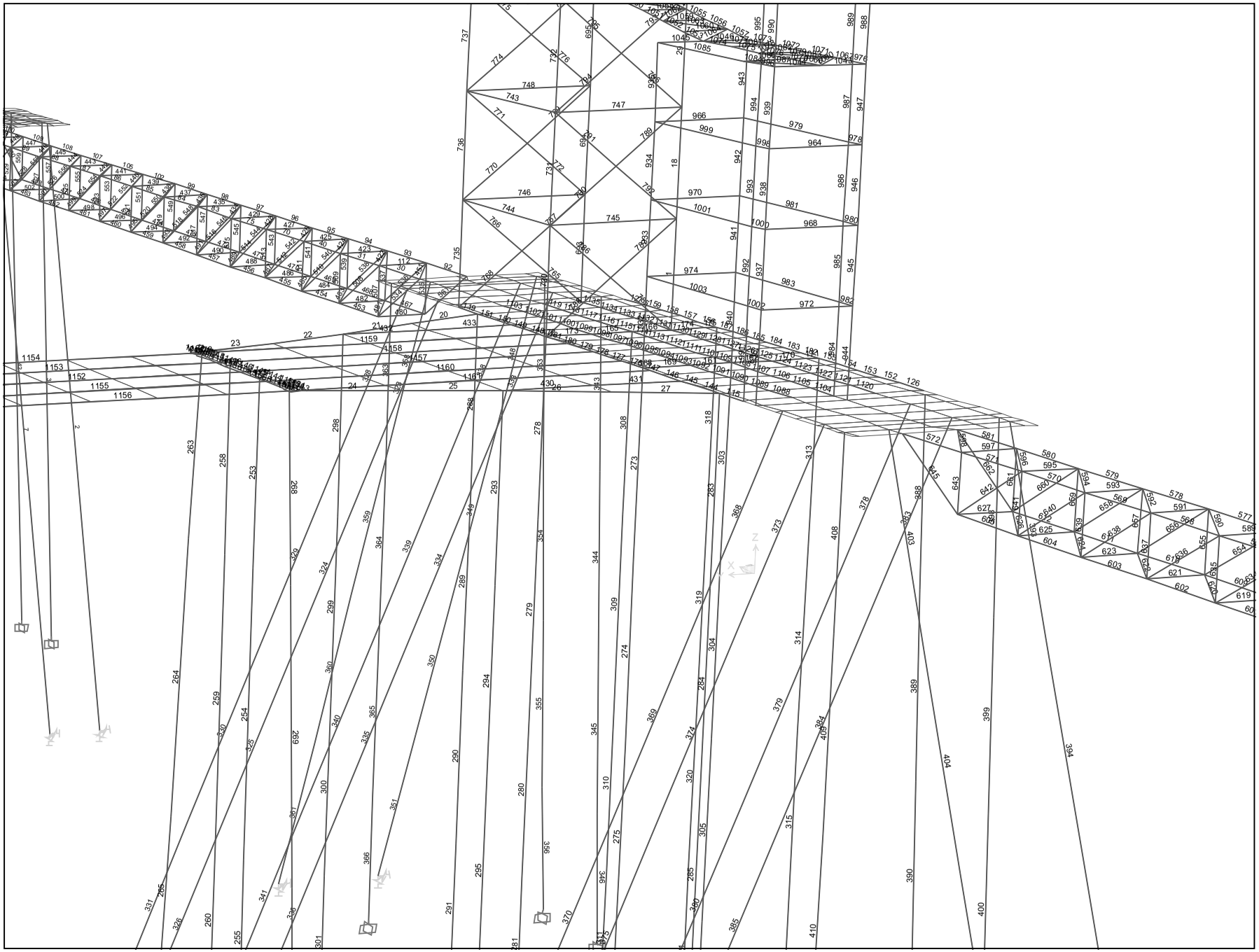
Attachment - Figures

SAP MODEL FIGURES





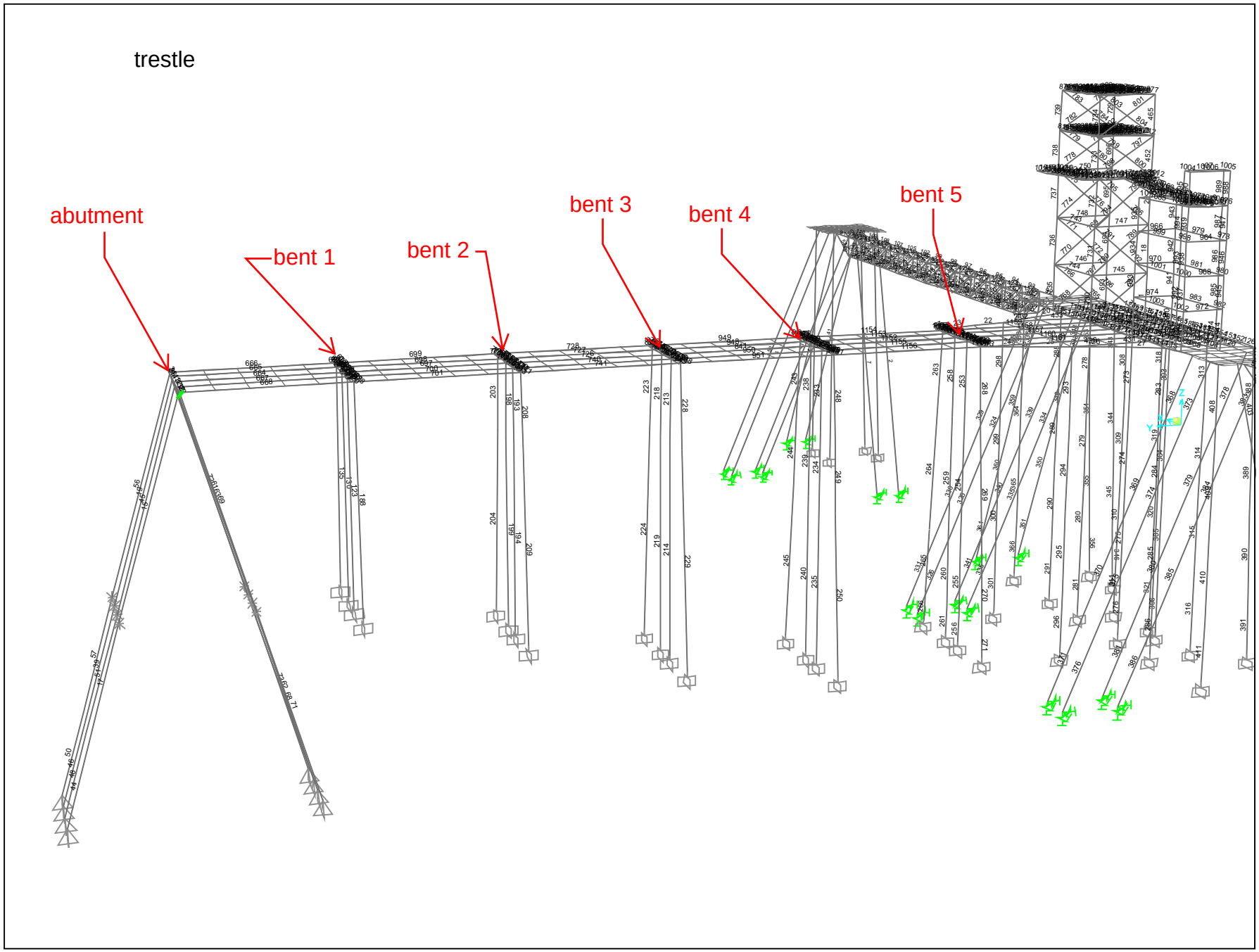
SAP2000 18.1.1 Deformed Shape (COMB8_LS_025EQ2) Kip, in, F

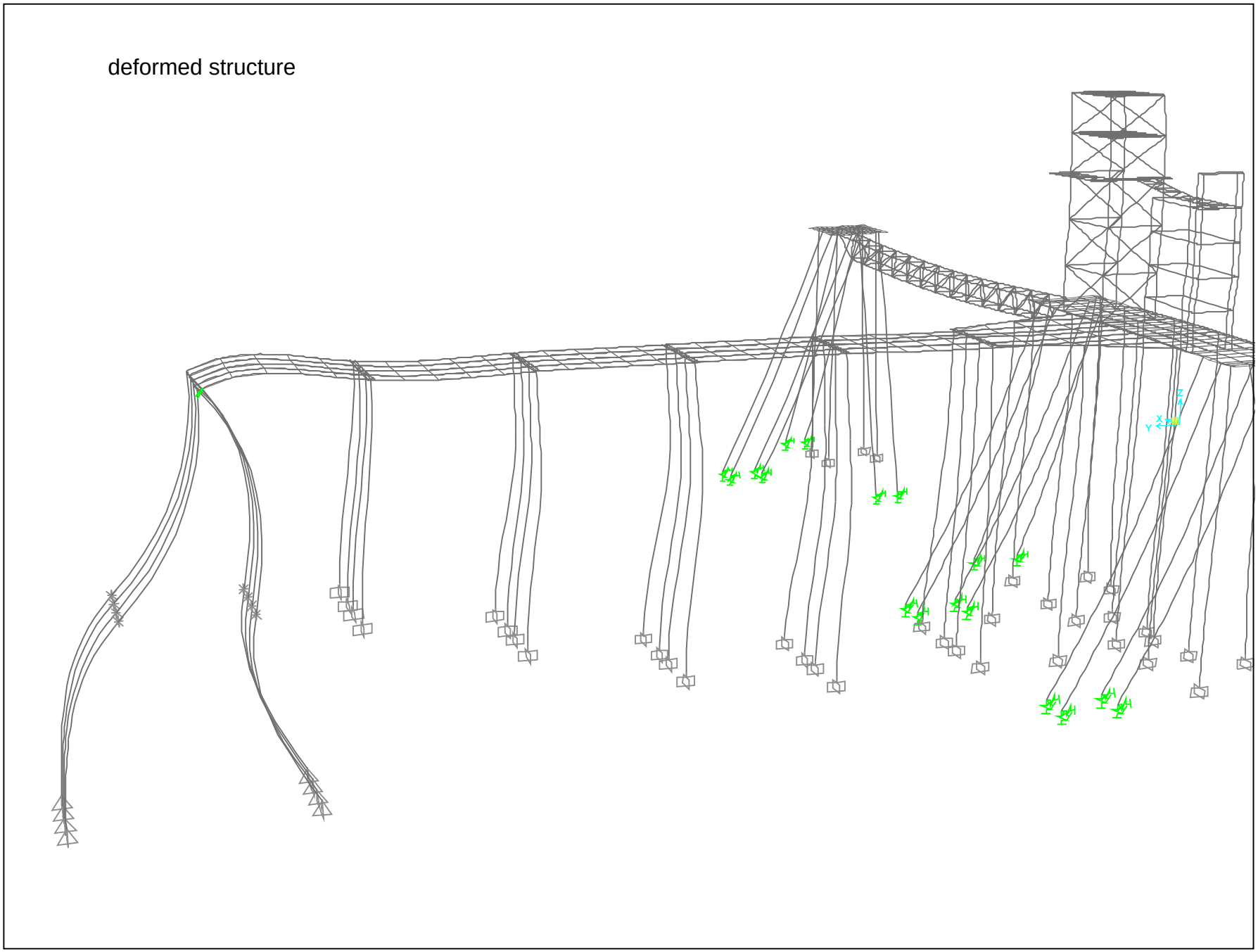


Project	POV Berth 13 and 14	Sheet	of
	Vancouver	Job Number	A130267
Subject	Trestle abutment analysis	Designer	G. Sheng
		Date	06/14/16

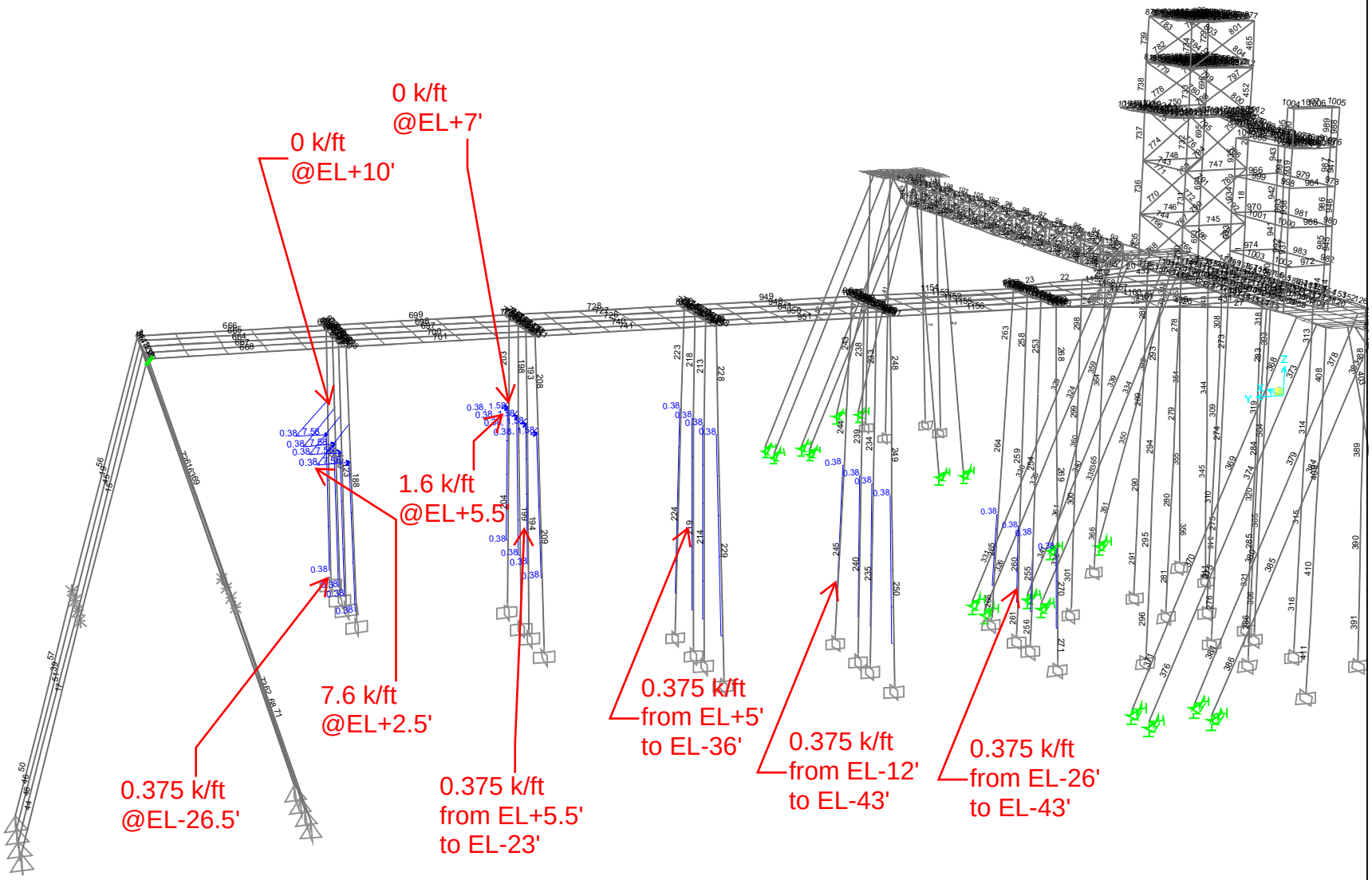
SAP model analysis outputs - existing trestle piles

TRESTLE PILES - SAP OUTPUT

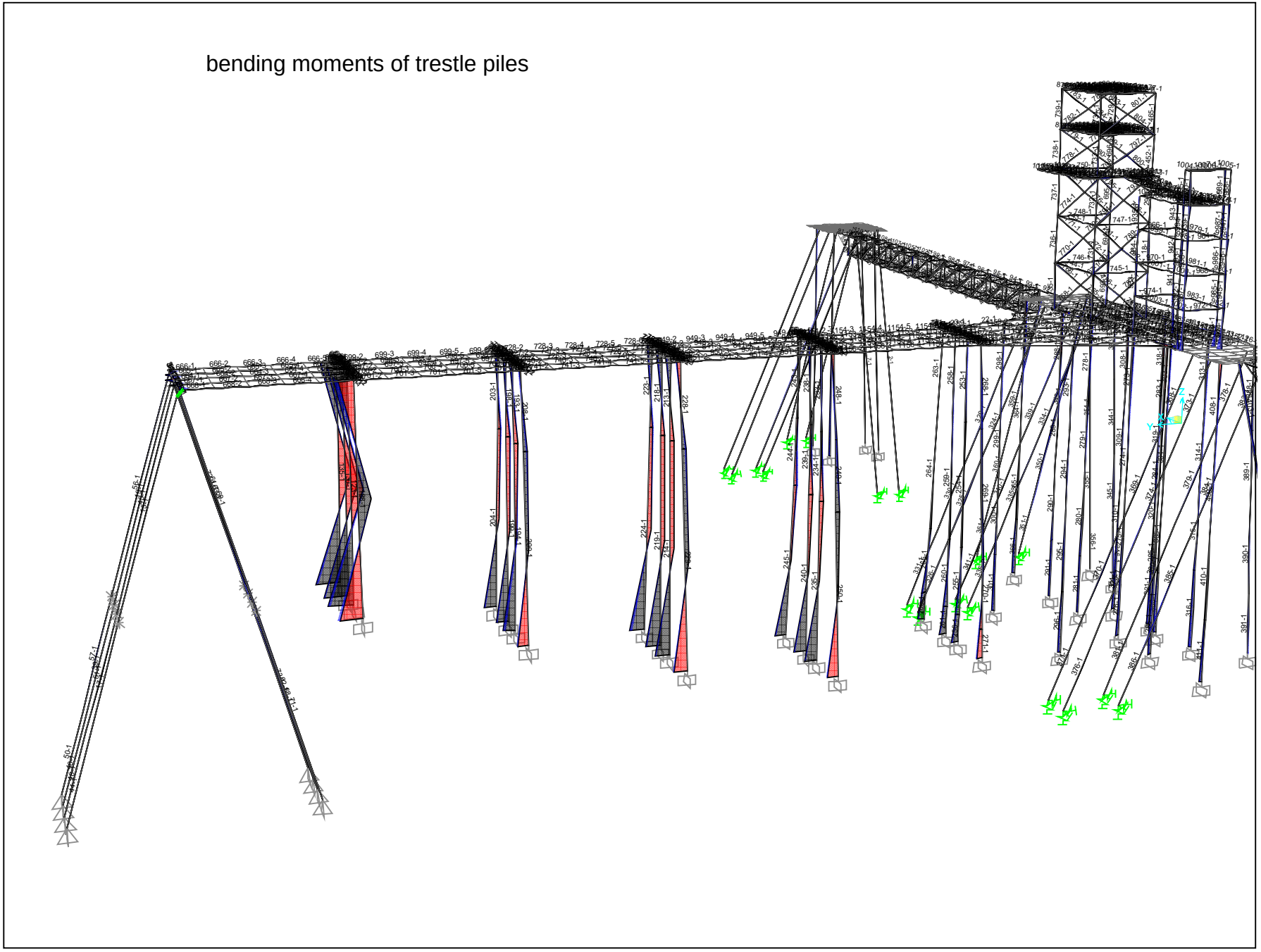

trestle
abutment
bent 1
bent 2
bent 3
bent 4
bent 5


deformed structure

earth pressure on trestle piles



bending moments of trestle piles



Trestle bent 1 piles: lateral spreading +0.25EQ+dead

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
123	0.	COMB8_LS_025EQ2	Combination	Max	30.246	0.094	18.845	0.6537	172.8895	0.9511	123-1
123	26.1875	COMB8_LS_025EQ2	Combination	Max	28.393	0.094	-10.436	0.6537	-143.5974	1.7358	123-1
123	52.375	COMB8_LS_025EQ2	Combination	Max	26.54	0.094	-19.984	0.6537	282.8193	4.2883	123-1
123	0.	COMB8_LS_025EQ2	Combination	Min	23.107	-0.097	17.904	-0.5809	151.0705	-0.8168	123-1
123	26.1875	COMB8_LS_025EQ2	Combination	Min	21.254	-0.097	-11.377	-0.5809	-146.415	-1.5097	123-1
123	52.375	COMB8_LS_025EQ2	Combination	Min	19.401	-0.097	-20.924	-0.5809	255.367	-3.9705	123-1
130	0.	COMB8_LS_025EQ2	Combination	Max	30.998	0.087	18.846	0.6904	172.9058	0.7238	130-1
130	26.1875	COMB8_LS_025EQ2	Combination	Max	29.145	0.087	-10.435	0.6904	-143.5953	1.6811	130-1
130	52.375	COMB8_LS_025EQ2	Combination	Max	27.292	0.087	-19.982	0.6904	282.7895	4.4069	130-1
130	0.	COMB8_LS_025EQ2	Combination	Min	23.111	-0.104	17.905	-0.5438	151.1045	-1.0448	130-1
130	26.1875	COMB8_LS_025EQ2	Combination	Min	21.258	-0.104	-11.376	-0.5438	-146.4338	-1.5645	130-1
130	52.375	COMB8_LS_025EQ2	Combination	Min	19.405	-0.104	-20.923	-0.5438	255.3131	-3.8529	130-1
135	0.	COMB8_LS_025EQ2	Combination	Max	42.422	-0.041	19.459	0.5709	192.5793	0.3565	135-1
135	26.2782	COMB8_LS_025EQ2	Combination	Max	40.569	0.114	-9.856	0.5709	-139.6443	2.5873	135-1
135	52.5564	COMB8_LS_025EQ2	Combination	Max	38.716	0.268	-19.37	0.5709	274.9021	2.6795	135-1
135	0.	COMB8_LS_025EQ2	Combination	Min	38.919	-0.235	18.461	-0.6871	168.6206	-1.562	135-1
135	26.2782	COMB8_LS_025EQ2	Combination	Min	37.066	-0.081	-10.854	-0.6871	-141.9158	-0.6064	135-1
135	52.5564	COMB8_LS_025EQ2	Combination	Min	35.213	0.074	-20.368	-0.6871	246.4076	-5.6263	135-1
188	0.	COMB8_LS_025EQ2	Combination	Max	42.905	-0.03	-18.456	0.7934	-168.4865	0.4554	188-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
188	26.2782	COMB8_LS_025EQ2	Combination	Max	41.052	0.124	10.859	0.7934	141.8695	2.4186	188-1
188	52.5564	COMB8_LS_025EQ2	Combination	Max	39.199	0.278	20.372	0.7934	-246.5889	2.2387	188-1
188	0.	COMB8_LS_025EQ2	Combination	Min	38.75	-0.225	-19.454	-0.4562	-192.491	-1.4586	188-1
188	26.2782	COMB8_LS_025EQ2	Combination	Min	36.896	-0.07	9.861	-0.4562	139.6589	-0.7747	188-1
188	52.5564	COMB8_LS_025EQ2	Combination	Min	35.043	0.084	19.375	-0.4562	-275.0068	-6.062	188-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
123	0.	COMB8_LS_025EQ2	Max	123-1	0.
123	26.1875	COMB8_LS_025EQ2	Max	123-1	26.1875
123	52.375	COMB8_LS_025EQ2	Max	123-1	52.375
123	0.	COMB8_LS_025EQ2	Min	123-1	0.
123	26.1875	COMB8_LS_025EQ2	Min	123-1	26.1875
123	52.375	COMB8_LS_025EQ2	Min	123-1	52.375
130	0.	COMB8_LS_025EQ2	Max	130-1	0.
130	26.1875	COMB8_LS_025EQ2	Max	130-1	26.1875
130	52.375	COMB8_LS_025EQ2	Max	130-1	52.375
130	0.	COMB8_LS_025EQ2	Min	130-1	0.
130	26.1875	COMB8_LS_025EQ2	Min	130-1	26.1875
130	52.375	COMB8_LS_025EQ2	Min	130-1	52.375

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
135	0.	COMB8_LS_025EQ2	Max	135-1	0.
135	26.2782	COMB8_LS_025EQ2	Max	135-1	26.2782
135	52.5564	COMB8_LS_025EQ2	Max	135-1	52.5564
135	0.	COMB8_LS_025EQ2	Min	135-1	0.
135	26.2782	COMB8_LS_025EQ2	Min	135-1	26.2782
135	52.5564	COMB8_LS_025EQ2	Min	135-1	52.5564
188	0.	COMB8_LS_025EQ2	Max	188-1	0.
188	26.2782	COMB8_LS_025EQ2	Max	188-1	26.2782
188	52.5564	COMB8_LS_025EQ2	Max	188-1	52.5564
188	0.	COMB8_LS_025EQ2	Min	188-1	0.
188	26.2782	COMB8_LS_025EQ2	Min	188-1	26.2782
188	52.5564	COMB8_LS_025EQ2	Min	188-1	52.5564

Trestle bent 2 pile: lateral spreading +0.25EQ+dead

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
193	0.	COMB8_LS_025EQ2	Combination	Max	-36.133	0.039	3.84	0.4103	26.0347	0.9675	193-1
193	9.	COMB8_LS_025EQ2	Combination	Max	-36.77	0.039	3.84	0.4103	-8.5213	0.6369	193-1
193	18.	COMB8_LS_025EQ2	Combination	Max	-37.407	0.039	3.84	0.4103	-43.0771	0.3643	193-1
193	0.	COMB8_LS_025EQ2	Combination	Min	-45.377	-0.049	3.657	-0.3314	13.6592	-1.0276	193-1
193	9.	COMB8_LS_025EQ2	Combination	Min	-46.014	-0.049	3.657	-0.3314	-19.252	-0.6115	193-1
193	18.	COMB8_LS_025EQ2	Combination	Min	-46.651	-0.049	3.657	-0.3314	-52.1633	-0.2534	193-1
194	0.	COMB8_LS_025EQ2	Combination	Max	-37.406	0.111	4.116	0.4103	-43.0771	0.3643	194-1
194	21.875	COMB8_LS_025EQ2	Combination	Max	-38.954	0.111	-4.638	0.4103	-24.9415	2.4545	194-1
194	43.75	COMB8_LS_025EQ2	Combination	Max	-40.502	0.111	-7.711	0.4103	147.2277	5.0944	194-1
194	0.	COMB8_LS_025EQ2	Combination	Min	-46.652	-0.121	3.38	-0.3314	-52.1633	-0.2534	194-1
194	21.875	COMB8_LS_025EQ2	Combination	Min	-48.2	-0.121	-5.373	-0.3314	-31.9432	-2.1357	194-1
194	43.75	COMB8_LS_025EQ2	Combination	Min	-49.748	-0.121	-8.446	-0.3314	124.1384	-4.5677	194-1
198	0.	COMB8_LS_025EQ2	Combination	Max	-35.563	0.037	3.84	0.4183	26.0543	0.8842	198-1
198	9.	COMB8_LS_025EQ2	Combination	Max	-36.2	0.037	3.84	0.4183	-8.5087	0.5721	198-1
198	18.	COMB8_LS_025EQ2	Combination	Max	-36.837	0.037	3.84	0.4183	-43.0717	0.3182	198-1
198	0.	COMB8_LS_025EQ2	Combination	Min	-44.729	-0.051	3.658	-0.3236	13.6788	-1.1109	198-1
198	9.	COMB8_LS_025EQ2	Combination	Min	-45.366	-0.051	3.658	-0.3236	-19.2396	-0.6763	198-1
198	18.	COMB8_LS_025EQ2	Combination	Min	-46.003	-0.051	3.658	-0.3236	-52.1581	-0.2998	198-1
199	0.	COMB8_LS_025EQ2	Combination	Max	-36.835	0.109	4.117	0.4183	-43.0717	0.3182	199-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
199	21.875	COMB8_LS_025EQ2	Combination	Max	-38.383	0.109	-4.637	0.4183	-24.9572	2.4533	199-1
199	43.75	COMB8_LS_025EQ2	Combination	Max	-39.931	0.109	-7.71	0.4183	147.1911	5.1383	199-1
199	0.	COMB8_LS_025EQ2	Combination	Min	-46.004	-0.123	3.381	-0.3236	-52.1581	-0.2998	199-1
199	21.875	COMB8_LS_025EQ2	Combination	Min	-47.552	-0.123	-5.372	-0.3236	-31.9515	-2.1371	199-1
199	43.75	COMB8_LS_025EQ2	Combination	Min	-49.1	-0.123	-8.445	-0.3236	124.1162	-4.5244	199-1
203	0.	COMB8_LS_025EQ2	Combination	Max	-34.055	-0.104	3.917	0.7074	28.9848	0.7448	203-1
203	9.0312	COMB8_LS_025EQ2	Combination	Max	-34.692	-0.051	3.917	0.7074	-6.3927	1.4649	203-1
203	18.0623	COMB8_LS_025EQ2	Combination	Max	-35.329	2.117E-03	3.917	0.7074	-41.7698	1.754	203-1
203	0.	COMB8_LS_025EQ2	Combination	Min	-37.217	-0.194	3.719	-0.038	15.5954	-1.4389	203-1
203	9.0312	COMB8_LS_025EQ2	Combination	Min	-37.854	-0.141	3.719	-0.038	-17.9914	0.0545	203-1
203	18.0623	COMB8_LS_025EQ2	Combination	Min	-38.491	-0.088	3.719	-0.038	-51.5787	1.0209	203-1
204	0.	COMB8_LS_025EQ2	Combination	Max	-35.328	0.077	4.199	0.7091	-41.7698	1.754	204-1
204	21.9508	COMB8_LS_025EQ2	Combination	Max	-36.876	0.206	-4.583	0.7091	-25.2058	3.1678	204-1
204	43.9016	COMB8_LS_025EQ2	Combination	Max	-38.424	0.335	-7.628	0.7091	146.5781	2.4267	204-1
204	0.	COMB8_LS_025EQ2	Combination	Min	-38.491	-0.16	3.438	-0.0363	-51.5787	1.0209	204-1
204	21.9508	COMB8_LS_025EQ2	Combination	Min	-40.039	-0.031	-5.344	-0.0363	-32.0973	-1.3952	204-1
204	43.9016	COMB8_LS_025EQ2	Combination	Min	-41.587	0.098	-8.389	-0.0363	122.9864	-7.3186	204-1
208	0.	COMB8_LS_025EQ2	Combination	Max	-33.858	-0.092	-3.716	0.1274	-15.5011	0.9009	208-1
208	9.0312	COMB8_LS_025EQ2	Combination	Max	-34.495	-0.039	-3.716	0.1274	18.0564	1.5145	208-1
208	18.0623	COMB8_LS_025EQ2	Combination	Max	-35.132	0.014	-3.716	0.1274	51.6145	1.6971	208-1
208	0.	COMB8_LS_025EQ2	Combination	Min	-36.949	-0.182	-3.914	-0.6226	-28.9007	-1.2829	208-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
208	9.0312	COMB8_LS_025EQ2	Combination	Min	-37.586	-0.129	-3.914	-0.6226	6.4501	0.104	208-1
208	18.0623	COMB8_LS_025EQ2	Combination	Min	-38.222	-0.076	-3.914	-0.6226	41.8004	0.9638	208-1
209	0.	COMB8_LS_025EQ2	Combination	Max	-35.131	0.088	-3.434	0.1257	51.6145	1.6971	209-1
209	21.9508	COMB8_LS_025EQ2	Combination	Max	-36.679	0.217	5.348	0.1257	32.0731	2.8518	209-1
209	43.9016	COMB8_LS_025EQ2	Combination	Max	-38.227	0.346	8.393	0.1257	-123.0653	1.8516	209-1
209	0.	COMB8_LS_025EQ2	Combination	Min	-38.223	-0.148	-4.196	-0.6243	41.8004	0.9638	209-1
209	21.9508	COMB8_LS_025EQ2	Combination	Min	-39.771	-0.019	4.586	-0.6243	25.1602	-1.7108	209-1
209	43.9016	COMB8_LS_025EQ2	Combination	Min	-41.319	0.11	7.631	-0.6243	-146.7051	-7.8926	209-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
193	0.	COMB8_LS_025EQ2	Max	193-1	0.
193	9.	COMB8_LS_025EQ2	Max	193-1	9.
193	18.	COMB8_LS_025EQ2	Max	193-1	18.
193	0.	COMB8_LS_025EQ2	Min	193-1	0.
193	9.	COMB8_LS_025EQ2	Min	193-1	9.
193	18.	COMB8_LS_025EQ2	Min	193-1	18.
194	0.	COMB8_LS_025EQ2	Max	194-1	0.
194	21.875	COMB8_LS_025EQ2	Max	194-1	21.875
194	43.75	COMB8_LS_025EQ2	Max	194-1	43.75

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
194	0.	COMB8_LS_025EQ2	Min	194-1	0.
194	21.875	COMB8_LS_025EQ2	Min	194-1	21.875
194	43.75	COMB8_LS_025EQ2	Min	194-1	43.75
198	0.	COMB8_LS_025EQ2	Max	198-1	0.
198	9.	COMB8_LS_025EQ2	Max	198-1	9.
198	18.	COMB8_LS_025EQ2	Max	198-1	18.
198	0.	COMB8_LS_025EQ2	Min	198-1	0.
198	9.	COMB8_LS_025EQ2	Min	198-1	9.
198	18.	COMB8_LS_025EQ2	Min	198-1	18.
199	0.	COMB8_LS_025EQ2	Max	199-1	0.
199	21.875	COMB8_LS_025EQ2	Max	199-1	21.875
199	43.75	COMB8_LS_025EQ2	Max	199-1	43.75
199	0.	COMB8_LS_025EQ2	Min	199-1	0.
199	21.875	COMB8_LS_025EQ2	Min	199-1	21.875
199	43.75	COMB8_LS_025EQ2	Min	199-1	43.75
203	0.	COMB8_LS_025EQ2	Max	203-1	0.
203	9.0312	COMB8_LS_025EQ2	Max	203-1	9.0312
203	18.0623	COMB8_LS_025EQ2	Max	203-1	18.0623
203	0.	COMB8_LS_025EQ2	Min	203-1	0.
203	9.0312	COMB8_LS_025EQ2	Min	203-1	9.0312
203	18.0623	COMB8_LS_025EQ2	Min	203-1	18.0623

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
204	0.	COMB8_LS_025EQ2	Max	204-1	0.
204	21.9508	COMB8_LS_025EQ2	Max	204-1	21.9508
204	43.9016	COMB8_LS_025EQ2	Max	204-1	43.9016
204	0.	COMB8_LS_025EQ2	Min	204-1	0.
204	21.9508	COMB8_LS_025EQ2	Min	204-1	21.9508
204	43.9016	COMB8_LS_025EQ2	Min	204-1	43.9016
208	0.	COMB8_LS_025EQ2	Max	208-1	0.
208	9.0312	COMB8_LS_025EQ2	Max	208-1	9.0312
208	18.0623	COMB8_LS_025EQ2	Max	208-1	18.0623
208	0.	COMB8_LS_025EQ2	Min	208-1	0.
208	9.0312	COMB8_LS_025EQ2	Min	208-1	9.0312
208	18.0623	COMB8_LS_025EQ2	Min	208-1	18.0623
209	0.	COMB8_LS_025EQ2	Max	209-1	0.
209	21.9508	COMB8_LS_025EQ2	Max	209-1	21.9508
209	43.9016	COMB8_LS_025EQ2	Max	209-1	43.9016
209	0.	COMB8_LS_025EQ2	Min	209-1	0.
209	21.9508	COMB8_LS_025EQ2	Min	209-1	21.9508
209	43.9016	COMB8_LS_025EQ2	Min	209-1	43.9016

Trestle bent 3 piles: lateral spreading + 0.25EQ+dead

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
213	0.	COMB8_LS_025EQ2	Combination	Max	-21.481	0.011	4.517	0.1899	53.5254	0.9478	213-1
213	10.	COMB8_LS_025EQ2	Combination	Max	-22.189	0.011	4.517	0.1899	9.4243	0.9333	213-1
213	20.	COMB8_LS_025EQ2	Combination	Max	-22.896	0.011	4.517	0.1899	-34.6765	0.9401	213-1
213	0.	COMB8_LS_025EQ2	Combination	Min	-31.172	-0.019	4.41	-0.1322	45.3388	-0.9816	213-1
213	10.	COMB8_LS_025EQ2	Combination	Min	-31.88	-0.019	4.41	-0.1322	0.1686	-0.8869	213-1
213	20.	COMB8_LS_025EQ2	Combination	Min	-32.588	-0.019	4.41	-0.1322	-45.0017	-0.8134	213-1
214	0.	COMB8_LS_025EQ2	Combination	Max	-22.895	0.104	4.762	0.1899	-34.6765	0.9401	214-1
214	25.5625	COMB8_LS_025EQ2	Combination	Max	-24.703	0.104	-4.074	0.1899	-47.378	2.0863	214-1
214	51.125	COMB8_LS_025EQ2	Combination	Max	-26.512	0.104	-10.66	0.1899	182.5361	4.9564	214-1
214	0.	COMB8_LS_025EQ2	Combination	Min	-32.589	-0.112	4.165	-0.1322	-45.0017	-0.8134	214-1
214	25.5625	COMB8_LS_025EQ2	Combination	Min	-34.398	-0.112	-4.671	-0.1322	-52.303	-1.7546	214-1
214	51.125	COMB8_LS_025EQ2	Combination	Min	-36.207	-0.112	-11.257	-0.1322	162.3612	-4.4197	214-1
218	0.	COMB8_LS_025EQ2	Combination	Max	-20.691	7.587E-03	4.517	0.1957	53.5255	0.8058	218-1
218	10.	COMB8_LS_025EQ2	Combination	Max	-21.399	7.587E-03	4.517	0.1957	9.417	0.8216	218-1
218	20.	COMB8_LS_025EQ2	Combination	Max	-22.107	7.587E-03	4.517	0.1957	-34.6912	0.8586	218-1
218	0.	COMB8_LS_025EQ2	Combination	Min	-30.415	-0.022	4.411	-0.1278	45.3559	-1.1236	218-1
218	10.	COMB8_LS_025EQ2	Combination	Min	-31.123	-0.022	4.411	-0.1278	0.1861	-0.9988	218-1
218	20.	COMB8_LS_025EQ2	Combination	Min	-31.83	-0.022	4.411	-0.1278	-44.984	-0.8952	218-1
219	0.	COMB8_LS_025EQ2	Combination	Max	-22.105	0.101	4.761	0.1957	-34.6912	0.8586	219-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
219	25.5625	COMB8_LS_025EQ2	Combination	Max	-23.914	0.101	-4.075	0.1957	-47.3954	2.0819	219-1
219	51.125	COMB8_LS_025EQ2	Combination	Max	-25.723	0.101	-10.661	0.1957	182.4837	5.0294	219-1
219	0.	COMB8_LS_025EQ2	Combination	Min	-31.832	-0.115	4.167	-0.1278	-44.984	-0.8952	219-1
219	25.5625	COMB8_LS_025EQ2	Combination	Min	-33.641	-0.115	-4.669	-0.1278	-52.3006	-1.7591	219-1
219	51.125	COMB8_LS_025EQ2	Combination	Min	-35.45	-0.115	-11.255	-0.1278	162.3806	-4.347	219-1
223	0.	COMB8_LS_025EQ2	Combination	Max	-16.911	-0.158	4.623	0.4004	58.2973	0.4606	223-1
223	10.0346	COMB8_LS_025EQ2	Combination	Max	-17.619	-0.099	4.623	0.4004	12.9498	1.841	223-1
223	20.0693	COMB8_LS_025EQ2	Combination	Max	-18.327	-0.04	4.623	0.4004	-32.3973	2.6502	223-1
223	0.	COMB8_LS_025EQ2	Combination	Min	-20.243	-0.189	4.519	0.0844	49.6635	-1.6633	223-1
223	10.0346	COMB8_LS_025EQ2	Combination	Min	-20.95	-0.13	4.519	0.0844	3.2782	-0.1561	223-1
223	20.0693	COMB8_LS_025EQ2	Combination	Min	-21.658	-0.071	4.519	0.0844	-43.1074	0.7393	223-1
224	0.	COMB8_LS_025EQ2	Combination	Max	-18.326	0.055	4.873	0.4007	-32.3973	2.6502	224-1
224	25.651	COMB8_LS_025EQ2	Combination	Max	-20.135	0.206	-3.996	0.4007	-47.7122	3.0879	224-1
224	51.3021	COMB8_LS_025EQ2	Combination	Max	-21.944	0.357	-10.549	0.4007	181.1368	1.5428	224-1
224	0.	COMB8_LS_025EQ2	Combination	Min	-21.659	-0.166	4.268	0.0846	-43.1074	0.7393	224-1
224	25.651	COMB8_LS_025EQ2	Combination	Min	-23.468	-0.015	-4.601	0.0846	-52.52	-0.7243	224-1
224	51.3021	COMB8_LS_025EQ2	Combination	Min	-25.277	0.135	-11.154	0.0846	160.8114	-7.9361	224-1
228	0.	COMB8_LS_025EQ2	Combination	Max	-16.617	-0.147	-4.516	-0.0128	-49.5634	0.652	228-1
228	10.0346	COMB8_LS_025EQ2	Combination	Max	-17.324	-0.088	-4.516	-0.0128	-3.1852	1.9188	228-1
228	20.0693	COMB8_LS_025EQ2	Combination	Max	-18.032	-0.029	-4.516	-0.0128	43.1935	2.6143	228-1
228	0.	COMB8_LS_025EQ2	Combination	Min	-19.974	-0.177	-4.622	-0.3457	-58.3002	-1.4718	228-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
228	10.0346	COMB8_LS_025EQ2	Combination	Min	-20.682	-0.118	-4.622	-0.3457	-12.9764	-0.0778	228-1
228	20.0693	COMB8_LS_025EQ2	Combination	Min	-21.389	-0.059	-4.622	-0.3457	32.3469	0.7045	228-1
229	0.	COMB8_LS_025EQ2	Combination	Max	-18.031	0.067	-4.263	-0.013	43.1935	2.6143	229-1
229	25.651	COMB8_LS_025EQ2	Combination	Max	-19.84	0.217	4.606	-0.013	52.5265	2.7625	229-1
229	51.3021	COMB8_LS_025EQ2	Combination	Max	-21.649	0.368	11.159	-0.013	-160.7481	0.9271	229-1
229	0.	COMB8_LS_025EQ2	Combination	Min	-21.39	-0.155	-4.876	-0.3459	32.3469	0.7045	229-1
229	25.651	COMB8_LS_025EQ2	Combination	Min	-23.199	-3.975E-03	3.994	-0.3459	47.6626	-1.0495	229-1
229	51.3021	COMB8_LS_025EQ2	Combination	Min	-25.008	0.147	10.546	-0.3459	-181.3219	-8.5508	229-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
213	0.	COMB8_LS_025EQ2	Max	213-1	0.
213	10.	COMB8_LS_025EQ2	Max	213-1	10.
213	20.	COMB8_LS_025EQ2	Max	213-1	20.
213	0.	COMB8_LS_025EQ2	Min	213-1	0.
213	10.	COMB8_LS_025EQ2	Min	213-1	10.
213	20.	COMB8_LS_025EQ2	Min	213-1	20.
214	0.	COMB8_LS_025EQ2	Max	214-1	0.
214	25.5625	COMB8_LS_025EQ2	Max	214-1	25.5625
214	51.125	COMB8_LS_025EQ2	Max	214-1	51.125

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
214	0.	COMB8_LS_025EQ2	Min	214-1	0.
214	25.5625	COMB8_LS_025EQ2	Min	214-1	25.5625
214	51.125	COMB8_LS_025EQ2	Min	214-1	51.125
218	0.	COMB8_LS_025EQ2	Max	218-1	0.
218	10.	COMB8_LS_025EQ2	Max	218-1	10.
218	20.	COMB8_LS_025EQ2	Max	218-1	20.
218	0.	COMB8_LS_025EQ2	Min	218-1	0.
218	10.	COMB8_LS_025EQ2	Min	218-1	10.
218	20.	COMB8_LS_025EQ2	Min	218-1	20.
219	0.	COMB8_LS_025EQ2	Max	219-1	0.
219	25.5625	COMB8_LS_025EQ2	Max	219-1	25.5625
219	51.125	COMB8_LS_025EQ2	Max	219-1	51.125
219	0.	COMB8_LS_025EQ2	Min	219-1	0.
219	25.5625	COMB8_LS_025EQ2	Min	219-1	25.5625
219	51.125	COMB8_LS_025EQ2	Min	219-1	51.125
223	0.	COMB8_LS_025EQ2	Max	223-1	0.
223	10.0346	COMB8_LS_025EQ2	Max	223-1	10.0346
223	20.0693	COMB8_LS_025EQ2	Max	223-1	20.0693
223	0.	COMB8_LS_025EQ2	Min	223-1	0.
223	10.0346	COMB8_LS_025EQ2	Min	223-1	10.0346
223	20.0693	COMB8_LS_025EQ2	Min	223-1	20.0693

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
224	0.	COMB8_LS_025EQ2	Max	224-1	0.
224	25.651	COMB8_LS_025EQ2	Max	224-1	25.651
224	51.3021	COMB8_LS_025EQ2	Max	224-1	51.3021
224	0.	COMB8_LS_025EQ2	Min	224-1	0.
224	25.651	COMB8_LS_025EQ2	Min	224-1	25.651
224	51.3021	COMB8_LS_025EQ2	Min	224-1	51.3021
228	0.	COMB8_LS_025EQ2	Max	228-1	0.
228	10.0346	COMB8_LS_025EQ2	Max	228-1	10.0346
228	20.0693	COMB8_LS_025EQ2	Max	228-1	20.0693
228	0.	COMB8_LS_025EQ2	Min	228-1	0.
228	10.0346	COMB8_LS_025EQ2	Min	228-1	10.0346
228	20.0693	COMB8_LS_025EQ2	Min	228-1	20.0693
229	0.	COMB8_LS_025EQ2	Max	229-1	0.
229	25.651	COMB8_LS_025EQ2	Max	229-1	25.651
229	51.3021	COMB8_LS_025EQ2	Max	229-1	51.3021
229	0.	COMB8_LS_025EQ2	Min	229-1	0.
229	25.651	COMB8_LS_025EQ2	Min	229-1	25.651
229	51.3021	COMB8_LS_025EQ2	Min	229-1	51.3021

Trestle bent 4 piles: lateral spreading + 0.25EQ+dead

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
233	0.	COMB8_LS_025EQ2	Combination	Max	-24.27	0.017	2.081	0.1374	28.6804	0.7946	233-1
233	10.	COMB8_LS_025EQ2	Combination	Max	-24.978	0.017	2.081	0.1374	9.263	0.8161	233-1
233	20.	COMB8_LS_025EQ2	Combination	Max	-25.685	0.017	2.081	0.1374	-10.1541	0.8974	233-1
233	0.	COMB8_LS_025EQ2	Combination	Min	-33.763	-0.029	1.942	-0.0994	22.4877	-1.0299	233-1
233	10.	COMB8_LS_025EQ2	Combination	Min	-34.47	-0.029	1.942	-0.0994	1.6837	-0.9323	233-1
233	20.	COMB8_LS_025EQ2	Combination	Min	-35.178	-0.029	1.942	-0.0994	-19.1207	-0.8944	233-1
234	0.	COMB8_LS_025EQ2	Combination	Max	-25.684	0.055	2.139	0.1374	-10.1541	0.8974	234-1
234	8.5	COMB8_LS_025EQ2	Combination	Max	-26.286	0.055	2.139	0.1374	-28.3348	0.5548	234-1
234	17.	COMB8_LS_025EQ2	Combination	Max	-26.888	0.055	2.139	0.1374	-46.5155	0.5993	234-1
234	0.	COMB8_LS_025EQ2	Combination	Min	-35.179	-0.067	1.883	-0.0994	-19.1207	-0.8944	234-1
234	8.5	COMB8_LS_025EQ2	Combination	Min	-35.78	-0.067	1.883	-0.0994	-35.1282	-0.4505	234-1
234	17.	COMB8_LS_025EQ2	Combination	Min	-36.382	-0.067	1.883	-0.0994	-51.1357	-0.3937	234-1
235	0.	COMB8_LS_025EQ2	Combination	Max	-26.886	0.109	2.341	0.1374	-46.5155	0.5993	235-1
235	19.5	COMB8_LS_025EQ2	Combination	Max	-28.266	0.109	-4.972	0.1374	-12.6291	2.647	235-1
235	39.	COMB8_LS_025EQ2	Combination	Max	-29.646	0.109	-9.284	0.1374	156.4709	4.9908	235-1
235	0.	COMB8_LS_025EQ2	Combination	Min	-36.383	-0.121	1.682	-0.0994	-51.1357	-0.3937	235-1
235	19.5	COMB8_LS_025EQ2	Combination	Min	-37.763	-0.121	-5.631	-0.0994	-20.8601	-2.209	235-1
235	39.	COMB8_LS_025EQ2	Combination	Min	-39.143	-0.121	-9.943	-0.0994	135.3893	-4.3203	235-1
238	0.	COMB8_LS_025EQ2	Combination	Max	-23.366	0.018	2.08	0.1402	28.6956	0.8289	238-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
238	10.	COMB8_LS_025EQ2	Combination	Max	-24.073	0.018	2.08	0.1402	9.2665	0.844	238-1
238	20.	COMB8_LS_025EQ2	Combination	Max	-24.781	0.018	2.08	0.1402	-10.1623	0.9187	238-1
238	0.	COMB8_LS_025EQ2	Combination	Min	-32.884	-0.028	1.943	-0.099	22.512	-0.9959	238-1
238	10.	COMB8_LS_025EQ2	Combination	Min	-33.592	-0.028	1.943	-0.099	1.71	-0.9048	238-1
238	20.	COMB8_LS_025EQ2	Combination	Min	-34.299	-0.028	1.943	-0.099	-19.0923	-0.8734	238-1
239	0.	COMB8_LS_025EQ2	Combination	Max	-24.78	0.056	2.139	0.1402	-10.1623	0.9187	239-1
239	8.5	COMB8_LS_025EQ2	Combination	Max	-25.381	0.056	2.139	0.1402	-28.3432	0.5704	239-1
239	17.	COMB8_LS_025EQ2	Combination	Max	-25.983	0.056	2.139	0.1402	-46.5239	0.6092	239-1
239	0.	COMB8_LS_025EQ2	Combination	Min	-34.3	-0.067	1.884	-0.099	-19.0923	-0.8734	239-1
239	8.5	COMB8_LS_025EQ2	Combination	Min	-34.902	-0.067	1.884	-0.099	-35.1079	-0.4349	239-1
239	17.	COMB8_LS_025EQ2	Combination	Min	-35.503	-0.067	1.884	-0.099	-51.1236	-0.3835	239-1
240	0.	COMB8_LS_025EQ2	Combination	Max	-25.982	0.11	2.339	0.1402	-46.5239	0.6092	240-1
240	19.5	COMB8_LS_025EQ2	Combination	Max	-27.362	0.11	-4.973	0.1402	-12.6581	2.6444	240-1
240	39.	COMB8_LS_025EQ2	Combination	Max	-28.742	0.11	-9.286	0.1402	156.4008	4.9756	240-1
240	0.	COMB8_LS_025EQ2	Combination	Min	-35.504	-0.121	1.684	-0.099	-51.1236	-0.3835	240-1
240	19.5	COMB8_LS_025EQ2	Combination	Min	-36.884	-0.121	-5.629	-0.099	-20.8464	-2.2117	240-1
240	39.	COMB8_LS_025EQ2	Combination	Min	-38.264	-0.121	-9.941	-0.099	135.4252	-4.3359	240-1
243	0.	COMB8_LS_025EQ2	Combination	Max	-25.45	-0.156	2.184	0.1751	33.8306	0.4831	243-1
243	10.0346	COMB8_LS_025EQ2	Combination	Max	-26.158	-0.097	2.184	0.1751	13.2976	1.9667	243-1
243	20.0693	COMB8_LS_025EQ2	Combination	Max	-26.866	-0.038	2.184	0.1751	-7.2349	2.9275	243-1
243	0.	COMB8_LS_025EQ2	Combination	Min	-28.664	-0.208	2.046	-0.0545	27.3799	-1.528	243-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
243	10.0346	COMB8_LS_025EQ2	Combination	Min	-29.372	-0.149	2.046	-0.0545	5.4675	0.0422	243-1
243	20.0693	COMB8_LS_025EQ2	Combination	Min	-30.08	-0.09	2.046	-0.0545	-16.4454	0.9521	243-1
244	0.	COMB8_LS_025EQ2	Combination	Max	-26.865	-1.028E-03	2.244	0.175	-7.2349	2.9275	244-1
244	8.5294	COMB8_LS_025EQ2	Combination	Max	-27.467	0.049	2.244	0.175	-26.3714	2.8563	244-1
244	17.0589	COMB8_LS_025EQ2	Combination	Max	-28.068	0.099	2.244	0.175	-45.5077	2.7085	244-1
244	0.	COMB8_LS_025EQ2	Combination	Min	-30.08	-0.127	1.986	-0.0546	-16.4454	0.9521	244-1
244	8.5294	COMB8_LS_025EQ2	Combination	Min	-30.682	-0.077	1.986	-0.0546	-33.3876	1.6862	244-1
244	17.0589	COMB8_LS_025EQ2	Combination	Min	-31.283	-0.027	1.986	-0.0546	-50.3299	1.6421	244-1
245	0.	COMB8_LS_025EQ2	Combination	Max	-28.068	0.155	2.446	0.1757	-45.5077	2.7085	245-1
245	19.5675	COMB8_LS_025EQ2	Combination	Max	-29.448	0.27	-4.891	0.1757	-13.435	2.7655	245-1
245	39.1351	COMB8_LS_025EQ2	Combination	Max	-30.828	0.385	-9.179	0.1757	154.6341	0.9643	245-1
245	0.	COMB8_LS_025EQ2	Combination	Min	-31.283	-0.082	1.783	-0.054	-50.3299	1.6421	245-1
245	19.5675	COMB8_LS_025EQ2	Combination	Min	-32.663	0.033	-5.554	-0.054	-21.5878	-2.1005	245-1
245	39.1351	COMB8_LS_025EQ2	Combination	Min	-34.043	0.148	-9.842	-0.054	133.507	-8.4839	245-1
248	0.	COMB8_LS_025EQ2	Combination	Max	-25.093	-0.144	-2.043	0.1056	-27.2645	0.7022	248-1
248	10.0346	COMB8_LS_025EQ2	Combination	Max	-25.801	-0.085	-2.043	0.1056	-5.3498	2.0699	248-1
248	20.0693	COMB8_LS_025EQ2	Combination	Max	-26.509	-0.026	-2.043	0.1056	16.5652	2.9155	248-1
248	0.	COMB8_LS_025EQ2	Combination	Min	-28.37	-0.196	-2.184	-0.1473	-33.8258	-1.3076	248-1
248	10.0346	COMB8_LS_025EQ2	Combination	Min	-29.078	-0.137	-2.184	-0.1473	-13.3244	0.1464	248-1
248	20.0693	COMB8_LS_025EQ2	Combination	Min	-29.785	-0.078	-2.184	-0.1473	7.1767	0.9395	248-1
249	0.	COMB8_LS_025EQ2	Combination	Max	-26.508	0.011	-1.983	0.1057	16.5652	2.9155	249-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
249	8.5294	COMB8_LS_025EQ2	Combination	Max	-27.11	0.061	-1.983	0.1057	33.4761	2.7469	249-1
249	17.0589	COMB8_LS_025EQ2	Combination	Max	-27.711	0.111	-1.983	0.1057	50.3872	2.5017	249-1
249	0.	COMB8_LS_025EQ2	Combination	Min	-29.786	-0.115	-2.244	-0.1472	7.1767	0.9395	249-1
249	8.5294	COMB8_LS_025EQ2	Combination	Min	-30.387	-0.065	-2.244	-0.1472	26.3193	1.5736	249-1
249	17.0589	COMB8_LS_025EQ2	Combination	Min	-30.989	-0.015	-2.244	-0.1472	45.4619	1.4297	249-1
250	0.	COMB8_LS_025EQ2	Combination	Max	-27.711	0.167	-1.776	0.105	50.3872	2.5017	250-1
250	19.5675	COMB8_LS_025EQ2	Combination	Max	-29.091	0.282	5.562	0.105	21.6351	2.3295	250-1
250	39.1351	COMB8_LS_025EQ2	Combination	Max	-30.471	0.397	9.849	0.105	-133.3666	0.302	250-1
250	0.	COMB8_LS_025EQ2	Combination	Min	-30.989	-0.07	-2.451	-0.1478	45.4619	1.4297	250-1
250	19.5675	COMB8_LS_025EQ2	Combination	Min	-32.369	0.045	4.887	-0.1478	13.3419	-2.5362	250-1
250	39.1351	COMB8_LS_025EQ2	Combination	Min	-33.749	0.16	9.174	-0.1478	-154.8777	-9.1456	250-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
233	0.	COMB8_LS_025EQ2	Max	233-1	0.
233	10.	COMB8_LS_025EQ2	Max	233-1	10.
233	20.	COMB8_LS_025EQ2	Max	233-1	20.
233	0.	COMB8_LS_025EQ2	Min	233-1	0.
233	10.	COMB8_LS_025EQ2	Min	233-1	10.
233	20.	COMB8_LS_025EQ2	Min	233-1	20.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
234	0.	COMB8_LS_025EQ2	Max	234-1	0.
234	8.5	COMB8_LS_025EQ2	Max	234-1	8.5
234	17.	COMB8_LS_025EQ2	Max	234-1	17.
234	0.	COMB8_LS_025EQ2	Min	234-1	0.
234	8.5	COMB8_LS_025EQ2	Min	234-1	8.5
234	17.	COMB8_LS_025EQ2	Min	234-1	17.
235	0.	COMB8_LS_025EQ2	Max	235-1	0.
235	19.5	COMB8_LS_025EQ2	Max	235-1	19.5
235	39.	COMB8_LS_025EQ2	Max	235-1	39.
235	0.	COMB8_LS_025EQ2	Min	235-1	0.
235	19.5	COMB8_LS_025EQ2	Min	235-1	19.5
235	39.	COMB8_LS_025EQ2	Min	235-1	39.
238	0.	COMB8_LS_025EQ2	Max	238-1	0.
238	10.	COMB8_LS_025EQ2	Max	238-1	10.
238	20.	COMB8_LS_025EQ2	Max	238-1	20.
238	0.	COMB8_LS_025EQ2	Min	238-1	0.
238	10.	COMB8_LS_025EQ2	Min	238-1	10.
238	20.	COMB8_LS_025EQ2	Min	238-1	20.
239	0.	COMB8_LS_025EQ2	Max	239-1	0.
239	8.5	COMB8_LS_025EQ2	Max	239-1	8.5
239	17.	COMB8_LS_025EQ2	Max	239-1	17.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
239	0.	COMB8_LS_025EQ2	Min	239-1	0.
239	8.5	COMB8_LS_025EQ2	Min	239-1	8.5
239	17.	COMB8_LS_025EQ2	Min	239-1	17.
240	0.	COMB8_LS_025EQ2	Max	240-1	0.
240	19.5	COMB8_LS_025EQ2	Max	240-1	19.5
240	39.	COMB8_LS_025EQ2	Max	240-1	39.
240	0.	COMB8_LS_025EQ2	Min	240-1	0.
240	19.5	COMB8_LS_025EQ2	Min	240-1	19.5
240	39.	COMB8_LS_025EQ2	Min	240-1	39.
243	0.	COMB8_LS_025EQ2	Max	243-1	0.
243	10.0346	COMB8_LS_025EQ2	Max	243-1	10.0346
243	20.0693	COMB8_LS_025EQ2	Max	243-1	20.0693
243	0.	COMB8_LS_025EQ2	Min	243-1	0.
243	10.0346	COMB8_LS_025EQ2	Min	243-1	10.0346
243	20.0693	COMB8_LS_025EQ2	Min	243-1	20.0693
244	0.	COMB8_LS_025EQ2	Max	244-1	0.
244	8.5294	COMB8_LS_025EQ2	Max	244-1	8.5294
244	17.0589	COMB8_LS_025EQ2	Max	244-1	17.0589
244	0.	COMB8_LS_025EQ2	Min	244-1	0.
244	8.5294	COMB8_LS_025EQ2	Min	244-1	8.5294
244	17.0589	COMB8_LS_025EQ2	Min	244-1	17.0589

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
245	0.	COMB8_LS_025EQ2	Max	245-1	0.
245	19.5675	COMB8_LS_025EQ2	Max	245-1	19.5675
245	39.1351	COMB8_LS_025EQ2	Max	245-1	39.1351
245	0.	COMB8_LS_025EQ2	Min	245-1	0.
245	19.5675	COMB8_LS_025EQ2	Min	245-1	19.5675
245	39.1351	COMB8_LS_025EQ2	Min	245-1	39.1351
248	0.	COMB8_LS_025EQ2	Max	248-1	0.
248	10.0346	COMB8_LS_025EQ2	Max	248-1	10.0346
248	20.0693	COMB8_LS_025EQ2	Max	248-1	20.0693
248	0.	COMB8_LS_025EQ2	Min	248-1	0.
248	10.0346	COMB8_LS_025EQ2	Min	248-1	10.0346
248	20.0693	COMB8_LS_025EQ2	Min	248-1	20.0693
249	0.	COMB8_LS_025EQ2	Max	249-1	0.
249	8.5294	COMB8_LS_025EQ2	Max	249-1	8.5294
249	17.0589	COMB8_LS_025EQ2	Max	249-1	17.0589
249	0.	COMB8_LS_025EQ2	Min	249-1	0.
249	8.5294	COMB8_LS_025EQ2	Min	249-1	8.5294
249	17.0589	COMB8_LS_025EQ2	Min	249-1	17.0589
250	0.	COMB8_LS_025EQ2	Max	250-1	0.
250	19.5675	COMB8_LS_025EQ2	Max	250-1	19.5675
250	39.1351	COMB8_LS_025EQ2	Max	250-1	39.1351

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
250	0.	COMB8_LS_025EQ2	Min	250-1	0.
250	19.5675	COMB8_LS_025EQ2	Min	250-1	19.5675
250	39.1351	COMB8_LS_025EQ2	Min	250-1	39.1351

Trestle bent 5 piles: lateral spreading + 0.25EQ + dead

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
253	0.	COMB8_LS_025EQ2	Combination	Max	-29.904	0.019	0.286	0.0752	1.1557	1.3393	253-1
253	10.	COMB8_LS_025EQ2	Combination	Max	-30.612	0.019	0.286	0.0752	-0.5729	1.1911	253-1
253	20.	COMB8_LS_025EQ2	Combination	Max	-31.319	0.019	0.286	0.0752	-2.3014	1.0578	253-1
253	0.	COMB8_LS_025EQ2	Combination	Min	-38.691	-9.506E-03	0.173	-0.2721	-3.6748	-0.443	253-1
253	10.	COMB8_LS_025EQ2	Combination	Min	-39.399	-9.506E-03	0.173	-0.2721	-6.533	-0.3907	253-1
253	20.	COMB8_LS_025EQ2	Combination	Min	-40.107	-9.506E-03	0.173	-0.2721	-9.3913	-0.3534	253-1
254	0.	COMB8_LS_025EQ2	Combination	Max	-31.318	0.085	0.427	0.0752	-2.3014	1.0578	254-1
254	15.5	COMB8_LS_025EQ2	Combination	Max	-32.415	0.085	0.427	0.0752	-8.9223	0.851	254-1
254	31.	COMB8_LS_025EQ2	Combination	Max	-33.512	0.085	0.427	0.0752	-10.3675	2.0137	254-1
254	0.	COMB8_LS_025EQ2	Combination	Min	-40.108	-0.076	0.031	-0.2721	-9.3913	-0.3534	254-1
254	15.5	COMB8_LS_025EQ2	Combination	Min	-41.205	-0.076	0.031	-0.2721	-9.8798	-0.2954	254-1
254	31.	COMB8_LS_025EQ2	Combination	Min	-42.302	-0.076	0.031	-0.2721	-15.5442	-1.6067	254-1
255	0.	COMB8_LS_025EQ2	Combination	Max	-33.511	0.103	0.5	0.0752	-10.3675	2.0137	255-1
255	8.5	COMB8_LS_025EQ2	Combination	Max	-34.113	0.103	-2.688	0.0752	3.5275	2.8058	255-1
255	17.	COMB8_LS_025EQ2	Combination	Max	-34.714	0.103	-5.875	0.0752	44.5163	3.6	255-1
255	0.	COMB8_LS_025EQ2	Combination	Min	-42.302	-0.094	-0.041	-0.2721	-15.5442	-1.6067	255-1
255	8.5	COMB8_LS_025EQ2	Combination	Min	-42.904	-0.094	-3.228	-0.2721	-6.2442	-2.4804	255-1
255	17.	COMB8_LS_025EQ2	Combination	Min	-43.505	-0.094	-6.416	-0.2721	30.1495	-3.3562	255-1
256	0.	COMB8_LS_025EQ2	Combination	Max	-34.714	0.104	-5.872	0.0752	44.5163	3.6	256-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
256	3.5	COMB8_LS_025EQ2	Combination	Max	-34.962	0.104	-5.872	0.0752	66.9854	3.9305	256-1
256	7.	COMB8_LS_025EQ2	Combination	Max	-35.21	0.104	-5.872	0.0752	89.4546	4.261	256-1
256	0.	COMB8_LS_025EQ2	Combination	Min	-43.505	-0.095	-6.42	-0.2721	30.1495	-3.3562	256-1
256	3.5	COMB8_LS_025EQ2	Combination	Min	-43.753	-0.095	-6.42	-0.2721	50.7	-3.7202	256-1
256	7.	COMB8_LS_025EQ2	Combination	Min	-44.	-0.095	-6.42	-0.2721	71.2505	-4.0844	256-1
258	0.	COMB8_LS_025EQ2	Combination	Max	-29.022	-3.146E-03	0.285	0.2583	1.1589	0.2258	258-1
258	10.	COMB8_LS_025EQ2	Combination	Max	-29.729	-3.146E-03	0.285	0.2583	-0.5758	0.3	258-1
258	20.	COMB8_LS_025EQ2	Combination	Max	-30.437	-3.146E-03	0.285	0.2583	-2.3103	0.389	258-1
258	0.	COMB8_LS_025EQ2	Combination	Min	-37.755	-0.032	0.173	-0.0586	-3.6789	-1.5578	258-1
258	10.	COMB8_LS_025EQ2	Combination	Min	-38.463	-0.032	0.173	-0.0586	-6.5308	-1.2826	258-1
258	20.	COMB8_LS_025EQ2	Combination	Min	-39.17	-0.032	0.173	-0.0586	-9.383	-1.0223	258-1
259	0.	COMB8_LS_025EQ2	Combination	Max	-30.436	0.063	0.427	0.2583	-2.3103	0.389	259-1
259	15.5	COMB8_LS_025EQ2	Combination	Max	-31.533	0.063	0.427	0.2583	-8.9211	0.5269	259-1
259	31.	COMB8_LS_025EQ2	Combination	Max	-32.63	0.063	0.427	0.2583	-10.3788	2.035	259-1
259	0.	COMB8_LS_025EQ2	Combination	Min	-39.172	-0.098	0.032	-0.0586	-9.383	-1.0223	259-1
259	15.5	COMB8_LS_025EQ2	Combination	Min	-40.269	-0.098	0.032	-0.0586	-9.8816	-0.6187	259-1
259	31.	COMB8_LS_025EQ2	Combination	Min	-41.365	-0.098	0.032	-0.0586	-15.5332	-1.5854	259-1
260	0.	COMB8_LS_025EQ2	Combination	Max	-32.629	0.081	0.499	0.2583	-10.3788	2.035	260-1
260	8.5	COMB8_LS_025EQ2	Combination	Max	-33.231	0.081	-2.689	0.2583	3.508	3.0165	260-1
260	17.	COMB8_LS_025EQ2	Combination	Max	-33.832	0.081	-5.876	0.2583	44.4885	4.0001	260-1
260	0.	COMB8_LS_025EQ2	Combination	Min	-41.366	-0.116	-0.04	-0.0586	-15.5332	-1.5854	260-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
260	8.5	COMB8_LS_025EQ2	Combination	Min	-41.967	-0.116	-3.227	-0.0586	-6.2249	-2.2699	260-1
260	17.	COMB8_LS_025EQ2	Combination	Min	-42.569	-0.116	-6.415	-0.0586	30.1772	-2.9566	260-1
261	0.	COMB8_LS_025EQ2	Combination	Max	-33.832	0.082	-5.873	0.2583	44.4885	4.0001	261-1
261	3.5	COMB8_LS_025EQ2	Combination	Max	-34.08	0.082	-5.873	0.2583	66.9542	4.4085	261-1
261	7.	COMB8_LS_025EQ2	Combination	Max	-34.327	0.082	-5.873	0.2583	89.4199	4.817	261-1
261	0.	COMB8_LS_025EQ2	Combination	Min	-42.569	-0.117	-6.419	-0.0586	30.1772	-2.9566	261-1
261	3.5	COMB8_LS_025EQ2	Combination	Min	-42.817	-0.117	-6.419	-0.0586	50.7311	-3.2427	261-1
261	7.	COMB8_LS_025EQ2	Combination	Min	-43.064	-0.117	-6.419	-0.0586	71.2851	-3.529	261-1
263	0.	COMB8_LS_025EQ2	Combination	Max	-8.129	-0.173	0.298	0.2598	2.4687	0.0678	263-1
263	10.0346	COMB8_LS_025EQ2	Combination	Max	-8.837	-0.114	0.298	0.2598	0.4475	1.5496	263-1
263	20.0693	COMB8_LS_025EQ2	Combination	Max	-9.545	-0.055	0.298	0.2598	-1.5549	2.4542	263-1
263	0.	COMB8_LS_025EQ2	Combination	Min	-12.302	-0.203	0.194	-0.0748	-3.756	-1.8867	263-1
263	10.0346	COMB8_LS_025EQ2	Combination	Min	-13.01	-0.144	0.194	-0.0748	-6.6706	-0.1868	263-1
263	20.0693	COMB8_LS_025EQ2	Combination	Min	-13.717	-0.085	0.194	-0.0748	-9.6041	0.9073	263-1
264	0.	COMB8_LS_025EQ2	Combination	Max	-9.544	0.012	0.456	0.26	-1.5549	2.4542	264-1
264	15.5537	COMB8_LS_025EQ2	Combination	Max	-10.641	0.104	0.456	0.26	-8.6206	2.5915	264-1
264	31.1074	COMB8_LS_025EQ2	Combination	Max	-11.738	0.195	0.456	0.26	-10.6879	2.8113	264-1
264	0.	COMB8_LS_025EQ2	Combination	Min	-13.718	-0.152	0.035	-0.0746	-9.6041	0.9073	264-1
264	15.5537	COMB8_LS_025EQ2	Combination	Min	-14.815	-0.061	0.035	-0.0746	-10.189	1.5215	264-1
264	31.1074	COMB8_LS_025EQ2	Combination	Min	-15.912	0.031	0.035	-0.0746	-15.7722	-0.7899	264-1
265	0.	COMB8_LS_025EQ2	Combination	Max	-11.738	0.213	0.532	0.2596	-10.6879	2.8113	265-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
265	8.5294	COMB8_LS_025EQ2	Combination	Max	-12.339	0.263	-2.667	0.2596	3.287	2.4908	265-1
265	17.0589	COMB8_LS_025EQ2	Combination	Max	-12.941	0.313	-5.866	0.2596	44.5464	1.7451	265-1
265	0.	COMB8_LS_025EQ2	Combination	Min	-15.912	0.012	-0.04	-0.075	-15.7722	-0.7899	265-1
265	8.5294	COMB8_LS_025EQ2	Combination	Min	-16.513	0.062	-3.238	-0.075	-6.6609	-2.8166	265-1
265	17.0589	COMB8_LS_025EQ2	Combination	Min	-17.115	0.112	-6.437	-0.075	29.7294	-5.2728	265-1
266	0.	COMB8_LS_025EQ2	Combination	Max	-12.941	0.313	-5.862	0.2625	44.5464	1.7451	266-1
266	3.5121	COMB8_LS_025EQ2	Combination	Max	-13.188	0.334	-5.862	0.2625	67.1664	1.3221	266-1
266	7.0242	COMB8_LS_025EQ2	Combination	Max	-13.436	0.354	-5.862	0.2625	89.7864	0.8269	266-1
266	0.	COMB8_LS_025EQ2	Combination	Min	-17.115	0.11	-6.441	-0.072	29.7294	-5.2728	266-1
266	3.5121	COMB8_LS_025EQ2	Combination	Min	-17.363	0.131	-6.441	-0.072	50.3162	-6.4082	266-1
266	7.0242	COMB8_LS_025EQ2	Combination	Min	-17.61	0.151	-6.441	-0.072	70.9029	-7.6162	266-1
268	0.	COMB8_LS_025EQ2	Combination	Max	-7.246	-0.16	-0.188	0.1106	4.0734	0.2964	268-1
268	10.0346	COMB8_LS_025EQ2	Combination	Max	-7.954	-0.101	-0.188	0.1106	6.947	1.6504	268-1
268	20.0693	COMB8_LS_025EQ2	Combination	Max	-8.661	-0.042	-0.188	0.1106	9.8397	2.4272	268-1
268	0.	COMB8_LS_025EQ2	Combination	Min	-11.523	-0.19	-0.294	-0.2996	-2.3189	-1.656	268-1
268	10.0346	COMB8_LS_025EQ2	Combination	Min	-12.231	-0.131	-0.294	-0.2996	-0.3503	-0.0857	268-1
268	20.0693	COMB8_LS_025EQ2	Combination	Min	-12.939	-0.072	-0.294	-0.2996	1.5992	0.8787	268-1
269	0.	COMB8_LS_025EQ2	Combination	Max	-8.661	0.025	-0.027	0.1104	9.8397	2.4272	269-1
269	15.5537	COMB8_LS_025EQ2	Combination	Max	-9.757	0.117	-0.027	0.1104	10.286	2.3653	269-1
269	31.1074	COMB8_LS_025EQ2	Combination	Max	-10.854	0.208	-0.027	0.1104	15.7976	2.385	269-1
269	0.	COMB8_LS_025EQ2	Combination	Min	-12.939	-0.139	-0.456	-0.2997	1.5992	0.8787	269-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
269	15.5537	COMB8_LS_025EQ2	Combination	Min	-14.036	-0.048	-0.456	-0.2997	8.6584	1.2936	269-1
269	31.1074	COMB8_LS_025EQ2	Combination	Min	-15.133	0.044	-0.456	-0.2997	10.6522	-1.2162	269-1
270	0.	COMB8_LS_025EQ2	Combination	Max	-10.854	0.226	0.05	0.1108	15.7976	2.385	270-1
270	8.5294	COMB8_LS_025EQ2	Combination	Max	-11.456	0.276	3.248	0.1108	6.6942	1.9548	270-1
270	17.0589	COMB8_LS_025EQ2	Combination	Max	-12.057	0.326	6.447	0.1108	-29.6884	1.0996	270-1
270	0.	COMB8_LS_025EQ2	Combination	Min	-15.133	0.025	-0.532	-0.2992	10.6522	-1.2162	270-1
270	8.5294	COMB8_LS_025EQ2	Combination	Min	-15.735	0.075	2.666	-0.2992	-3.4102	-3.3522	270-1
270	17.0589	COMB8_LS_025EQ2	Combination	Min	-16.336	0.125	5.865	-0.2992	-44.7569	-5.9178	270-1
271	0.	COMB8_LS_025EQ2	Combination	Max	-12.057	0.326	6.451	0.1075	-29.6884	1.0996	271-1
271	3.5121	COMB8_LS_025EQ2	Combination	Max	-12.305	0.347	6.451	0.1075	-50.2717	0.6313	271-1
271	7.0242	COMB8_LS_025EQ2	Combination	Max	-12.552	0.367	6.451	0.1075	-70.855	0.0908	271-1
271	0.	COMB8_LS_025EQ2	Combination	Min	-16.336	0.123	5.861	-0.3019	-44.7569	-5.9178	271-1
271	3.5121	COMB8_LS_025EQ2	Combination	Min	-16.584	0.143	5.861	-0.3019	-67.4131	-7.0985	271-1
271	7.0242	COMB8_LS_025EQ2	Combination	Min	-16.832	0.164	5.861	-0.3019	-90.0694	-8.3518	271-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
253	0.	COMB8_LS_025EQ2	Max	253-1	0.
253	10.	COMB8_LS_025EQ2	Max	253-1	10.
253	20.	COMB8_LS_025EQ2	Max	253-1	20.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
253	0.	COMB8_LS_025EQ2	Min	253-1	0.
253	10.	COMB8_LS_025EQ2	Min	253-1	10.
253	20.	COMB8_LS_025EQ2	Min	253-1	20.
254	0.	COMB8_LS_025EQ2	Max	254-1	0.
254	15.5	COMB8_LS_025EQ2	Max	254-1	15.5
254	31.	COMB8_LS_025EQ2	Max	254-1	31.
254	0.	COMB8_LS_025EQ2	Min	254-1	0.
254	15.5	COMB8_LS_025EQ2	Min	254-1	15.5
254	31.	COMB8_LS_025EQ2	Min	254-1	31.
255	0.	COMB8_LS_025EQ2	Max	255-1	0.
255	8.5	COMB8_LS_025EQ2	Max	255-1	8.5
255	17.	COMB8_LS_025EQ2	Max	255-1	17.
255	0.	COMB8_LS_025EQ2	Min	255-1	0.
255	8.5	COMB8_LS_025EQ2	Min	255-1	8.5
255	17.	COMB8_LS_025EQ2	Min	255-1	17.
256	0.	COMB8_LS_025EQ2	Max	256-1	0.
256	3.5	COMB8_LS_025EQ2	Max	256-1	3.5
256	7.	COMB8_LS_025EQ2	Max	256-1	7.
256	0.	COMB8_LS_025EQ2	Min	256-1	0.
256	3.5	COMB8_LS_025EQ2	Min	256-1	3.5
256	7.	COMB8_LS_025EQ2	Min	256-1	7.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
258	0.	COMB8_LS_025EQ2	Max	258-1	0.
258	10.	COMB8_LS_025EQ2	Max	258-1	10.
258	20.	COMB8_LS_025EQ2	Max	258-1	20.
258	0.	COMB8_LS_025EQ2	Min	258-1	0.
258	10.	COMB8_LS_025EQ2	Min	258-1	10.
258	20.	COMB8_LS_025EQ2	Min	258-1	20.
259	0.	COMB8_LS_025EQ2	Max	259-1	0.
259	15.5	COMB8_LS_025EQ2	Max	259-1	15.5
259	31.	COMB8_LS_025EQ2	Max	259-1	31.
259	0.	COMB8_LS_025EQ2	Min	259-1	0.
259	15.5	COMB8_LS_025EQ2	Min	259-1	15.5
259	31.	COMB8_LS_025EQ2	Min	259-1	31.
260	0.	COMB8_LS_025EQ2	Max	260-1	0.
260	8.5	COMB8_LS_025EQ2	Max	260-1	8.5
260	17.	COMB8_LS_025EQ2	Max	260-1	17.
260	0.	COMB8_LS_025EQ2	Min	260-1	0.
260	8.5	COMB8_LS_025EQ2	Min	260-1	8.5
260	17.	COMB8_LS_025EQ2	Min	260-1	17.
261	0.	COMB8_LS_025EQ2	Max	261-1	0.
261	3.5	COMB8_LS_025EQ2	Max	261-1	3.5
261	7.	COMB8_LS_025EQ2	Max	261-1	7.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
261	0.	COMB8_LS_025EQ2	Min	261-1	0.
261	3.5	COMB8_LS_025EQ2	Min	261-1	3.5
261	7.	COMB8_LS_025EQ2	Min	261-1	7.
263	0.	COMB8_LS_025EQ2	Max	263-1	0.
263	10.0346	COMB8_LS_025EQ2	Max	263-1	10.0346
263	20.0693	COMB8_LS_025EQ2	Max	263-1	20.0693
263	0.	COMB8_LS_025EQ2	Min	263-1	0.
263	10.0346	COMB8_LS_025EQ2	Min	263-1	10.0346
263	20.0693	COMB8_LS_025EQ2	Min	263-1	20.0693
264	0.	COMB8_LS_025EQ2	Max	264-1	0.
264	15.5537	COMB8_LS_025EQ2	Max	264-1	15.5537
264	31.1074	COMB8_LS_025EQ2	Max	264-1	31.1074
264	0.	COMB8_LS_025EQ2	Min	264-1	0.
264	15.5537	COMB8_LS_025EQ2	Min	264-1	15.5537
264	31.1074	COMB8_LS_025EQ2	Min	264-1	31.1074
265	0.	COMB8_LS_025EQ2	Max	265-1	0.
265	8.5294	COMB8_LS_025EQ2	Max	265-1	8.5294
265	17.0589	COMB8_LS_025EQ2	Max	265-1	17.0589
265	0.	COMB8_LS_025EQ2	Min	265-1	0.
265	8.5294	COMB8_LS_025EQ2	Min	265-1	8.5294
265	17.0589	COMB8_LS_025EQ2	Min	265-1	17.0589

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
266	0.	COMB8_LS_025EQ2	Max	266-1	0.
266	3.5121	COMB8_LS_025EQ2	Max	266-1	3.5121
266	7.0242	COMB8_LS_025EQ2	Max	266-1	7.0242
266	0.	COMB8_LS_025EQ2	Min	266-1	0.
266	3.5121	COMB8_LS_025EQ2	Min	266-1	3.5121
266	7.0242	COMB8_LS_025EQ2	Min	266-1	7.0242
268	0.	COMB8_LS_025EQ2	Max	268-1	0.
268	10.0346	COMB8_LS_025EQ2	Max	268-1	10.0346
268	20.0693	COMB8_LS_025EQ2	Max	268-1	20.0693
268	0.	COMB8_LS_025EQ2	Min	268-1	0.
268	10.0346	COMB8_LS_025EQ2	Min	268-1	10.0346
268	20.0693	COMB8_LS_025EQ2	Min	268-1	20.0693
269	0.	COMB8_LS_025EQ2	Max	269-1	0.
269	15.5537	COMB8_LS_025EQ2	Max	269-1	15.5537
269	31.1074	COMB8_LS_025EQ2	Max	269-1	31.1074
269	0.	COMB8_LS_025EQ2	Min	269-1	0.
269	15.5537	COMB8_LS_025EQ2	Min	269-1	15.5537
269	31.1074	COMB8_LS_025EQ2	Min	269-1	31.1074
270	0.	COMB8_LS_025EQ2	Max	270-1	0.
270	8.5294	COMB8_LS_025EQ2	Max	270-1	8.5294
270	17.0589	COMB8_LS_025EQ2	Max	270-1	17.0589

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
270	0.	COMB8_LS_025EQ2	Min	270-1	0.
270	8.5294	COMB8_LS_025EQ2	Min	270-1	8.5294
270	17.0589	COMB8_LS_025EQ2	Min	270-1	17.0589
271	0.	COMB8_LS_025EQ2	Max	271-1	0.
271	3.5121	COMB8_LS_025EQ2	Max	271-1	3.5121
271	7.0242	COMB8_LS_025EQ2	Max	271-1	7.0242
271	0.	COMB8_LS_025EQ2	Min	271-1	0.
271	3.5121	COMB8_LS_025EQ2	Min	271-1	3.5121
271	7.0242	COMB8_LS_025EQ2	Min	271-1	7.0242

TRESTLE PILES - CHECK

Steel Pipe Piles		Trestle bent 1				
Wall thick	0.375	in.	E =	2.90E+07	psi	
L =	50	ft	Fy =	50	ksi	
K =	0.65					
corrosion	0.0625	in., at OD				
Pile size(OD)	18	18	18	18	14	18
at corrosion	17.875	17.875	17.875	17.875	13.875	17.875
I.D.	17.25	17.25	17.25	17.25	13.25	17.25
I	664.97	664.97	664.97	664.97	306.31	664.97
EI	1.93E+10	1.93E+10	1.93E+10	1.93E+10	8.88E+09	1.93E+10
r	6.21	6.21	6.21	6.21	4.80	6.21
P_{cr} ,kips	1251.33	1251.33	1251.33	1251.33	576.40	1251.33
P, kips	517.26	517.26	517.26	517.26	399.45	517.26
A, in^2	17.24	17.24	17.24	17.24	13.31	17.24
AE, kips	500016.38	500016.38	500016.38	500016.38	386133.64	500016.38
KL/r =	62.80	62.80	62.80	62.80	81.31	62.80
Cc =	107.00	107.00	107.00	107.00	107.00	107.00
Fa =	22.23	22.23	22.23	22.23	18.75	22.23
P_{allow} =	383.36	383.36	383.36	383.36	249.64	383.36
S (in^3)	74	74	74	74	44	74
M_{ult} = (k-ft)	310	310	310	310	184	310
(kN-m)	420	420	420	420	249	420
(ton-m)	43	43	43	43	25	43
0.66M_{ult} = (k-ft)	204.6065964	204.6065964	204.6065964	204.6065964	121.4188067	204.6065964
(kN-m)	277	277	277	277	165	277
(ton-m)	28	28	28	28	17	28
0.6M_{ult} = (k-ft)	186.0059968	186.0059968	186.0059968	186.0059968	110.3807334	186.0059968
(kN-m)	252	252	252	252	150	252
(ton-m)	26	26	26	26	15	26
Structural check						18"OD+14"OD
ϕc	0.90	0.90	0.90	0.90	0.90	0.90
ϕb	0.90	0.90	0.90	0.90	0.90	0.90
Pn, kips	383.36	383.36	383.36	383.36	249.64	633.00
Mnx, kip-ft	310.01	310.01	310.01	310.01	183.97	493.98
Mny, kip-ft	310.01	310.01	310.01	310.01	183.97	493.98
Pc=ϕcPn, kips	345.02	345.02	345.02	345.02	224.68	569.70
Mcx=ϕbMnx, k-ft	279.01	279.01	279.01	279.01	165.57	444.58
Mcy=ϕbMny, k-ft	279.01	279.01	279.01	279.01	165.57	444.58
Pr, kips	26.50	27.30	38.70	38.00		27.30
Mrx, k-ft	4.30	4.40	2.70	6.10		4.40
Mry, k-ft	282.80	282.80	274.90	275.00		282.80
Pr/Pc	0.08	0.08	0.11	0.11	0.00	0.05
combined chk	1.07	1.07	1.05	1.06	0.00	0.67

Bent 1, #123 Bent 1, #130 Bent 1, #135 Bent 1, #188

Steel Pipe Piles		Trestle bent 2 to 5				
Wall thick	0.375	in.	E =	2.90E+07	psi	
L =	70	ft	Fy =	50	ksi	
K =	0.65					
corrosion	0.0625	in., at OD				
Pile size(OD)	18	18	18	18	18	18
at corrosion	17.875	17.875	17.875	17.875	17.875	17.875
I.D.	17.25	17.25	17.25	17.25	17.25	17.25
I	664.97	664.97	664.97	664.97	664.97	664.97
EI	1.93E+10	1.93E+10	1.93E+10	1.93E+10	1.93E+10	1.93E+10
r	6.21	6.21	6.21	6.21	6.21	6.21
P_{cr} ,kips	638.43	638.43	638.43	638.43	638.43	638.43
P, kips	517.26	517.26	517.26	517.26	517.26	517.26
A, in^2	17.24	17.24	17.24	17.24	17.24	17.24
AE, kips	500016.38	500016.38	500016.38	500016.38	500016.38	500016.38
KL/r =	87.92	87.92	87.92	87.92	87.92	87.92
Cc =	107.00	107.00	107.00	107.00	107.00	107.00
Fa =	17.38	17.38	17.38	17.38	17.38	17.38
P_{allow} =	299.70	299.70	299.70	299.70	299.70	299.70
S (in^3)	74	74	74	74	74	74
M_{ult} = (k-ft)	310	310	310	310	310	310
(kN-m)	420	420	420	420	420	420
(ton-m)	43	43	43	43	43	43
$0.66M_{ult}$ = (k-ft)	204.6065964	204.6065964	204.6065964	204.6065964	204.6065964	204.6065964
(kN-m)	277	277	277	277	277	277
(ton-m)	28	28	28	28	28	28
$0.6M_{ult}$ = (k-ft)	186.0059968	186.0059968	186.0059968	186.0059968	186.0059968	186.0059968
(kN-m)	252	252	252	252	252	252
(ton-m)	26	26	26	26	26	26
Structural check						
ϕc	0.90	0.90	0.90	0.90	0.90	0.90
ϕb	0.90	0.90	0.90	0.90	0.90	0.90
Pn, kips	299.70	299.70	299.70	299.70	299.70	299.70
Mnx, kip-ft	310.01	310.01	310.01	310.01	310.01	310.01
Mny, kip-ft	310.01	310.01	310.01	310.01	310.01	310.01
Pc=ϕcPn, kips	269.73	269.73	269.73	269.73	269.73	269.73
Mcx=ϕbMnx, k-ft	279.01	279.01	279.01	279.01	279.01	279.01
Mcy=ϕbMny, k-ft	279.01	279.01	279.01	279.01	279.01	279.01
Pr, kips	40.50	26.50	29.60	16.80		
Mrx, k-ft	5.09	5.00	5.00	8.40		
Mry, k-ft	147.20	182.50	156.40	90.10		
Pr/Pc	0.15	0.10	0.11	0.06	0.00	0.00
combined chk	0.62	0.72	0.63	0.38	0.00	0.00
	Bent 2, #194	Bent 1, #130	Bent 1, #135	Bent 1, #188		

Project	POV Berth 13 and 14 Vancouver	Sheet	of
		Job Number	A130267
Subject	platform piles under lateral spreading & EQ	Designer	G. Sheng
		Date	06/09/16

Attachment - SAP analysis outputs

PLATFORM PILES - SAP OUTPUT

Platform piles under lateral spreading + 25% seismic load

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
273	0.	COMB8_LS_025EQ2	Combination	Max	-43.832	0.031	-0.504	1.291	-174.822	28.623	273-1
273	120.	COMB8_LS_025EQ2	Combination	Max	-44.044	0.031	-0.504	1.291	-111.796	24.927	273-1
273	240.	COMB8_LS_025EQ2	Combination	Max	-44.257	0.031	-0.504	1.291	-48.767	21.251	273-1
273	0.	COMB8_LS_025EQ2	Combination	Min	-56.183	-0.11	-0.526	-2.464	-299.544	-73.659	273-1
273	120.	COMB8_LS_025EQ2	Combination	Min	-56.396	-0.11	-0.526	-2.464	-238.921	-60.452	273-1
273	240.	COMB8_LS_025EQ2	Combination	Min	-56.608	-0.11	-0.526	-2.464	-178.301	-47.265	273-1
278	0.	COMB8_LS_025EQ2	Combination	Max	-48.537	0.093	-0.503	2.272	-179.476	64.694	278-1
278	120.	COMB8_LS_025EQ2	Combination	Max	-48.749	0.093	-0.503	2.272	-115.936	53.503	278-1
278	240.	COMB8_LS_025EQ2	Combination	Max	-48.962	0.093	-0.503	2.272	-52.391	42.316	278-1
278	0.	COMB8_LS_025EQ2	Combination	Min	-54.876	-0.047	-0.531	-1.596	-296.747	-34.621	278-1
278	120.	COMB8_LS_025EQ2	Combination	Min	-55.089	-0.047	-0.531	-1.596	-236.24	-29.017	278-1
278	240.	COMB8_LS_025EQ2	Combination	Min	-55.301	-0.047	-0.531	-1.596	-175.739	-23.416	278-1
283	0.	COMB8_LS_025EQ2	Combination	Max	-58.979	-5.259E-03	-0.494	-0.764	-163.668	9.103	283-1
283	120.	COMB8_LS_025EQ2	Combination	Max	-59.192	-5.259E-03	-0.494	-0.764	-102.591	9.798	283-1
283	240.	COMB8_LS_025EQ2	Combination	Max	-59.404	-5.259E-03	-0.494	-0.764	-41.498	10.525	283-1
283	0.	COMB8_LS_025EQ2	Combination	Min	-122.796	-0.163	-0.514	-4.198	-298.684	-107.38	283-1
283	120.	COMB8_LS_025EQ2	Combination	Min	-123.008	-0.163	-0.514	-4.198	-238.777	-87.856	283-1
283	240.	COMB8_LS_025EQ2	Combination	Min	-123.22	-0.163	-0.514	-4.198	-178.886	-68.363	283-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
288	0.	COMB8_LS_025EQ2	Combination	Max	-65.801	0.142	-0.489	4.059	-168.608	95.688	288-1
288	120.	COMB8_LS_025EQ2	Combination	Max	-66.013	0.142	-0.489	4.059	-107.397	78.616	288-1
288	240.	COMB8_LS_025EQ2	Combination	Max	-66.226	0.142	-0.489	4.059	-46.162	61.551	288-1
288	0.	COMB8_LS_025EQ2	Combination	Min	-113.631	-0.017	-0.515	0.242	-290.501	-18.75	288-1
288	120.	COMB8_LS_025EQ2	Combination	Min	-113.843	-0.017	-0.515	0.242	-231.292	-16.696	288-1
288	240.	COMB8_LS_025EQ2	Combination	Min	-114.056	-0.017	-0.515	0.242	-172.106	-14.648	288-1
293	0.	COMB8_LS_025EQ2	Combination	Max	-11.15	0.109	-0.362	0.932	-104.965	70.7	293-1
293	120.	COMB8_LS_025EQ2	Combination	Max	-11.362	0.109	-0.362	0.932	-56.412	57.661	293-1
293	240.	COMB8_LS_025EQ2	Combination	Max	-11.575	0.109	-0.362	0.932	-7.855	44.651	293-1
293	0.	COMB8_LS_025EQ2	Combination	Min	-15.035	0.036	-0.405	-3.025	-210.41	18.488	293-1
293	120.	COMB8_LS_025EQ2	Combination	Min	-15.247	0.036	-0.405	-3.025	-166.946	14.152	293-1
293	240.	COMB8_LS_025EQ2	Combination	Min	-15.46	0.036	-0.405	-3.025	-123.487	9.787	293-1
298	0.	COMB8_LS_025EQ2	Combination	Max	-11.894	-0.047	-0.369	2.373	-101.277	-22.834	298-1
298	120.	COMB8_LS_025EQ2	Combination	Max	-12.106	-0.047	-0.369	2.373	-53.527	-17.194	298-1
298	240.	COMB8_LS_025EQ2	Combination	Max	-12.318	-0.047	-0.369	2.373	-5.77	-11.528	298-1
298	0.	COMB8_LS_025EQ2	Combination	Min	-13.453	-0.116	-0.399	-1.646	-214.234	-72.409	298-1
298	120.	COMB8_LS_025EQ2	Combination	Min	-13.666	-0.116	-0.399	-1.646	-169.9	-58.506	298-1
298	240.	COMB8_LS_025EQ2	Combination	Min	-13.878	-0.116	-0.399	-1.646	-125.573	-44.628	298-1
303	0.	COMB8_LS_025EQ2	Combination	Max	-24.428	0.033	-0.502	1.288	-170.569	29.358	303-1
303	120.	COMB8_LS_025EQ2	Combination	Max	-24.641	0.033	-0.502	1.288	-108.285	25.43	303-1
303	240.	COMB8_LS_025EQ2	Combination	Max	-24.853	0.033	-0.502	1.288	-45.999	21.523	303-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
303	0.	COMB8_LS_025EQ2	Combination	Min	-41.377	-0.107	-0.52	-2.376	-298.678	-71.533	303-1
303	120.	COMB8_LS_025EQ2	Combination	Min	-41.59	-0.107	-0.52	-2.376	-238.346	-58.732	303-1
303	240.	COMB8_LS_025EQ2	Combination	Min	-41.802	-0.107	-0.52	-2.376	-178.017	-45.952	303-1
308	0.	COMB8_LS_025EQ2	Combination	Max	-24.607	0.089	-0.497	2.131	-176.975	62.07	308-1
308	120.	COMB8_LS_025EQ2	Combination	Max	-24.819	0.089	-0.497	2.131	-113.972	51.392	308-1
308	240.	COMB8_LS_025EQ2	Combination	Max	-25.031	0.089	-0.497	2.131	-50.961	40.72	308-1
308	0.	COMB8_LS_025EQ2	Combination	Min	-42.098	-0.049	-0.526	-1.628	-293.179	-35.919	308-1
308	120.	COMB8_LS_025EQ2	Combination	Min	-42.31	-0.049	-0.526	-1.628	-233.357	-30.016	308-1
308	240.	COMB8_LS_025EQ2	Combination	Min	-42.523	-0.049	-0.526	-1.628	-173.542	-24.118	308-1
313	0.	COMB8_LS_025EQ2	Combination	Max	-10.884	0.013	-0.342	1.007	-160.544	24.855	313-1
313	120.	COMB8_LS_025EQ2	Combination	Max	-11.097	0.013	-0.342	1.007	-100.315	23.43	313-1
313	240.	COMB8_LS_025EQ2	Combination	Max	-11.309	0.013	-0.342	1.007	-40.082	22.038	313-1
313	0.	COMB8_LS_025EQ2	Combination	Min	-25.874	-0.065	-0.502	-2.466	-253.017	-56.871	313-1
313	120.	COMB8_LS_025EQ2	Combination	Min	-26.086	-0.065	-0.502	-2.466	-211.997	-49.15	313-1
313	240.	COMB8_LS_025EQ2	Combination	Min	-26.298	-0.065	-0.502	-2.466	-170.982	-41.46	313-1
318	0.	COMB8_LS_025EQ2	Combination	Max	-7.985	0.057	-0.34	2.31	-162.198	52.658	318-1
318	120.	COMB8_LS_025EQ2	Combination	Max	-8.197	0.057	-0.34	2.31	-102.151	45.918	318-1
318	240.	COMB8_LS_025EQ2	Combination	Max	-8.409	0.057	-0.34	2.31	-42.09	39.207	318-1
318	0.	COMB8_LS_025EQ2	Combination	Min	-30.904	-0.023	-0.501	-1.302	-249.153	-28.768	318-1
318	120.	COMB8_LS_025EQ2	Combination	Min	-31.117	-0.023	-0.501	-1.302	-208.342	-26.097	318-1
318	240.	COMB8_LS_025EQ2	Combination	Min	-31.329	-0.023	-0.501	-1.302	-167.544	-23.454	318-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
323	0.	COMB8_LS_025EQ2	Combination	Max	168.928	0.159	0.128	3.067E-14	20.467	98.638	323-1
323	130.002	COMB8_LS_025EQ2	Combination	Max	168.716	0.248	0.128	3.067E-14	22.033	72.893	323-1
323	260.003	COMB8_LS_025EQ2	Combination	Max	168.503	0.336	0.128	3.067E-14	34.13	116.3	323-1
323	0.	COMB8_LS_025EQ2	Combination	Min	45.506	-0.852	-0.111	-3.566E-14	-2.859	-83.159	323-1
323	130.002	COMB8_LS_025EQ2	Combination	Min	45.293	-0.764	-0.111	-3.566E-14	-6.625	21.155	323-1
323	260.003	COMB8_LS_025EQ2	Combination	Min	45.081	-0.675	-0.111	-3.566E-14	-20.923	33.315	323-1
328	0.	COMB8_LS_025EQ2	Combination	Max	164.606	0.162	0.117	1.145E-13	9.32	98.386	328-1
328	130.002	COMB8_LS_025EQ2	Combination	Max	164.393	0.25	0.117	1.145E-13	13.752	72.524	328-1
328	260.003	COMB8_LS_025EQ2	Combination	Max	164.181	0.339	0.117	1.145E-13	27.49	117.173	328-1
328	0.	COMB8_LS_025EQ2	Combination	Min	45.228	-0.855	-0.118	-1.143E-13	-10.217	-83.289	328-1
328	130.002	COMB8_LS_025EQ2	Combination	Min	45.015	-0.767	-0.118	-1.143E-13	-14.536	21.19	328-1
328	260.003	COMB8_LS_025EQ2	Combination	Min	44.803	-0.678	-0.118	-1.143E-13	-28.162	32.156	328-1
333	0.	COMB8_LS_025EQ2	Combination	Max	189.812	0.161	0.122	4.427E-14	15.916	98.873	333-1
333	130.002	COMB8_LS_025EQ2	Combination	Max	189.6	0.249	0.122	4.427E-14	19.602	72.927	333-1
333	260.003	COMB8_LS_025EQ2	Combination	Max	189.387	0.338	0.122	4.427E-14	32.243	118.059	333-1
333	0.	COMB8_LS_025EQ2	Combination	Min	60.411	-0.852	-0.109	-4.260E-14	-2.854	-81.212	333-1
333	130.002	COMB8_LS_025EQ2	Combination	Min	60.198	-0.763	-0.109	-4.260E-14	-8.173	23.03	333-1
333	260.003	COMB8_LS_025EQ2	Combination	Min	59.986	-0.675	-0.109	-4.260E-14	-22.446	33.193	333-1
338	0.	COMB8_LS_025EQ2	Combination	Max	186.713	0.162	0.118	3.619E-14	10.923	99.05	338-1
338	130.002	COMB8_LS_025EQ2	Combination	Max	186.5	0.251	0.118	3.619E-14	16.133	73.124	338-1
338	260.003	COMB8_LS_025EQ2	Combination	Max	186.288	0.339	0.118	3.619E-14	29.561	118.955	338-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
338	0.	COMB8_LS_025EQ2	Combination	Min	58.945	-0.852	-0.114	-3.719E-14	-6.805	-80.754	338-1
338	130.002	COMB8_LS_025EQ2	Combination	Min	58.732	-0.764	-0.114	-3.719E-14	-12.529	23.388	338-1
338	260.003	COMB8_LS_025EQ2	Combination	Min	58.52	-0.676	-0.114	-3.719E-14	-26.472	32.773	338-1
343	0.	COMB8_LS_025EQ2	Combination	Max	-48.805	-0.621	0.074	3.635	52.533	-201.328	343-1
343	120.104	COMB8_LS_025EQ2	Combination	Max	-49.018	-0.612	0.074	3.635	43.615	-127.197	343-1
343	240.209	COMB8_LS_025EQ2	Combination	Max	-49.23	-0.604	0.074	3.635	34.706	-54.116	343-1
343	0.	COMB8_LS_025EQ2	Combination	Min	-145.989	-0.798	-0.097	-0.315	-69.297	-387.894	343-1
343	120.104	COMB8_LS_025EQ2	Combination	Min	-146.202	-0.789	-0.097	-0.315	-57.615	-292.629	343-1
343	240.209	COMB8_LS_025EQ2	Combination	Min	-146.414	-0.78	-0.097	-0.315	-45.943	-198.44	343-1
348	0.	COMB8_LS_025EQ2	Combination	Max	4.266	-0.322	0.432	5.567E-13	-6.981	-77.092	348-1
348	130.002	COMB8_LS_025EQ2	Combination	Max	4.054	-0.234	0.432	5.567E-13	-61.723	-23.378	348-1
348	260.003	COMB8_LS_025EQ2	Combination	Max	3.842	-0.145	0.432	5.567E-13	-31.865	29.115	348-1
348	0.	COMB8_LS_025EQ2	Combination	Min	-74.868	-0.558	-0.628	6.101E-14	-196.962	-102.566	348-1
348	130.002	COMB8_LS_025EQ2	Combination	Min	-75.08	-0.47	-0.628	6.101E-14	-116.726	-53.319	348-1
348	260.003	COMB8_LS_025EQ2	Combination	Min	-75.293	-0.381	-0.628	6.101E-14	-121.092	-25.852	348-1
353	0.	COMB8_LS_025EQ2	Combination	Max	-47.968	-0.617	0.099	3.488	67.519	-200.662	353-1
353	120.104	COMB8_LS_025EQ2	Combination	Max	-48.18	-0.609	0.099	3.488	55.71	-126.687	353-1
353	240.209	COMB8_LS_025EQ2	Combination	Max	-48.392	-0.6	0.099	3.488	43.914	-53.664	353-1
353	0.	COMB8_LS_025EQ2	Combination	Min	-159.437	-0.817	-0.082	-0.488	-60.601	-392.664	353-1
353	120.104	COMB8_LS_025EQ2	Combination	Min	-159.649	-0.808	-0.082	-0.488	-50.771	-295.472	353-1
353	240.209	COMB8_LS_025EQ2	Combination	Min	-159.862	-0.799	-0.082	-0.488	-40.953	-199.455	353-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
358	0.	COMB8_LS_025EQ2	Combination	Max	-7.52	-0.323	0.433	6.894E-14	-0.435	-77.69	358-1
358	130.002	COMB8_LS_025EQ2	Combination	Max	-7.732	-0.235	0.433	6.894E-14	-55.397	-23.646	358-1
358	260.003	COMB8_LS_025EQ2	Combination	Max	-7.944	-0.146	0.433	6.894E-14	-29.169	29.017	358-1
358	0.	COMB8_LS_025EQ2	Combination	Min	-96.118	-0.556	-0.618	1.439E-14	-191.705	-101.046	358-1
358	130.002	COMB8_LS_025EQ2	Combination	Min	-96.331	-0.468	-0.618	1.439E-14	-112.725	-52.245	358-1
358	260.003	COMB8_LS_025EQ2	Combination	Min	-96.543	-0.379	-0.618	1.439E-14	-114.936	-25.063	358-1
363	0.	COMB8_LS_025EQ2	Combination	Max	-80.195	0.116	-0.646	3.015	-246.172	86.132	363-1
363	120.	COMB8_LS_025EQ2	Combination	Max	-80.444	0.116	-0.646	3.015	-168.026	72.256	363-1
363	240.	COMB8_LS_025EQ2	Combination	Max	-80.693	0.116	-0.646	3.015	-89.818	58.383	363-1
363	0.	COMB8_LS_025EQ2	Combination	Min	-190.656	-0.144	-0.733	-1.352	-456.959	-102.218	363-1
363	120.	COMB8_LS_025EQ2	Combination	Min	-190.905	-0.144	-0.733	-1.352	-369.579	-84.892	363-1
363	240.	COMB8_LS_025EQ2	Combination	Min	-191.154	-0.144	-0.733	-1.352	-282.26	-67.569	363-1
364	0.	COMB8_LS_025EQ2	Combination	Max	-80.667	0.19	-0.406	3.015	-89.818	58.383	364-1
364	120.	COMB8_LS_025EQ2	Combination	Max	-80.88	0.19	-0.406	3.015	-41.072	35.592	364-1
364	240.	COMB8_LS_025EQ2	Combination	Max	-81.092	0.19	-0.406	3.015	7.683	12.805	364-1
364	0.	COMB8_LS_025EQ2	Combination	Min	-191.179	-0.219	-0.973	-1.352	-282.26	-67.569	364-1
364	120.	COMB8_LS_025EQ2	Combination	Min	-191.391	-0.219	-0.973	-1.352	-165.479	-41.328	364-1
364	240.	COMB8_LS_025EQ2	Combination	Min	-191.604	-0.219	-0.973	-1.352	-48.708	-15.091	364-1
368	0.	COMB8_LS_025EQ2	Combination	Max	165.238	0.205	0.11	7.989E-14	-3.136	106.656	368-1
368	130.002	COMB8_LS_025EQ2	Combination	Max	165.026	0.294	0.11	7.989E-14	0.723	75.344	368-1
368	260.003	COMB8_LS_025EQ2	Combination	Max	164.813	0.382	0.11	7.989E-14	16.413	123.516	368-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
368	0.	COMB8_LS_025EQ2	Combination	Min	44.037	-0.895	-0.138	-5.711E-14	-26.097	-87.332	368-1
368	130.002	COMB8_LS_025EQ2	Combination	Min	43.825	-0.806	-0.138	-5.711E-14	-26.301	22.068	368-1
368	260.003	COMB8_LS_025EQ2	Combination	Min	43.613	-0.718	-0.138	-5.711E-14	-38.338	28.983	368-1
373	0.	COMB8_LS_025EQ2	Combination	Max	159.192	0.215	0.114	1.342E-13	4.286	108.596	373-1
373	130.002	COMB8_LS_025EQ2	Combination	Max	158.98	0.304	0.114	1.342E-13	8.795	76.357	373-1
373	260.003	COMB8_LS_025EQ2	Combination	Max	158.767	0.392	0.114	1.342E-13	23.411	124.913	373-1
373	0.	COMB8_LS_025EQ2	Combination	Min	42.229	-0.904	-0.125	-1.060E-13	-15.708	-88.848	373-1
373	130.002	COMB8_LS_025EQ2	Combination	Min	42.017	-0.816	-0.125	-1.060E-13	-18.789	21.425	373-1
373	260.003	COMB8_LS_025EQ2	Combination	Min	41.804	-0.727	-0.125	-1.060E-13	-31.977	27.904	373-1
378	0.	COMB8_LS_025EQ2	Combination	Max	192.23	0.204	0.11	1.677E-14	-0.673	106.363	378-1
378	130.002	COMB8_LS_025EQ2	Combination	Max	192.018	0.293	0.11	1.677E-14	2.844	75.258	378-1
378	260.003	COMB8_LS_025EQ2	Combination	Max	191.805	0.381	0.11	1.677E-14	17.962	125.567	378-1
378	0.	COMB8_LS_025EQ2	Combination	Min	56.565	-0.891	-0.134	-1.140E-14	-23.832	-84.351	378-1
378	130.002	COMB8_LS_025EQ2	Combination	Min	56.353	-0.802	-0.134	-1.140E-14	-24.286	24.506	378-1
378	260.003	COMB8_LS_025EQ2	Combination	Min	56.141	-0.714	-0.134	-1.140E-14	-36.342	28.948	378-1
383	0.	COMB8_LS_025EQ2	Combination	Max	187.129	0.212	0.112	2.848E-14	2.419	108.29	383-1
383	130.002	COMB8_LS_025EQ2	Combination	Max	186.916	0.301	0.112	2.848E-14	7.017	76.495	383-1
383	260.003	COMB8_LS_025EQ2	Combination	Max	186.704	0.389	0.112	2.848E-14	21.758	126.493	383-1
383	0.	COMB8_LS_025EQ2	Combination	Min	54.123	-0.898	-0.128	-2.648E-14	-18.465	-85.624	383-1
383	130.002	COMB8_LS_025EQ2	Combination	Min	53.911	-0.81	-0.128	-2.648E-14	-21.058	23.841	383-1
383	260.003	COMB8_LS_025EQ2	Combination	Min	53.699	-0.721	-0.128	-2.648E-14	-33.793	28.512	383-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
388	0.	COMB8_LS_025EQ2	Combination	Max	-49.337	-0.622	0.117	-0.365	79.285	-195.386	388-1
388	120.104	COMB8_LS_025EQ2	Combination	Max	-49.549	-0.613	0.117	-0.365	65.335	-121.199	388-1
388	240.209	COMB8_LS_025EQ2	Combination	Max	-49.761	-0.604	0.117	-0.365	51.41	-48.061	388-1
388	0.	COMB8_LS_025EQ2	Combination	Min	-140.261	-0.798	-0.052	-3.845	-41.808	-397.299	388-1
388	120.104	COMB8_LS_025EQ2	Combination	Min	-140.473	-0.79	-0.052	-3.845	-35.617	-301.994	388-1
388	240.209	COMB8_LS_025EQ2	Combination	Min	-140.686	-0.781	-0.052	-3.845	-29.451	-207.766	388-1
393	0.	COMB8_LS_025EQ2	Combination	Max	6.273	-0.3	0.682	1.867E-14	205.445	-65.239	393-1
393	130.002	COMB8_LS_025EQ2	Combination	Max	6.061	-0.212	0.682	1.867E-14	118.501	-17.596	393-1
393	260.003	COMB8_LS_025EQ2	Combination	Max	5.849	-0.124	0.682	1.867E-14	129.244	33.258	393-1
393	0.	COMB8_LS_025EQ2	Combination	Min	-69.93	-0.569	-0.483	-9.521E-14	1.844	-103.256	393-1
393	130.002	COMB8_LS_025EQ2	Combination	Min	-70.142	-0.481	-0.483	-9.521E-14	62.876	-49.334	393-1
393	260.003	COMB8_LS_025EQ2	Combination	Min	-70.355	-0.392	-0.483	-9.521E-14	26.223	-21.623	393-1
398	0.	COMB8_LS_025EQ2	Combination	Max	-49.15	-0.618	0.103	-0.276	71.181	-194.14	398-1
398	120.104	COMB8_LS_025EQ2	Combination	Max	-49.363	-0.609	0.103	-0.276	58.855	-120.144	398-1
398	240.209	COMB8_LS_025EQ2	Combination	Max	-49.575	-0.6	0.103	-0.276	46.549	-47.114	398-1
398	0.	COMB8_LS_025EQ2	Combination	Min	-162.168	-0.829	-0.075	-3.756	-55.612	-405.861	398-1
398	120.104	COMB8_LS_025EQ2	Combination	Min	-162.38	-0.82	-0.075	-3.756	-46.656	-307.165	398-1
398	240.209	COMB8_LS_025EQ2	Combination	Min	-162.592	-0.811	-0.075	-3.756	-37.719	-209.629	398-1
403	0.	COMB8_LS_025EQ2	Combination	Max	-5.162	-0.302	0.669	-1.137E-14	199.349	-66.076	403-1
403	130.002	COMB8_LS_025EQ2	Combination	Max	-5.374	-0.214	0.669	-1.137E-14	113.865	-17.756	403-1
403	260.003	COMB8_LS_025EQ2	Combination	Max	-5.587	-0.125	0.669	-1.137E-14	122.326	33.576	403-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	in				Kip	Kip	Kip	Kip-in	Kip-in	Kip-in	
403	0.	COMB8_LS_025EQ2	Combination	Min	-94.646	-0.566	-0.482	-7.236E-14	-4.769	-100.758	403-1
403	130.002	COMB8_LS_025EQ2	Combination	Min	-94.859	-0.478	-0.482	-7.236E-14	56.392	-47.72	403-1
403	260.003	COMB8_LS_025EQ2	Combination	Min	-95.071	-0.389	-0.482	-7.236E-14	23.609	-20.695	403-1
408	0.	COMB8_LS_025EQ2	Combination	Max	-67.82	0.076	-0.506	0.95	-165.954	56.755	408-1
408	120.	COMB8_LS_025EQ2	Combination	Max	-68.032	0.076	-0.506	0.95	-103.94	47.689	408-1
408	240.	COMB8_LS_025EQ2	Combination	Max	-68.244	0.076	-0.506	0.95	-41.874	38.632	408-1
408	0.	COMB8_LS_025EQ2	Combination	Min	-185.041	-0.104	-0.543	-2.662	-323.436	-70.525	408-1
408	120.	COMB8_LS_025EQ2	Combination	Min	-185.254	-0.104	-0.543	-2.662	-259.637	-58.078	408-1
408	240.	COMB8_LS_025EQ2	Combination	Min	-185.466	-0.104	-0.543	-2.662	-195.89	-45.64	408-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	in				in
273	0.	COMB8_LS_025EQ2	Max	273-1	0.
273	120.	COMB8_LS_025EQ2	Max	273-1	120.
273	240.	COMB8_LS_025EQ2	Max	273-1	240.
273	0.	COMB8_LS_025EQ2	Min	273-1	0.
273	120.	COMB8_LS_025EQ2	Min	273-1	120.
273	240.	COMB8_LS_025EQ2	Min	273-1	240.
278	0.	COMB8_LS_025EQ2	Max	278-1	0.
278	120.	COMB8_LS_025EQ2	Max	278-1	120.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
278	240.	COMB8_LS_025EQ2	Max	278-1	240.
278	0.	COMB8_LS_025EQ2	Min	278-1	0.
278	120.	COMB8_LS_025EQ2	Min	278-1	120.
278	240.	COMB8_LS_025EQ2	Min	278-1	240.
283	0.	COMB8_LS_025EQ2	Max	283-1	0.
283	120.	COMB8_LS_025EQ2	Max	283-1	120.
283	240.	COMB8_LS_025EQ2	Max	283-1	240.
283	0.	COMB8_LS_025EQ2	Min	283-1	0.
283	120.	COMB8_LS_025EQ2	Min	283-1	120.
283	240.	COMB8_LS_025EQ2	Min	283-1	240.
288	0.	COMB8_LS_025EQ2	Max	288-1	0.
288	120.	COMB8_LS_025EQ2	Max	288-1	120.
288	240.	COMB8_LS_025EQ2	Max	288-1	240.
288	0.	COMB8_LS_025EQ2	Min	288-1	0.
288	120.	COMB8_LS_025EQ2	Min	288-1	120.
288	240.	COMB8_LS_025EQ2	Min	288-1	240.
293	0.	COMB8_LS_025EQ2	Max	293-1	0.
293	120.	COMB8_LS_025EQ2	Max	293-1	120.
293	240.	COMB8_LS_025EQ2	Max	293-1	240.
293	0.	COMB8_LS_025EQ2	Min	293-1	0.
293	120.	COMB8_LS_025EQ2	Min	293-1	120.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
293	240.	COMB8_LS_025EQ2	Min	293-1	240.
298	0.	COMB8_LS_025EQ2	Max	298-1	0.
298	120.	COMB8_LS_025EQ2	Max	298-1	120.
298	240.	COMB8_LS_025EQ2	Max	298-1	240.
298	0.	COMB8_LS_025EQ2	Min	298-1	0.
298	120.	COMB8_LS_025EQ2	Min	298-1	120.
298	240.	COMB8_LS_025EQ2	Min	298-1	240.
303	0.	COMB8_LS_025EQ2	Max	303-1	0.
303	120.	COMB8_LS_025EQ2	Max	303-1	120.
303	240.	COMB8_LS_025EQ2	Max	303-1	240.
303	0.	COMB8_LS_025EQ2	Min	303-1	0.
303	120.	COMB8_LS_025EQ2	Min	303-1	120.
303	240.	COMB8_LS_025EQ2	Min	303-1	240.
308	0.	COMB8_LS_025EQ2	Max	308-1	0.
308	120.	COMB8_LS_025EQ2	Max	308-1	120.
308	240.	COMB8_LS_025EQ2	Max	308-1	240.
308	0.	COMB8_LS_025EQ2	Min	308-1	0.
308	120.	COMB8_LS_025EQ2	Min	308-1	120.
308	240.	COMB8_LS_025EQ2	Min	308-1	240.
313	0.	COMB8_LS_025EQ2	Max	313-1	0.
313	120.	COMB8_LS_025EQ2	Max	313-1	120.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
313	240.	COMB8_LS_025EQ2	Max	313-1	240.
313	0.	COMB8_LS_025EQ2	Min	313-1	0.
313	120.	COMB8_LS_025EQ2	Min	313-1	120.
313	240.	COMB8_LS_025EQ2	Min	313-1	240.
318	0.	COMB8_LS_025EQ2	Max	318-1	0.
318	120.	COMB8_LS_025EQ2	Max	318-1	120.
318	240.	COMB8_LS_025EQ2	Max	318-1	240.
318	0.	COMB8_LS_025EQ2	Min	318-1	0.
318	120.	COMB8_LS_025EQ2	Min	318-1	120.
318	240.	COMB8_LS_025EQ2	Min	318-1	240.
323	0.	COMB8_LS_025EQ2	Max	323-1	0.
323	130.002	COMB8_LS_025EQ2	Max	323-1	130.002
323	260.003	COMB8_LS_025EQ2	Max	323-1	260.003
323	0.	COMB8_LS_025EQ2	Min	323-1	0.
323	130.002	COMB8_LS_025EQ2	Min	323-1	130.002
323	260.003	COMB8_LS_025EQ2	Min	323-1	260.003
328	0.	COMB8_LS_025EQ2	Max	328-1	0.
328	130.002	COMB8_LS_025EQ2	Max	328-1	130.002
328	260.003	COMB8_LS_025EQ2	Max	328-1	260.003
328	0.	COMB8_LS_025EQ2	Min	328-1	0.
328	130.002	COMB8_LS_025EQ2	Min	328-1	130.002

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
328	260.003	COMB8_LS_025EQ2	Min	328-1	260.003
333	0.	COMB8_LS_025EQ2	Max	333-1	0.
333	130.002	COMB8_LS_025EQ2	Max	333-1	130.002
333	260.003	COMB8_LS_025EQ2	Max	333-1	260.003
333	0.	COMB8_LS_025EQ2	Min	333-1	0.
333	130.002	COMB8_LS_025EQ2	Min	333-1	130.002
333	260.003	COMB8_LS_025EQ2	Min	333-1	260.003
338	0.	COMB8_LS_025EQ2	Max	338-1	0.
338	130.002	COMB8_LS_025EQ2	Max	338-1	130.002
338	260.003	COMB8_LS_025EQ2	Max	338-1	260.003
338	0.	COMB8_LS_025EQ2	Min	338-1	0.
338	130.002	COMB8_LS_025EQ2	Min	338-1	130.002
338	260.003	COMB8_LS_025EQ2	Min	338-1	260.003
343	0.	COMB8_LS_025EQ2	Max	343-1	0.
343	120.104	COMB8_LS_025EQ2	Max	343-1	120.104
343	240.209	COMB8_LS_025EQ2	Max	343-1	240.209
343	0.	COMB8_LS_025EQ2	Min	343-1	0.
343	120.104	COMB8_LS_025EQ2	Min	343-1	120.104
343	240.209	COMB8_LS_025EQ2	Min	343-1	240.209
348	0.	COMB8_LS_025EQ2	Max	348-1	0.
348	130.002	COMB8_LS_025EQ2	Max	348-1	130.002

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
348	260.003	COMB8_LS_025EQ2	Max	348-1	260.003
348	0.	COMB8_LS_025EQ2	Min	348-1	0.
348	130.002	COMB8_LS_025EQ2	Min	348-1	130.002
348	260.003	COMB8_LS_025EQ2	Min	348-1	260.003
353	0.	COMB8_LS_025EQ2	Max	353-1	0.
353	120.104	COMB8_LS_025EQ2	Max	353-1	120.104
353	240.209	COMB8_LS_025EQ2	Max	353-1	240.209
353	0.	COMB8_LS_025EQ2	Min	353-1	0.
353	120.104	COMB8_LS_025EQ2	Min	353-1	120.104
353	240.209	COMB8_LS_025EQ2	Min	353-1	240.209
358	0.	COMB8_LS_025EQ2	Max	358-1	0.
358	130.002	COMB8_LS_025EQ2	Max	358-1	130.002
358	260.003	COMB8_LS_025EQ2	Max	358-1	260.003
358	0.	COMB8_LS_025EQ2	Min	358-1	0.
358	130.002	COMB8_LS_025EQ2	Min	358-1	130.002
358	260.003	COMB8_LS_025EQ2	Min	358-1	260.003
363	0.	COMB8_LS_025EQ2	Max	363-1	0.
363	120.	COMB8_LS_025EQ2	Max	363-1	120.
363	240.	COMB8_LS_025EQ2	Max	363-1	240.
363	0.	COMB8_LS_025EQ2	Min	363-1	0.
363	120.	COMB8_LS_025EQ2	Min	363-1	120.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
363	240.	COMB8_LS_025EQ2	Min	363-1	240.
364	0.	COMB8_LS_025EQ2	Max	364-1	0.
364	120.	COMB8_LS_025EQ2	Max	364-1	120.
364	240.	COMB8_LS_025EQ2	Max	364-1	240.
364	0.	COMB8_LS_025EQ2	Min	364-1	0.
364	120.	COMB8_LS_025EQ2	Min	364-1	120.
364	240.	COMB8_LS_025EQ2	Min	364-1	240.
368	0.	COMB8_LS_025EQ2	Max	368-1	0.
368	130.002	COMB8_LS_025EQ2	Max	368-1	130.002
368	260.003	COMB8_LS_025EQ2	Max	368-1	260.003
368	0.	COMB8_LS_025EQ2	Min	368-1	0.
368	130.002	COMB8_LS_025EQ2	Min	368-1	130.002
368	260.003	COMB8_LS_025EQ2	Min	368-1	260.003
373	0.	COMB8_LS_025EQ2	Max	373-1	0.
373	130.002	COMB8_LS_025EQ2	Max	373-1	130.002
373	260.003	COMB8_LS_025EQ2	Max	373-1	260.003
373	0.	COMB8_LS_025EQ2	Min	373-1	0.
373	130.002	COMB8_LS_025EQ2	Min	373-1	130.002
373	260.003	COMB8_LS_025EQ2	Min	373-1	260.003
378	0.	COMB8_LS_025EQ2	Max	378-1	0.
378	130.002	COMB8_LS_025EQ2	Max	378-1	130.002

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
378	260.003	COMB8_LS_025EQ2	Max	378-1	260.003
378	0.	COMB8_LS_025EQ2	Min	378-1	0.
378	130.002	COMB8_LS_025EQ2	Min	378-1	130.002
378	260.003	COMB8_LS_025EQ2	Min	378-1	260.003
383	0.	COMB8_LS_025EQ2	Max	383-1	0.
383	130.002	COMB8_LS_025EQ2	Max	383-1	130.002
383	260.003	COMB8_LS_025EQ2	Max	383-1	260.003
383	0.	COMB8_LS_025EQ2	Min	383-1	0.
383	130.002	COMB8_LS_025EQ2	Min	383-1	130.002
383	260.003	COMB8_LS_025EQ2	Min	383-1	260.003
388	0.	COMB8_LS_025EQ2	Max	388-1	0.
388	120.104	COMB8_LS_025EQ2	Max	388-1	120.104
388	240.209	COMB8_LS_025EQ2	Max	388-1	240.209
388	0.	COMB8_LS_025EQ2	Min	388-1	0.
388	120.104	COMB8_LS_025EQ2	Min	388-1	120.104
388	240.209	COMB8_LS_025EQ2	Min	388-1	240.209
393	0.	COMB8_LS_025EQ2	Max	393-1	0.
393	130.002	COMB8_LS_025EQ2	Max	393-1	130.002
393	260.003	COMB8_LS_025EQ2	Max	393-1	260.003
393	0.	COMB8_LS_025EQ2	Min	393-1	0.
393	130.002	COMB8_LS_025EQ2	Min	393-1	130.002

Table: Element Forces - Frames, Part 2 of 2

Frame	Station in	OutputCase	StepType	FrameElem	ElemStation in
393	260.003	COMB8_LS_025EQ2	Min	393-1	260.003
398	0.	COMB8_LS_025EQ2	Max	398-1	0.
398	120.104	COMB8_LS_025EQ2	Max	398-1	120.104
398	240.209	COMB8_LS_025EQ2	Max	398-1	240.209
398	0.	COMB8_LS_025EQ2	Min	398-1	0.
398	120.104	COMB8_LS_025EQ2	Min	398-1	120.104
398	240.209	COMB8_LS_025EQ2	Min	398-1	240.209
403	0.	COMB8_LS_025EQ2	Max	403-1	0.
403	130.002	COMB8_LS_025EQ2	Max	403-1	130.002
403	260.003	COMB8_LS_025EQ2	Max	403-1	260.003
403	0.	COMB8_LS_025EQ2	Min	403-1	0.
403	130.002	COMB8_LS_025EQ2	Min	403-1	130.002
403	260.003	COMB8_LS_025EQ2	Min	403-1	260.003
408	0.	COMB8_LS_025EQ2	Max	408-1	0.
408	120.	COMB8_LS_025EQ2	Max	408-1	120.
408	240.	COMB8_LS_025EQ2	Max	408-1	240.
408	0.	COMB8_LS_025EQ2	Min	408-1	0.
408	120.	COMB8_LS_025EQ2	Min	408-1	120.
408	240.	COMB8_LS_025EQ2	Min	408-1	240.

Dock/platform plumb piles: lateral spreading + 25%EQ+dead

Table: Element Forces - Frames, Part 1 of 2

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
278	0.	COMB8_LS_025EQ2	Combination	Max	-124.422	0.087	-0.689	0.1988	-22.4972	5.1937	278-1
278	10.	COMB8_LS_025EQ2	Combination	Max	-125.13	0.087	-0.689	0.1988	-15.3392	4.3229	278-1
278	20.	COMB8_LS_025EQ2	Combination	Max	-125.837	0.087	-0.689	0.1988	-8.1808	3.4524	278-1
278	0.	COMB8_LS_025EQ2	Combination	Min	-130.761	-0.053	-0.717	-0.1235	-32.2698	-3.0825	278-1
278	10.	COMB8_LS_025EQ2	Combination	Min	-131.469	-0.053	-0.717	-0.1235	-25.3645	-2.5538	278-1
278	20.	COMB8_LS_025EQ2	Combination	Min	-132.177	-0.053	-0.717	-0.1235	-18.4598	-2.0253	278-1
279	0.	COMB8_LS_025EQ2	Combination	Max	-125.836	0.148	-0.497	0.1988	-8.1808	3.4524	279-1
279	10.	COMB8_LS_025EQ2	Combination	Max	-126.544	0.148	-0.497	0.1988	-3.2142	1.976	279-1
279	20.	COMB8_LS_025EQ2	Combination	Max	-127.252	0.148	-0.497	0.1988	1.7524	0.5869	279-1
279	0.	COMB8_LS_025EQ2	Combination	Min	-132.178	-0.114	-0.91	-0.1235	-18.4598	-2.0253	279-1
279	10.	COMB8_LS_025EQ2	Combination	Min	-132.885	-0.114	-0.91	-0.1235	-9.3632	-0.8908	279-1
279	20.	COMB8_LS_025EQ2	Combination	Min	-133.593	-0.114	-0.91	-0.1235	-0.2667	0.1563	279-1
280	0.	COMB8_LS_025EQ2	Combination	Max	-127.251	0.183	-0.368	0.1988	1.7524	0.5869	280-1
280	10.	COMB8_LS_025EQ2	Combination	Max	-127.959	0.183	-0.368	0.1988	10.1208	1.7624	280-1
280	20.	COMB8_LS_025EQ2	Combination	Max	-128.666	0.183	-0.368	0.1988	20.5081	3.2457	280-1
280	0.	COMB8_LS_025EQ2	Combination	Min	-133.594	-0.149	-1.039	-0.1235	-0.2667	0.1563	280-1
280	10.	COMB8_LS_025EQ2	Combination	Min	-134.301	-0.149	-1.039	-0.1235	5.4281	-1.3612	280-1
280	20.	COMB8_LS_025EQ2	Combination	Min	-135.009	-0.149	-1.039	-0.1235	9.1039	-3.1865	280-1
281	0.	COMB8_LS_025EQ2	Combination	Max	-128.666	0.19	-0.34	0.1988	20.5081	3.2457	281-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
281	7.5	COMB8_LS_025EQ2	Combination	Max	-129.197	0.19	-0.34	0.1988	28.5076	4.4158	281-1
281	15.	COMB8_LS_025EQ2	Combination	Max	-129.728	0.19	-0.34	0.1988	36.5071	5.5866	281-1
281	0.	COMB8_LS_025EQ2	Combination	Min	-135.009	-0.156	-1.067	-0.1235	9.1039	-3.1865	281-1
281	7.5	COMB8_LS_025EQ2	Combination	Min	-135.54	-0.156	-1.067	-0.1235	11.6518	-4.613	281-1
281	15.	COMB8_LS_025EQ2	Combination	Min	-136.071	-0.156	-1.067	-0.1235	14.1997	-6.0403	281-1
288	0.	COMB8_LS_025EQ2	Combination	Max	-147.577	0.146	-0.645	0.3718	-20.1094	8.2653	288-1
288	10.	COMB8_LS_025EQ2	Combination	Max	-148.284	0.146	-0.645	0.3718	-13.4436	6.8063	288-1
288	20.	COMB8_LS_025EQ2	Combination	Max	-148.992	0.146	-0.645	0.3718	-6.7759	5.3479	288-1
288	0.	COMB8_LS_025EQ2	Combination	Min	-195.407	-0.014	-0.671	0.0538	-30.2672	-1.2712	288-1
288	10.	COMB8_LS_025EQ2	Combination	Min	-196.114	-0.014	-0.671	0.0538	-23.7683	-1.1363	288-1
288	20.	COMB8_LS_025EQ2	Combination	Min	-196.822	-0.014	-0.671	0.0538	-17.2712	-1.002	288-1
289	0.	COMB8_LS_025EQ2	Combination	Max	-148.982	0.209	-0.449	0.3718	-6.7759	5.3479	289-1
289	10.	COMB8_LS_025EQ2	Combination	Max	-149.689	0.209	-0.449	0.3718	-2.2855	3.2844	289-1
289	20.	COMB8_LS_025EQ2	Combination	Max	-150.397	0.209	-0.449	0.3718	2.2055	1.368	289-1
289	0.	COMB8_LS_025EQ2	Combination	Min	-196.833	-0.076	-0.867	0.0538	-17.2712	-1.002	289-1
289	10.	COMB8_LS_025EQ2	Combination	Min	-197.54	-0.076	-0.867	0.0538	-8.5969	-0.2626	289-1
289	20.	COMB8_LS_025EQ2	Combination	Min	-198.248	-0.076	-0.867	0.0538	0.0768	0.3297	289-1
290	0.	COMB8_LS_025EQ2	Combination	Max	-150.39	0.245	-0.32	0.3718	2.2055	1.368	290-1
290	10.	COMB8_LS_025EQ2	Combination	Max	-151.098	0.245	-0.32	0.3718	10.0391	1.7425	290-1
290	20.	COMB8_LS_025EQ2	Combination	Max	-151.805	0.245	-0.32	0.3718	20.0003	2.8409	290-1
290	0.	COMB8_LS_025EQ2	Combination	Min	-198.255	-0.113	-0.996	0.0538	0.0768	0.3297	290-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
290	10.	COMB8_LS_025EQ2	Combination	Min	-198.962	-0.113	-0.996	0.0538	5.408	-1.3689	290-1
290	20.	COMB8_LS_025EQ2	Combination	Min	-199.67	-0.113	-0.996	0.0538	8.6115	-3.7914	290-1
291	0.	COMB8_LS_025EQ2	Combination	Max	-151.803	0.253	-0.293	0.3718	20.0003	2.8409	291-1
291	7.5	COMB8_LS_025EQ2	Combination	Max	-152.334	0.253	-0.293	0.3718	27.6801	3.7391	291-1
291	15.	COMB8_LS_025EQ2	Combination	Max	-152.864	0.253	-0.293	0.3718	35.3598	4.6411	291-1
291	0.	COMB8_LS_025EQ2	Combination	Min	-199.673	-0.121	-1.024	0.0538	8.6115	-3.7914	291-1
291	7.5	COMB8_LS_025EQ2	Combination	Min	-200.203	-0.121	-1.024	0.0538	10.8053	-5.6826	291-1
291	15.	COMB8_LS_025EQ2	Combination	Min	-200.734	-0.121	-1.024	0.0538	12.9991	-7.5777	291-1
343	0.	COMB8_LS_025EQ2	Combination	Max	-118.648	-0.977	0.098	0.315	5.462	-27.0758	343-1
343	10.0087	COMB8_LS_025EQ2	Combination	Max	-119.356	-0.947	0.098	0.315	4.4785	-17.4451	343-1
343	20.0174	COMB8_LS_025EQ2	Combination	Max	-120.063	-0.918	0.098	0.315	3.4958	-8.1086	343-1
343	0.	COMB8_LS_025EQ2	Combination	Min	-215.832	-1.153	-0.073	-0.0143	-4.6905	-42.623	343-1
343	10.0087	COMB8_LS_025EQ2	Combination	Min	-216.54	-1.124	-0.073	-0.0143	-3.9573	-31.2311	343-1
343	20.0174	COMB8_LS_025EQ2	Combination	Min	-217.247	-1.094	-0.073	-0.0143	-3.2251	-20.1356	343-1
344	0.	COMB8_LS_025EQ2	Combination	Max	-120.042	-0.703	0.162	0.315	3.4958	-8.1086	344-1
344	10.0087	COMB8_LS_025EQ2	Combination	Max	-120.75	-0.674	0.162	0.315	1.8764	-1.2104	344-1
344	20.0174	COMB8_LS_025EQ2	Combination	Max	-121.457	-0.644	0.162	0.315	0.2665	5.7032	344-1
344	0.	COMB8_LS_025EQ2	Combination	Min	-217.268	-1.309	-0.137	-0.0143	-3.2251	-20.1356	344-1
344	10.0087	COMB8_LS_025EQ2	Combination	Min	-217.976	-1.279	-0.137	-0.0143	-1.8561	-7.1926	344-1
344	20.0174	COMB8_LS_025EQ2	Combination	Min	-218.684	-1.25	-0.137	-0.0143	-0.4966	5.1443	344-1
345	0.	COMB8_LS_025EQ2	Combination	Max	-121.444	-0.529	0.199	0.315	0.2665	5.7032	345-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
345	10.0087	COMB8_LS_025EQ2	Combination	Max	-122.152	-0.5	0.199	0.315	1.2633	18.9913	345-1
345	20.0174	COMB8_LS_025EQ2	Combination	Max	-122.859	-0.47	0.199	0.315	3.0043	32.2018	345-1
345	0.	COMB8_LS_025EQ2	Combination	Min	-218.697	-1.365	-0.174	-0.0143	-0.4966	5.1443	345-1
345	10.0087	COMB8_LS_025EQ2	Combination	Min	-219.405	-1.335	-0.174	-0.0143	-1.7439	10.5161	345-1
345	20.0174	COMB8_LS_025EQ2	Combination	Min	-220.112	-1.306	-0.174	-0.0143	-3.7352	15.3747	345-1
346	0.	COMB8_LS_025EQ2	Combination	Max	-122.849	1.744	0.207	0.3091	3.0069	32.2018	346-1
346	7.5116	COMB8_LS_025EQ2	Combination	Max	-123.38	1.774	0.207	0.3091	4.3741	19.1862	346-1
346	15.0232	COMB8_LS_025EQ2	Combination	Max	-123.91	1.803	0.207	0.3091	5.7415	6.0901	346-1
346	0.	COMB8_LS_025EQ2	Combination	Min	-220.114	1.236	-0.182	0.0017	-3.7336	15.3747	346-1
346	7.5116	COMB8_LS_025EQ2	Combination	Min	-220.645	1.265	-0.182	0.0017	-5.2887	5.7829	346-1
346	15.0232	COMB8_LS_025EQ2	Combination	Min	-221.176	1.295	-0.182	0.0017	-6.844	-4.1717	346-1
353	0.	COMB8_LS_025EQ2	Combination	Max	-106.032	-0.955	0.131	0.2978	7.123	-26.612	353-1
353	10.0087	COMB8_LS_025EQ2	Combination	Max	-106.74	-0.926	0.131	0.2978	5.8162	-17.1686	353-1
353	20.0174	COMB8_LS_025EQ2	Combination	Max	-107.448	-0.896	0.131	0.2978	4.5106	-8.0111	353-1
353	0.	COMB8_LS_025EQ2	Combination	Min	-217.502	-1.154	-0.05	-0.0335	-3.5537	-42.6122	353-1
353	10.0087	COMB8_LS_025EQ2	Combination	Min	-218.209	-1.125	-0.05	-0.0335	-3.0571	-31.234	353-1
353	20.0174	COMB8_LS_025EQ2	Combination	Min	-218.917	-1.095	-0.05	-0.0335	-2.5617	-20.1604	353-1
354	0.	COMB8_LS_025EQ2	Combination	Max	-107.425	-0.686	0.195	0.2978	4.5106	-8.0111	354-1
354	10.0087	COMB8_LS_025EQ2	Combination	Max	-108.133	-0.657	0.195	0.2978	2.5547	-1.2517	354-1
354	20.0174	COMB8_LS_025EQ2	Combination	Max	-108.84	-0.627	0.195	0.2978	0.6006	5.9404	354-1
354	0.	COMB8_LS_025EQ2	Combination	Min	-218.94	-1.305	-0.114	-0.0335	-2.5617	-20.1604	354-1

Table: Element Forces - Frames, Part 1 of 2

Frame	Station	OutputCase	CaseType	StepType	P	V2	V3	T	M2	M3	FrameElem
	ft				Kip	Kip	Kip	Kip-ft	Kip-ft	Kip-ft	
354	10.0087	COMB8_LS_025EQ2	Combination	Min	-219.647	-1.276	-0.114	-0.0335	-1.416	-7.2795	354-1
354	20.0174	COMB8_LS_025EQ2	Combination	Min	-220.355	-1.246	-0.114	-0.0335	-0.2721	4.578	354-1
355	0.	COMB8_LS_025EQ2	Combination	Max	-108.826	-0.514	0.234	0.2978	0.6006	5.9404	355-1
355	10.0087	COMB8_LS_025EQ2	Combination	Max	-109.534	-0.485	0.234	0.2978	1.2579	18.9048	355-1
355	20.0174	COMB8_LS_025EQ2	Combination	Max	-110.241	-0.455	0.234	0.2978	2.7851	32.0418	355-1
355	0.	COMB8_LS_025EQ2	Combination	Min	-220.369	-1.359	-0.153	-0.0335	-0.2721	4.578	355-1
355	10.0087	COMB8_LS_025EQ2	Combination	Min	-221.077	-1.33	-0.153	-0.0335	-1.7396	10.0725	355-1
355	20.0174	COMB8_LS_025EQ2	Combination	Min	-221.785	-1.3	-0.153	-0.0335	-4.0771	14.8037	355-1
356	0.	COMB8_LS_025EQ2	Combination	Max	-110.232	1.823	0.242	0.296	2.7875	32.0418	356-1
356	7.5116	COMB8_LS_025EQ2	Combination	Max	-110.763	1.853	0.242	0.296	3.995	19.2514	356-1
356	15.0232	COMB8_LS_025EQ2	Combination	Max	-111.293	1.882	0.242	0.296	5.2026	7.222	356-1
356	0.	COMB8_LS_025EQ2	Combination	Min	-221.786	1.025	-0.161	-0.0137	-4.0757	14.8037	356-1
356	7.5116	COMB8_LS_025EQ2	Combination	Min	-222.317	1.055	-0.161	-0.0137	-5.8912	5.976	356-1
356	15.0232	COMB8_LS_025EQ2	Combination	Min	-222.848	1.084	-0.161	-0.0137	-7.7069	-4.0559	356-1

Table: Element Forces - Frames, Part 2 of 2

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
278	0.	COMB8_LS_025EQ2	Max	278-1	0.
278	10.	COMB8_LS_025EQ2	Max	278-1	10.
278	20.	COMB8_LS_025EQ2	Max	278-1	20.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
278	0.	COMB8_LS_025EQ2	Min	278-1	0.
278	10.	COMB8_LS_025EQ2	Min	278-1	10.
278	20.	COMB8_LS_025EQ2	Min	278-1	20.
279	0.	COMB8_LS_025EQ2	Max	279-1	0.
279	10.	COMB8_LS_025EQ2	Max	279-1	10.
279	20.	COMB8_LS_025EQ2	Max	279-1	20.
279	0.	COMB8_LS_025EQ2	Min	279-1	0.
279	10.	COMB8_LS_025EQ2	Min	279-1	10.
279	20.	COMB8_LS_025EQ2	Min	279-1	20.
280	0.	COMB8_LS_025EQ2	Max	280-1	0.
280	10.	COMB8_LS_025EQ2	Max	280-1	10.
280	20.	COMB8_LS_025EQ2	Max	280-1	20.
280	0.	COMB8_LS_025EQ2	Min	280-1	0.
280	10.	COMB8_LS_025EQ2	Min	280-1	10.
280	20.	COMB8_LS_025EQ2	Min	280-1	20.
281	0.	COMB8_LS_025EQ2	Max	281-1	0.
281	7.5	COMB8_LS_025EQ2	Max	281-1	7.5
281	15.	COMB8_LS_025EQ2	Max	281-1	15.
281	0.	COMB8_LS_025EQ2	Min	281-1	0.
281	7.5	COMB8_LS_025EQ2	Min	281-1	7.5
281	15.	COMB8_LS_025EQ2	Min	281-1	15.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station ft	OutputCase	StepType	FrameElem	ElemStation ft
288	0.	COMB8_LS_025EQ2	Max	288-1	0.
288	10.	COMB8_LS_025EQ2	Max	288-1	10.
288	20.	COMB8_LS_025EQ2	Max	288-1	20.
288	0.	COMB8_LS_025EQ2	Min	288-1	0.
288	10.	COMB8_LS_025EQ2	Min	288-1	10.
288	20.	COMB8_LS_025EQ2	Min	288-1	20.
289	0.	COMB8_LS_025EQ2	Max	289-1	0.
289	10.	COMB8_LS_025EQ2	Max	289-1	10.
289	20.	COMB8_LS_025EQ2	Max	289-1	20.
289	0.	COMB8_LS_025EQ2	Min	289-1	0.
289	10.	COMB8_LS_025EQ2	Min	289-1	10.
289	20.	COMB8_LS_025EQ2	Min	289-1	20.
290	0.	COMB8_LS_025EQ2	Max	290-1	0.
290	10.	COMB8_LS_025EQ2	Max	290-1	10.
290	20.	COMB8_LS_025EQ2	Max	290-1	20.
290	0.	COMB8_LS_025EQ2	Min	290-1	0.
290	10.	COMB8_LS_025EQ2	Min	290-1	10.
290	20.	COMB8_LS_025EQ2	Min	290-1	20.
291	0.	COMB8_LS_025EQ2	Max	291-1	0.
291	7.5	COMB8_LS_025EQ2	Max	291-1	7.5
291	15.	COMB8_LS_025EQ2	Max	291-1	15.

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
291	0.	COMB8_LS_025EQ2	Min	291-1	0.
291	7.5	COMB8_LS_025EQ2	Min	291-1	7.5
291	15.	COMB8_LS_025EQ2	Min	291-1	15.
343	0.	COMB8_LS_025EQ2	Max	343-1	0.
343	10.0087	COMB8_LS_025EQ2	Max	343-1	10.0087
343	20.0174	COMB8_LS_025EQ2	Max	343-1	20.0174
343	0.	COMB8_LS_025EQ2	Min	343-1	0.
343	10.0087	COMB8_LS_025EQ2	Min	343-1	10.0087
343	20.0174	COMB8_LS_025EQ2	Min	343-1	20.0174
344	0.	COMB8_LS_025EQ2	Max	344-1	0.
344	10.0087	COMB8_LS_025EQ2	Max	344-1	10.0087
344	20.0174	COMB8_LS_025EQ2	Max	344-1	20.0174
344	0.	COMB8_LS_025EQ2	Min	344-1	0.
344	10.0087	COMB8_LS_025EQ2	Min	344-1	10.0087
344	20.0174	COMB8_LS_025EQ2	Min	344-1	20.0174
345	0.	COMB8_LS_025EQ2	Max	345-1	0.
345	10.0087	COMB8_LS_025EQ2	Max	345-1	10.0087
345	20.0174	COMB8_LS_025EQ2	Max	345-1	20.0174
345	0.	COMB8_LS_025EQ2	Min	345-1	0.
345	10.0087	COMB8_LS_025EQ2	Min	345-1	10.0087
345	20.0174	COMB8_LS_025EQ2	Min	345-1	20.0174

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
346	0.	COMB8_LS_025EQ2	Max	346-1	0.
346	7.5116	COMB8_LS_025EQ2	Max	346-1	7.5116
346	15.0232	COMB8_LS_025EQ2	Max	346-1	15.0232
346	0.	COMB8_LS_025EQ2	Min	346-1	0.
346	7.5116	COMB8_LS_025EQ2	Min	346-1	7.5116
346	15.0232	COMB8_LS_025EQ2	Min	346-1	15.0232
353	0.	COMB8_LS_025EQ2	Max	353-1	0.
353	10.0087	COMB8_LS_025EQ2	Max	353-1	10.0087
353	20.0174	COMB8_LS_025EQ2	Max	353-1	20.0174
353	0.	COMB8_LS_025EQ2	Min	353-1	0.
353	10.0087	COMB8_LS_025EQ2	Min	353-1	10.0087
353	20.0174	COMB8_LS_025EQ2	Min	353-1	20.0174
354	0.	COMB8_LS_025EQ2	Max	354-1	0.
354	10.0087	COMB8_LS_025EQ2	Max	354-1	10.0087
354	20.0174	COMB8_LS_025EQ2	Max	354-1	20.0174
354	0.	COMB8_LS_025EQ2	Min	354-1	0.
354	10.0087	COMB8_LS_025EQ2	Min	354-1	10.0087
354	20.0174	COMB8_LS_025EQ2	Min	354-1	20.0174
355	0.	COMB8_LS_025EQ2	Max	355-1	0.
355	10.0087	COMB8_LS_025EQ2	Max	355-1	10.0087
355	20.0174	COMB8_LS_025EQ2	Max	355-1	20.0174

Table: Element Forces - Frames, Part 2 of 2

Frame	Station	OutputCase	StepType	FrameElem	ElemStation
	ft				ft
355	0.	COMB8_LS_025EQ2	Min	355-1	0.
355	10.0087	COMB8_LS_025EQ2	Min	355-1	10.0087
355	20.0174	COMB8_LS_025EQ2	Min	355-1	20.0174
356	0.	COMB8_LS_025EQ2	Max	356-1	0.
356	7.5116	COMB8_LS_025EQ2	Max	356-1	7.5116
356	15.0232	COMB8_LS_025EQ2	Max	356-1	15.0232
356	0.	COMB8_LS_025EQ2	Min	356-1	0.
356	7.5116	COMB8_LS_025EQ2	Min	356-1	7.5116
356	15.0232	COMB8_LS_025EQ2	Min	356-1	15.0232

Project	POV Berth 13 and 14 Vancouver	Sheet	of
		Job Number	A130267
Subject	platform piles under lateral spreading & EQ	Designer	G. Sheng
		Date	06/15/16

Check dock/platform plumb piles

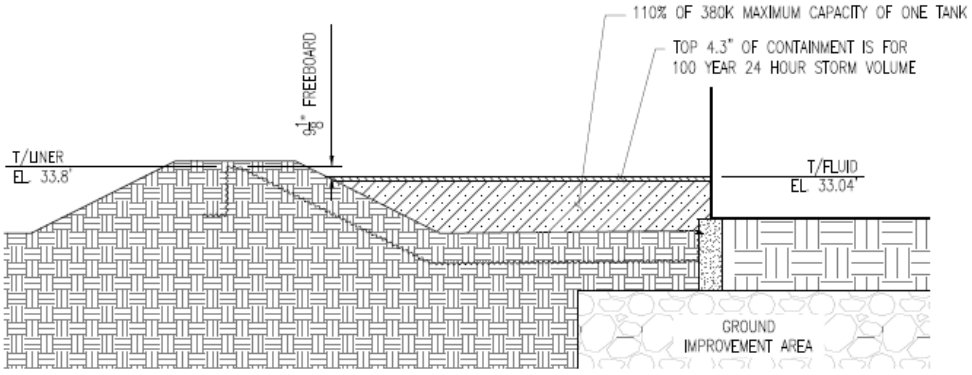
PLATFORM PILES - CHECK

Steel Pipe Piles		platform plumb pile				
Wall thick	0.375	in.	E =	2.90E+07	psi	
L =	70	ft	Fy =	50	ksi	
K =	0.65					
corrosion	0.0625	in., at OD				
Pile size(OD)	18	18	18	18	18	18
at corrosion	17.875	17.875	17.875	17.875	17.875	17.875
I.D.	17.25	17.25	17.25	17.25	17.25	17.25
I	664.97	664.97	664.97	664.97	664.97	664.97
EI	1.93E+10	1.93E+10	1.93E+10	1.93E+10	1.93E+10	1.93E+10
r	6.21	6.21	6.21	6.21	6.21	6.21
P_{cr} ,kips	638.43	638.43	638.43	638.43	638.43	638.43
P, kips	517.26	517.26	517.26	517.26	517.26	517.26
A, in^2	17.24	17.24	17.24	17.24	17.24	17.24
AE, kips	500016.38	500016.38	500016.38	500016.38	500016.38	500016.38
KL/r =	87.92	87.92	87.92	87.92	87.92	87.92
Cc =	107.00	107.00	107.00	107.00	107.00	107.00
Fa =	17.38	17.38	17.38	17.38	17.38	17.38
P_{allow} =	299.70	299.70	299.70	299.70	299.70	299.70
S (in^3)	74	74	74	74	74	74
M_{ult} = (k-ft)	310	310	310	310	310	310
(kN-m)	420	420	420	420	420	420
(ton-m)	43	43	43	43	43	43
$0.66M_{ult}$ = (k-ft)	204.61	204.61	204.61	204.61	204.61	204.61
(kN-m)	277	277	277	277	277	277
(ton-m)	28	28	28	28	28	28
$0.6M_{ult}$ = (k-ft)	186.01	186.01	186.01	186.01	186.01	186.01
(kN-m)	252	252	252	252	252	252
(ton-m)	26	26	26	26	26	26
Structural check						
ϕc	0.90	0.90	0.90	0.90	0.90	0.90
ϕb	0.90	0.90	0.90	0.90	0.90	0.90
Pn, kips	299.70	299.70	299.70	299.70	299.70	299.70
Mnx, kip-ft	310.01	310.01	310.01	310.01	310.01	310.01
Mny, kip-ft	310.01	310.01	310.01	310.01	310.01	310.01
Pc=ϕcPn, kips	269.73	269.73	269.73	269.73	269.73	269.73
Mcx=ϕbMnx, k-ft	279.01	279.01	279.01	279.01	279.01	279.01
Mcy=ϕbMny, k-ft	279.01	279.01	279.01	279.01	279.01	279.01
Pr, kips	217.50					
Mrx, k-ft	42.60					
Mry, k-ft	3.60					
Pr/Pc	0.81	0.00	0.00	0.00	0.00	0.00
combined chk	0.95	0.00	0.00	0.00	0.00	0.00

#353

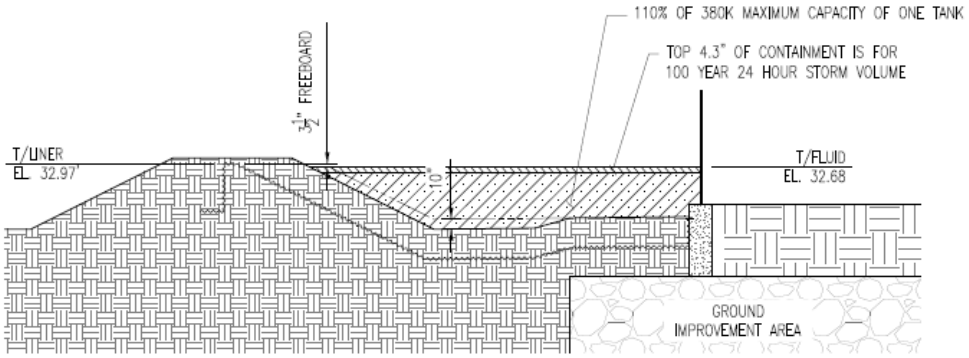
Attachment 2: Response to Item SA-28 – Figures and Liner Specifications

Figure 1:



NON–LIQUIFIED DESIGN CAPACITY

Figure 2:



10" LIQUIFIED BERM DROP CAPACITY

Figure 3:

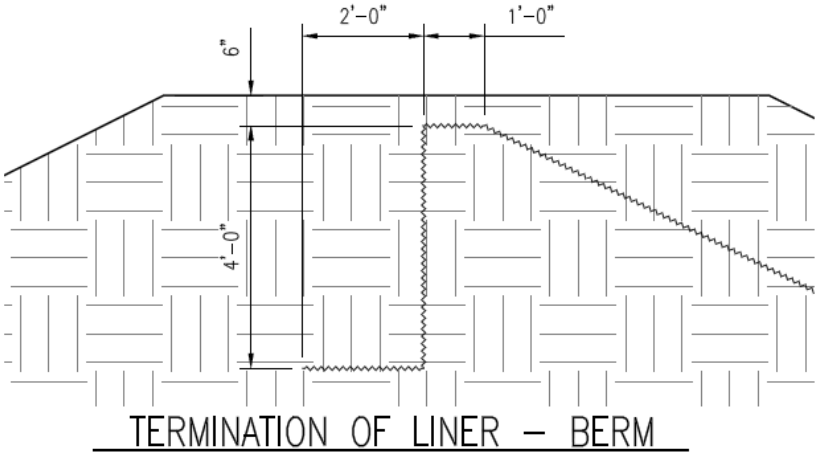
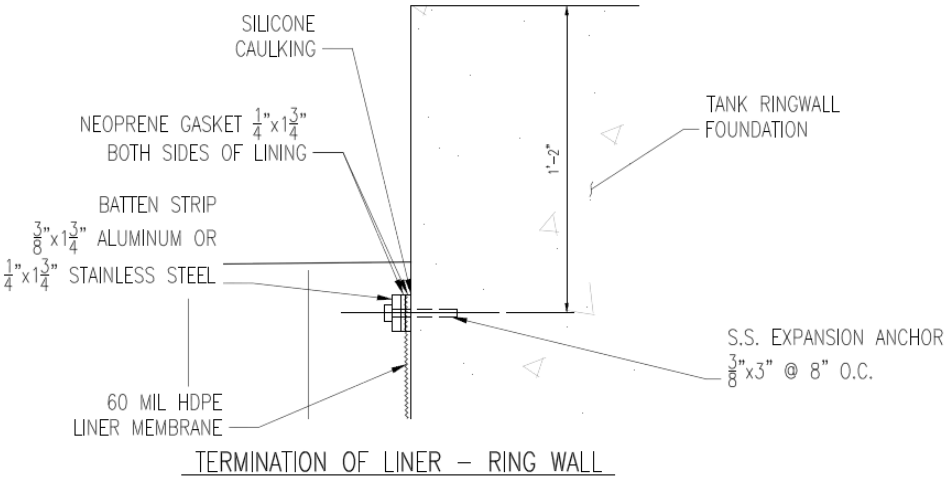


Figure 4:



DROP-IN SPECIFICATIONS
STANDARD GEOMEMBRANES (ENGLISH UNITS)

The following drop-in specifications is a sample guideline to be customized by the engineer for preparing site specific specification. This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Please contact GSE for current specifications.

GSE and other trademarks in this document are registered trademarks of GSE Lining Technology, LLC in the United States and certain foreign countries.

1 GENERAL

1.1 SCOPE

This drop-in specification covers the technical requirements for the Manufacturing and Installation of the geomembrane. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
   2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
   3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
   4. D 1603 Test Method for Carbon Black in Olefin Plastics
   5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
   6. D 4218 Standard Test Method for Determination of Carbon Black in Polyethylene Compounds
   7. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
   8. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
   9. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
   10. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
   11. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes
   12. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
   13. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
   14. D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test)

B. Geosynthetic Research Institute
   1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
   2. GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

1.3 DEFINITIONS

A. Lot - A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

B. Construction Quality Assurance Consultant (CONSULTANT) - Party, independent from MANUFACTURER and INSTALLER that is responsible for observing and documenting activities related to quality assurance during the lining system construction.
C. ENGINEER- The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.
D. Geomembrane Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geomembrane rolls.
E. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) - Party, independent from the OWNER, MANUFACTURER and INSTALLER, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the OWNER.
F. INSTALLER- Party responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.
G. Panel- Unit area of a geomembrane that will be seamed in the field that is larger than 100 ft2.
H. Patch - Unit area of a geomembrane that will be seamed in the field that is less than 100 ft2.
I. Subgrade Surface - Soil layer surface which immediately underlies the geosynthetic material(s).

1.4 SUBMITTALS POST-AWARD

A. Furnish the following product data, in writing, to ENGINEER prior to installation of the geomembrane material:
   1. Resin Data shall include the following.
      a. Certification stating that the resin meets the specification requirements (see Table 1.9B).
   2. Geomembrane Roll
      a. Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).
B. The INSTALLER shall furnish the following information to the ENGINEER and OWNER prior to installation:
   1. Installation layout drawings
      a. Must show proposed panel layout including field seams and details
      b. Must be approved prior to installing the geomembrane
   2. Approved drawings will be for concept only and actual panel placement will be determined by site conditions.
   3. Installer's Geosynthetic Field Installation Quality Assurance Plan
C. The INSTALLER will submit the following to the ENGINEER upon completion of installation:
   1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents
   2. Material and installation warranties
   3. As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail

1.5 QUALITY ASSURANCE

A. The OWNER will engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.6 QUALIFICATIONS

A. MANUFACTURER
   1. Geomembrane shall be manufactured by the following:
      a. GSE Lining Technology, LLC
      b. approved equal
   2. MANUFACTURER shall have manufactured a minimum of 10,000,000 square feet of polyethylene geomembrane during the last year.

B. INSTALLER
   1. Installation shall be performed by one of the following installation companies (or approved equal)
      a. GSE Lining Technology, LLC
      b. GSE Approved Installers
   2. INSTALLER shall have installed a minimum of [ ] square feet of HDPE geomembrane during the [ ] last years.
   3. INSTALLER shall have worked in a similar capacity on at least [ ] projects similar in complexity to the project described in the contract documents, and with at least [ ] square feet of HDPE geomembrane installation on each project.
   4. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.
   5. The INSTALLER shall provide a minimum of one Master Seamer for work on the project.
      a. Must have completed a minimum of 1,000,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.

1.7 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the MANUFACTURER. The label will identify:
   a. manufacturer's name
   b. product identification
   c. thickness
   d. length
   e. width
   f. roll number

B. Delivery- Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage- The on-site storage location for geomembrane material, provided by the CONTRACTOR to protect the geomembrane from punctures, abrasions and excessive dirt and moisture for should have the following characteristics:
   a. level (no wooden pallets)
   b. smooth
   c. dry
   d. protected from theft and vandalism
   e. adjacent to the area being lined

D. Handling- Materials are to be handled so as to prevent damage.

1.8 WARRANTY

A. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.
B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

1.9 GEOMEMBRANE PROPERTIES

A. Material shall be smooth/textured polyethylene geomembrane as shown on the drawings.
B. Resin
   1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.
   2. Natural resin (without carbon black) shall meet the following requirements:

Table 1.9B: Raw Material Properties

Property	Test Method	HDPE	LLDPE
Density (g/cm3)	ASTM D 1505	≥0.932	≥0.915
Melt Flow Index (g/10 min)	ASTM D 1238 (190/2.16)	≤1.0	≤1.0
OIT (minutes)	ASTM D 3895 (1 atm/200^{0}C)	≥100	≥100

C. Geomembrane Rolls
   1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
   2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
   3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width and MANUFACTURER.
   4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in section 1.09 D and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.
D. Smooth surfaced geomembrane shall meet the requirements shown in the following data sheets below:
   1. Table 1.1 for Black HDPE
   2. Table 1.2 for Green HDPE
   3. Table 1.3 for White HDPE
      a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
      b) The white surface shall be installed upwards.
   4. Table 1.4 for Smooth Leak Location Liner HDPE
      a) The geomembrane shall have a coextruded, electrically conductive layer.
      b) The conductive layer is installed downward.
      c) Electrical testing shall be performed after liner installation by the INSTALLER.
   5. Table 1.5 for Smooth White Leak Location Liner HDPE
      a) The geomembrane shall have a coextruded, electrically conductive layer.
      b) The conductive layer is installed downward.
      c) The geomembrane shall be a white-surfaced, coextruded geomembrane.
      d) The white surface shall be installed upwards.

   e) Electrical testing shall be performed after liner installation by the INSTALLER.
6. Table 1.6 for Black LLDPE
7. Table 1.7 for White-surfaced LLDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
8. Table 1.8 for Leak Location Liner LLDPE
   a) The geomembrane shall have a coextruded, electrically conductive layer.
   b) The conductive layer is installed downward.
   c) Electrical testing shall be performed after liner installation by the INSTALLER.
9. Table 1.9 for White Leak Location Liner LLDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
   c) The geomembrane shall have a coextruded, electrically conductive layer.
   d) The conductive layer is installed downward.
   e) Electrical testing shall be performed after liner installation by the INSTALLER.

Table 1.1: GSE HD Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(2), ft			1,120	870	560	430	340
Roll Width(2), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000091-TSS

Table 1.2: GSE Green Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)	Note(2)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(3), ft			1,120	870	560	430	340
Roll Width(3), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- (1)GSE Green Smooth may have an overall ash content of 3.0% due to the green layer. These values apply to the black layer only.
- (2)Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE Green Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000092-TSS

Table 1.3: GSE White Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)	Note(2)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(3), ft			1,120	870	560	430	340
Roll Width(3), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- (1)GSE White Smooth may have an overall ash content of 3.0% due to the white layer. These values apply to the black layer only.
- (2)Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000093-TSS

Table 1.4: GSE Leak Location Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	72	108	144	180
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(3), ft			870	560	430	340
Roll Width(3), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- (1)GSE Leak Location Smooth may have an overall ash content of 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- (2)Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE Leak Location Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000094-TSS

Table 1.5: GSE Leak Location White Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	72	108	144	180
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(3), ft			870	560	430	340
Roll Width(3), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- (1)GSE Leak Location White Smooth may have an overall ash content of 3.0% due to the white and conductive layers. These values apply to the black layer only.
- (2)Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE Leak Location White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000095-TSS

Table 1.6: GSE UltraFlex Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(2), ft			870	560	430	340
Roll Width(2), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ±1 %.
- GSE UltraFlex is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000096-TSS

Table 1.7: GSE UltraFlex White Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex White Smooth may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000097-TSS

Table 1.8: GSE UltraFlex Leak Location Liner Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(3), ft			870	560	430	340
Roll Width(3), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- (1)GSE UltraFlex Leak Location Smooth may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- (2)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000098-TSS

Table 1.9: GSE UltraFlex Leak Location Liner White Smooth Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex Leak Location White Smooth may have an overall ash content greater than 3.0% due to the white and conductive layers. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000099-TSS

E. Textured surfaced geomembrane shall meet the requirements shown in the following data sheets below.

1. Table 2.1 for Black coextruded textured HDPE
2. Table 2.2 for Green coextruded textured HDPE
3. Table 2.3 for White coextruded textured HDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
4. Table 2.4 for Leak Location Liner coextruded textured HDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
5. Table 2.4 for White Leak Location Liner coextruded textured HDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
6. Table 2.6 for Black coextruded textured LLDPE
7. Table 2.7 for White coextruded textured LLDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
8. Table 2.8 for Leak Location Liner coextruded textured LLDPE
   a) The geomembrane shall have a coextruded, electrically conductive layer.
   b) The conductive layer is installed downward.
   c) Electrical testing shall be performed after liner installation by the INSTALLER.
9. Table 2.9 for White Leak Location Liner coextruded textured LLDPE
   a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
   b) The white surface shall be installed upwards.
   c) The geomembrane shall have a coextruded, electrically conductive layer.
   d) The conductive layer is installed downward.
   e) Electrical testing shall be performed after liner installation by the INSTALLER.

Table 2.1: GSE HD Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load(2), hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(3), ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width(3), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)NCTL for GSE HD Textured is conducted on representative smooth geomembrane samples.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000101-TSS

Table 2.2: GSE Green Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)	Note(2)
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load(3), hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(4), ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width(4), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- (1)GSE Green may have an overall ash content greater than 3.0% due to the green layer. These values apply to the black layer only.
- (2)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)NCTL for GSE Green Textured is conducted on representative smooth geomembrane samples.
- (4)Roll lengths and widths have a tolerance of ±1%.
- GSE Green Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000102-TSS

Table 2.3: GSE White Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [(1)]GSE White may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE White Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000103-TSS

Table 2.4: GSE Leak Location Liner Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	60	90	120	150
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Notch Constant Tensile Load(3), hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(4), ft	Double-Sided Textured Single-Sided Textured		700 780	520 540	400 410	330 330
Roll Width(4), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- (1)GSE Leak Location may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive layer only.
- (2)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)NCTL for GSE Leak Location Textured is conducted on representative smooth geomembrane samples.
- (4)Roll lengths and widths have a tolerance of ±1%.
- GSE Leak Location Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000104-TSS

Table 2.5: GSE Leak Location Liner White Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Notch Constant Tensile Load[(2)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [(1)]GSE Leak Location White may have an overall ash content greater than 3.0% due to the conductive and white layers. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE Leak Location White Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE Leak Location White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

EX-0370-000105-TSS

Table 2.6: GSE UltraFlex Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(2), ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width(2), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000106-TSS

Table 2.7: GSE UltraFlex White Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex White Textured may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000107-TSS

Table 2.8: GSE UltraFlex Leak Location Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex Leak Location Textured may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000108-TSS

Table 2.9: GSE UltraFlex Leak Location White Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex Leak Location White Textured may have an overall ash content greater than 3.0% due to the white and conductive layers. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

EX-0370-000109-TSS

F. Extrudate Rod or Bead
   1. Extrudate material shall be made from same type resin as the geomembrane.
   2. Additives shall be thoroughly dispersed.
   3. Materials shall be free of contamination by moisture or foreign matter.

1.10 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:
   1. Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present.
   2. An adequate number of welding apparati shall be available to avoid delaying work.
   3. Power source must be capable of providing constant voltage under combined line load.

1.11 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.
B. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.
C. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
   1. Geomembranes shall be installed according to site-specific specifications, and GSE Conductive should be installed with the Conductive layer down.
      Note: A spark tester or ohm meter can be used to determine Conductive layer.
   2. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
   3. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
   4. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
   5. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 8 psi.
   6. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.
D. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

1.12 FIELD SEAMING

A. Seams shall meet the following requirements:
   1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
   2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
   3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.
   4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the CONSULTANT and INSTALLER.

5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-inch overlap is commonly suggested.

B. During Welding Operations

1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding

1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.

D. Hot Wedge Welding

1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

E. Trial Welds

1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
4. Cut four, one-inch wide by six-inch long test strips from the trial weld.
5. Quantitatively test specimens for peel adhesion, and then for shear strength.
6. Trial weld specimens shall pass when the results shown in the following tables for HDPE and LLDPE are achieved in both peel and shear test.

Table 1.12.6A: Minimum Weld Values for HDPE Geomembranes (English)

Property	Test Method	30	40	60	80	100	120
Peel Strength (fusion), ppi	ASTM D 6392	49	65	98	130	162	196
Peel Strength (extrusion), ppi	ASTM D 6392	39	52	78	104	130	157
Shear Strength (fusion & ext.), ppi	ASTM D 6392	61	81	121	162	203	242

Table 1.2.6B: Minimum Weld Values for LLDPE Geomembranes (English)

Property	Test Method	30	40	60	80	100
Peel Strength (extrusion), ppi	ASTM D 6392	36	48	72	96	120
Peel Strength (fusion), ppi	ASTM D 6392	38	50	75	100	125
Shear Strength (fusion & ext.), ppi	ASTM D 6392	45	60	90	120	150

a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
b. The break is ductile.

7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. INSTALLER shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs

1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

1.13 FIELD QUALITY ASSURANCE

A. MANUFACTURER and INSTALLER shall participate in and conform to all terms and requirements of the Owner's quality assurance program. CONTRACTOR shall be responsible for assuring this participation.

B. Quality assurance requirements are as specified in this Section and in the Field Installation Quality Assurance Manual if it is included in the contract.

C. Field Testing

1. Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.
   a. Vacuum Testing
      1) Shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
   b. Air Pressure Testing
      1) Shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
   c. Spark Tesing
      1) Shall be performed accordance with ASTM D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test).
   d. Other approved methods.
2. Destructive Testing (performed by CONSULTANT with assistance from INSTALLER)
   a. Location and Frequency of Testing
      1) Collect destructive test samples at a frequency of one per every 500 lineal feet of seam length.
      2) Test locations will be determined after seaming.
      3) Exercise Method of Attributes as described by GRI GM-14 (Geosynthetic Research Institute, http://www.geosynthetic-institute.org) to minimize test samples taken.
   b. Sampling Procedures are performed as follows:
      1) INSTALLER shall cut samples at locations designated by the CONSULTANT as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
      2) CONSULTANT will number each sample, and the location will be noted on the installation as-built.
      3) Samples shall be twelve (12) inches wide by minimal length with the seam centered lengthwise.
      4) Cut a 2-inch wide strip from each end of the sample for field-testing.

5) Cut the remaining sample into two parts for distribution as follows:
   a) One portion for INSTALLER, 12-inches by 12 inches
   b) One portion for the Third Party laboratory, 12-inches by 18-inches
   c) Additional samples may be archived if required.
6) Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method for Determing the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
7) INSTALLER shall repair all holes in the geomembrane resulting from destructive sampling.
8) Repair and test the continuity of the repair in accordance with these Specifications.

3. Failed Seam Procedures
   a) If the seam fails, INSTALLER shall follow one of two options:
      1) Reconstruct the seam between any two passed test locations.
      2) Trace the weld to intermediate location at least 10 feet minimum or where the seam ends in both directions from the location of the failed test.
   b) The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10 feet long.
   c) If sample passes, then the seam shall be reconstructed or capped between the test sample locations.
   d) If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

1.14 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.
C. INSTALLER shall be responsible for repair of defective areas.
D. Agreement upon the appropriate repair method shall be decided between CONSULTANT and INSTALLER by using one of the following repair methods:
   1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
   2. Abrading and Re-welding- Used to repair short section of a seam.
   3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
   4. Capping- Used to repair long lengths of failed seams.
   5. Flap Welding- Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
   6. Remove the unacceptable seam and replace with new material.
E. The following procedures shall be observed when a repair method is used:
   1. All geomembrane surfaces shall be clean and dry at the time of repair.
   2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
   3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.
F. Repair Verification
   1. Number and log each patch repair (performed by CONSULTANT).
   2. Non-destructively test each repair using methods specified in this Specification.

1.15 MEASUREMENT AND PAYMENT

A. Payment for geomembrane installation will be as per contract unit price per square foot, as measured parallel to liner surface, including designed anchor trench material and is based upon net lined area.

B. Net lined area is defined to be the true area of all surfaces to be lined plus designed burial in all anchor trenches, rubsheets, and sacrificial layers.

C. Prices shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals.

D. Prices also include doing all the work involved in performing geomembrane installation completely as shown on the drawing, as specified herein, and as directed by the ENGINEER.

END OF SECTION

Attachment 3: June 7, 2016 Letter to Stephen Posner

Van Ness Feldman LLP

719 Second Avenue, Suite 1150
Seattle, WA 98104-1728
206-623-9372
vnf.com

June 7, 2016

Via e-mail sposner@utc.wa.gov

Stephen Posner, Manager
Energy Facility Site Evaluation Council
Utilities & Transportation Commission
P.O. Box 43172
Olympia, WA 98504-3172

Re: Tesoro Savage Vancouver Energy Distribution Terminal Project
Application No. 2013-0; Docket: EF-131590

Dear Mr. Posner:

This letter addresses the recommendations in the Draft Environmental Impact Statement ("DEIS") to complete additional numerical modeling of the seismic design. As you are aware, Vancouver Energy has previously expressed its willingness to complete additional numerical modeling. While we believe that our seismic consultants' analysis and work to-date support our proposed design and adequately address seismic risks, we are willing to explore completion of the additional analysis in an effort to resolve questions raised in the DEIS. As we have previously indicated in our correspondence, we have requested the opportunity to meet with EFSEC's seismic consultant to discuss the detailed methods to be used for the suggested numerical modeling before we initiated that work, precisely because of the highly subjective nature of the modeling and the potential range of assumptions incorporated during development of the model. We want to clarify that our request for a meeting is not an attempt to negotiate with staff. Rather, it is for the express purpose of getting clarity before initiating costly and time consuming work. Fundamentally, we seek to avoid, to the greatest extent possible, the need to eventually re-build and re-run the model to address issues that could have been identified at the outset.

To further that discussion we previously prepared a scope of work for the FLAC/PLAXIS analysis to advance the discussion with EFSEC. Most recently, we received your letter requesting additional information in advance of a meeting with EFSEC's seismic consultants. In this letter, we provide responses to your requests. This letter and our ongoing effort to get clarity on the approach for additional computer modeling also resolves data request item SA-29 from the more recent Data Request 10.

Our seismic consultants' responses are organized below according to the list of tasks we provided on April 12, 2016. We have listed the task, followed by your questions on those specific tasks, and the included our answers to those questions.

Once you have the opportunity to review, we request the opportunity to discuss this further.

Very truly yours,

VAN NESS FELDMAN LLP

Tadas A. Kisielius

69055-8

1. Review existing project geotechnical, ground improvement design, and design criteria information as provided by HBI. Perform conceptual review of the current ground improvement design.

   EFSEC QUESTION: NONE

2. Develop one idealized dynamic geotechnical cross-section with soil parameters to approximate dynamic soil engineering behavior. The cross-section will be perpendicular to the shoreline and will be selected by HBI.

   EFSEC QUESTION: How far in each direction from the shoreline will the cross-section extend?

   APPLICANT ANSWER: The section to be evaluated is the cross section previously evaluated (see adobe page 480 of the ground improvement design submittal and Drawing HB-14). This cross section extends about 540 feet measured perpendicular to the river. The cross-section for the FE/FLAC analysis will be taken at the same location. The extents of the cross section for the FLAC analyses will be chosen such that free field conditions persist in the uplands and a laterally spreading slide mass does not intersect the lateral boundaries of the model. Our initial expectations are that in the upland (northern) direction, the cross-section will extend about 200 feet beyond the maximum possible extent of a potential lateral spread estimated to be about 800-1000 feet from the lowest point in the river. In the downslope (southern) direction, the cross section will likely extend about 200 feet beyond the deepest portion of the river.

3. Develop seven horizontal ground motions based on the 2008 USGS probabilistic seismic hazard analysis uniform hazard spectra corresponding to a 2,475 year return period. These motions will be used to simulate seismic demand of the numerical model as described below.

   EFSEC QUESTION 1. Does this statement mean that the results of the site-specific seismic hazards analysis will not be used in the analysis and design for the area 400 structures?

   APPLICANT ANSWER 1: No, the results of the site-specific seismic hazards analysis will be used as part of the analysis and design for area 400 structures. We intend to build on that site-specific seismic hazards analysis. This means for the initial iteration, HBI will not develop ground motions. Rather, the input ground motions developed by GRI for the site specific response analyses (DMOD) in the geotechnical report will be used for the initial iteration of the FE/FLAC analyses. These motions were developed as outcrop motions for a site class C soil with a Vs=2,500 ft/s. The upward propagating portion of the motion will be applied at the compliant base of the FLAC model. Subsequent iterations may also be performed. These subsequent iterations may draw on other ground motions.

EFSEC QUESTION 2: Will the ground motions be based on the 2008 USGS seismic-source and magnitude-distance deaggregation data?

APPLICANT ANSWER 2: Yes, the initial evaluation will use the same ground motions as previously submitted (see Applicant Answer 1 immediately above). It is possible that subsequent FE/ FLAC iterations will use different ground motions than those previously developed by GRI. But even in that case the selected ground motions would be based on the 2008 USGS seismic-source and magnitude-distance deaggregation data.

EFSEC QUESTION 3: Will only accelerograms components recorded during past earthquakes be selected or will some of the records be artificial.

APPLICANT ANSWER 3: All accelerograms will be based on recorded time histories. For the initial evaluation, the specific time histories will be the same as listed in Table 5B (page B-10) of the geotechnical investigation report for the dock facility prepared by GRI and dated September 5, 2014. No synthetic records are proposed for use in the initial or possible subsequent FE/FLAC analyses. For your convenience, Table 5B of the referenced geotechnical report is reproduced below.

TABLE 5B SELECTED STRONG-MOTION RECORDS

Earthquake	Recording Station	Magnitude	Rupture Distance, km	Peak Bedrock Acceleration, g
Loma Prieta (1989)	San Jose - Santa Teresa Hills	6.9	14.7	0.28
Nisqually (2001)	Olympia, WSDOT Test Lab	6.8	18.3	0.22
Chile (2010)	Curico	8.8	65.1	0.47
Chile (2010)	Hualane	8.8	50	0.46
Japan (2011)	Kuroiso (TCG001)	9	102	0.42
Japan (2011)	Yamatsuri (FKS 014)	9	76	0.23
Japan (2011)	Hachinohe (AOM 012)	9	99	0.19

EFSEC QUESTION 4: Which procedure (constant scaling or spectral matching) will be used to modify the components so they are compatible with the 2475-yr uniform hazard spectrum?

APPLICANT ANSWER 4: As noted in Appendix B of the geotechnical investigation report for the dock facility dated September 5, 2014, GRI used a constant scaling. This is specifically described on page B-10 where GRI discusses use of a single factor for scaling the time histories. For the initial FE modeling, we propose using the same scaling factors used by GRI. For possible subsequent analyses of different (more hazard targeted) motions we anticipate the use of spectral matching will provide the highest degree of confidence in the calculated displacements..

EFSEC QUESTION 5: At what depth (and at the top of what soil layer) will these ground motions be considered as an outcrop motion?

APPLICANT ANSWER 5: As explained in Appendix B of the geotechnical investigation report for the dock facility dated September 5, 2014, GRI input the bedrock motions at depths of 206 ft and 252 ft for the dock section and the trestle pier 3 section, respectively. The soil profiles for the two sections are summarized in Tables 3B and 4B. For the proposed FE modeling, we propose using the same generalized soil profile and depth to bedrock for both the initial and possible subsequent FE modeling.

4. Calibrate soil constitutive models for site-specific dynamic site response and liquefaction behavior.

EFSEC QUESTION: Provide details regarding the calibration, including the code to be used and describe how it will account for pore-pressure buildup in the saturated soil units

APPLICANT ANSWER: The code PM4SAND version 3 developed and implemented for FLAC by Ross Boulanger et al will be used. This model is being used on a wide variety of projects in which liquefaction is evaluated and has been published in peer reviewed journals. The model is generally calibrated to produce the cyclic resistance of sands as estimated by the Boulanger and Idriss methods of evaluating liquefaction. Additional calibration of the model will be made based on cyclic direct simple shear tests performed for the upstream Columbia River Crossing project and exploration data collected for the Vancouver Energy project.

5. Perform one-dimensional (1D) site response analyses in the ground improvement zone along the developed cross-section.

EFSEC QUESTION: What is the purpose of the 1D site response analysis and how will it be used in subsequent analysis? Is it for a liquefaction trigger analysis?

APPLICANT ANSWER: The 1D site response analyses have several purposes for these analyses. The first is that the constitutive model (PM4SAND) is different than the models used in DMOD. Therefore it is expected that there will be differences between the two analyses. The 1D analyses will be used to understand the differences between the two. Second, it is anticipated that there could be differences in results between 1D and 2D analyses based on the geometry and distribution of soil parameters in a 2D geometry. The 1D analysis will act as a QA/QC check of the free field (upland) response of the 2D analyses.

6. Develop a two-dimensional (2D) model using the program FLAC. The model will simulate free-field conditions with and without the proposed stone column ground

improvement. This model will not consider the deep soil mix columns, jet grout columns, pipeline or any other structure.

EFSEC QUESTION1: Provide details on exactly what is going to be done for this 2D analysis, state the area of the facility to be modeled, and state the purpose of the analysis and expected results/outputs.

APPLICANT ANSWER1: The 2D analysis will be a non-linear, effective stress, dynamic numerical model performed in the program FLAC. Area 400 will be modeled. The purpose is to calculate anticipated displacement of the pipeline footings which will validate the previously completed work. For the initial iteration, the model will be excited at its base by the earthquake ground motions developed by GRI. Saturated sand soil response will be simulated using the PM4SAND constitutive model. The intention of the 2D analyses is to evaluate the natural slope displacement response to the earthquake ground motions. Stone column ground improvement will be introduced into the model to evaluate the relative impact of the ground improvement on slope displacements. The stone column will be modeled with parameters to represent dense gravel. *In situ* sand that will be densified by the ground improvement will be modeled with an increased cyclic resistance based HBI's estimation of the densification that will be achieved. The soil response (displacement and liquefied stiffness/strength) of the soil upland of the stone columns will be used as input (driving and resistance) for subsequent analyses of the DSM and jet grout column.

EFSEC QUESTION2: The term 'free field' usually implies level ground away from any slopes or structures, so does this mean the tank area will be modeled?

APPLICANT ANSWER2: We agree that free-field usually implies level ground. Here, we used the term to mean the natural (unimproved) slope in Area 400. We do not intend to complete the modeling for Area 300.

EFSEC QUESTION 3: If it is to be Area 400, then why leave out the deep soil mix columns and jet grout columns in this model?

APPLICANT ANSWER 3: The DSM and jet grout columns in our opinion do not map well to the 2D assumption of the model. We intend to use a decoupled approach to evaluate the DSM and jet grout columns. See response above and details for 3D analysis below.

7. Develop a three-dimensional model using the program FLAC3D to perform a pseudo-static analysis of the deep soil mix and jet grout columns. Parameters for modeling the ground improvement will be based on the HBI design. Ground deformations and soil strengths based on the 2D model results will be used as input of imposed permanent soil deformation and resistance for this analysis.

EFSEC QUESTION 1: Clarify the scope. Pseudo-static analysis, with imposed ground deformations/soil strengths from the 2D model is mentioned.

APPLICANT ANSWER 1: The 3D model is better described as a quasi-dynamic model rather than a pseudo-static model. The soil response from the 2D analyses (deformation and pore pressure generation) for the soils upland of the ground improvement will be used as input for the 3D analyses. This deformation response will be used to impose displacements on the boundaries of the 3D model. The pore pressure response will be used to reduce the soil strength and stiffness. These input conditions will apply demands in the form of shear traction forces on the side of the DSM and jet grout columns and normal forces on the lateral ends of the DSM. These forces will induce deformation of the DSM and jet grout.

EFSEC QUESTION 2: What types of results will be obtained?

APPLICANT ANSWER 2: The results of this analysis will be deformation response of the DSM and jet grout column from loading by the surrounding soils.

EFSEC QUESTION 3: What plan view area will be modeled? Will it include the stone-column area to the east?

APPLICANT ANSWER 3: The plan area will be the tributary area around one set of DSM panels, jet grout column, and the stone-column area between the DSM panels and the River.

EFSEC QUESTION 4: In addition to this pseudo-static analysis, why isn't a dynamic analysis being considered using some or all of the modified acceleration components as the input motions?

APPLICANT ANSWER 4: See our answer to EFSEC Question 1 in topic 7 (this set of questions), above.