BLUFFDALE
EST. 1848

14600 SOUTH BOX JACKING RAILROAD CROSSING

TEMPORARY WORKS 100% PACKAGE REV.02

11TH JULY 2025

PETRUCCO box jacking systems

McNARY BERGERON & JOHANNESEN ENGINEERED CONSTRUCTION

GERHART COLE

This Appendix D contains the following design packages:

1. Jacking works drawings (by Petrucco)	pp. 2	through 39
2. Project sequence and method statement (by Petrucco)	pp. 40	through 75
3. Temporary Micropile Design Submittal (by Gerhart Cole)	pp. 76	through 176
4. Temporary bridge "Verona shoring system" review (by MBJ)	pp. 177	through 361
5. Temporary works design (by MBJ)	pp. 362	through 380
5. Micropile cap design (by MBJ)	pp. 381	through 390

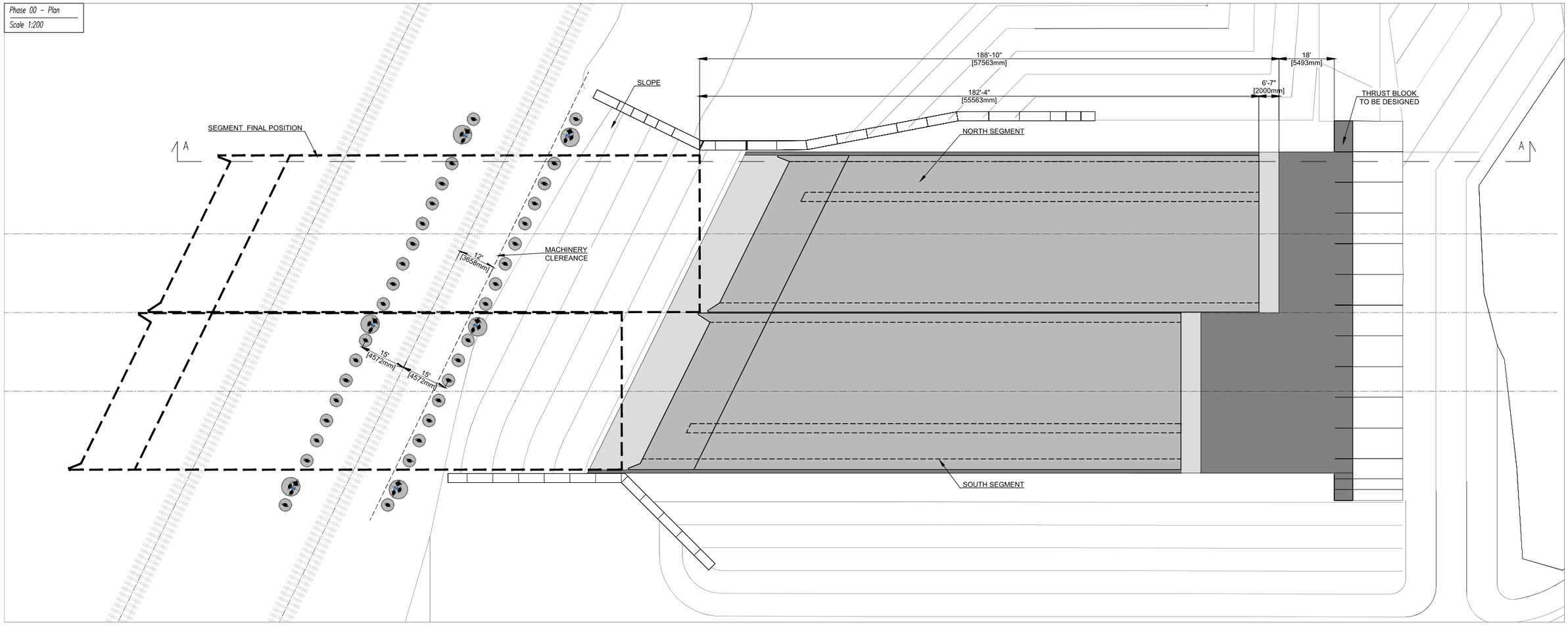
PETRUCCO ITALIA SRL
BOX JACKING SYSTEMS
info@petruccosrl.it
www.petrucco.com

PETRUCCO box jacking systems

WORK CODE	PUSA_2021_18_BLUFFDALE CITY_UTAH - 100% REVISION_02 - 11th JULY 2025				
BUIDING SITE	BLUFFDALE CITY - UTAH				
FILENAME	NUMBER	FILE	DESCRIPTION	EMISSION	LAST REVISION
DRAWINGS					
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	01	PDF	BOX 1 - PHASE 0 - CASTING POSITION	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.02	02	PDF	BOX 1 - PHASE 1 - VERONA SYSTEM INSTALLATION	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	03	PDF	BOX 1 - PHASE 2.1 - PRELIMINARY JACKING	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	04	PDF	BOX 1 - PHASE 2.2 - 1ST ROW MICROPILE DEMOLITION AND 1ST SECONDARY SLAB	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	05	PDF	BOX 1 - PHASE 2.3 - JACKING UNTIL 2ND ROW OF MICROPILES	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	06	PDF	BOX 1 - PHASE 2.4 - 2ND ROW OF MICROPILES DEMOLITION	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	07	PDF	BOX 1 - PHASE 2.5 - ADVANCEMENT UNTIL CONTROL STOP	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	08	PDF	BOX 1 - PHASE 2.6 - 2ND SECONDARY SLAB CASTING	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	09	PDF	BOX 1 - PHASE 3.1 - UTA TRACK REMOVAL	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	10	PDF	BOX 1 - PHASE 3.2 - CONTINUOUS EXCAVATION AND JACKING	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	11	PDF	BOX 1 - PHASE 3.3 - UTA TRACK RESTORED	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	12	PDF	BOX 2 - PHASE 0 - CASTING POSITION	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	**13**	**PDF**	**BOX 2 - PHASE 1 - VERONA SYSTEM INSTALLATION (SHIMS UPDATED - COMMENT 145)**	**20/09/2024**	**11/07/2025**
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	14	PDF	BOX 2 - PHASE 2.1 - PRELIMINARY JACKING	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	15	PDF	BOX 2 - PHASE 2.2 - 1ST ROW MICROPILE DEMOLITION AND 1ST SECONDARY SLAB	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	16	PDF	BOX 2 - PHASE 2.3 - JACKING UNTIL 2ND ROW OF MICROPILES	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	17	PDF	BOX 2 - PHASE 2.4 - 2ND ROW OF MICROPILES DEMOLITION	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	18	PDF	BOX 2 - PHASE 2.5 - ADVANCEMENT UNTIL CONTROL STOP	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	19	PDF	BOX 2 - PHASE 2.6 - 2ND SECONDARY SLAB CASTING	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	20	PDF	BOX 2 - PHASE 3.1 - UTA TRACK REMOVAL	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	21	PDF	BOX 2 - PHASE 3.2 - CONTINUOUS EXCAVATION AND JACKING	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_2C_DESIGN_rev.03	22	PDF	BOX 2 - PHASE 3.3 - UTA TRACK RESTORED	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.02	23	PDF	VERONA SYSTEM DETAILS - BOX 1 LAYOUT	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.02	24	PDF	VERONA SYSTEM DETAILS - BOX 2 LAYOUT	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.01	25	PDF	VERONA SYSTEM DETAILS - MODULE 1	20/09/2024	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.01	26	PDF	VERONA SYSTEM DETAILS - MODULE 2	20/09/2024	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.02	27	PDF	VERONA SYSTEM DETAILS - CROSS SECTION	20/09/2024	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.02	28	PDF	VERONA SYSTEM DETAILS - RESTRAINING BEAM	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE DETAILS_rev.02	29	PDF	VERONA SYSTEM DETAILS - RESTRAINING BEAM	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_PEDESTRIAN WALKWAY DETAILS_rev.03	**30**	**PDF**	**VERONA SYSTEM SAFETY GANGWAY (UPDATED FOR TRAIN ENVELOPE COMMENT 145)**	**20/09/2024**	**11/07/2025**
PUSA_2021_18_BLUFFDALE_100%_JACKING SYSTEM FUNCTIONAL SCHEME_rev.01	31	PDF	JACKING SYSTEM FUNCTIONAL SCHEME	20/09/2024	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_JACKING SPACERS HANDLING SEQUENCE_rev.01	32	PDF	JACKING SPACERS HANDLING SEQUENCE	20/09/2024	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE INSTALLATION PHASES_rev.03	33	PDF	VERONA SYSTEM INSTALLATION - PHASE 0-1	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE INSTALLATION PHASES_rev.03	34	PDF	VERONA SYSTEM INSTALLATION - PHASE 2-3	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_BRIDGE INSTALLATION PHASES_rev.03	35	PDF	VERONA SYSTEM INSTALLATION - PHASE 4	20/09/2024	11/07/2025
PUSA_2021_18_BLUFFDALE_100%_VERONA SYSTEM FOUNDATION_rev.02	36	PDF	VERONA SYSTEM FOUNDATION LAYOUT	20/09/2024	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_ROLLER WITH HDPE PAD_rev.00	DOC.	PDF	ROLLER WITH HDPE DETAIL	28/05/2025	28/05/2025
PUSA_2021_18_BLUFFDALE_100%_METHOD STATEMENT_rev.00	DOC.	PDF	PROJECT SEQUENCE & EXCAVATION METHODS & CONTINGENCY MEASURES	20/09/2024	28/05/2025
PETRUCCO SIMILAR PROJECT EXAMPLES	DOC.	PDF	PETRUCCO SIMILAR PROJECT EXAMPLES	20/09/2024	28/05/2025

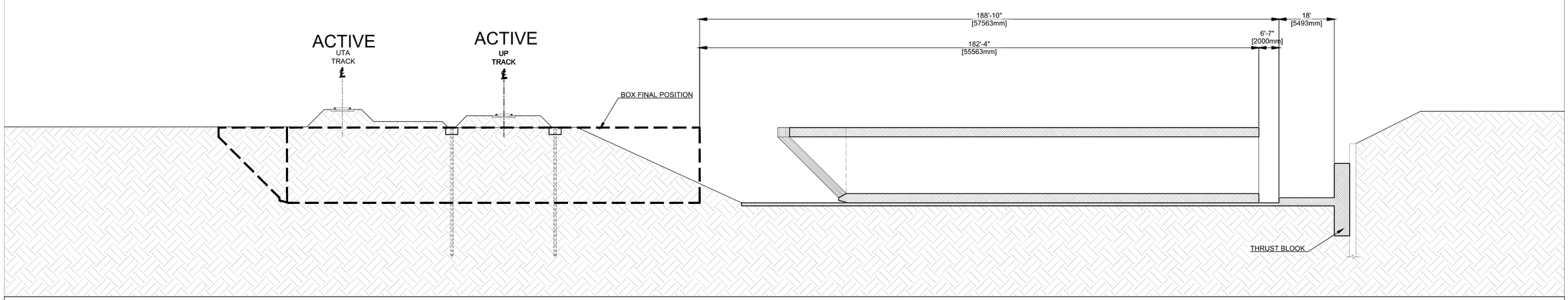
Phase 00 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 0: Underpass construction on the jacking pit. Micropiles and concrete caps for the Verona System support completed before the beginning of the first push.

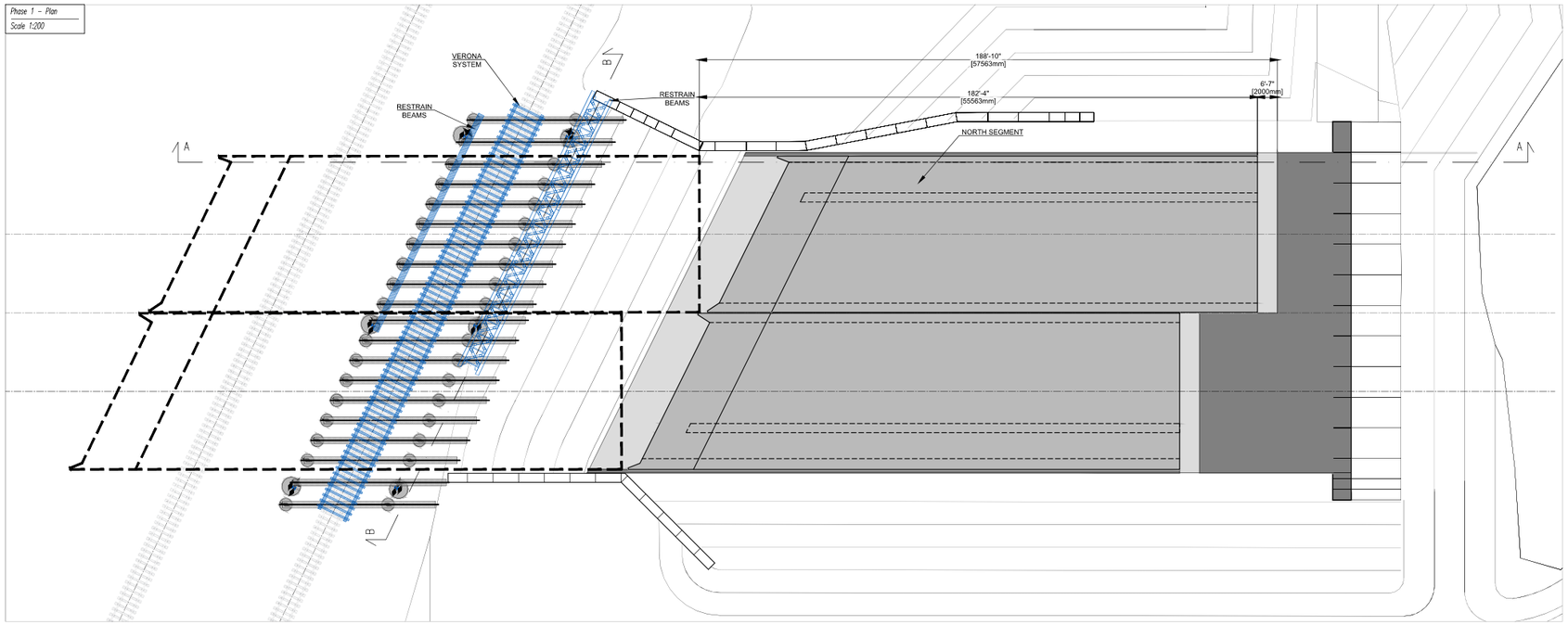
DRAWING N.	1	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	
DRAWN:	drf	REVISION:	11th JUL 2025	14600 CROSSING – ROAD UNDERPASS BOX 1
CHECKED:	vpo	REVISION:		
APPROVED:	ap			PHASE 0 – CASTING POSITION

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

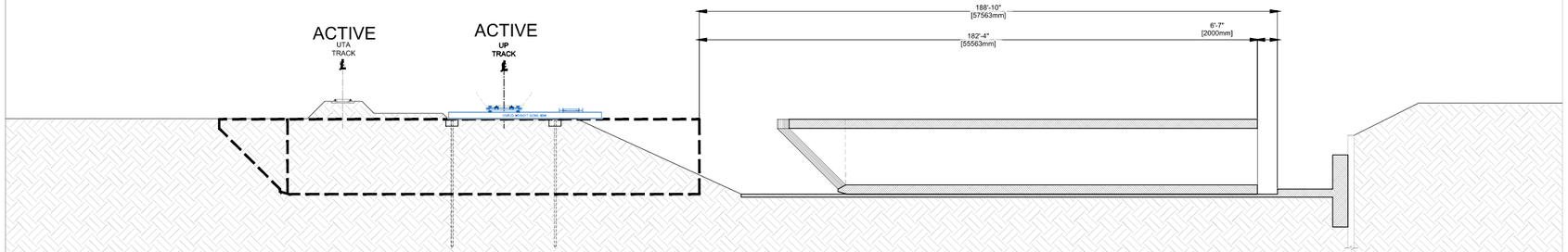
PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 1 – Plan
Scale 1:200

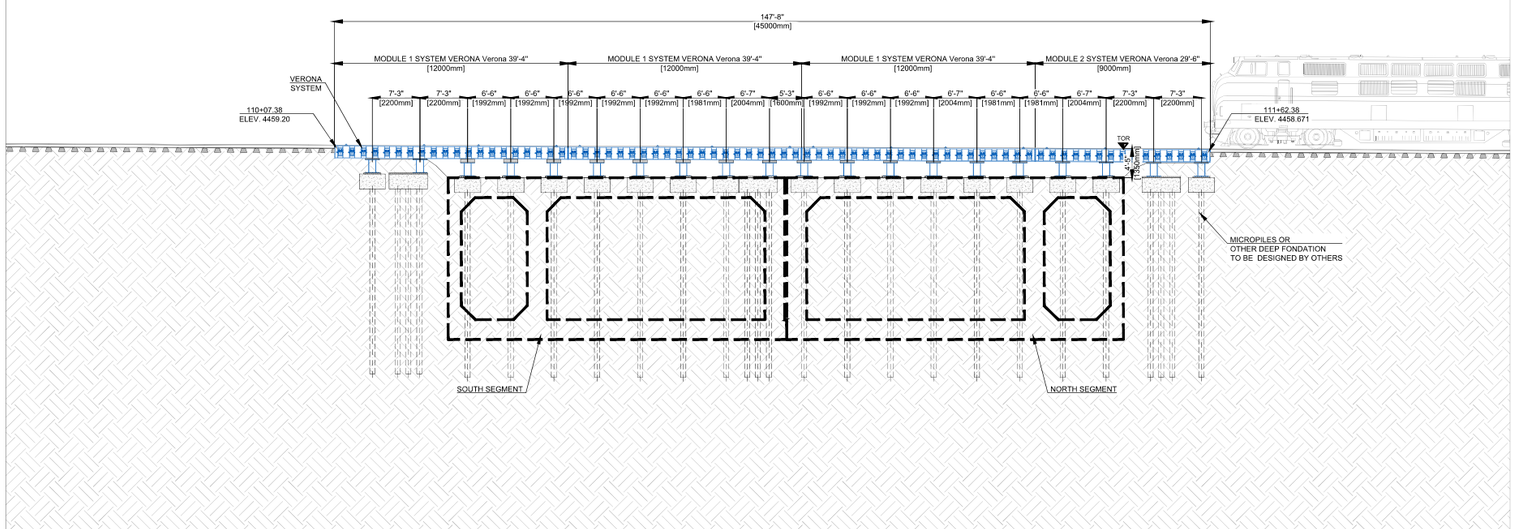


Section A-A
Scale 1:200



Box 1 – Phase 1: Verona System installation on UP Track for both North and South segments.

Section B-B
Scale 1:100



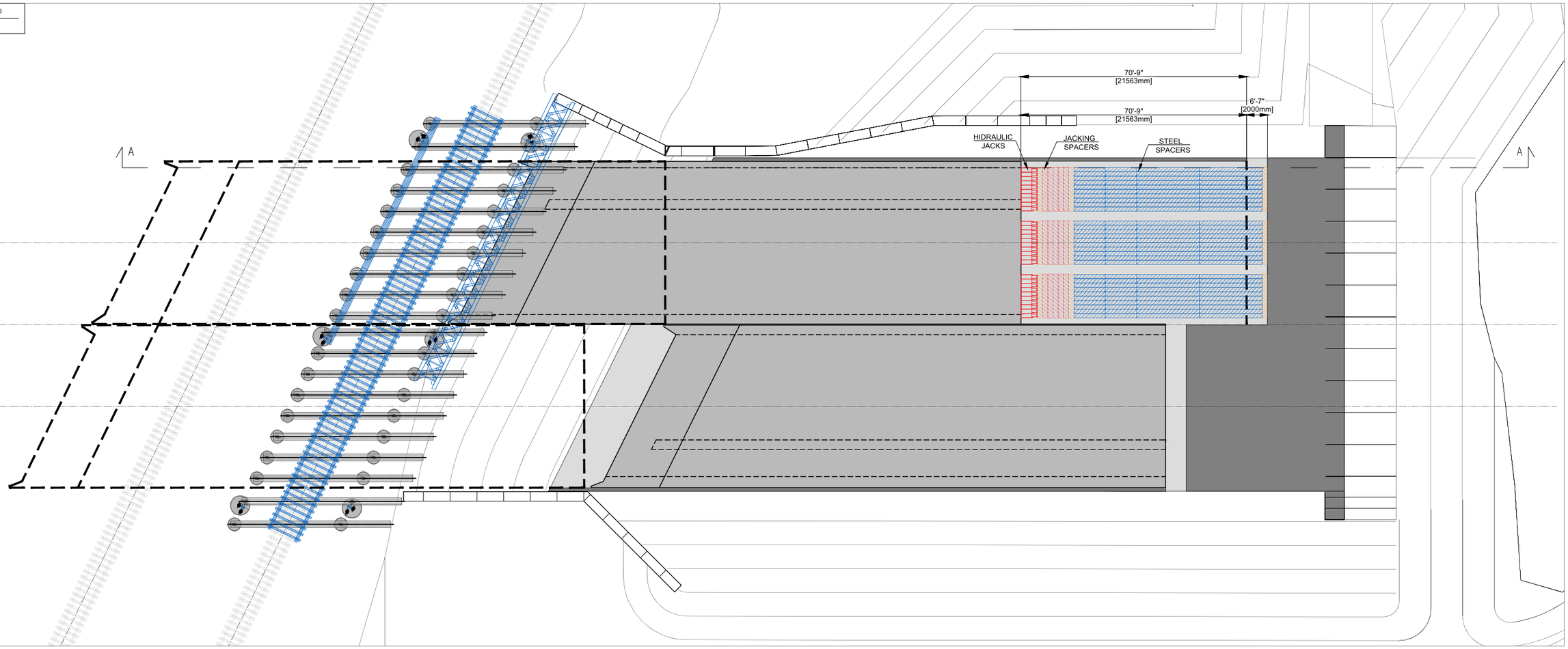
DRAWING N.		TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			PHASE 1 – VERONA SYSTEM INSTALLATION	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1575 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

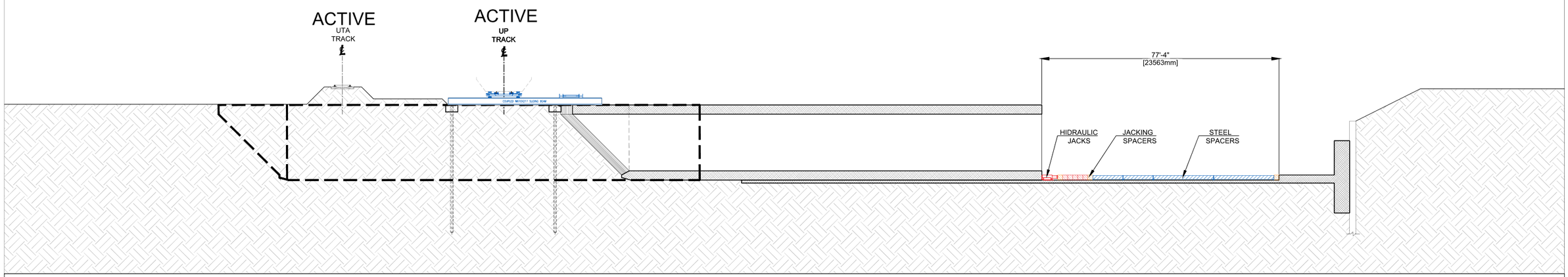
Phase 2.1 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 2.1: North segment first push 70'–9". The push will reach the first row of micropiles.

DRAWING N.	3	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.1 – PRELIMINARY JACKING	
APPROVED:	ap				

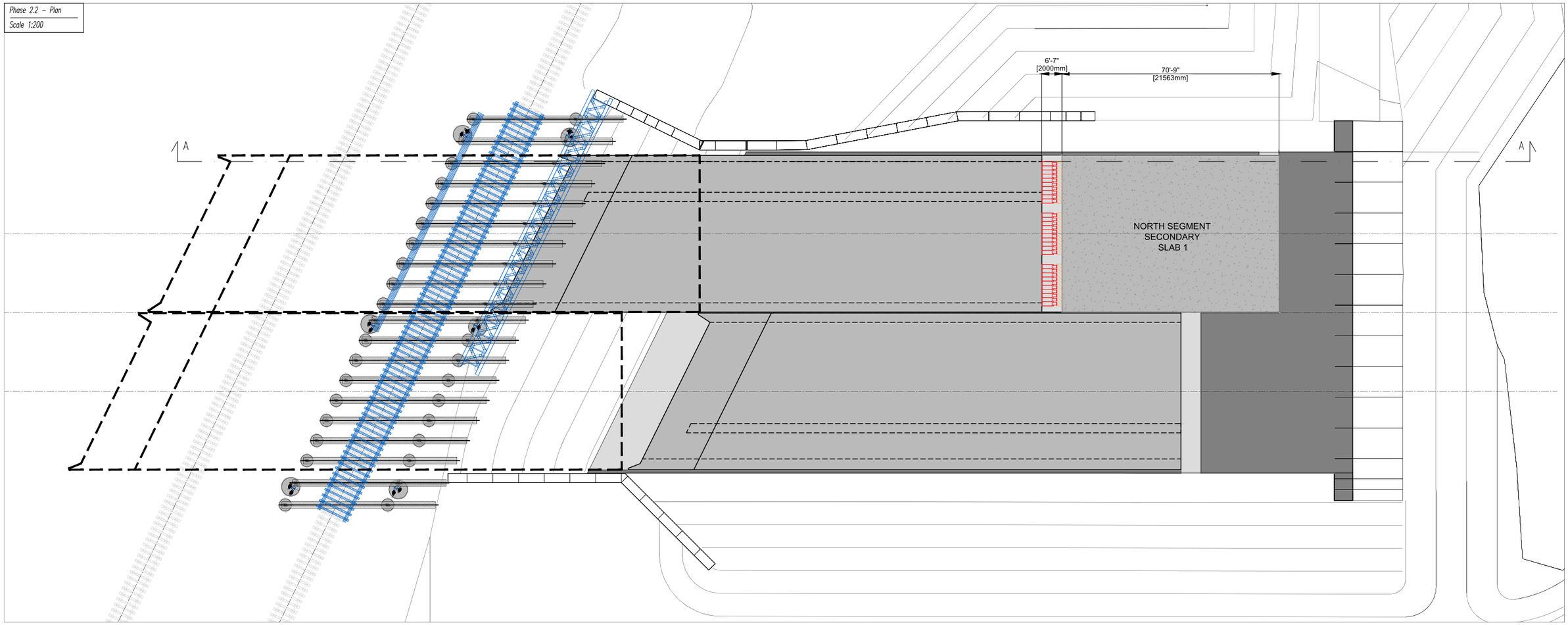
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

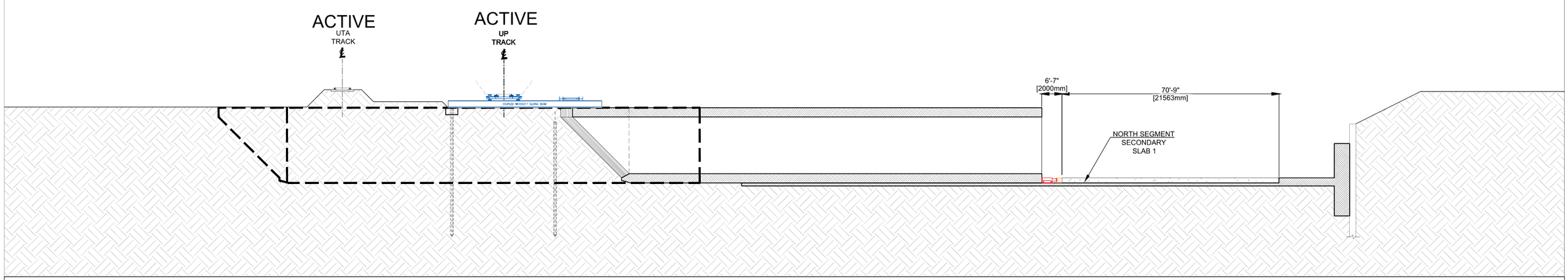
Phase 2.2 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 2.2: Demolition of the micropiles caps. First secondary slab done on the launching slab to reduce the jacking spacers lenght.

DRAWING N.	4	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.2 – 1st ROW OF M.P DEMOLITION + SECOND. SLAB N°1	
APPROVED:	ap				

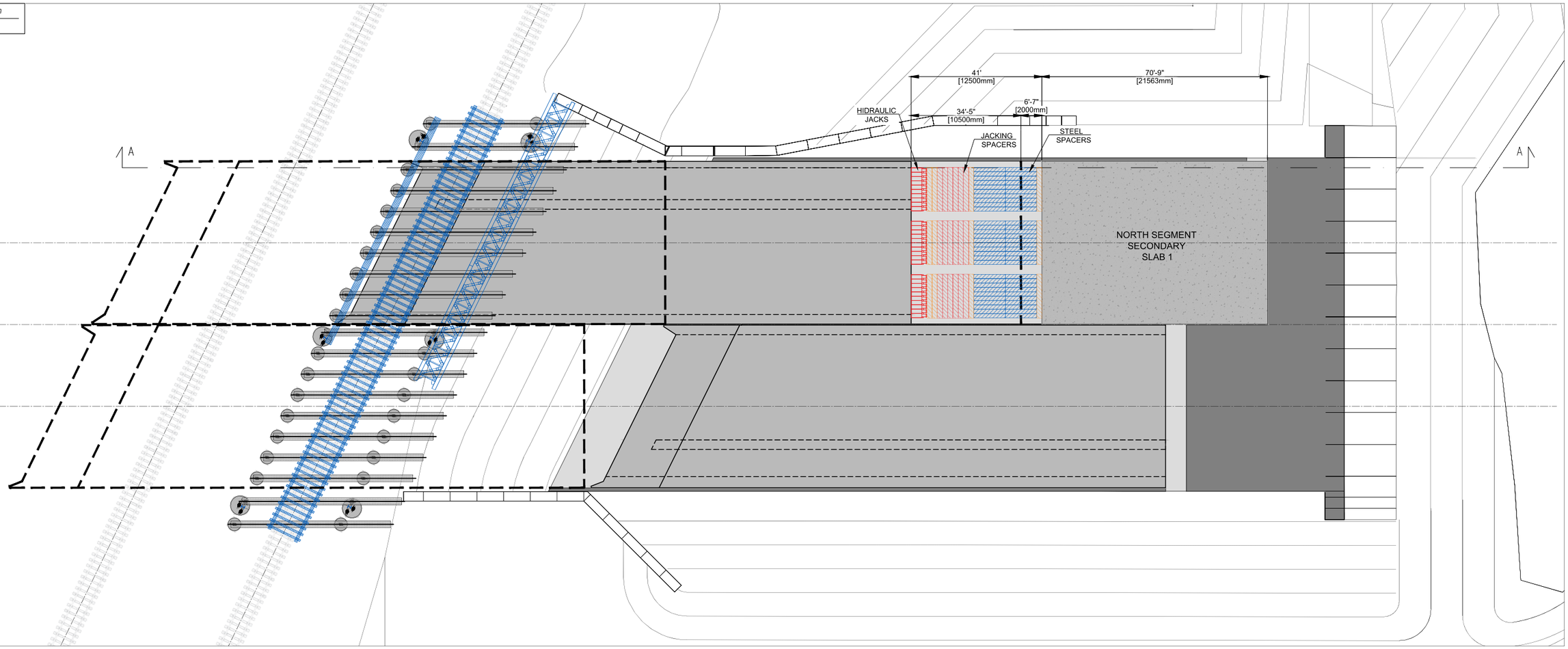
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

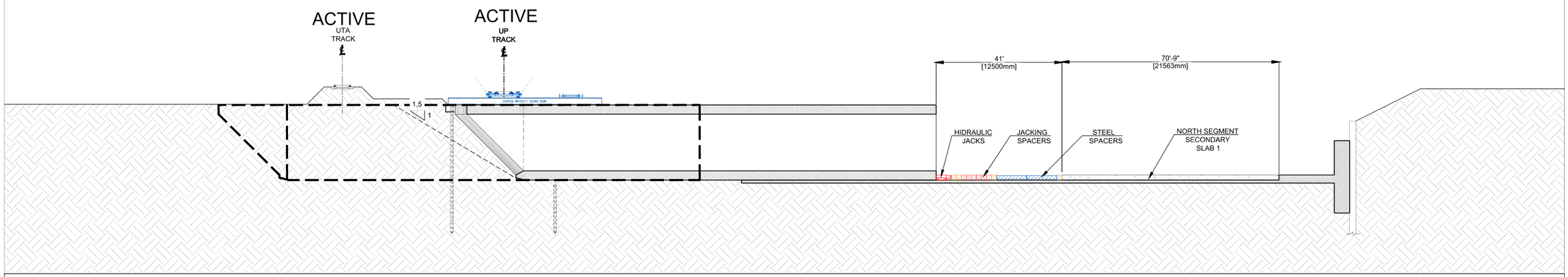
Phase 2.3 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 2.3: Push progression until reaching the second row of micropiles. Jackink lenght ~ 34'–5"

DRAWING N.	5	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	
DRAWN:	drf	REVISION:	11th JUL 2025	14600 CROSSING – ROAD UNDERPASS BOX 1
CHECKED:	vpo	REVISION:		
APPROVED:	ap			PHASE 2.3 – JACKING UNTIL 2nd ROW OF MICRO PILES

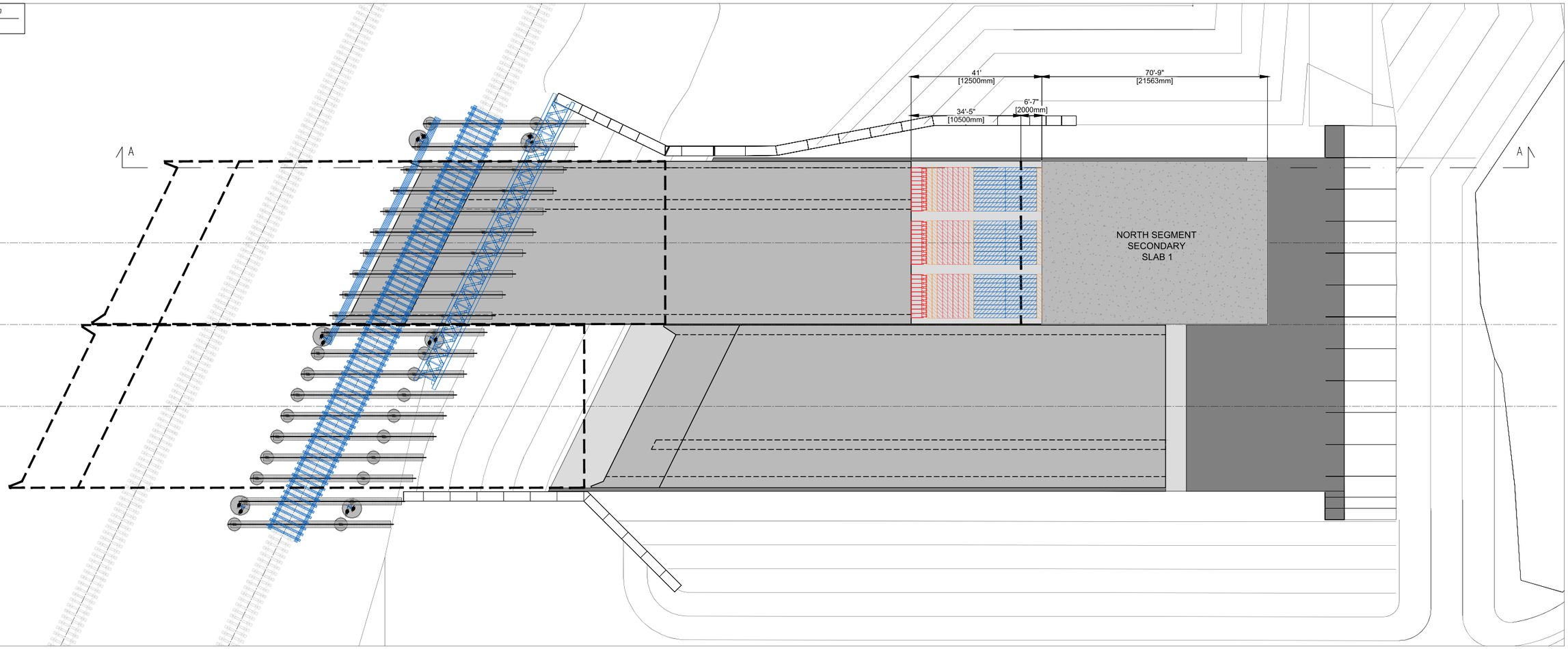
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

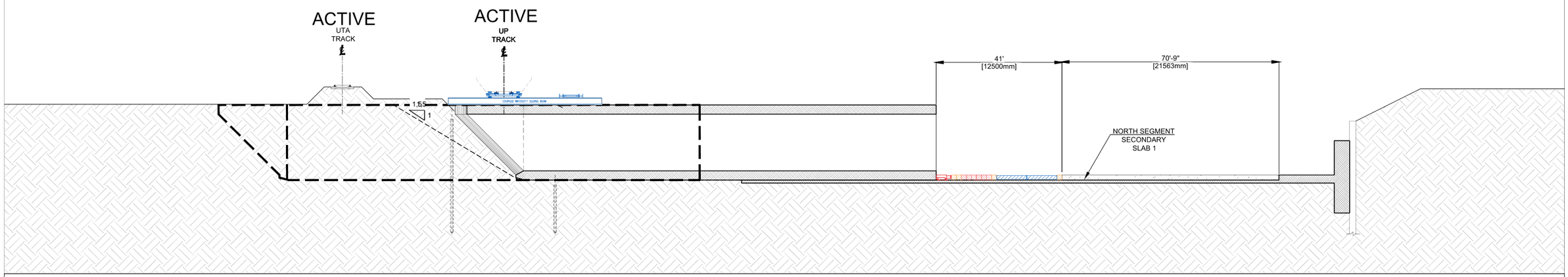
Phase 2.4 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 2.4: Micropiles second row caps demolition.

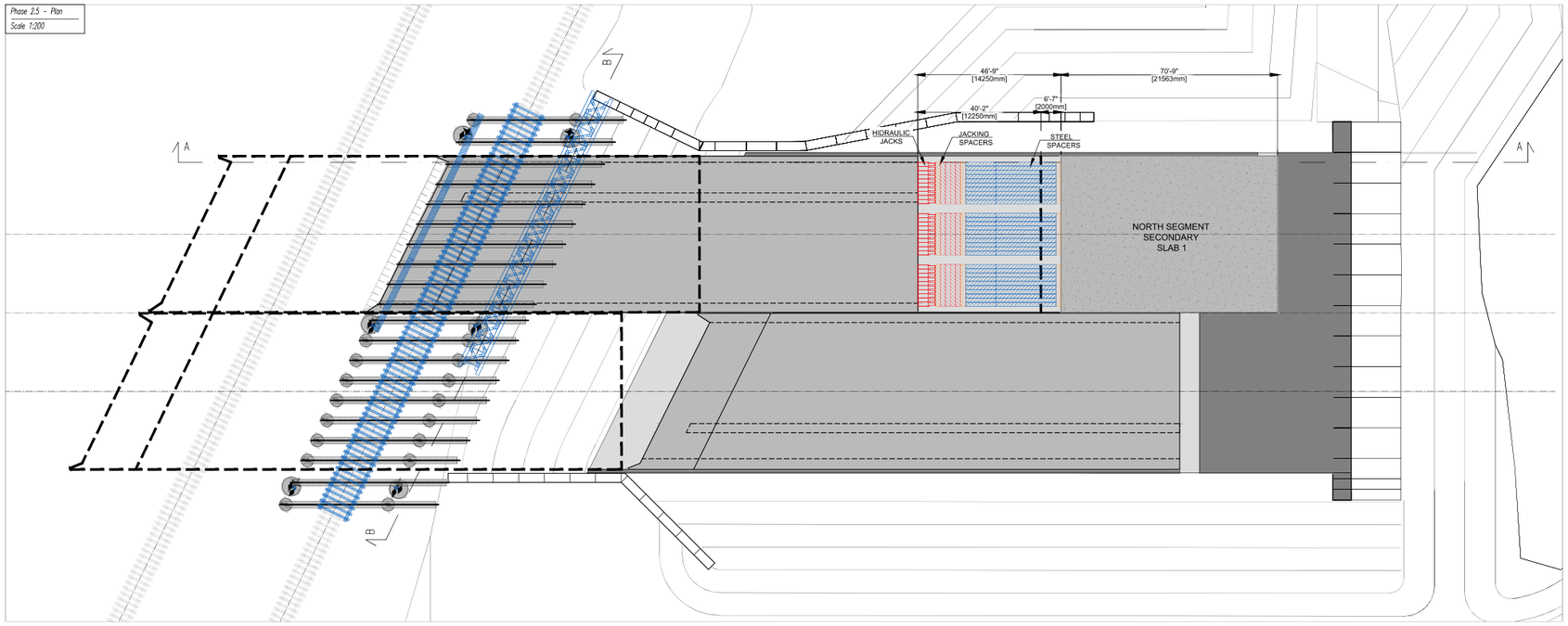
DRAWING N.	6	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.4 – 2nd ROW OF MICRO PILES DEMOLITION	
APPROVED:	ap				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

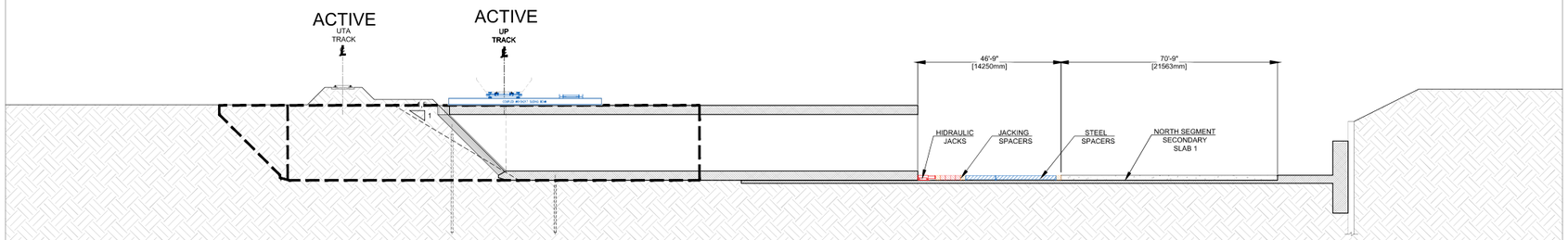
PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 2.5 – Plan
Scale 1:200

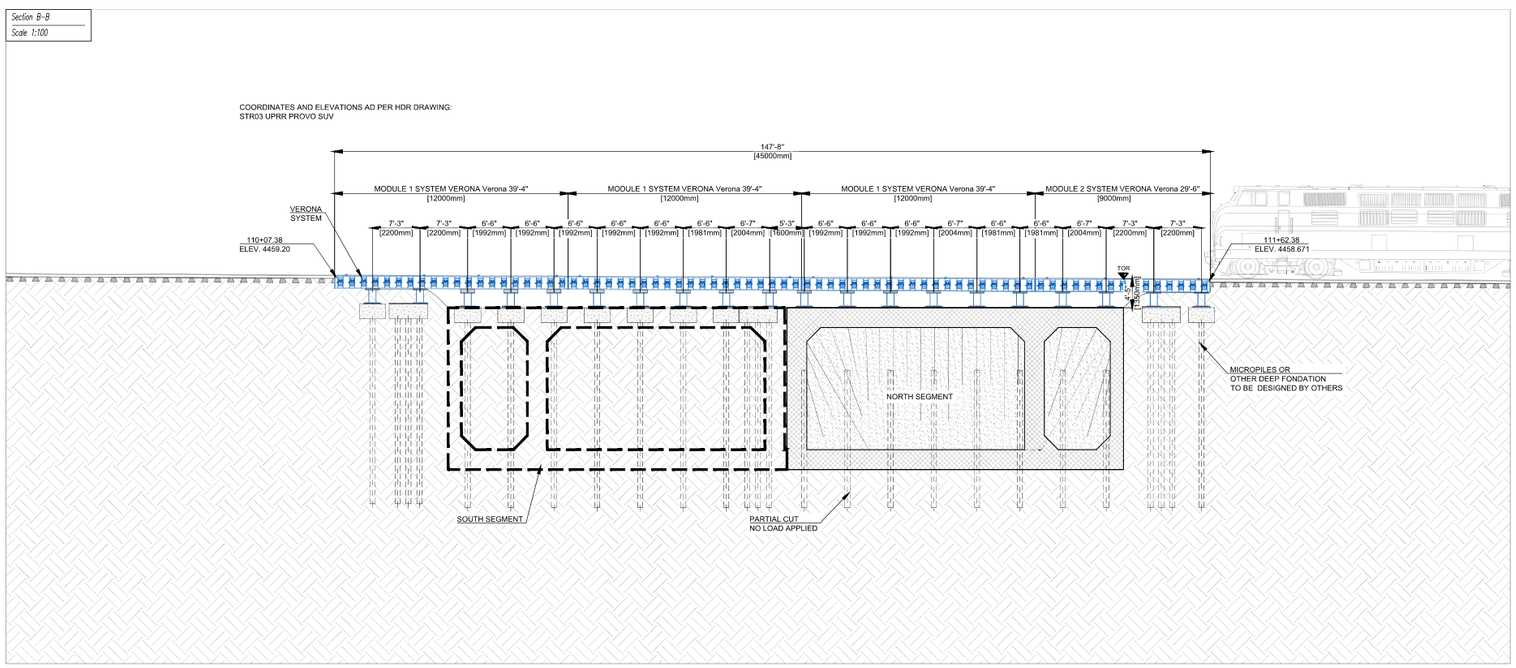


Section A-A
Scale 1:200



Box 1 – Phase 2.5: Underpass progression until covering all the lenght of the transverse beams over the underpass roof. Temporary bridges are fully supported by the underpass. Control stop position until UTA weekend closure.

Section B-B
Scale 1:100



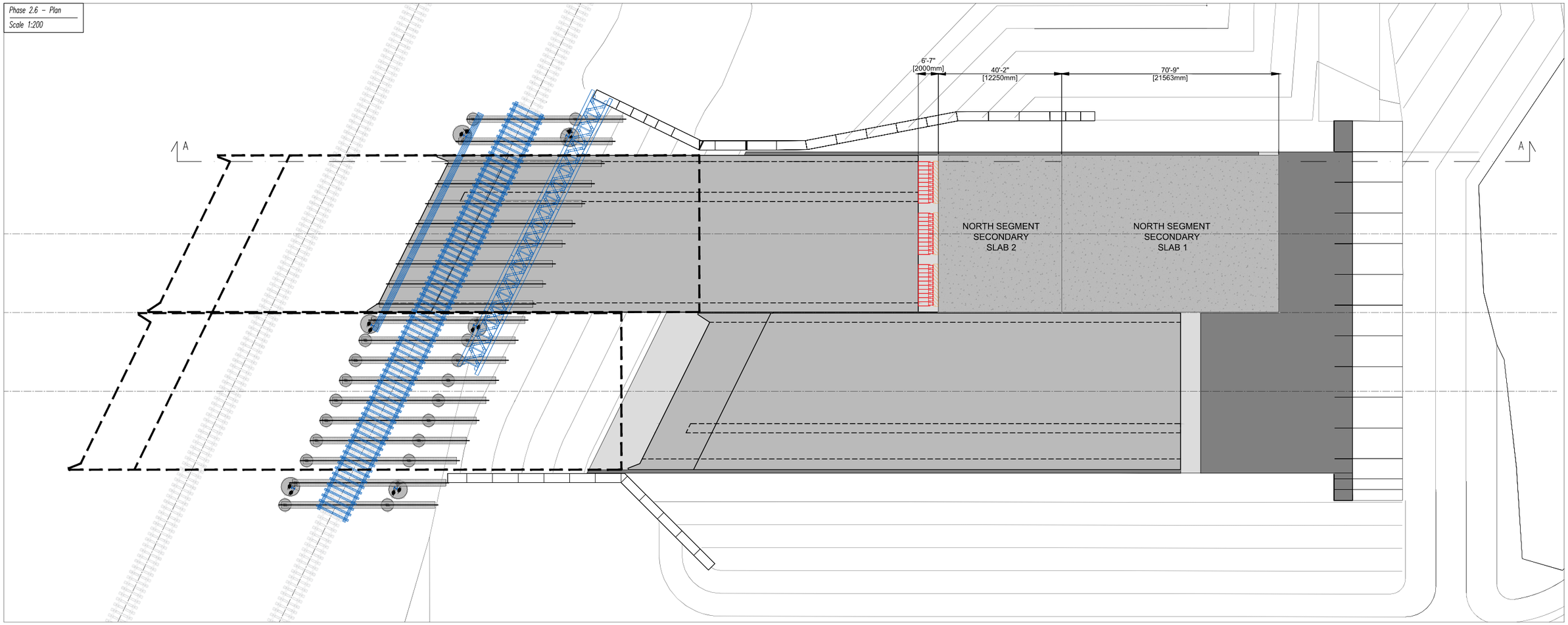
DRAWING N.	7	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT., 2024	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			PHASE 2.5 – ADVANCEMENT UNTIL CONTROL STOP	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1575 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

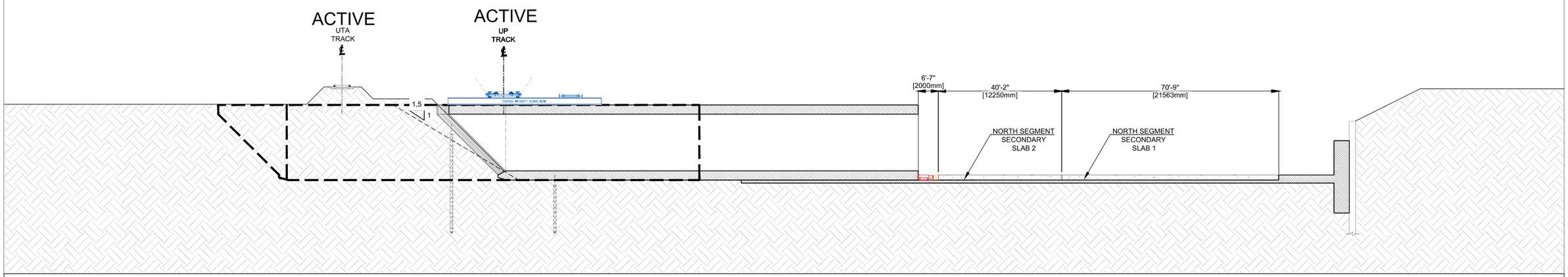
Phase 2.6 – Plan

Scale 1:200



Section A-A

Scale 1:200



Box 1 – Phase 2.6: Casting of the second secondary slab.

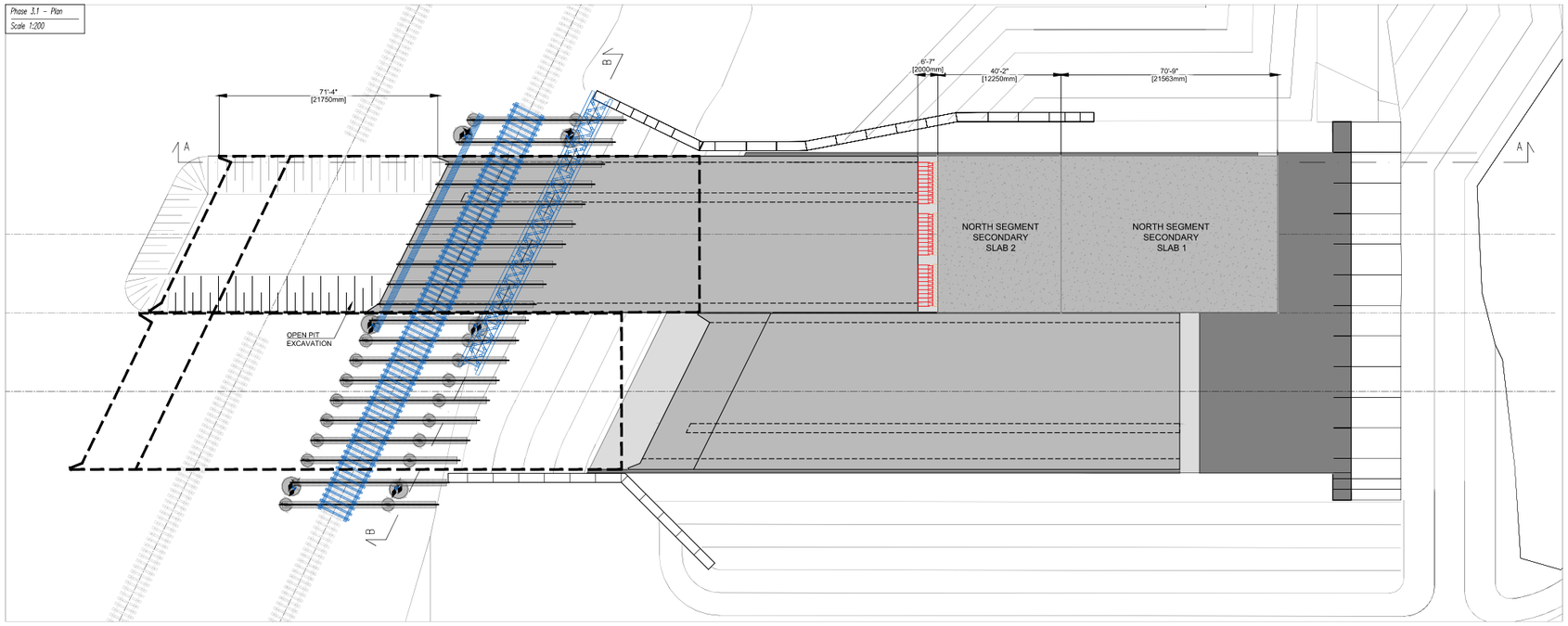
DRAWING N.	8	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.6 – SECONDARY SLAB N°2 CASTING	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

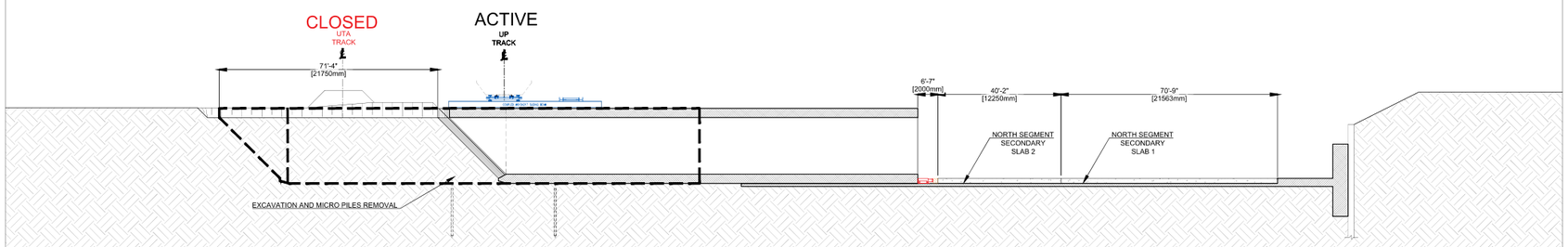
PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 3.1 – Plan
Scale 1:200

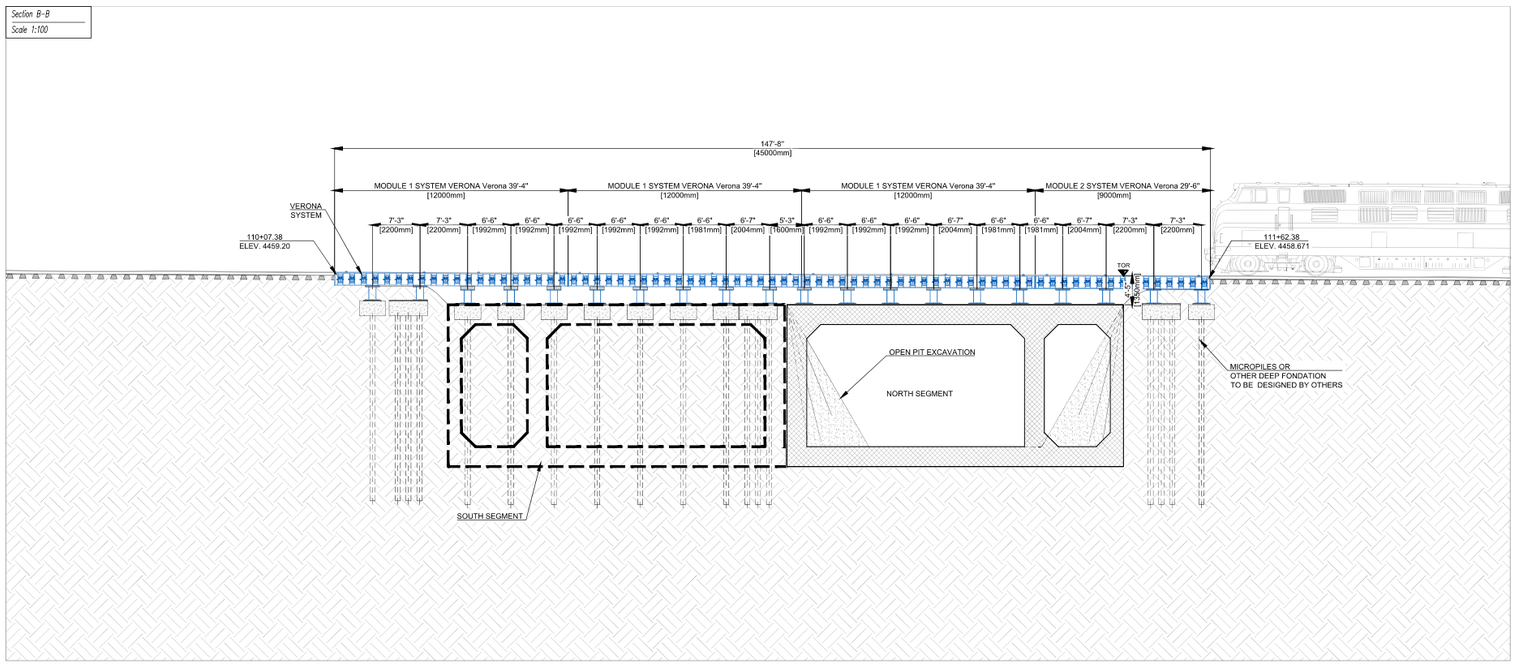


Section A-A
Scale 1:200



Box 1 – Phase 3.1: UTA track closure and track removal. Pre-excavation to allow the open pit jacking.

Section B-B
Scale 1:100



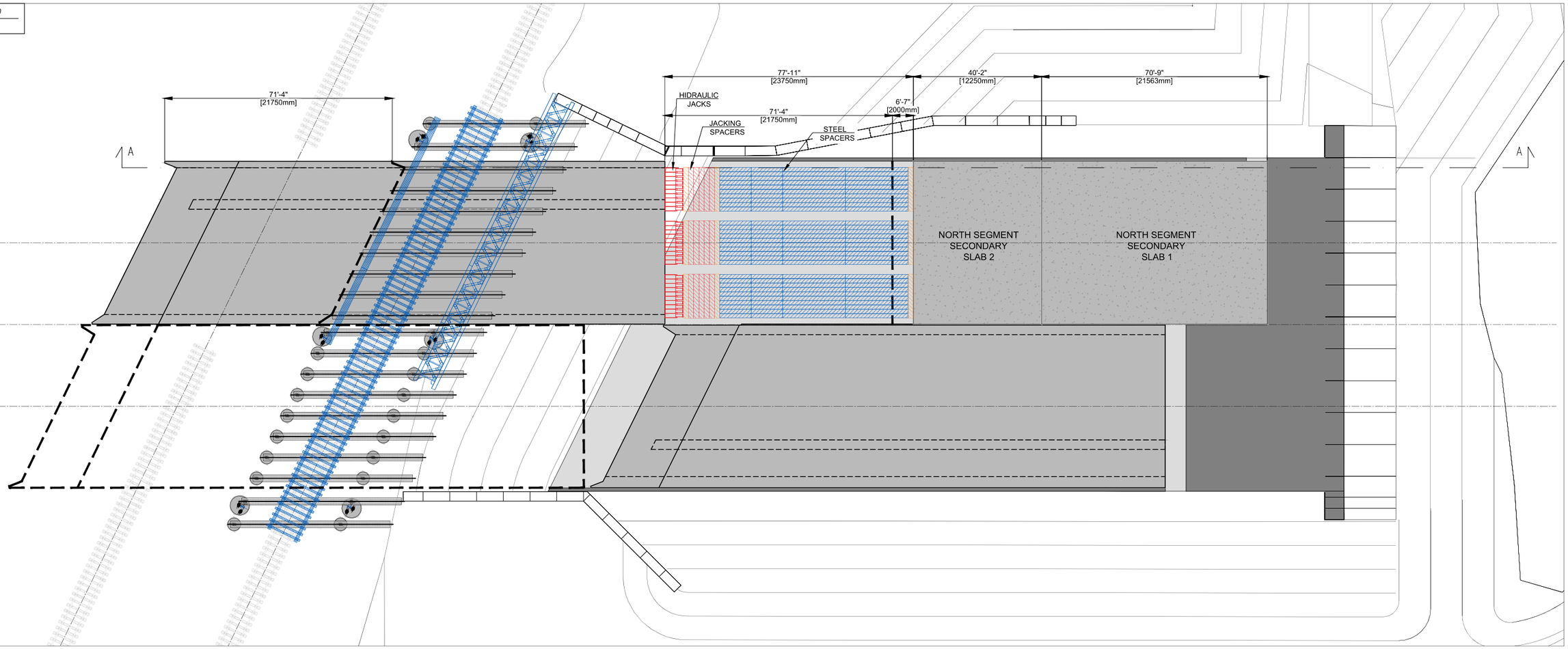
DRAWING N.	9	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT., 2024	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			PHASE 3.1 – UTA TRACK REMOVAL	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

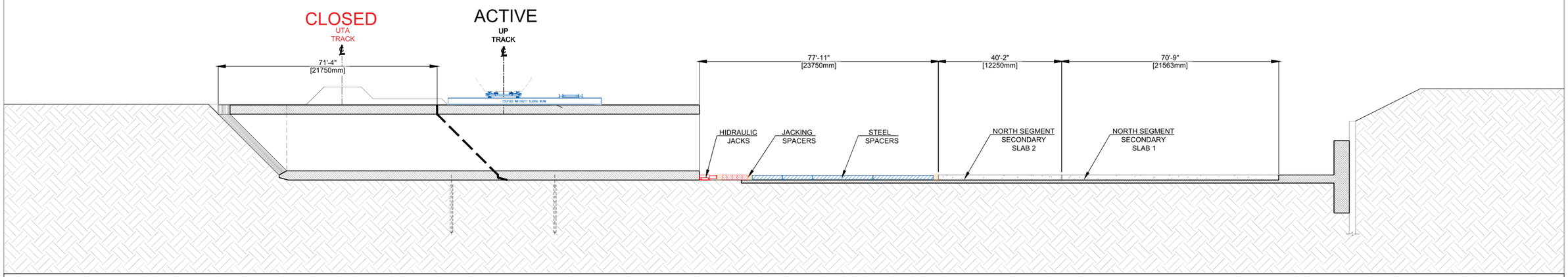
Phase 3.2 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 3.2: Continuous excavation and push of the box until reaching the underpass final position.

DRAWING N.	10	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 3.2 – CONTINUOUS EXCAVATION & JACKING	
APPROVED:	qp				

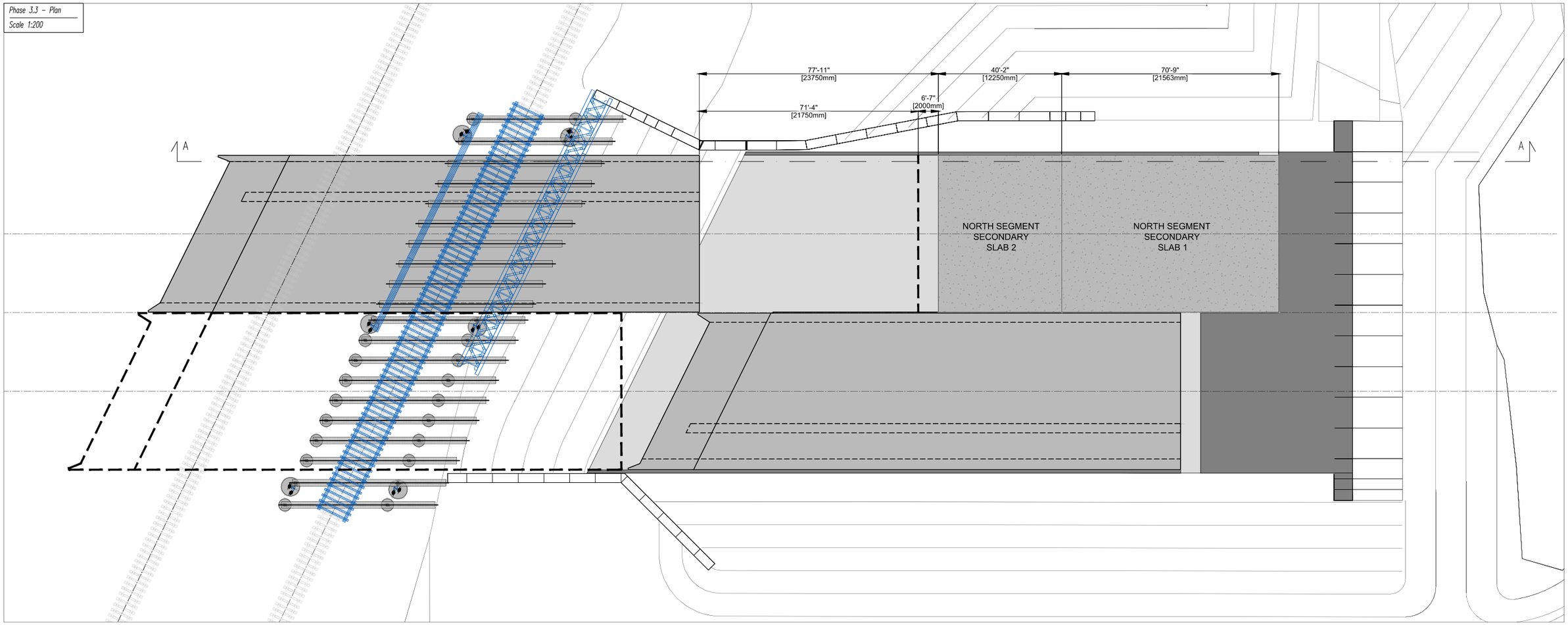
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

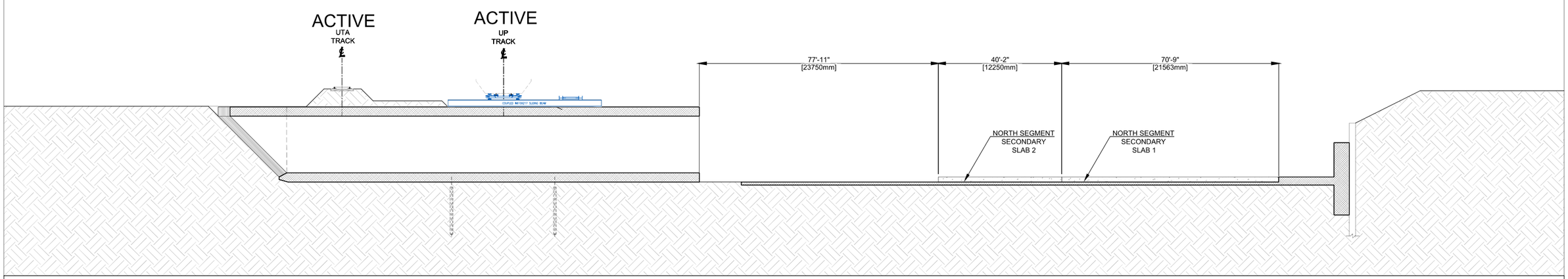
Phase 3.3 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 1 – Phase 3.3: UTA track restored and reopened to the traffic.

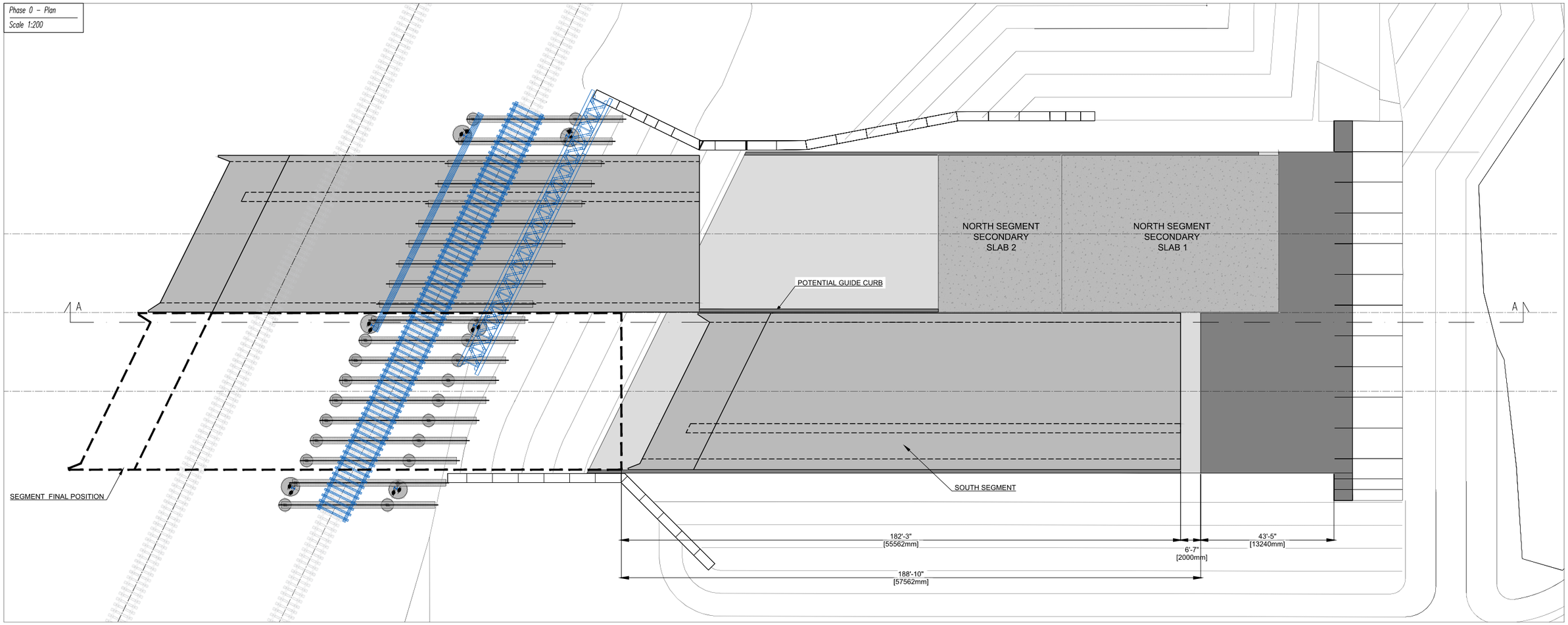
DRAWING N.	11	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 3.3 – UTA TRACK RESTORED	
APPROVED:	qp				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

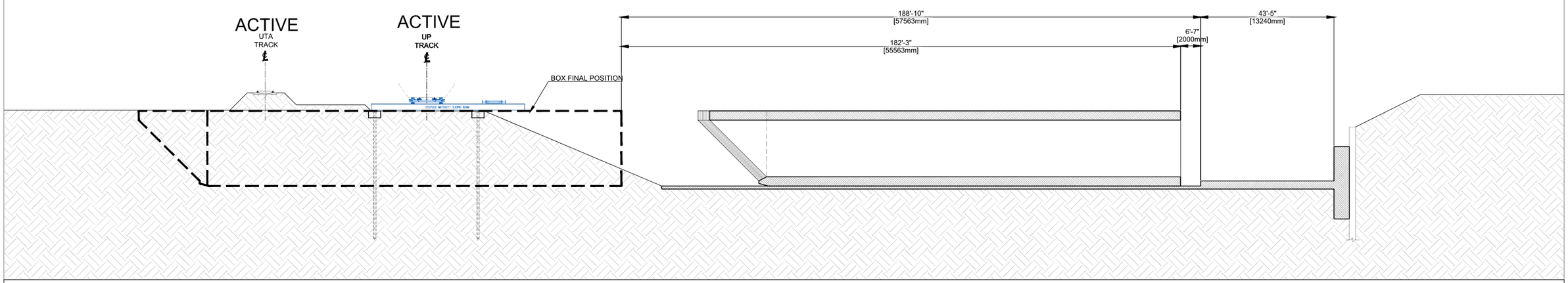
Phase 0 – Plan

Scale 1:200



Section A–A

Scale 1:200



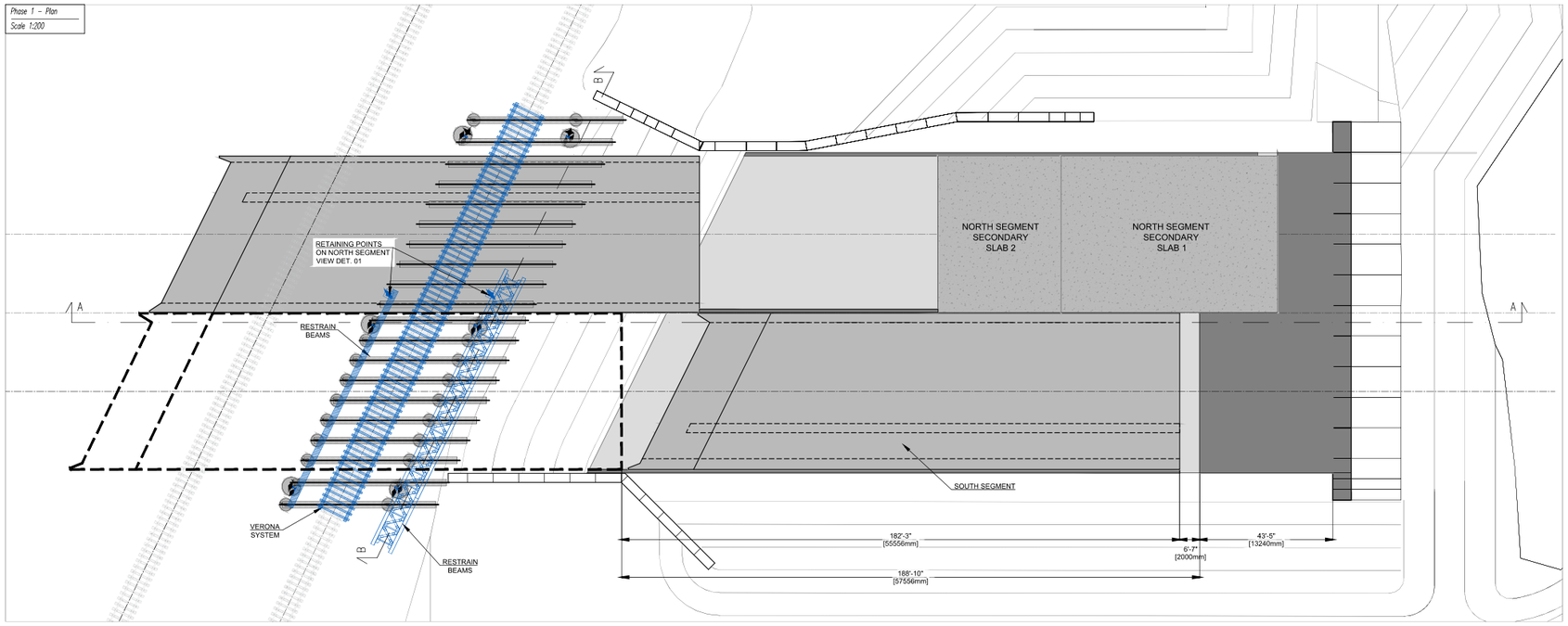
Box 2 – Phase 0: Secondary slab casted before the beginning of the push.

DRAWING N.	12	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 0 – CASTING POSITION	
APPROVED:	op				

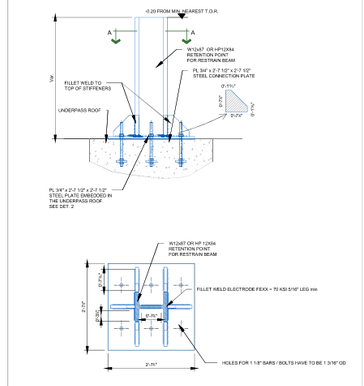
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

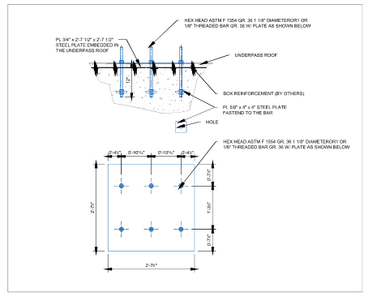
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 1 – Plan
Scale 1:200

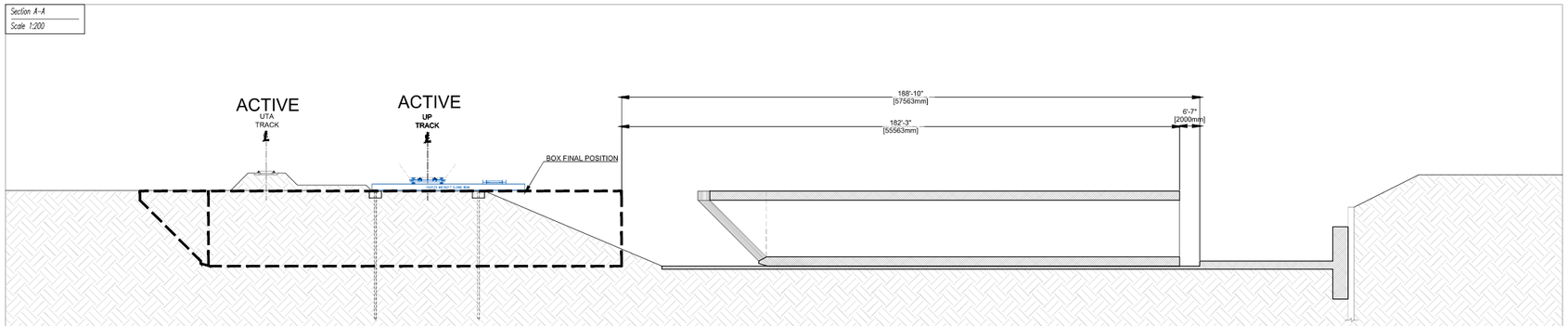


Detail 1
Scale 1:20



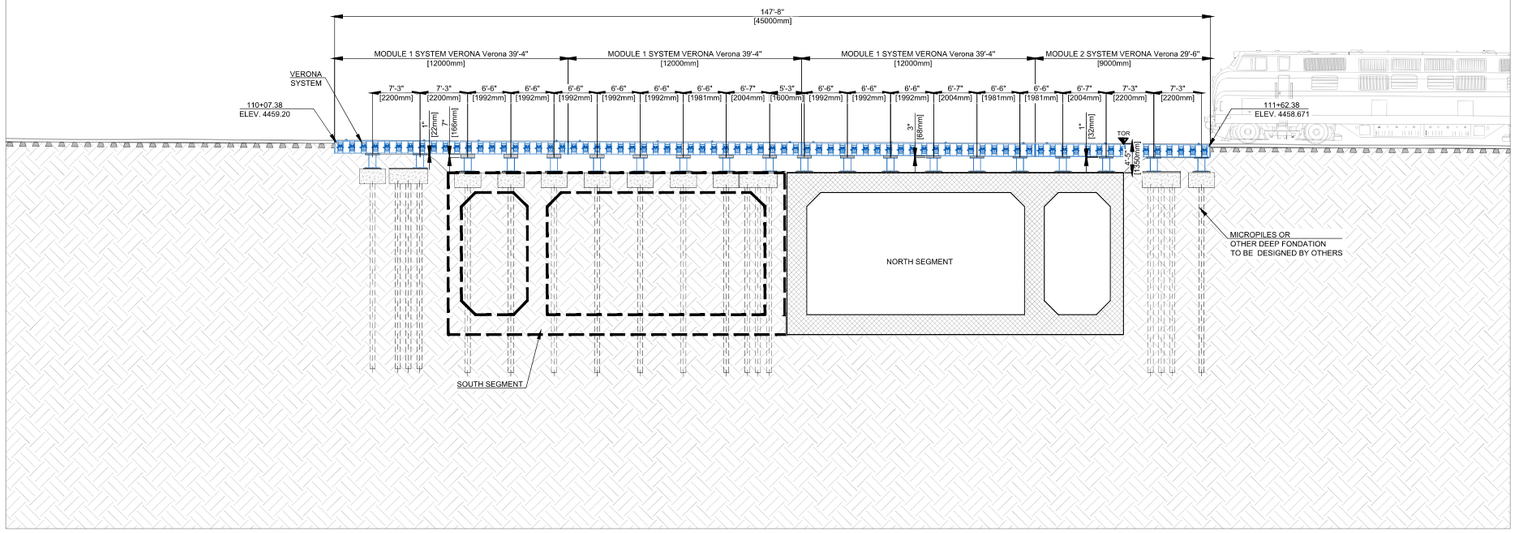


Section A-A
Scale 1:200



BOX 2 – Phase 1: Both retaining beams of the Verona System shifted to complete the installation for the South segment push. See the retention point detail on North segment.

Section B-B
Scale 1:100



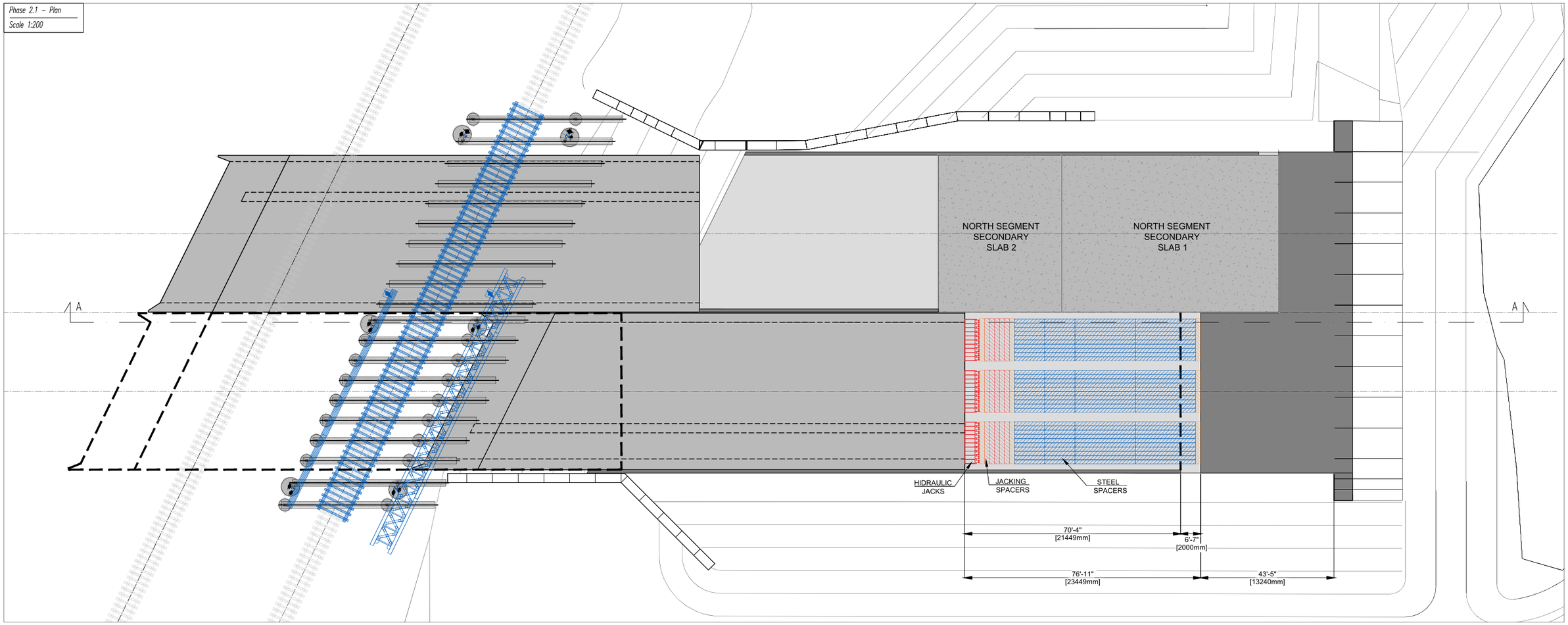
DRAWING N.	13	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	
DRAWN:	drf	REVISION:	14600 CROSSING – ROAD UNDERPASS BOX 2	
CHECKED:	vpo		PHASE 1 – VERONA SYSTEM INSTALLATION	
APPROVED:	op			

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

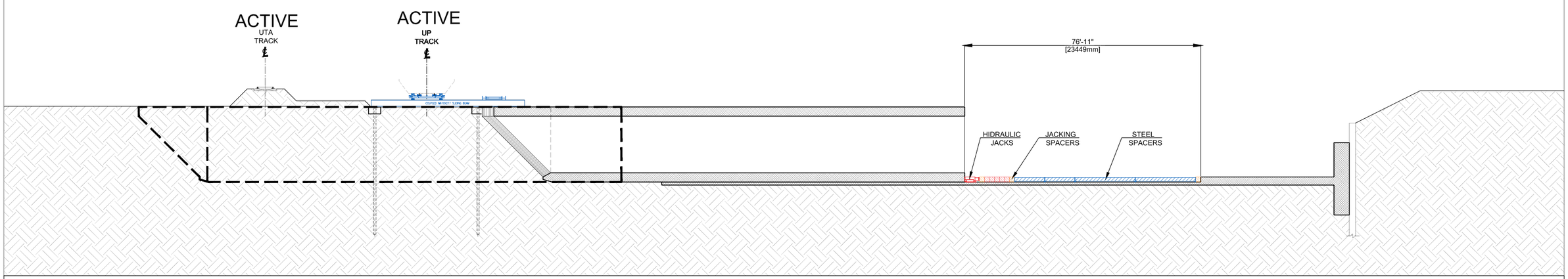
Phase 2.1 – Plan

Scale 1:200



Section A–A

Scale 1:200



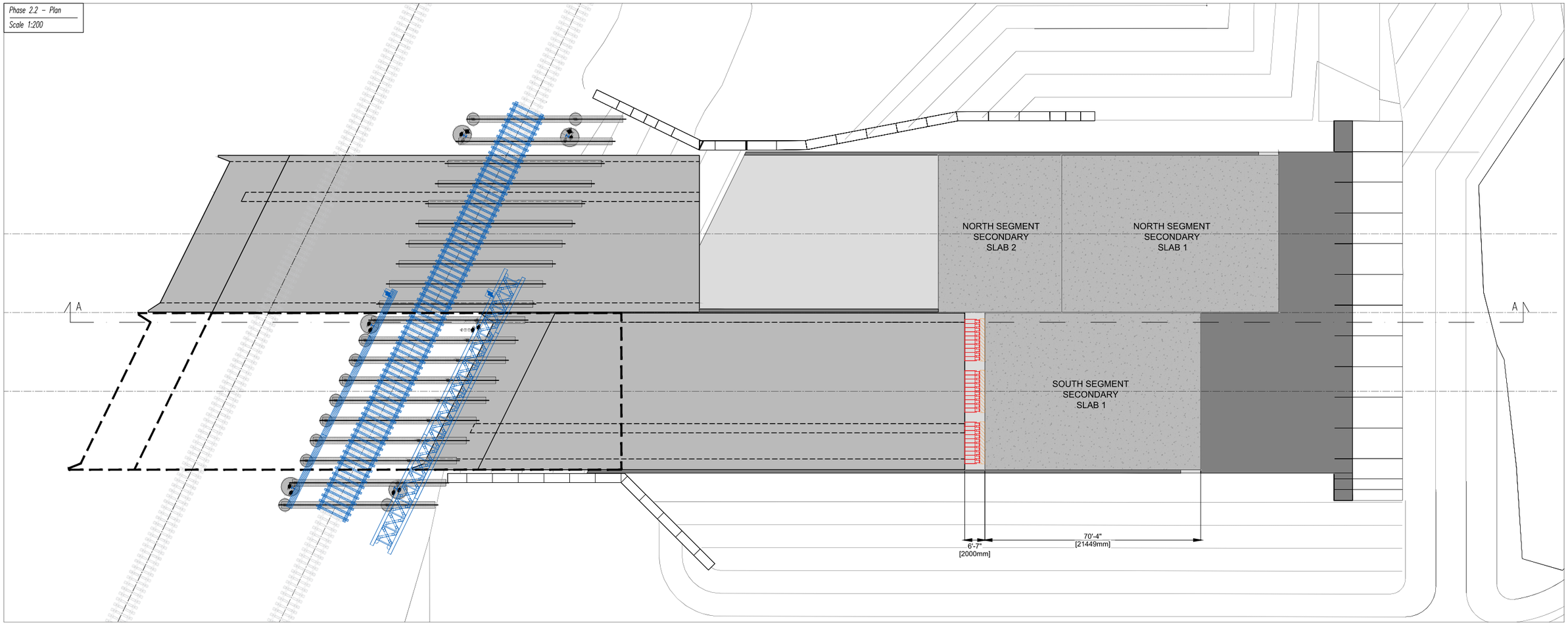
Box 2 – Phase 2.1: South Underpass first push 70'–4". The push will reach the first line of micropiles.

DRAWING N.	14	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	PETRUCCO box jacking systems
DRAWN:	drf	REVISION:	11th JUL 2025		PETRUCCO USA L.L.C. Railroad Box Jacking Systems 1576 DAYTONIA RD. MIAMI BEACH, FI 33141 www.petrucco.com
CHECKED:	vpo	REVISION:		PHASE 2.1 – PRELIMINARY JACKING	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

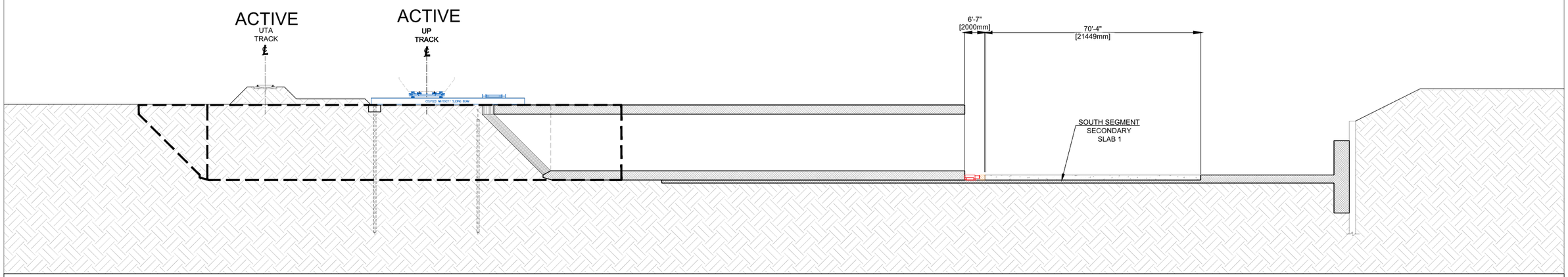
Phase 2.2 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 2 – Phase 2.2: Demolition of the micropiles caps. Secondary slab done on the launching slab to reduce the jacking spacers lenght.

DRAWING N.	15	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.2 – 1st ROW OF M.P DEMOLITION + SECOND. SLAB N°1	
APPROVED:	op				

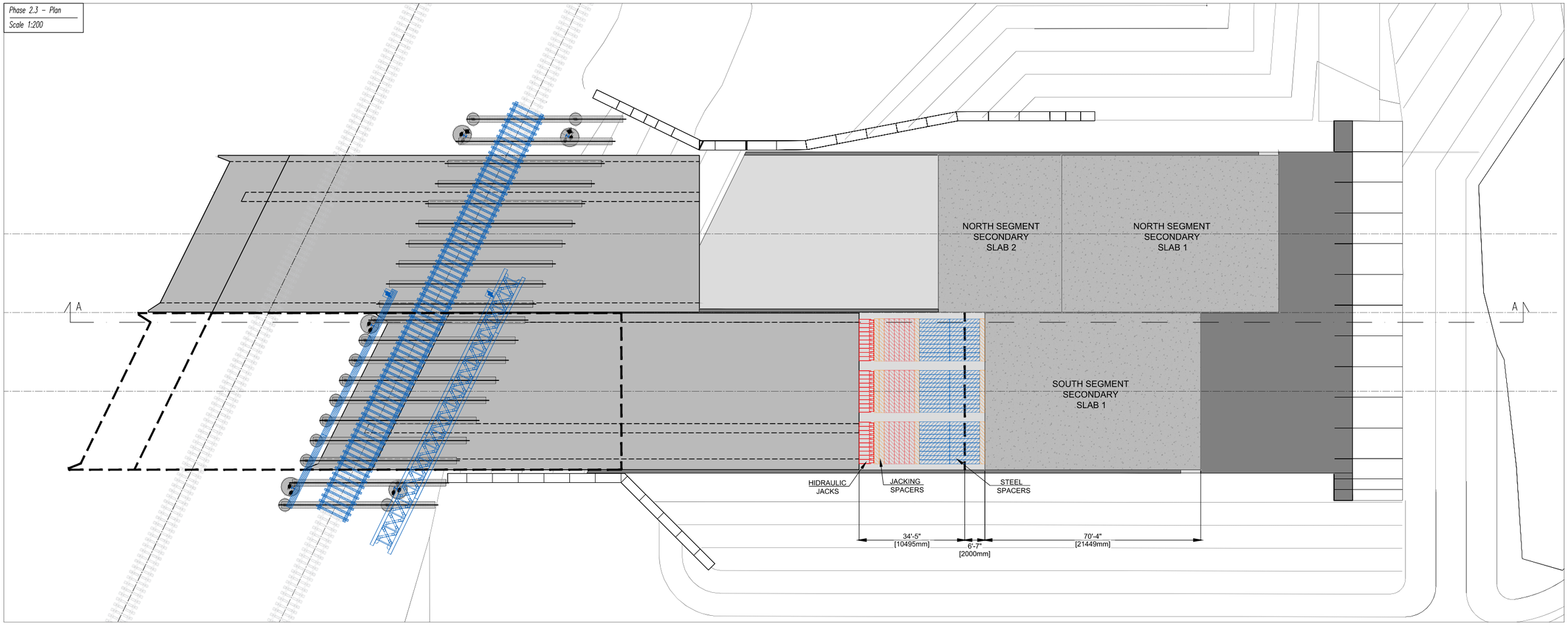
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

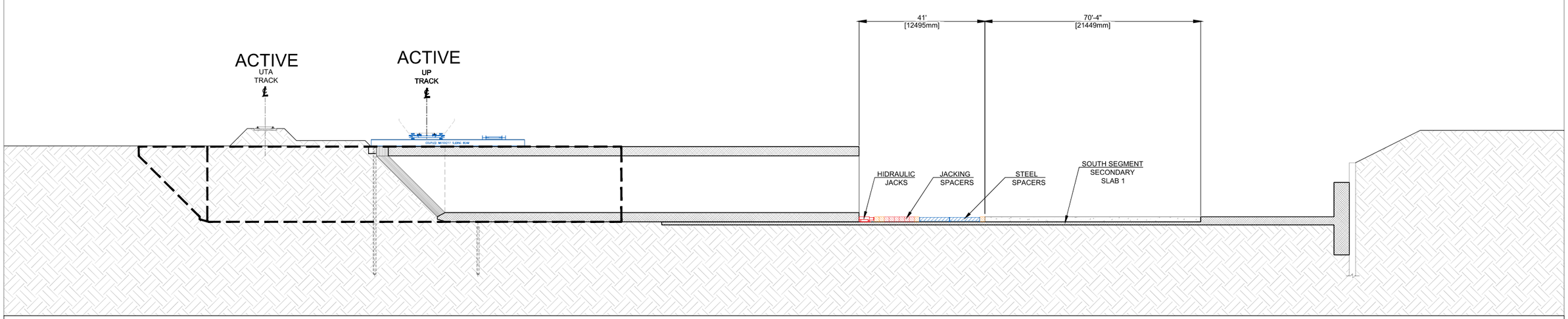
Phase 2.3 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 2 – Phase 2.3: Push progression until reaching the second row of micropiles. Jacking lenght ~ 34'-5"

DRAWING N.	16	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.3 – JACKING UNTIL 2nd ROW OF MICRO PILES	
APPROVED:	op				

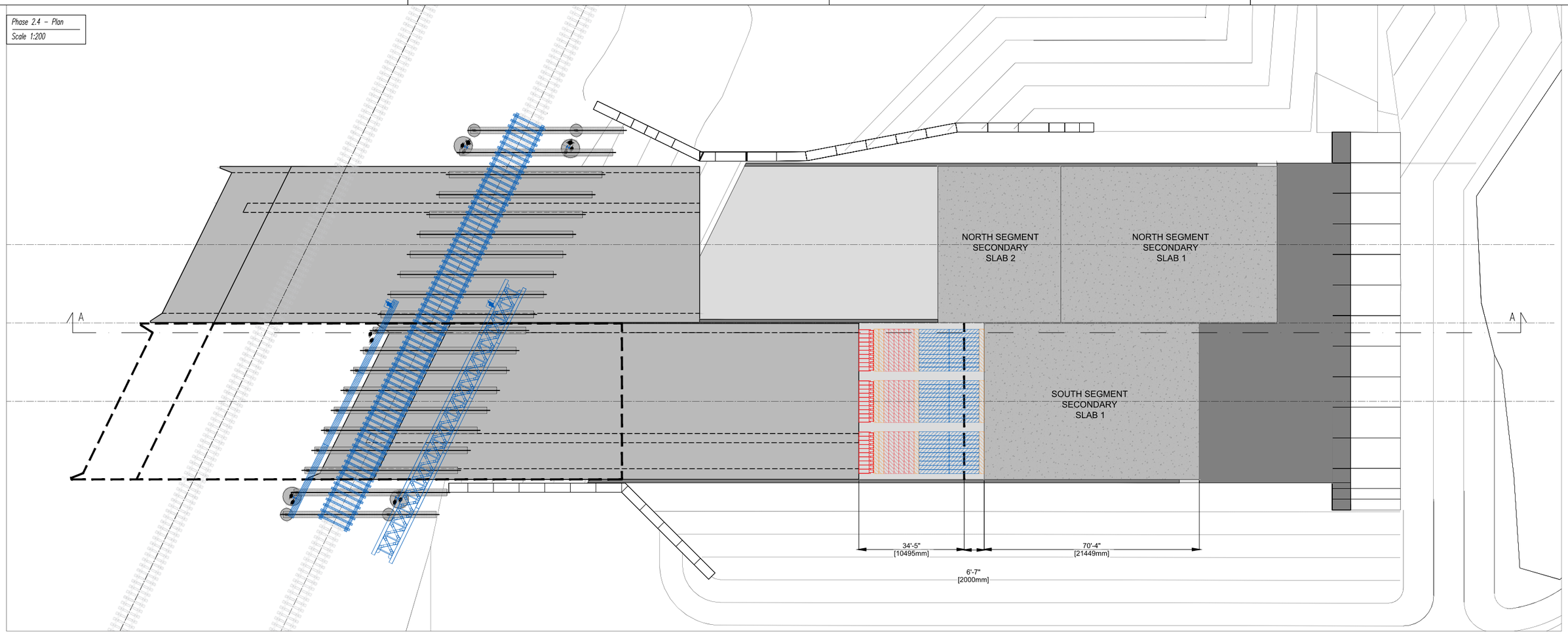
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

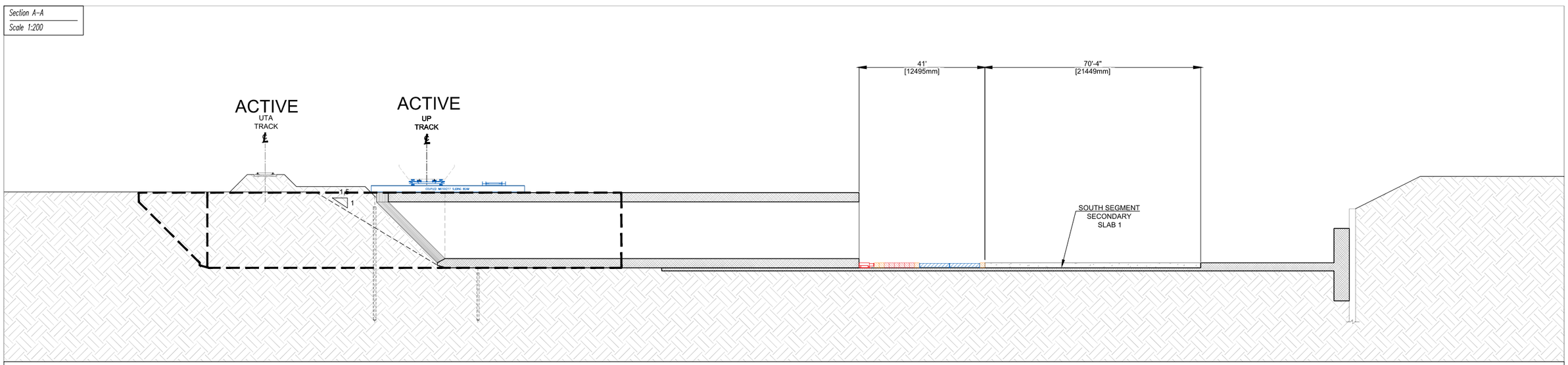
Phase 2.4 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 2 – Phase 2.4: Micropiles second row caps demolition.

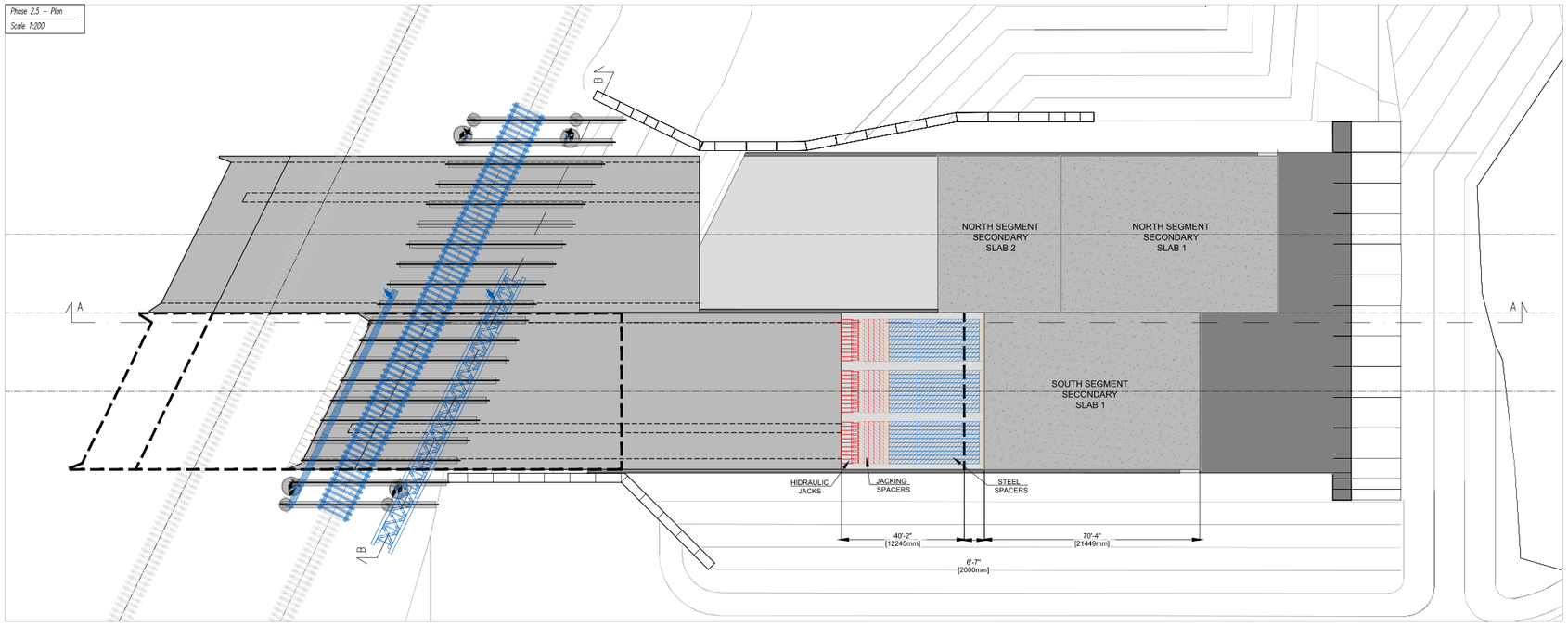
DRAWING N.	17	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.4 – 2nd ROW OF MICRO PILES DEMOLITION	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

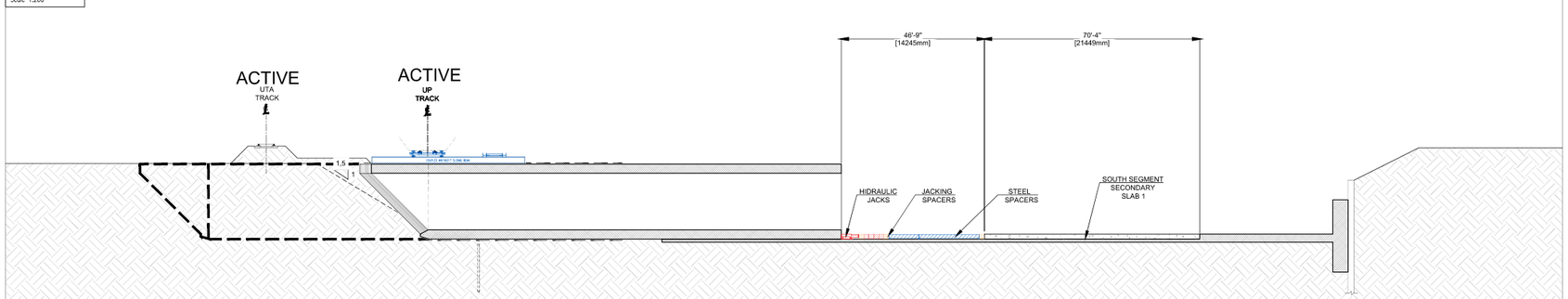
PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 2.5 – Plan
Scale 1:200

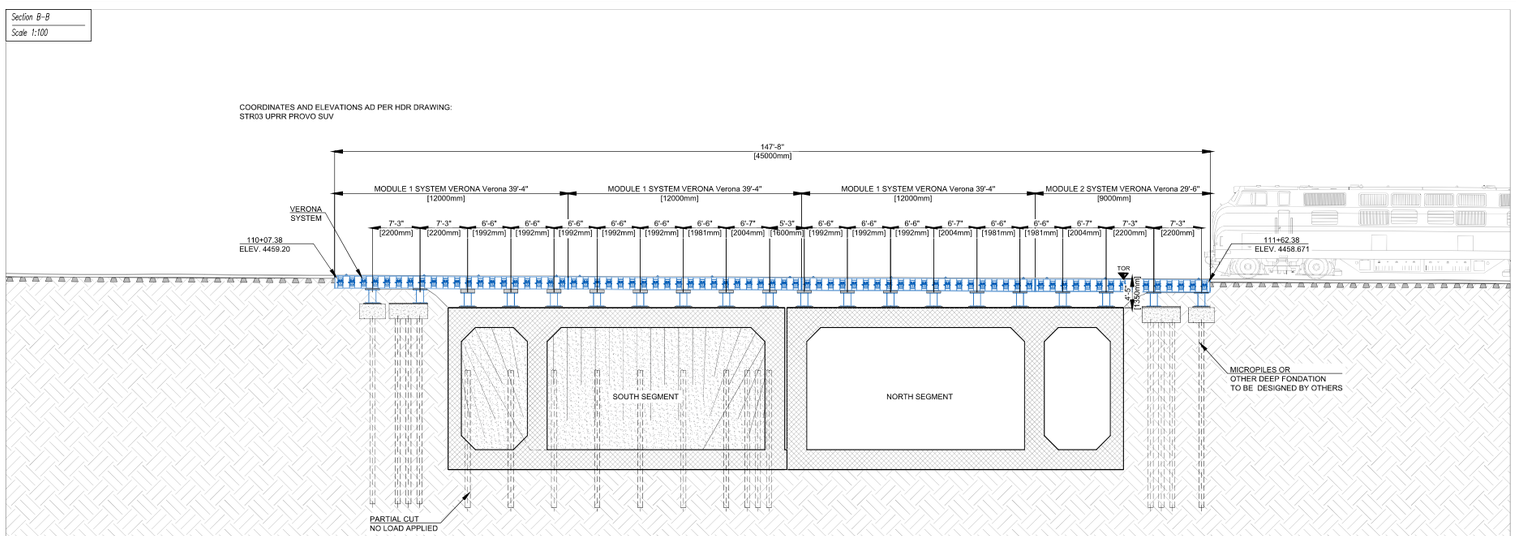


Section A-A
Scale 1:200



Box 2 – Phase 2.5: Underpass progression until covering all the lenght of the transverse beams over the underpass roof. Temporary bridges fully supported by the underpass. Control stop position until UTA weekend closure.

Section B-B
Scale 1:100



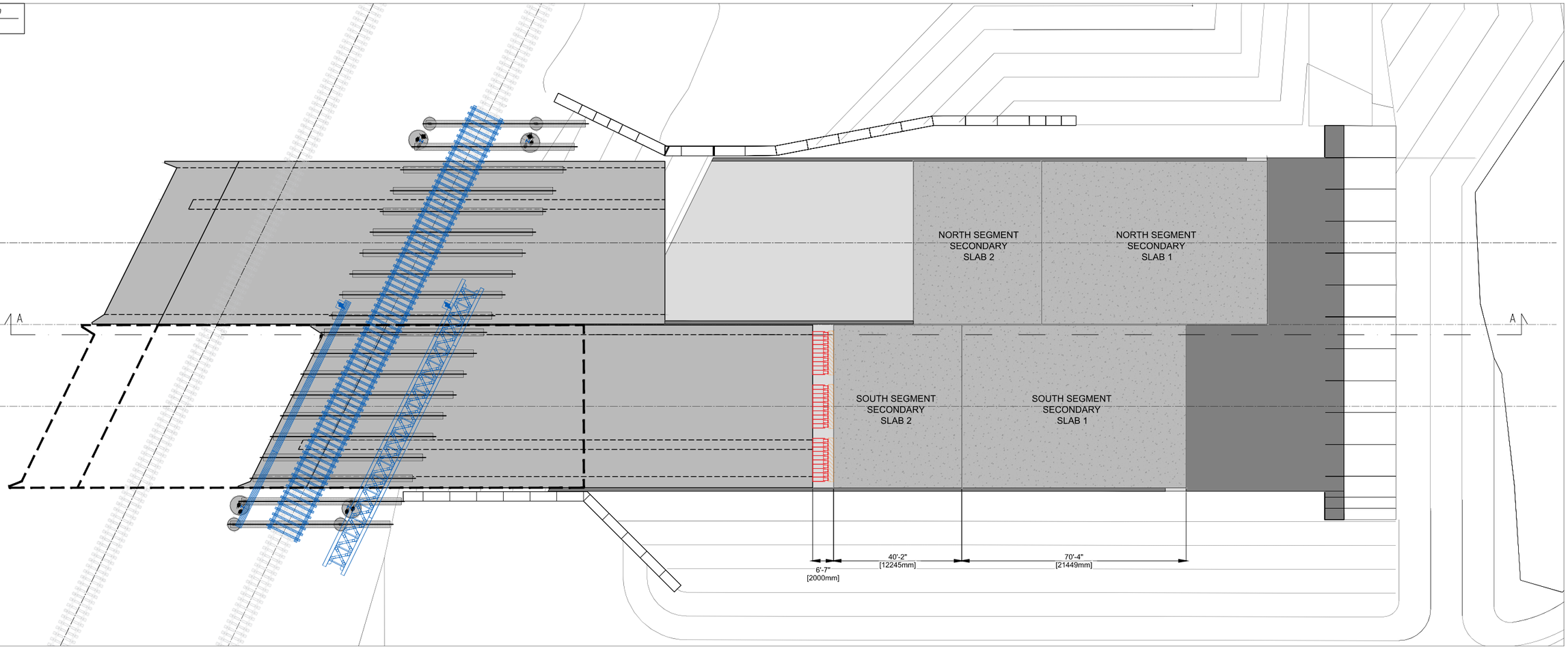
DRAWING N.	18	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT., 2024	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			PHASE 2.5 – ADVANCEMENT UNTIL CONTROL STOP	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1575 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

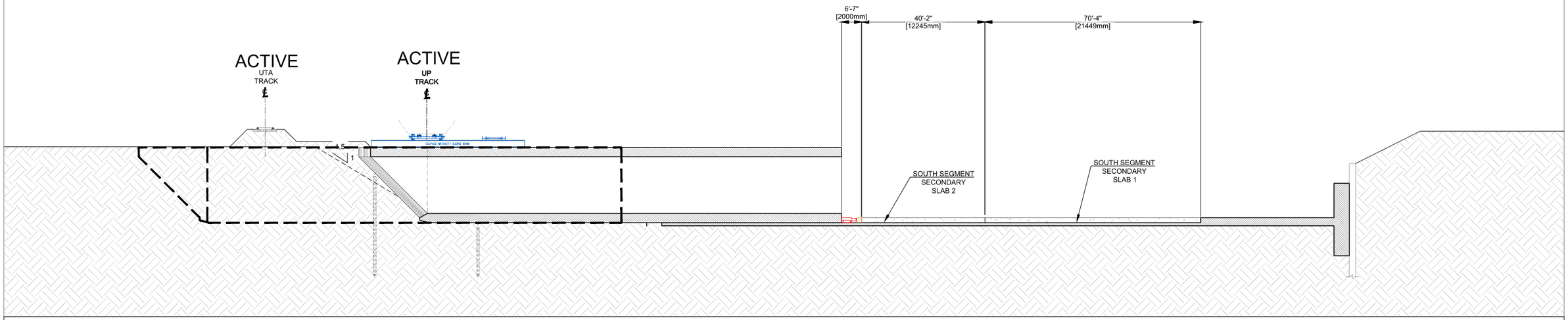
Phase 2.6 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 2 – Phase 2.6: Casting of the second secondary slab.

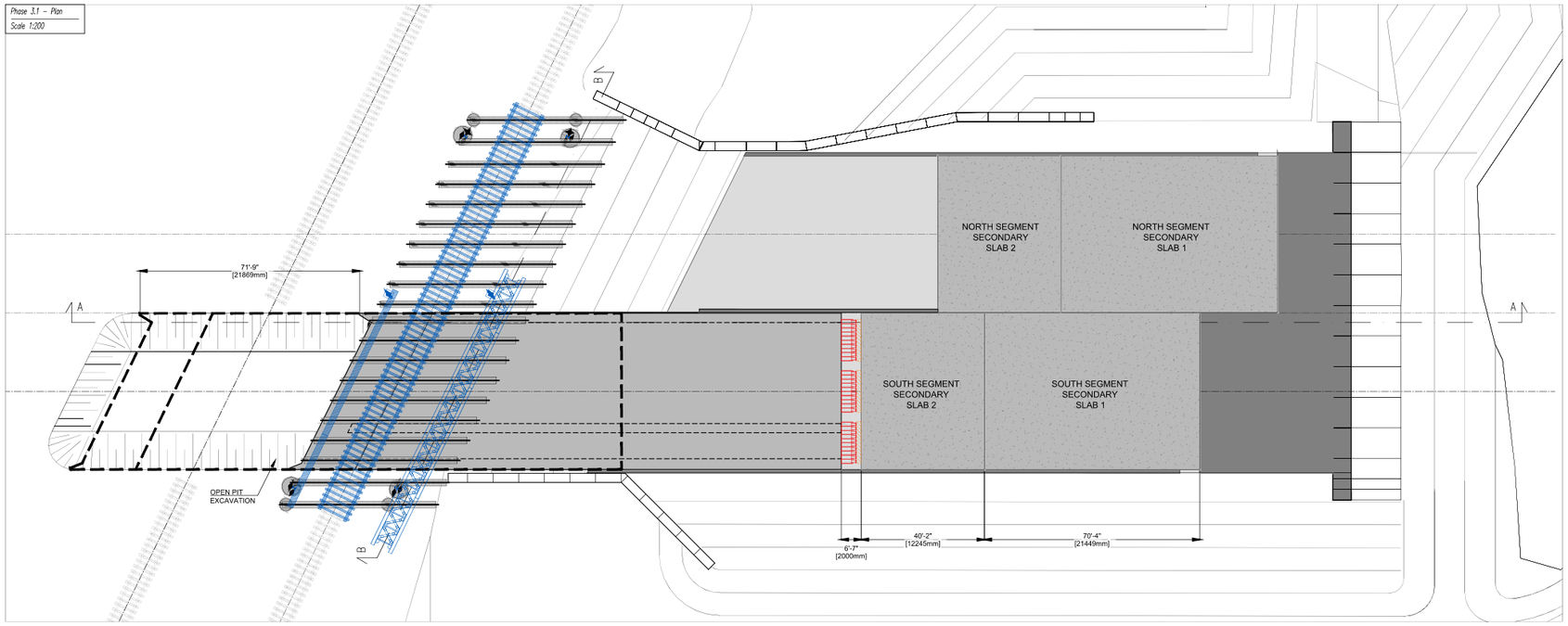
DRAWING N.	19	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 2.6 – SECONDARY SLAB N°3 CASTING	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

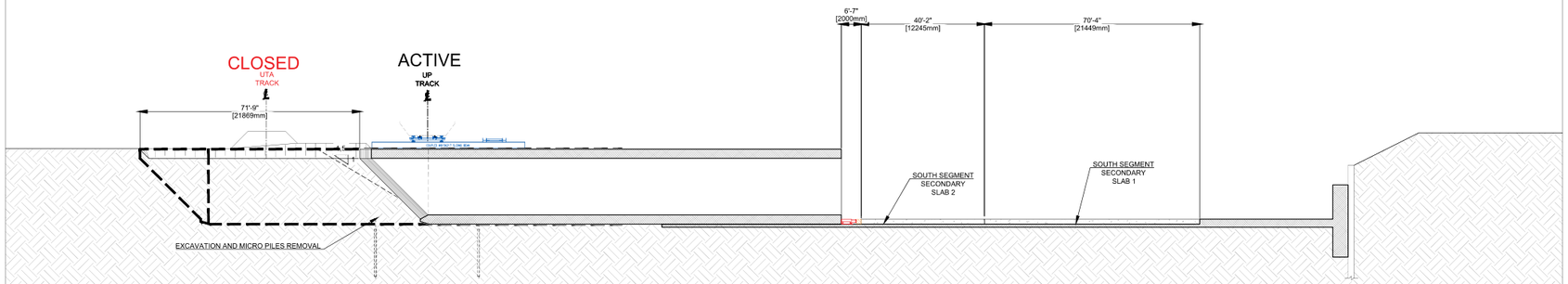
PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 3.1 – Plan
Scale 1:200

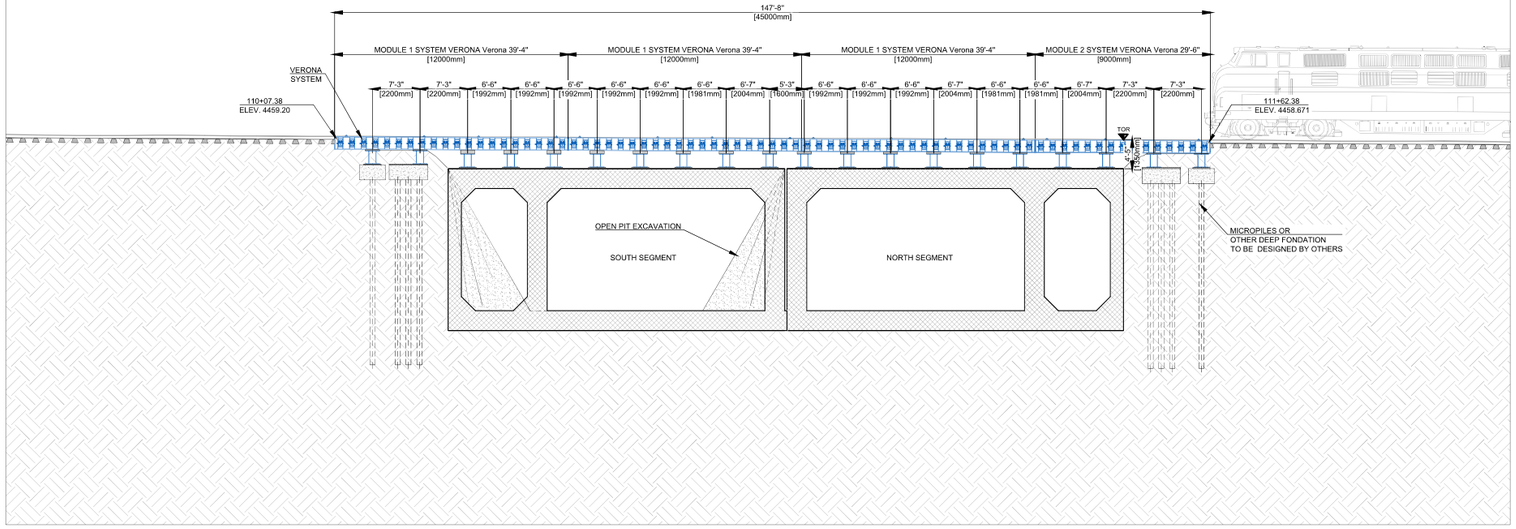


Section A-A
Scale 1:200



Box 2 – Phase 3.1: UTA track closure and track removal. Pre-excavation to allow the open pit jacking.

Section B-B
Scale 1:100



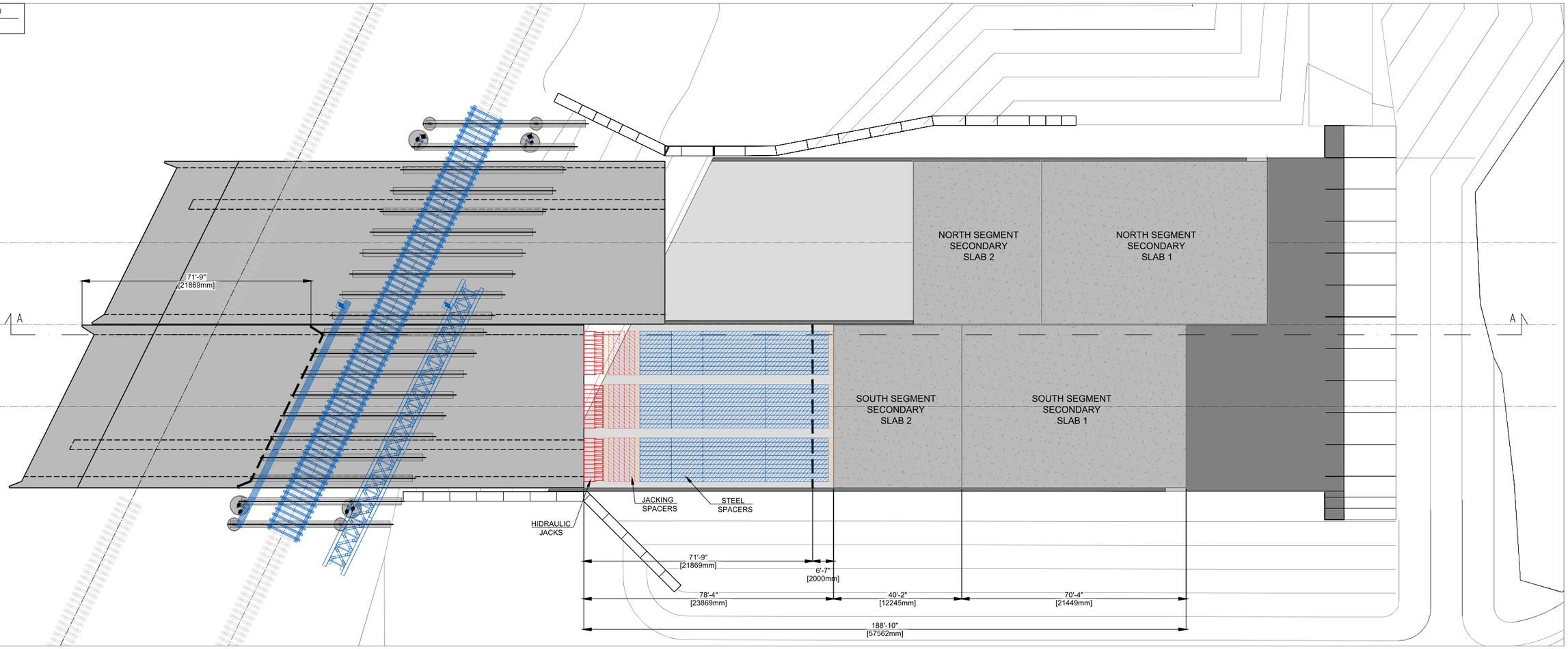
DRAWING N.	20	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			PHASE 3.1 – UTA TRACK REMOVAL	
APPROVED:	rp				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

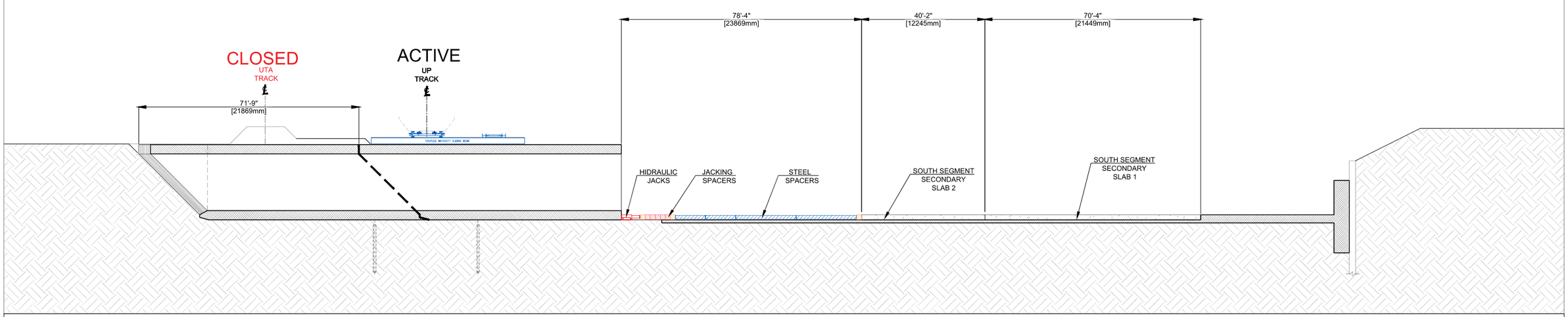
Phase 3.2 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 2 – Phase 3.2: Continuous excavation and push of the box until reaching the underpass final position.

DRAWING N.	21	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 3.2 – CONTINUOUS EXCAVATION & JACKING	
APPROVED:	op				

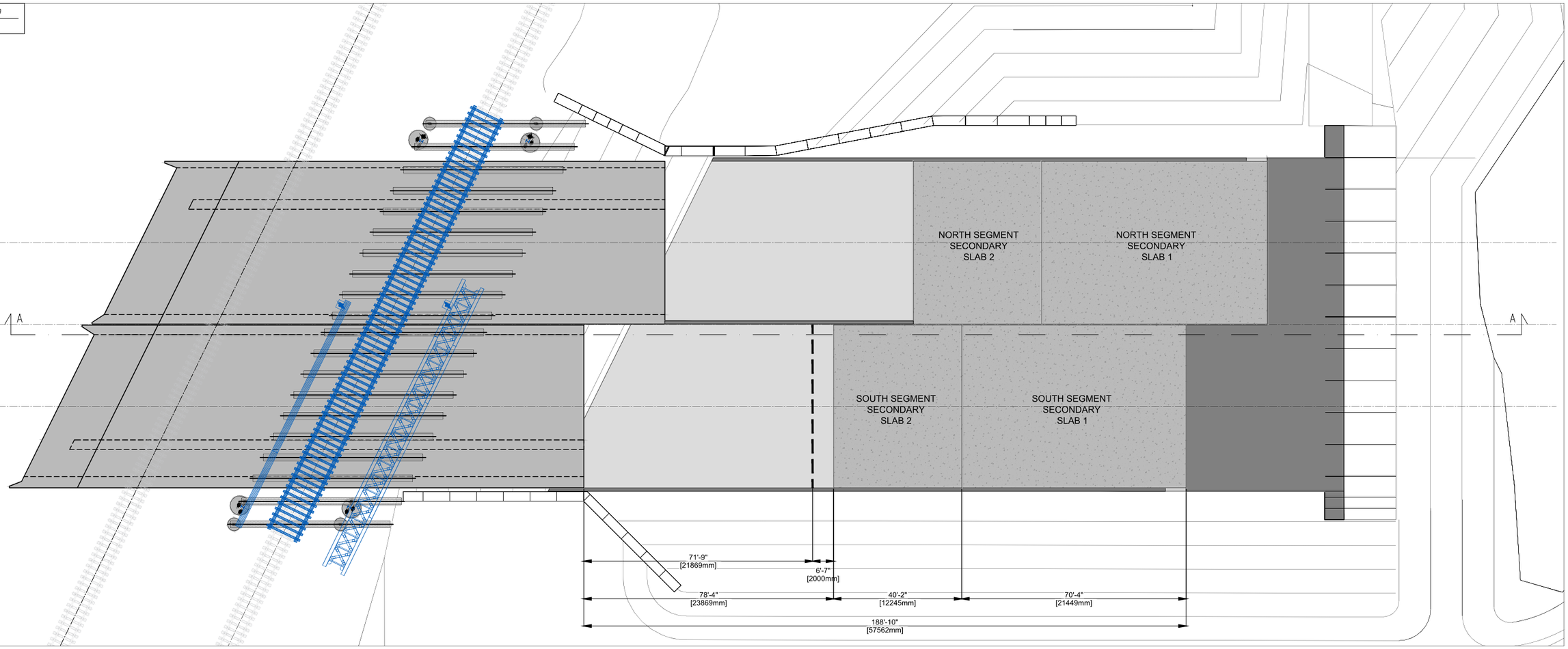
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

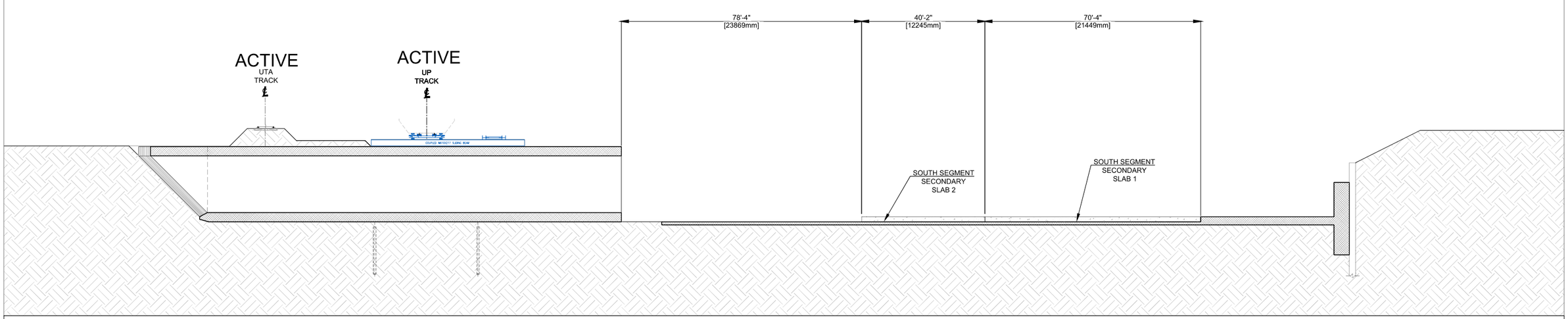
Phase 3.3 – Plan

Scale 1:200



Section A–A

Scale 1:200



Box 2 – Phase 3.3: UTA track restored and reopened to the traffic.

DRAWING N.	22	TITLE:	100% DESIGN RESUBMISSION – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th MAY 2025	14600 CROSSING – ROAD UNDERPASS BOX 2	
DRAWN:	drf	REVISION:	11th JUL 2025		
CHECKED:	vpo	REVISION:		PHASE 3.3 – UTA TRACK RESTORED	
APPROVED:	qp				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

VERONA SYSTEM NORTH SEGMENT PLAN
Scale 1:50

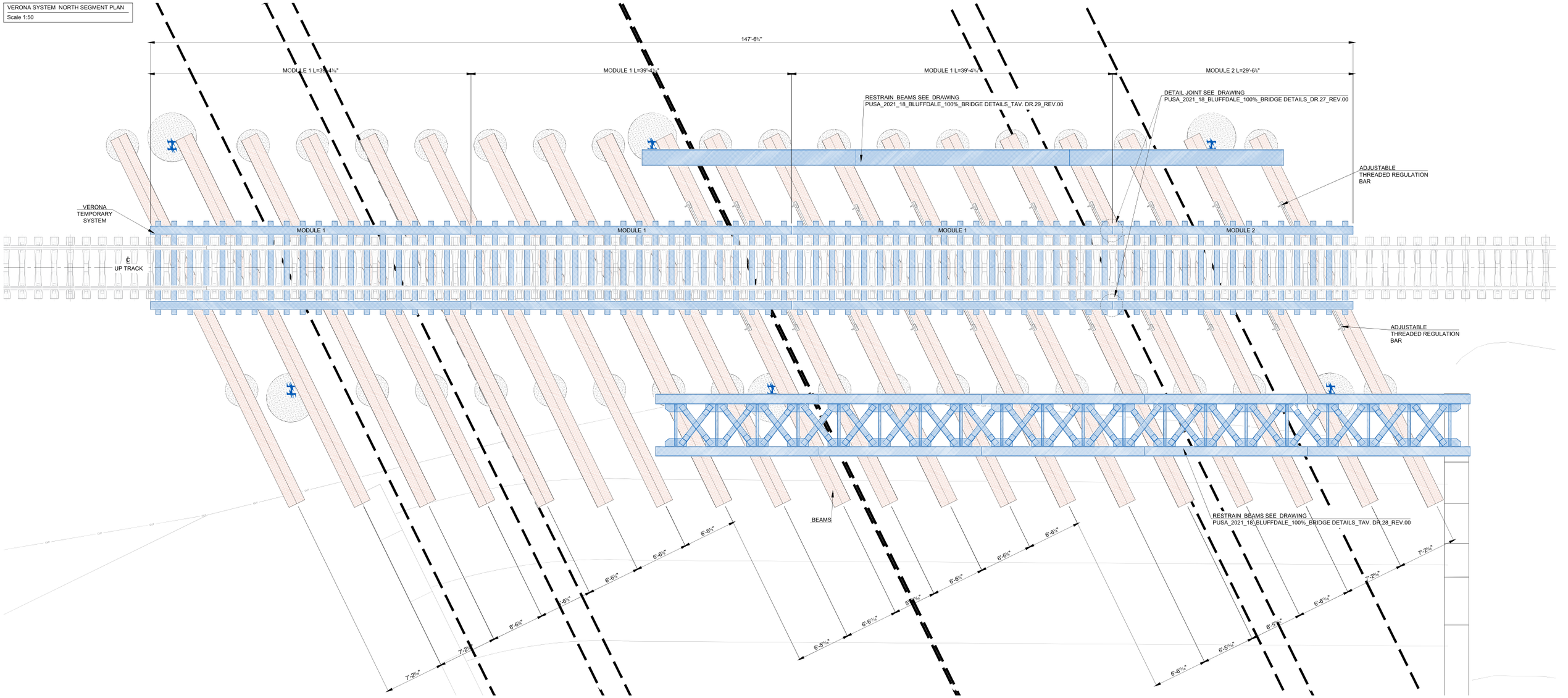


PHOTO 1: VERONA SYSTEM



PHOTO 2: VERONA SYSTEM

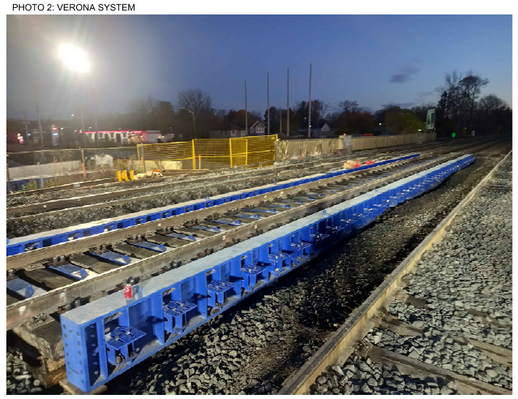


PHOTO 3: VERONA SYSTEM



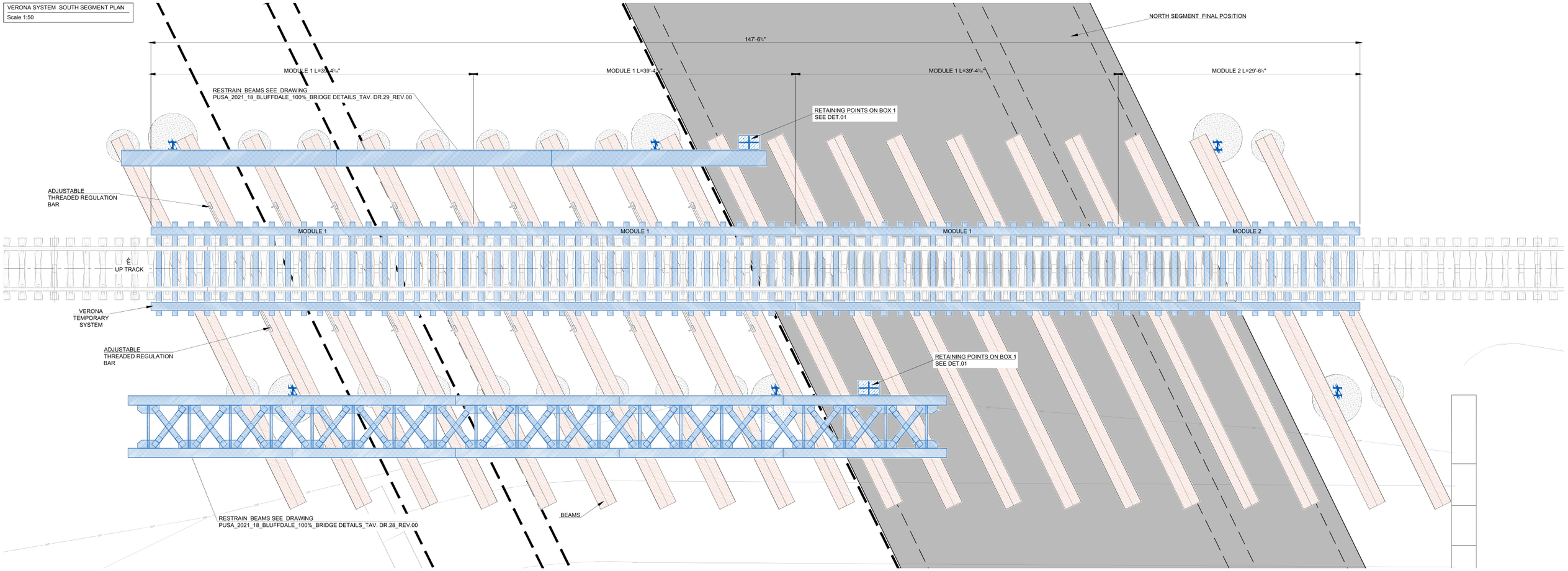
DRAWING N.	23	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

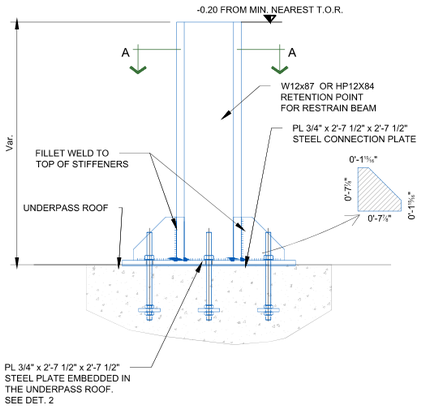
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

THIS DRAWING IS COPYRIGHT OF PETRUCCO S.R.L. AND IS LOANED ON THE CONDITION THAT IT SHALL NOT BE COPIED, USED OR REPRODUCED IN ANY WAY

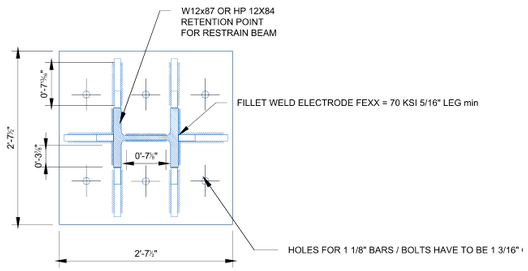
VERONA SYSTEM SOUTH SEGMENT PLAN
Scale 1:50



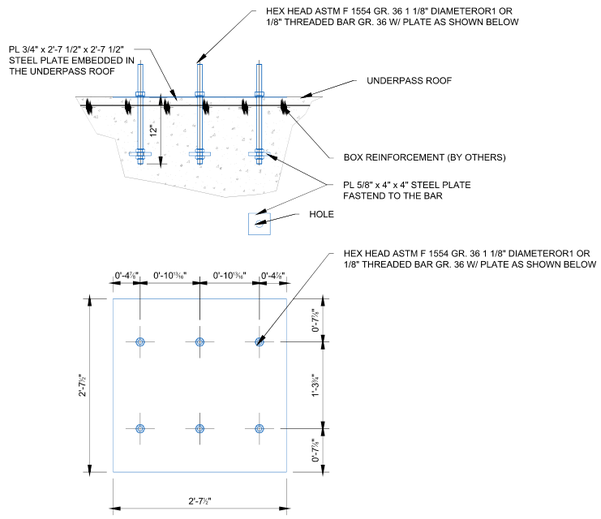
DETAIL 1
Scale 1:10



DETAIL 1 - SECTION A-A
Scale 1:10



DETAIL 2
Scale 1:10



RETAINING POINTS POSITION ON NORTH SEGMENT
Scale 1:100

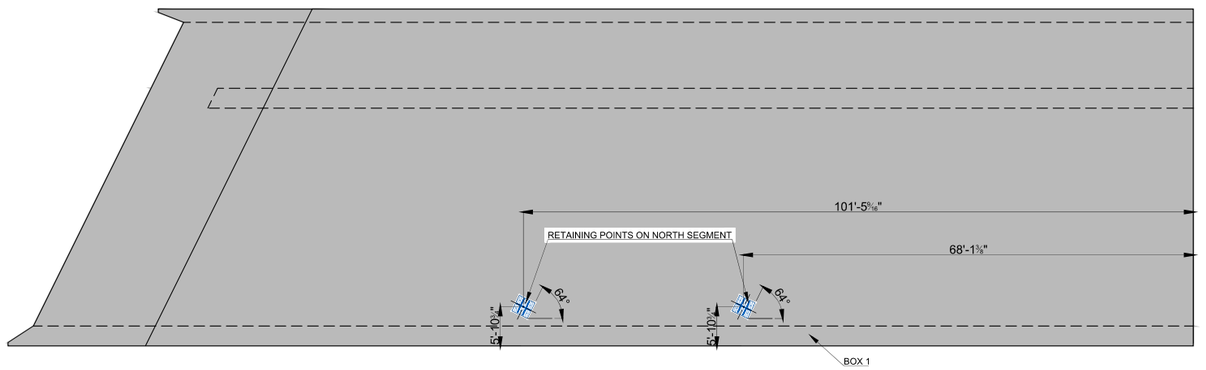


PHOTO: EXAMPLE RETAINING POINTS ON BOX 1



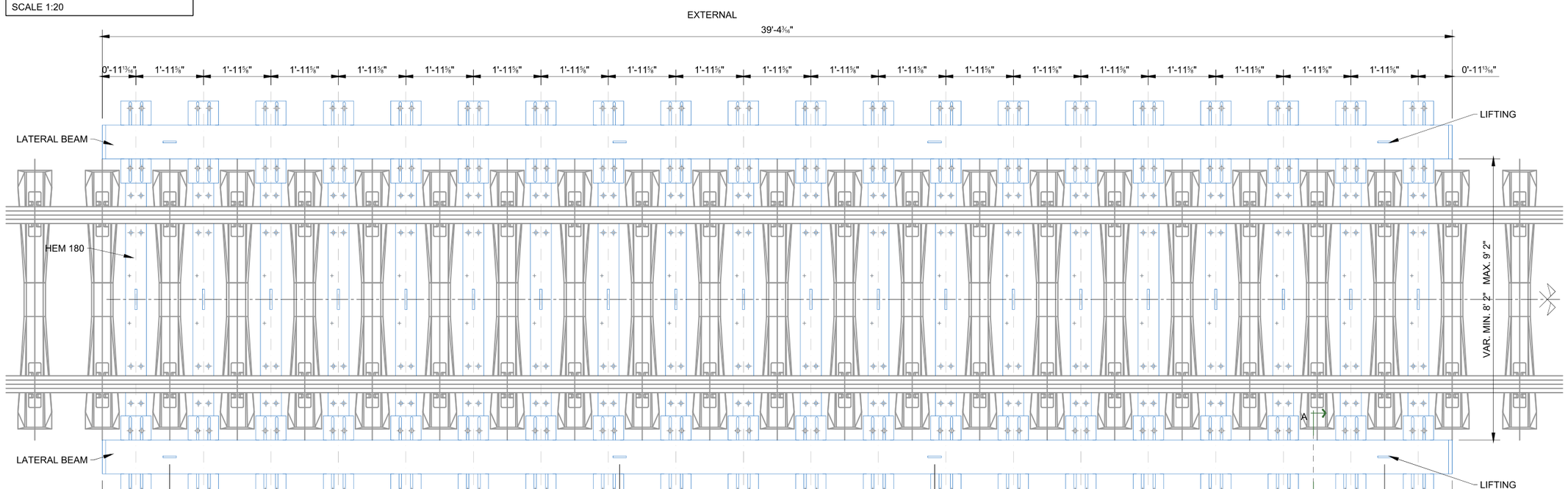
DRAWING N.	24	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	rp				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

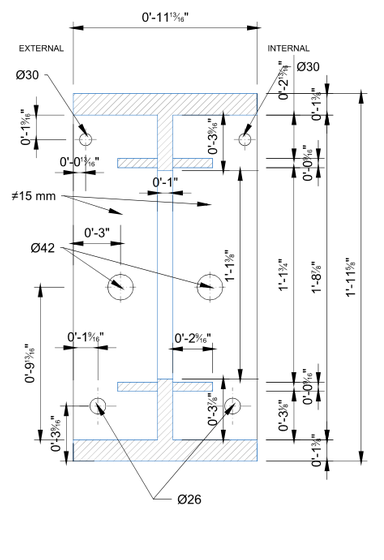
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

THIS DRAWING IS COPYRIGHTED. DO NOT COPY OR DISCLOSE WITHOUT WRITTEN CONSENT OF PETRUCCO GROUP

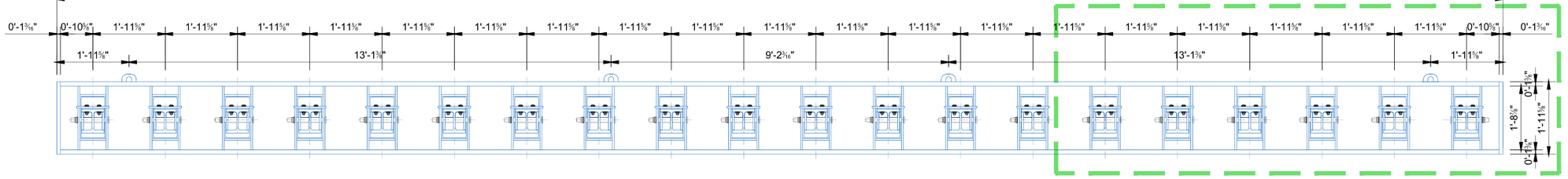
VERONA SYSTEM - MODULE 1 PLAN
SCALE 1:20



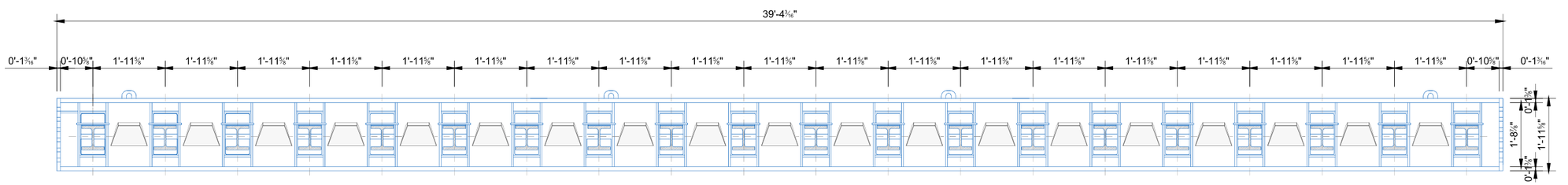
SECTION A-A
SCALE 1:5



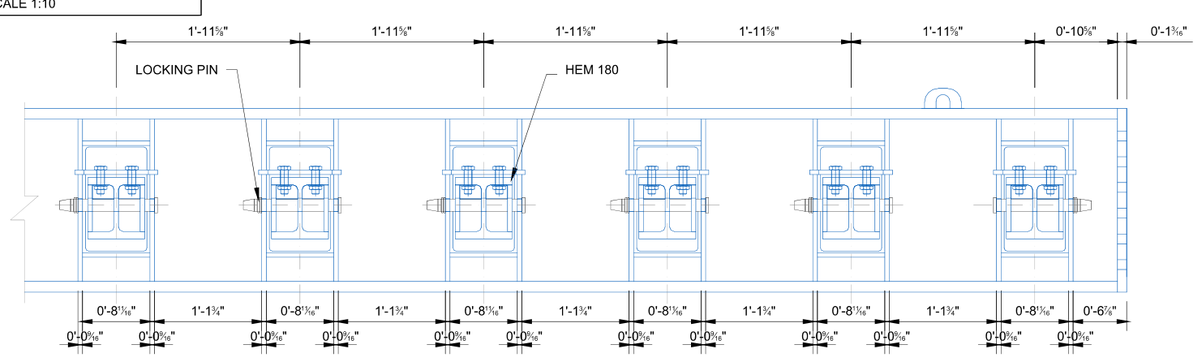
VERONA SYSTEM - MODULE 1 EXTERNAL LATERAL VIEW
SCALE 1:20



VERONA SYSTEM - MODULE 1 INTERNAL LATERAL VIEW
SCALE 1:20



DETAIL 1
SCALE 1:10



MATERIAL DESIGNATION	YIELD STR. (ksi)	TENSILE STR. (ksi)
A709	50	65

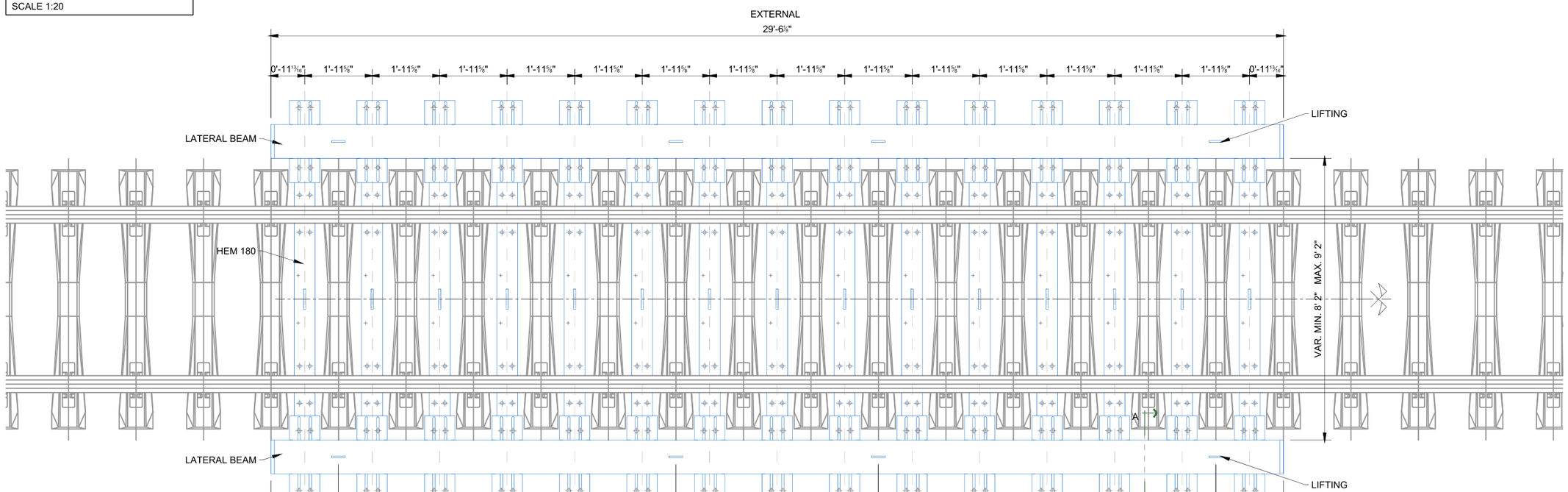
DRAWING N.	25	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

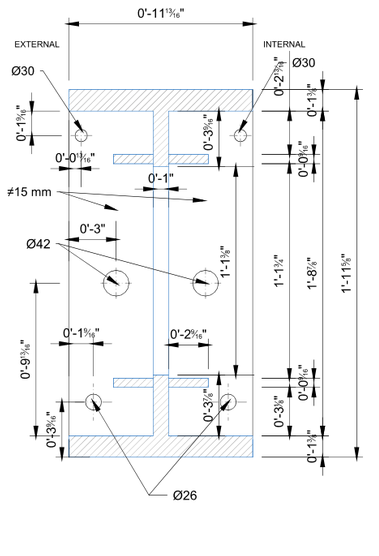
PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA - ALCALA' DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N. P.C.T/ES 2010/070674. ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT.

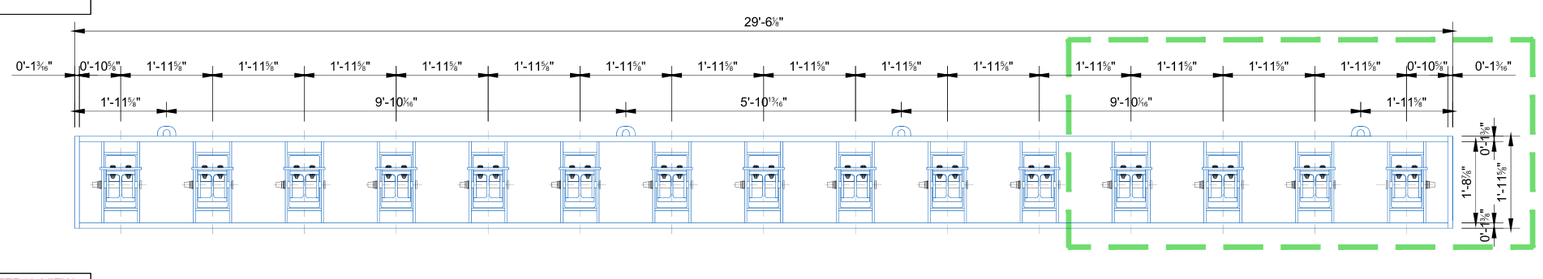
VERONA SYSTEM - MODULE 2 PLAN
SCALE 1:20



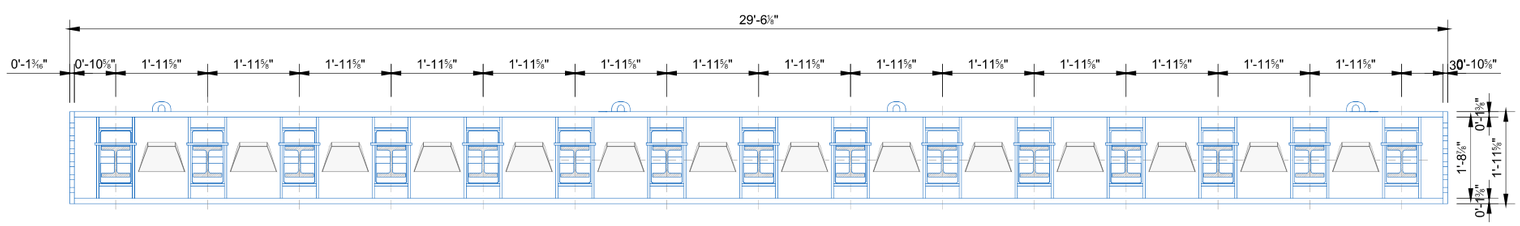
SECTION A-A
SCALE 1:5



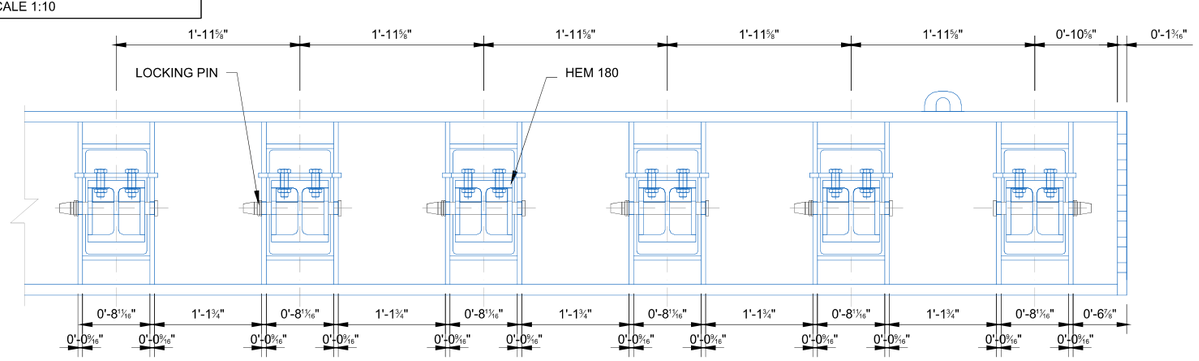
VERONA SYSTEM - MODULE 2 EXTERNAL LATERAL VIEW
SCALE 1:20



VERONA SYSTEM - MODULE 2 INTERNAL LATERAL VIEW
SCALE 1:20



DETAIL 1
SCALE 1:10



MATERIAL DESIGNATION	YIELD STR. (ksi)	TENSILE STR. (ksi)
A709	50	65

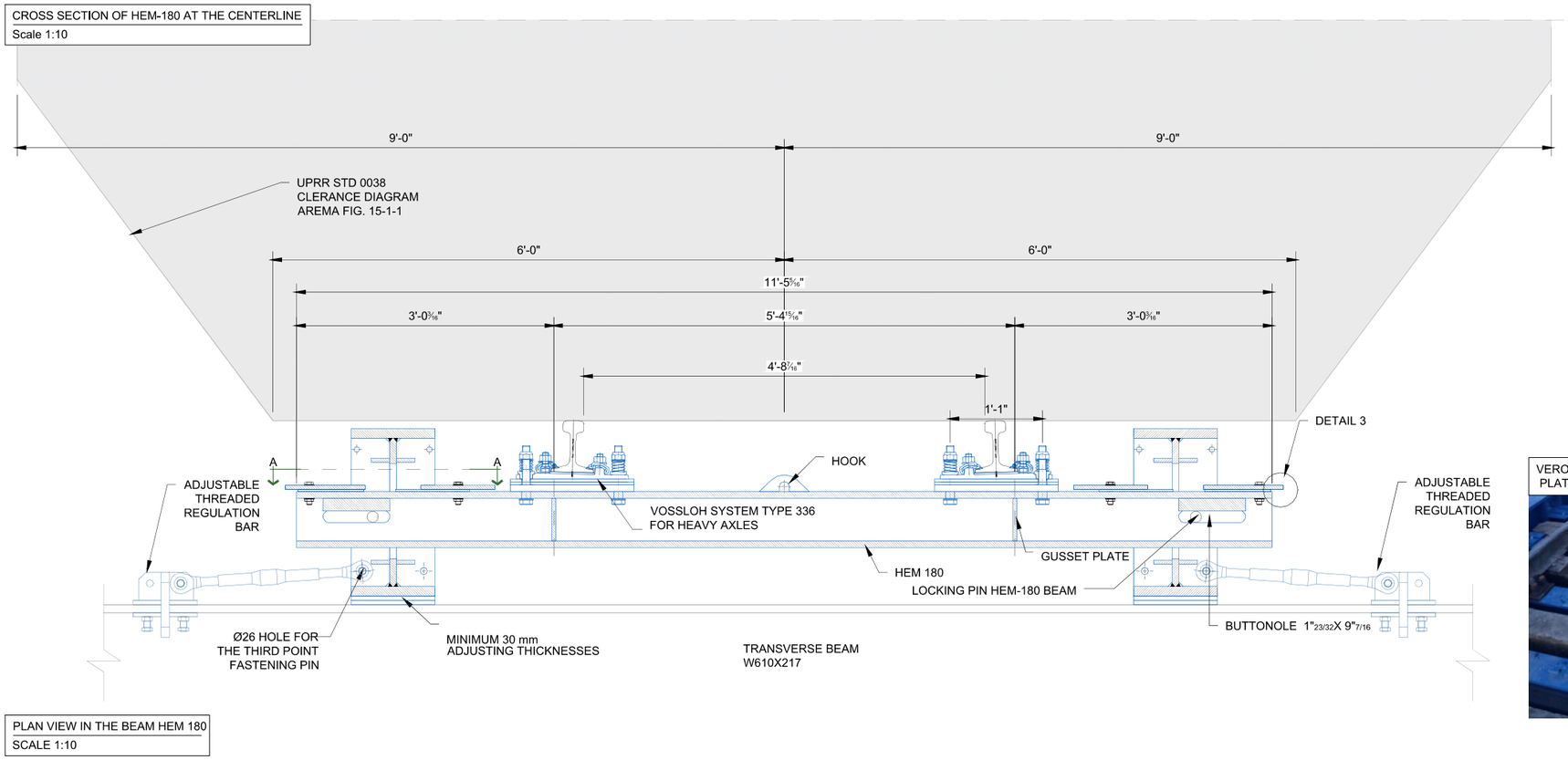
DRAWING N.	26	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

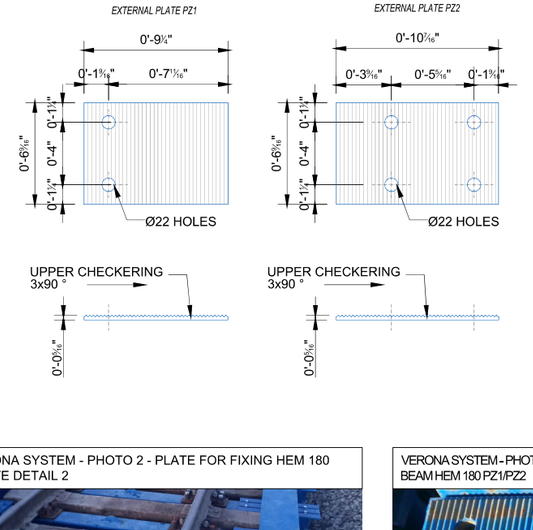
PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA - ALCALA' DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N. P.C.T/ES 2010/070674. ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT.

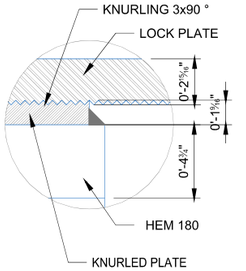
CROSS SECTION OF HEM-180 AT THE CENTERLINE
Scale 1:10



DETAIL 2
Scale 1:5



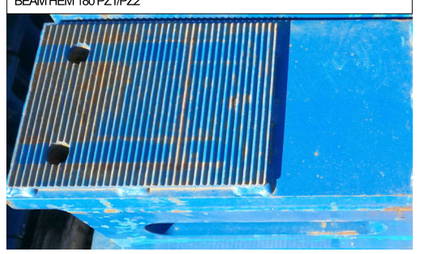
DETAIL 3
Scale 1:2



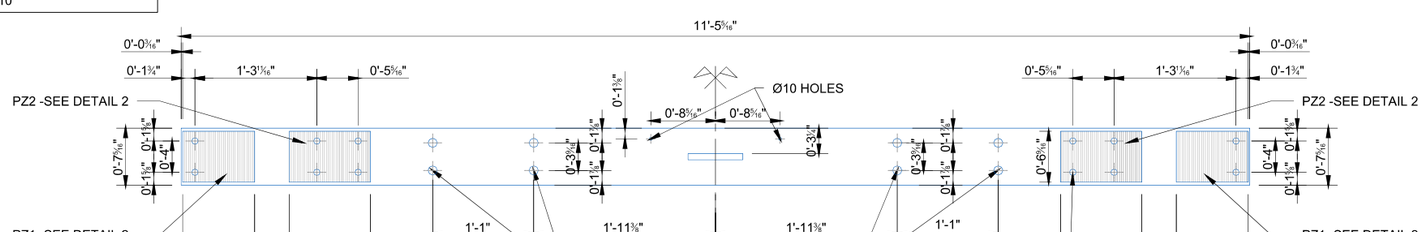
VERONA SYSTEM - PHOTO 2 - PLATE FOR FIXING HEM 180 PLATE DETAIL 2



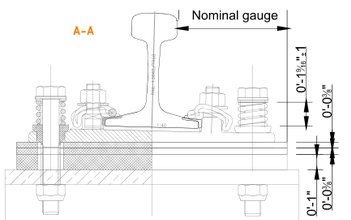
VERONA SYSTEM - PHOTO 1 - KNURLED PLATES WELDED ON THE BEAM HEM 180 PZ1/PZ2

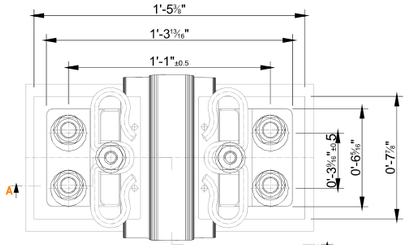


PLAN VIEW IN THE BEAM HEM 180
SCALE 1:10

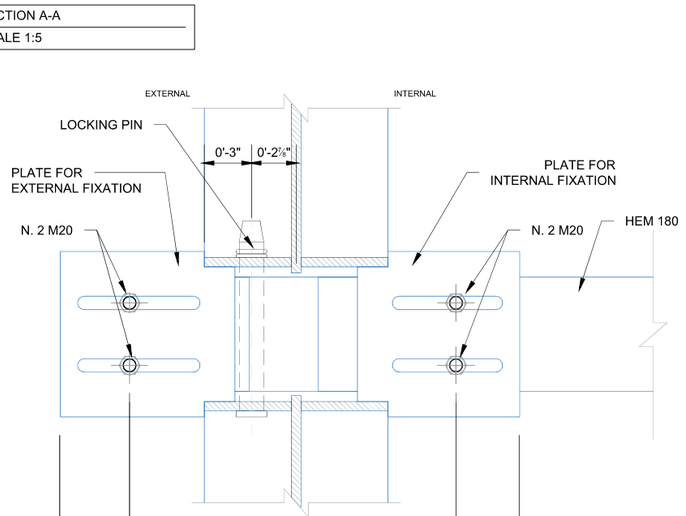


VOSSLOH RAIL FASTENING SYSTEM 336 FOR HEAVY AXLES
SCALE 1:5

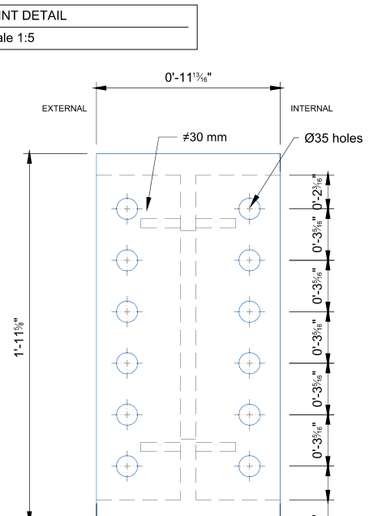




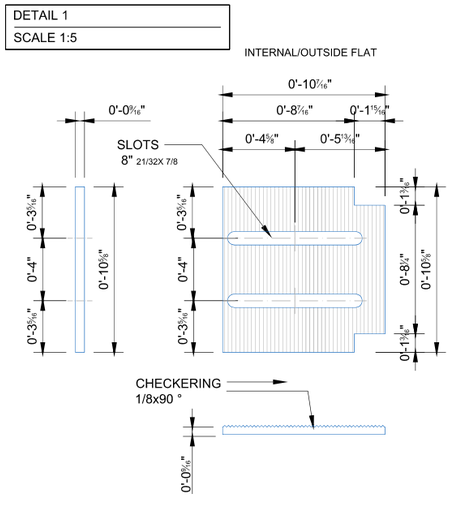
SECTION A-A
SCALE 1:5



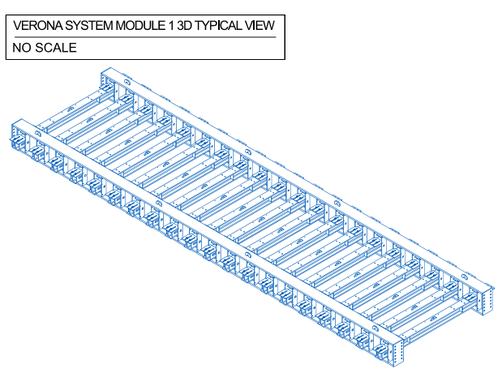
JOINT DETAIL
Scale 1:5



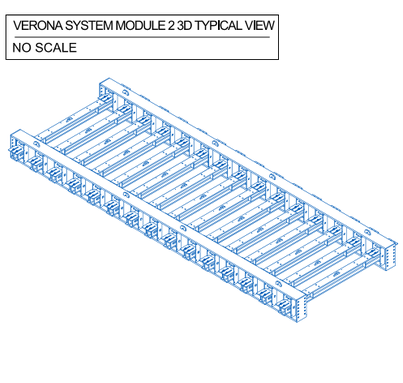
DETAIL 1
SCALE 1:5



VERONA SYSTEM MODULE 1 3D TYPICAL VIEW
NO SCALE



VERONA SYSTEM MODULE 2 3D TYPICAL VIEW
NO SCALE



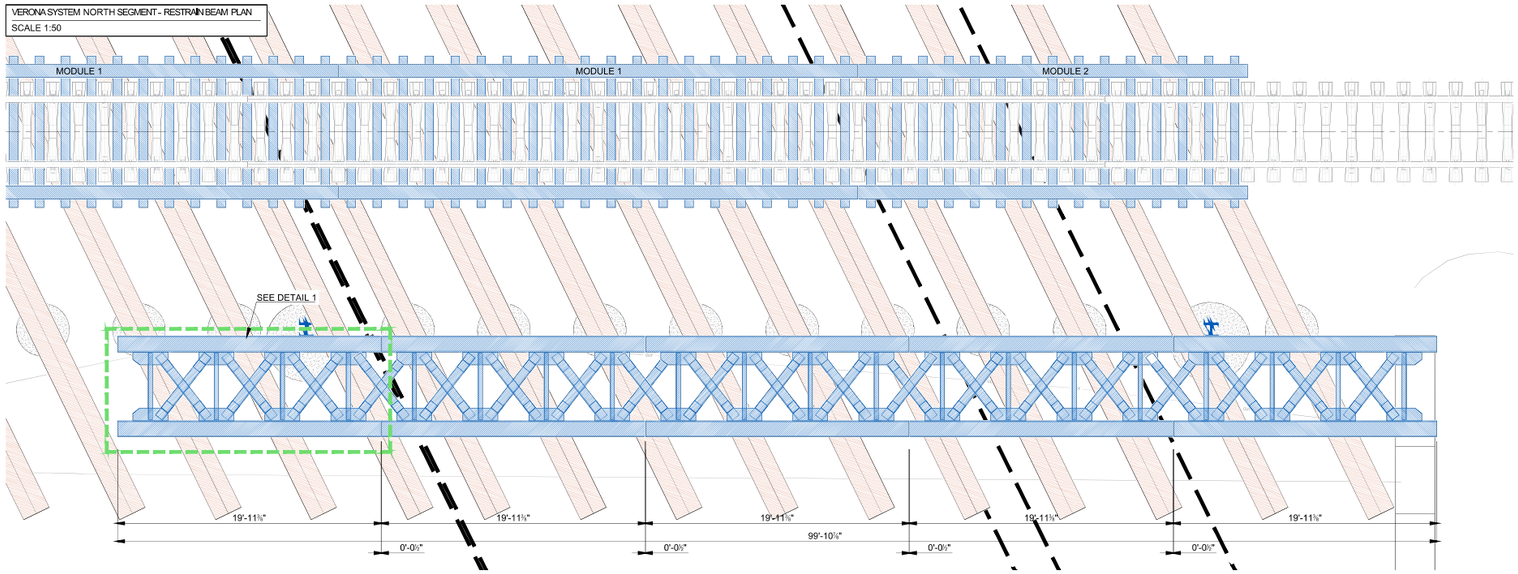
DRAWING N.	27	TITLE:	100% DESIGN – VERONA SYSTEM		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	qp				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

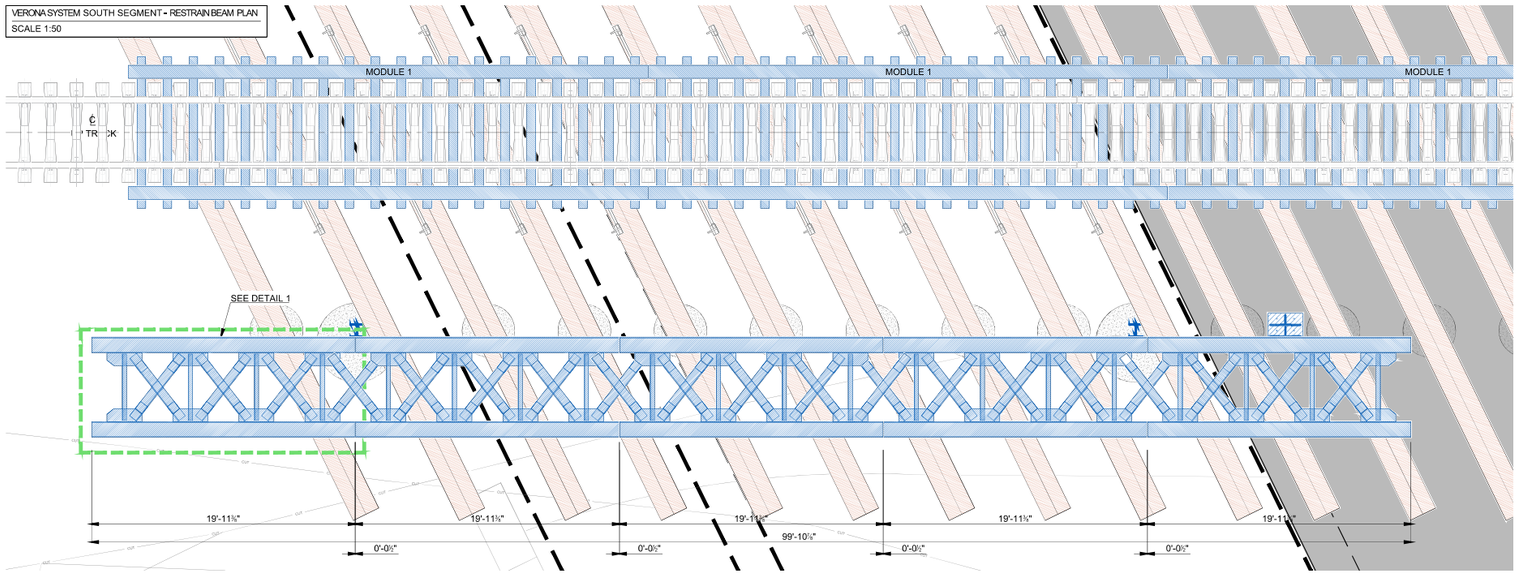
PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA. - ALCALA' DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N. P.C.T./ES 2010/070674 ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT

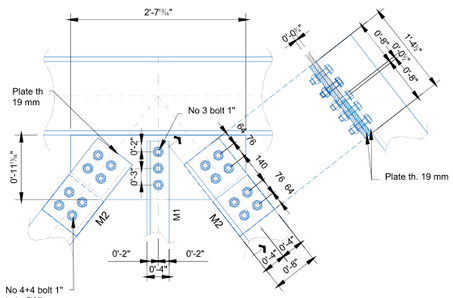
VERONA SYSTEM NORTH SEGMENT - RESTRAIN BEAM PLAN
SCALE 1:50



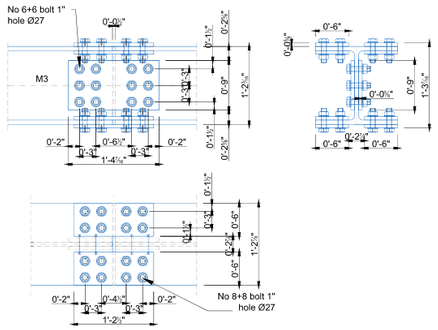
VERONA SYSTEM SOUTH SEGMENT - RESTRAIN BEAM PLAN
SCALE 1:50



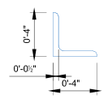
DETAIL 2
SCALE 1:10



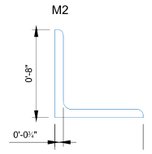
DETAIL 3
SCALE 1:10



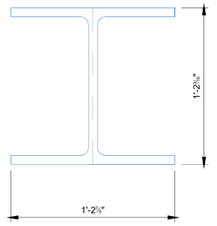
M1



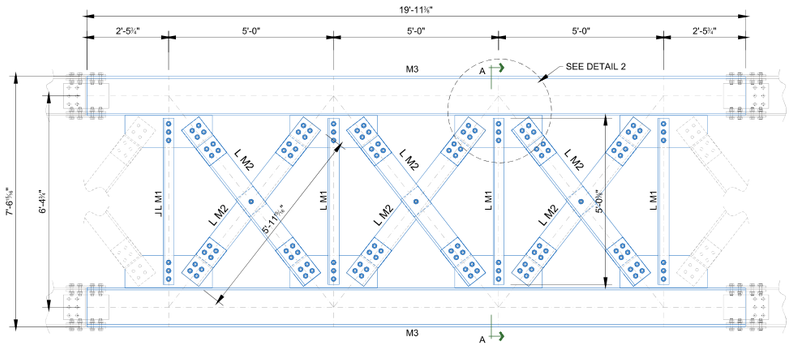
M2



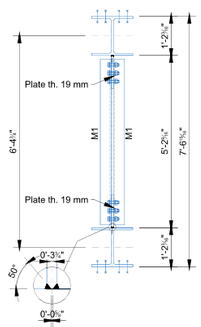
M3
HP



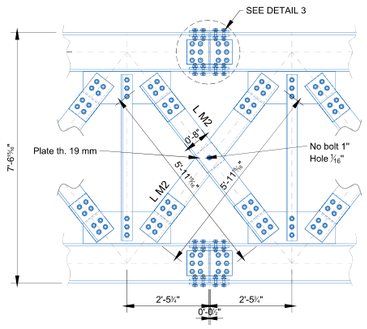
DETAIL 1
SCALE 1:20



SECTION A-A
SCALE 1:20



BEAMS JOINT
SCALE 1:20



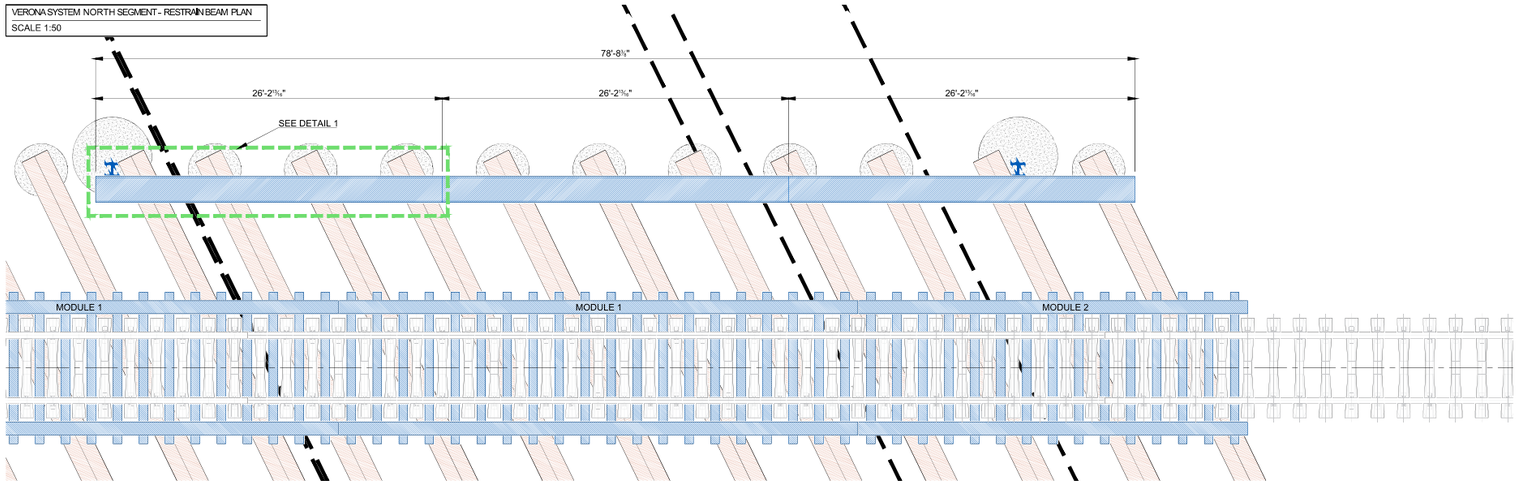
DRAWING N.	28	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

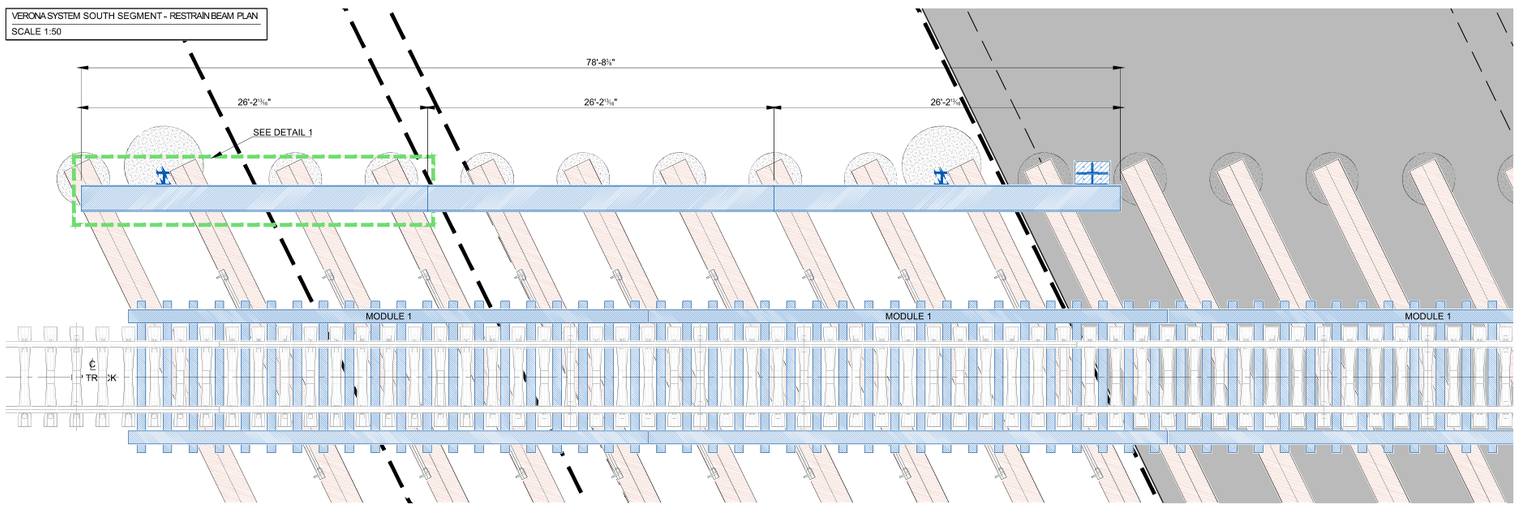
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1575 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

THIS DRAWING OR PRODUCED CAD DATA IS THE PROPERTY OF PETRUCCO GROUP AND SHALL NOT BE REPRODUCED OR COPIED OR USED IN ANY MANNER WHATSOEVER WITHOUT THE EXPRESS WRITTEN PERMISSION OF PETRUCCO GROUP

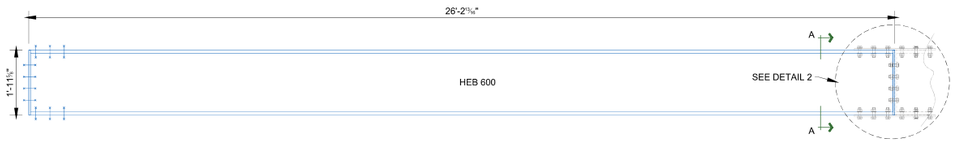
VERONA SYSTEM NORTH SEGMENT - RESTRAIN BEAM PLAN
SCALE 1:50



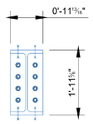
VERONA SYSTEM SOUTH SEGMENT - RESTRAIN BEAM PLAN
SCALE 1:50



DETAIL 1
Scale 1:20



SECTION A-A
Scale 1:20



DETAIL 2
Scale 1:10

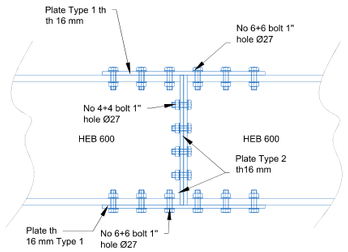


PLATE TYPE 1
Scale 1:10

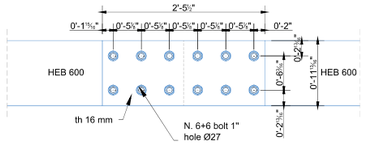
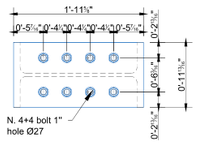


PLATE TYPE 2
Scale 1:10



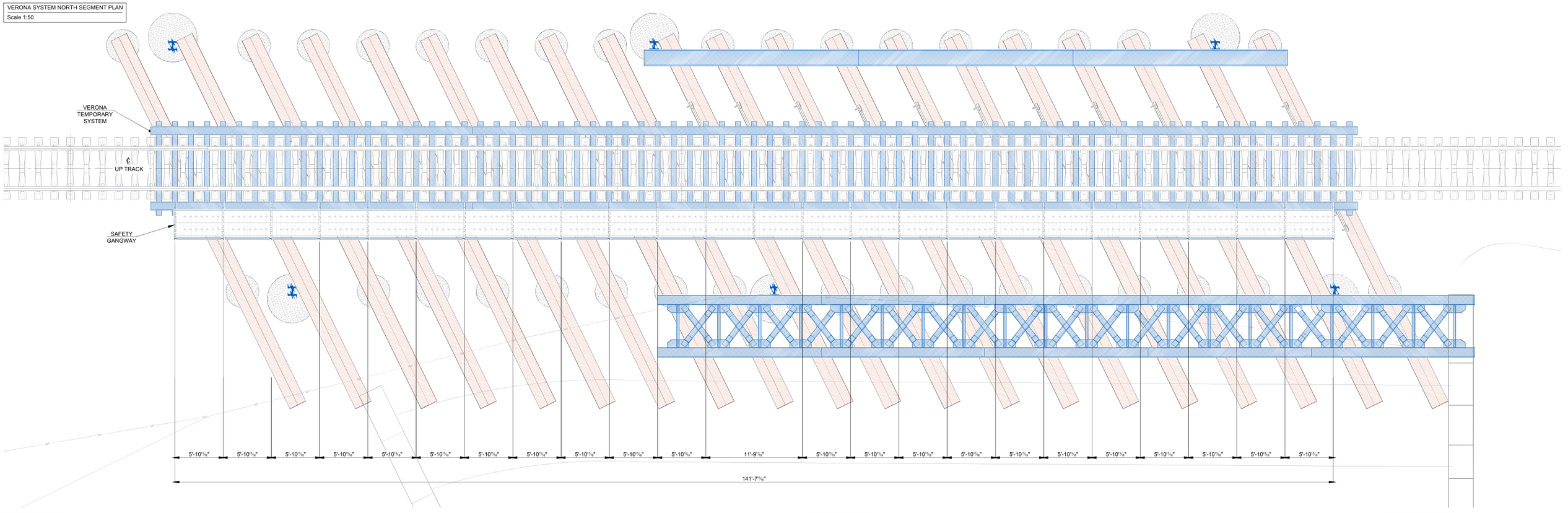
DRAWING N.	29	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY, 2025	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:	11th JUL, 2025		
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	rp				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

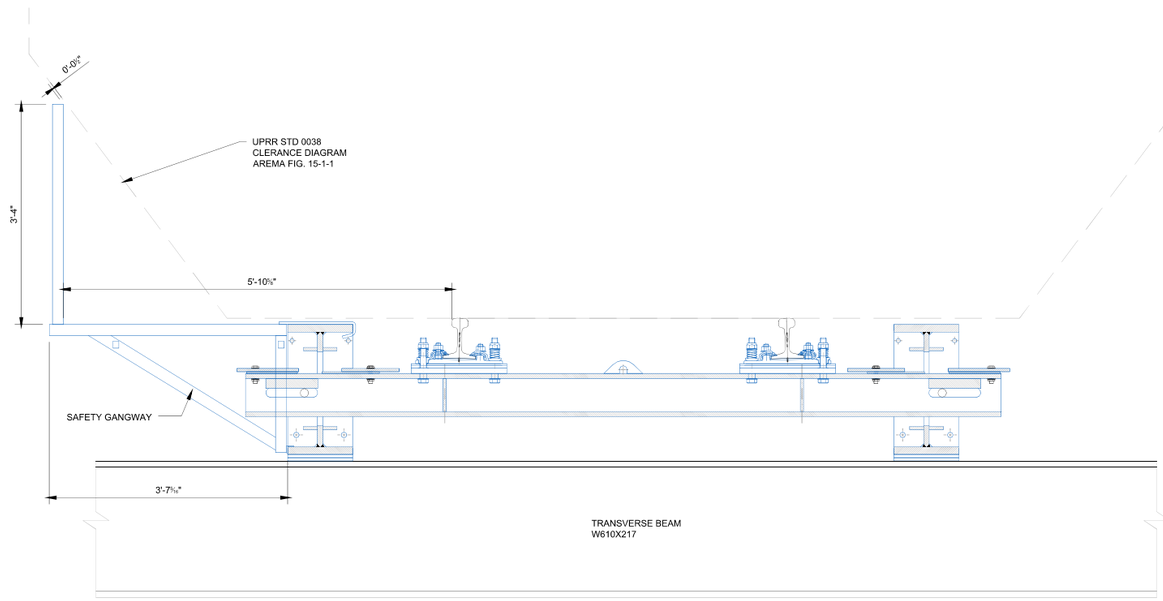
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

THIS DRAWING IS THE PROPERTY OF PETRUCCO S.R.L. AND IS COVERED BY INTERNATIONAL PATENT LAWS AND TREATIES. ALL RIGHTS RESERVED. NO PUBLICATION ALLOWED WITHOUT PERMISSION. AS WRITTEN CONSENT.

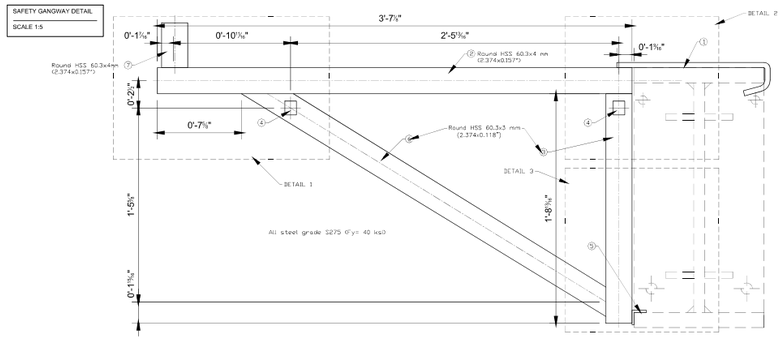
VERONA SYSTEM NORTH SEGMENT PLAN
Scale 1:50



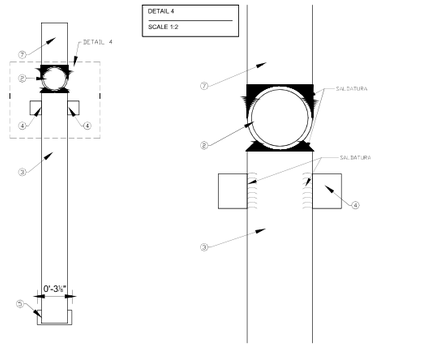
SAFETY GANGWAY DETAIL
SCALE 1:10



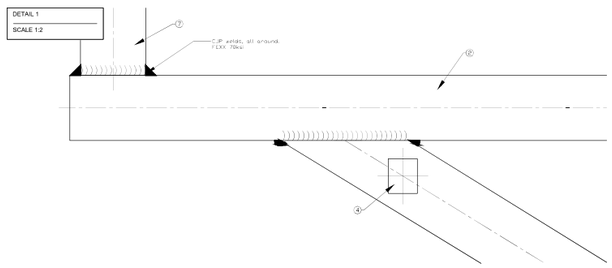
SAFETY GANGWAY DETAIL
SCALE 1:5



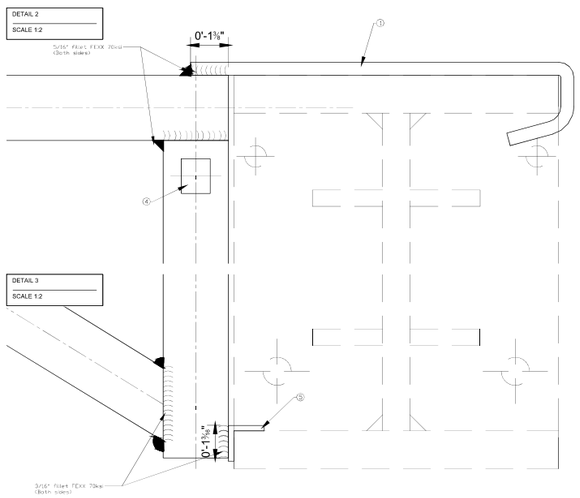
DETAIL 4
SCALE 1:2



DETAIL 1
SCALE 1:2



DETAIL 2
SCALE 1:2



DETAIL 3
SCALE 1:2

PHOTO 1



PHOTO 2



PHOTO 3



PHOTO 4

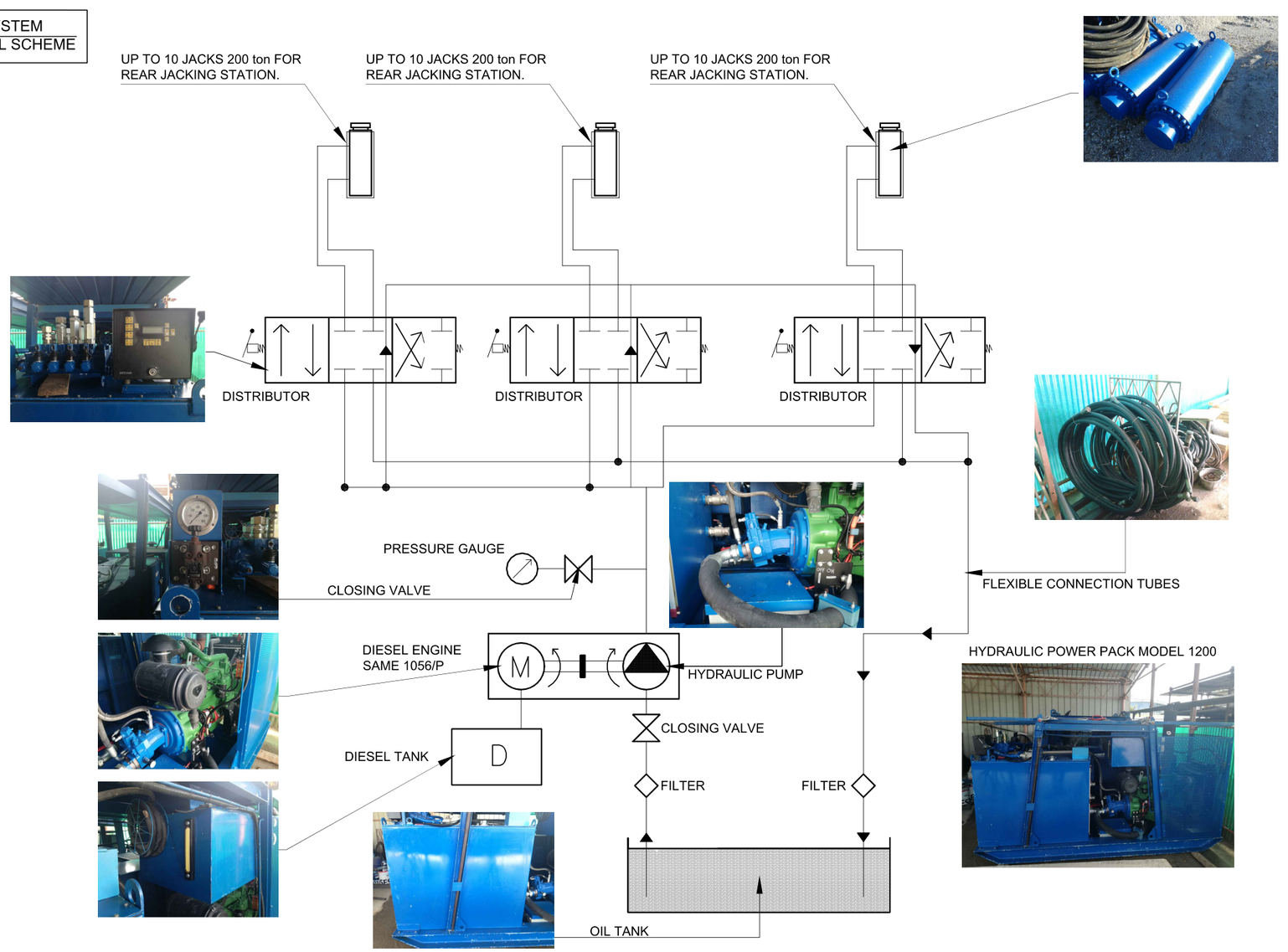


DRAWING N.	J0	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:	10th JUL. 2025		
CHECKED:	vpo	REVISION:		VERONA SYSTEM SAFETY PLAN	
APPROVED:	op				
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY					

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

THIS DRAWING IS PROPRIETARY AND CONFIDENTIAL. IT IS THE PROPERTY OF PETRUCCO USA L.L.C. AND SHALL NOT BE REPRODUCED, PUBLISHED OR USED IN ANY WAY WITHOUT THE EXPRESS WRITTEN CONSENT OF PETRUCCO USA L.L.C.

JACKING SYSTEM
FUNCTIONAL SCHEME



DRAWING N.	31	TITLE:	100% DESIGN – JACKING WORKS		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			JACKING SYSTEM FUNCTIONAL SCHEME	
APPROVED:	ap				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

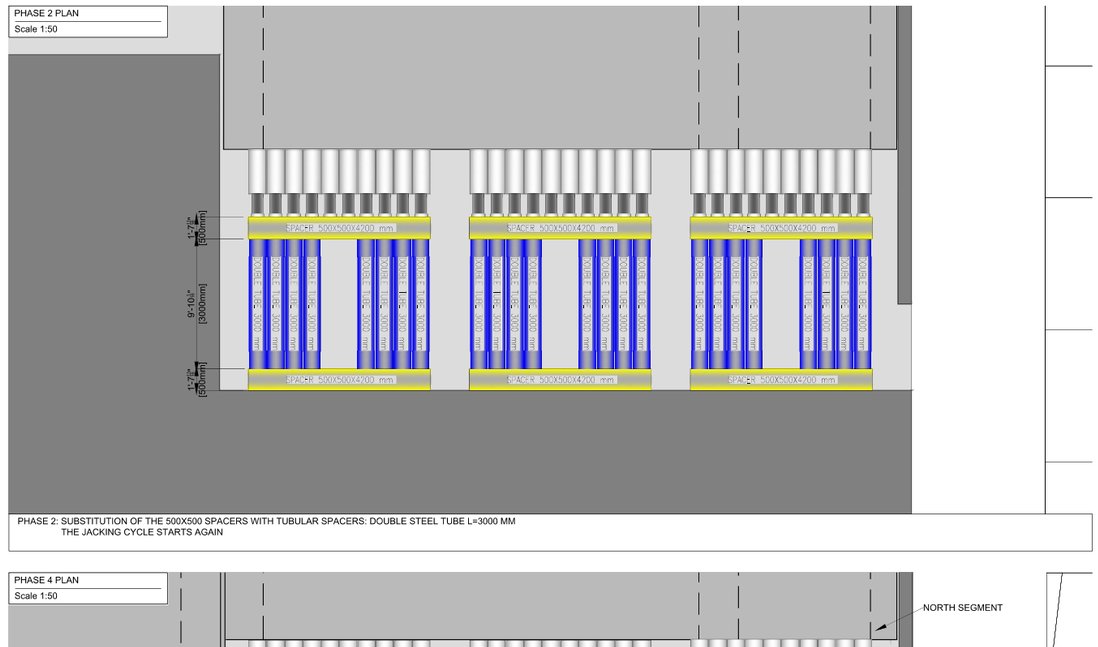
ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA , ALCALA' DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N. P.C.T./ES 2010/070674 ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT.

PHASE 1 PLAN
Scale 1:50



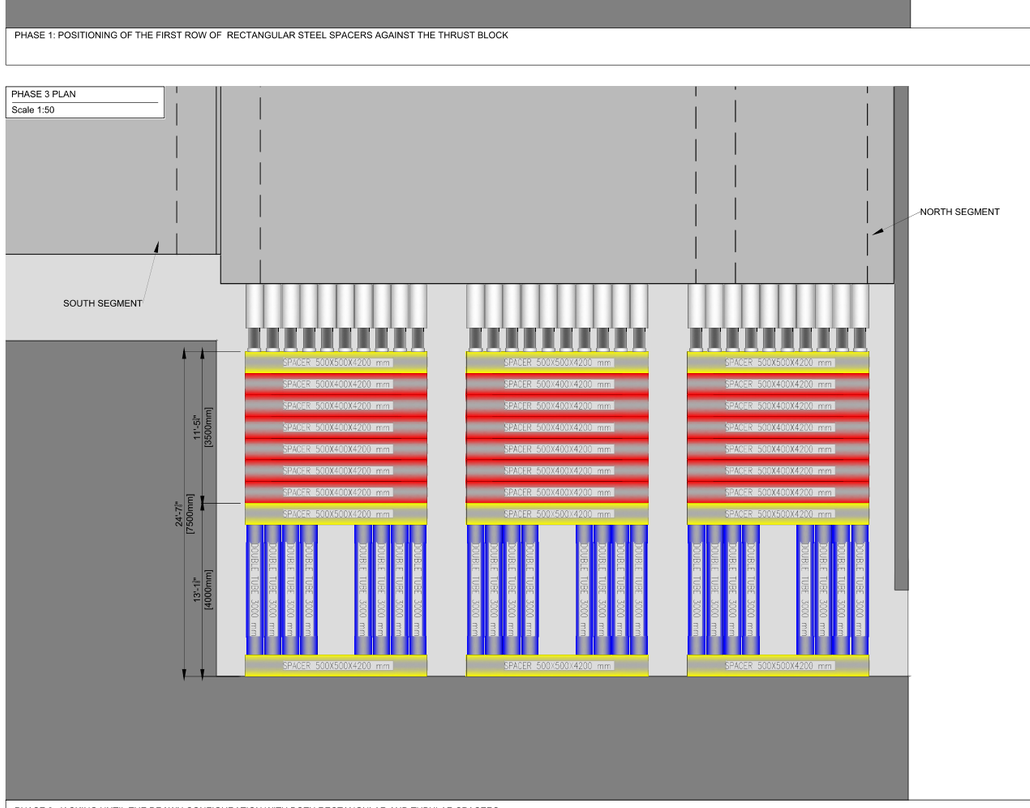
PHASE 1: POSITIONING OF THE FIRST ROW OF RECTANGULAR STEEL SPACERS AGAINST THE THRUST BLOCK

PHASE 2 PLAN
Scale 1:50



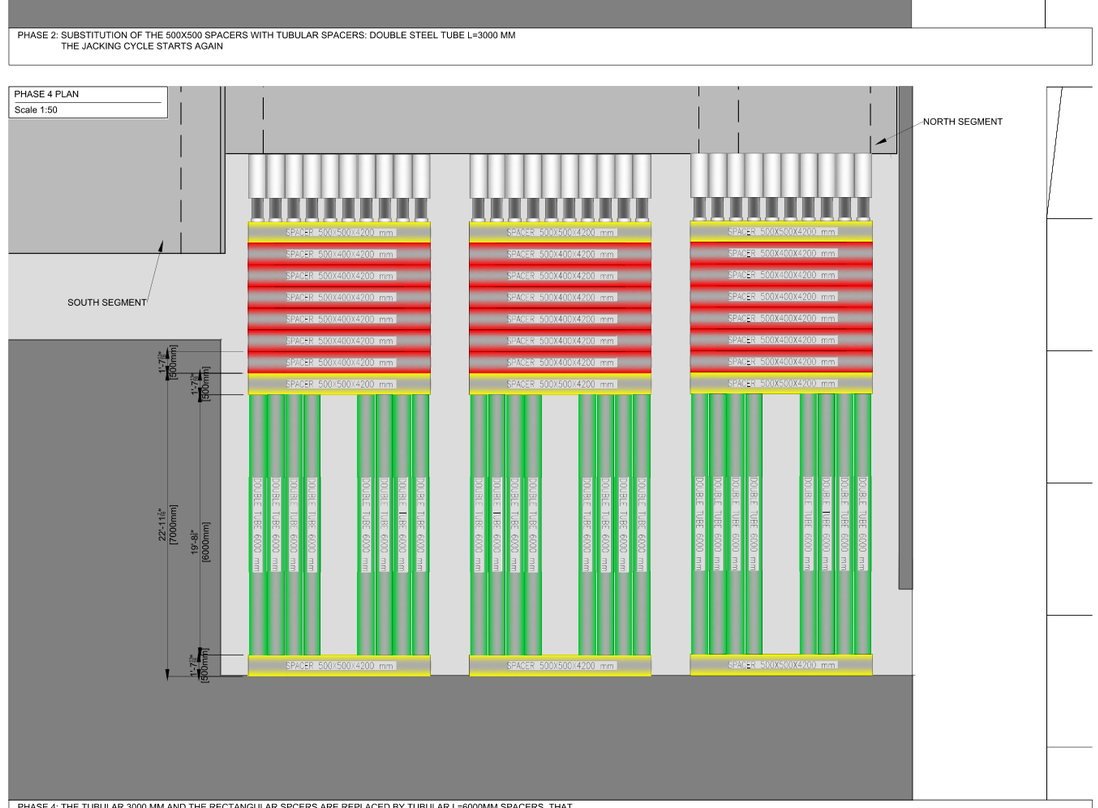
PHASE 2: SUBSTITUTION OF THE 500X500 SPACERS WITH TUBULAR SPACERS: DOUBLE STEEL TUBE L=3000 MM
THE JACKING CYCLE STARTS AGAIN

PHASE 3 PLAN
Scale 1:50



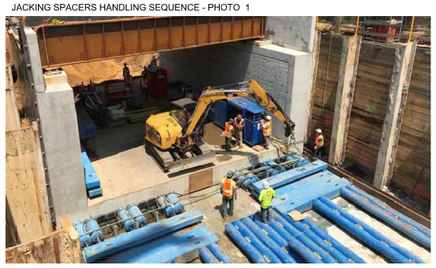
PHASE 3: JACKING UNTIL THE DRAWN CONFIGURATION WITH BOTH RECTANGULAR AND TUBULAR SPACERS

PHASE 4 PLAN
Scale 1:50

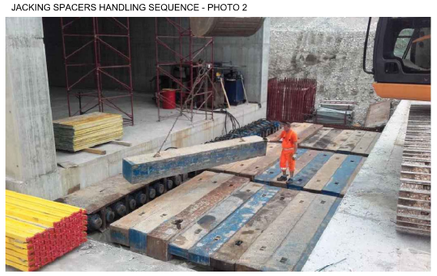


PHASE 4: THE TUBULAR 3000 MM AND THE RECTANGULAR SPCERS ARE REPLACED BY TUBULAR L=6000MM SPACERS, THAT
WILL STAY IN POSITION UNTIL THE END OF THE PUSH

JACKING SPACERS HANDLING SEQUENCE - PHOTO 1



JACKING SPACERS HANDLING SEQUENCE - PHOTO 2



DRAWING N.	32	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY. 2025		
DRAWN:	drf	REVISION:		14600 CROSSING – ROAD UNDERPASS	
CHECKED:	vpo			JACKING SPACERS HANDLING SEQUENCE – NORTH AND SOUTH SEGMENTS	
APPROVED:	op				

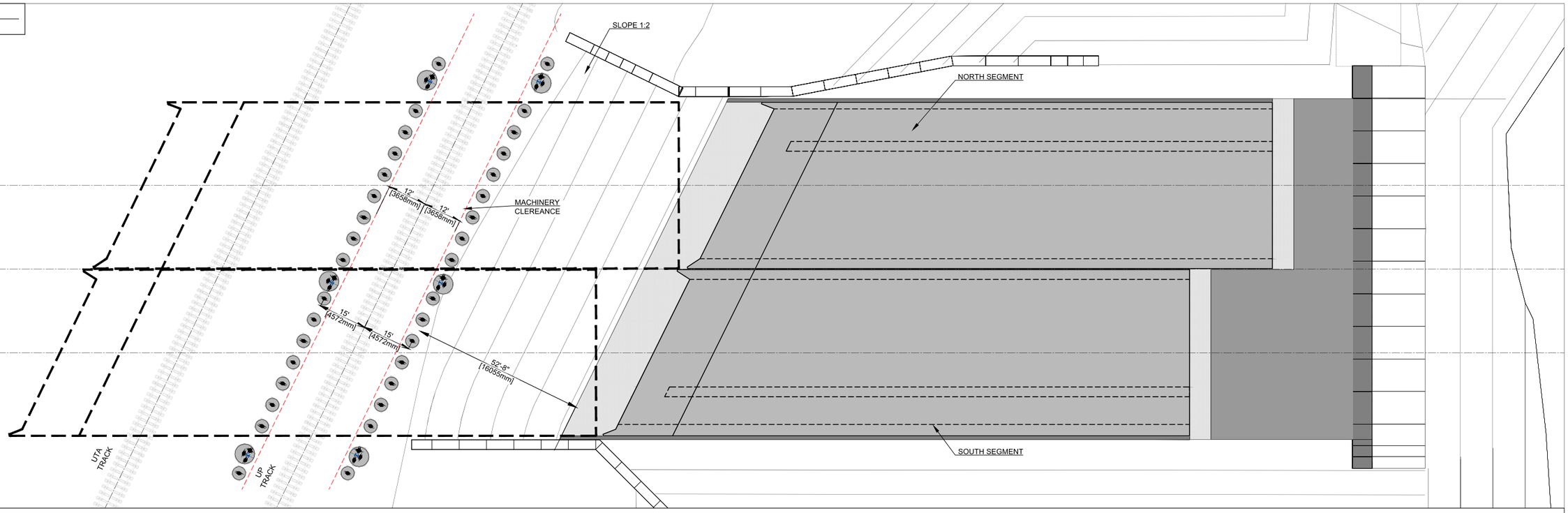
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

THIS DRAWING AND ITS CONTENTS ARE PROPERTY OF PETRUCCO SA. ALL RIGHTS RESERVED. ANY REPRODUCTION, ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT

Phase 00 – Plan

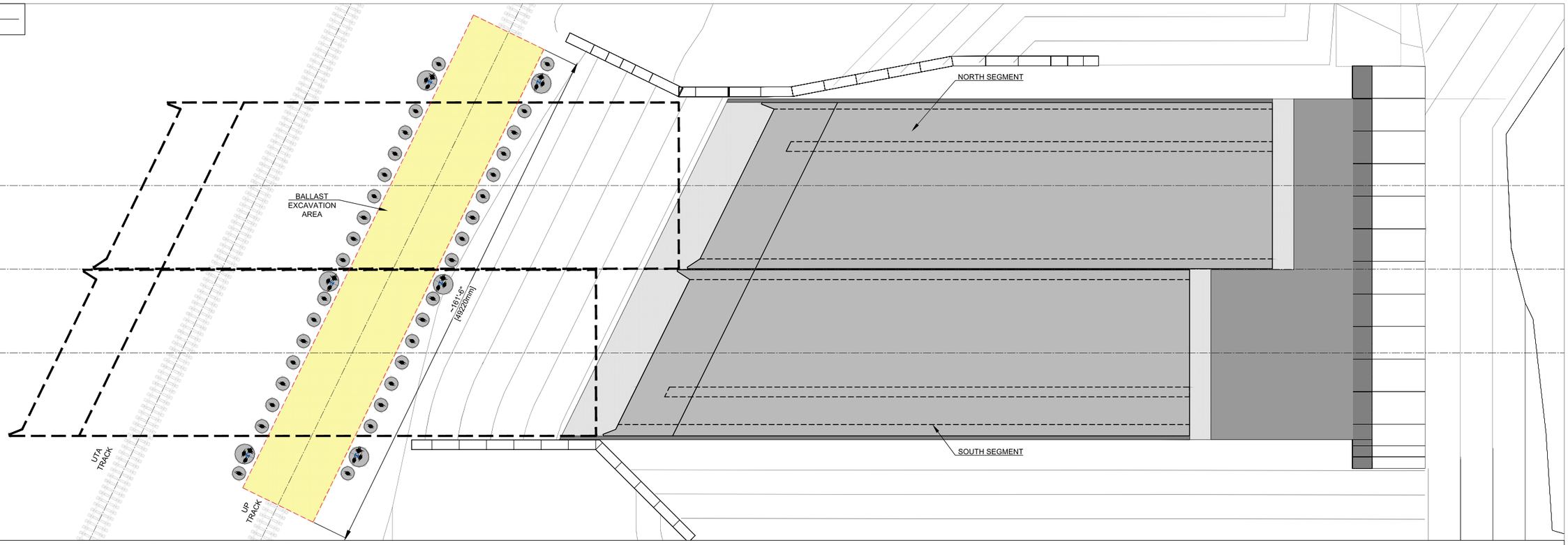
Scale 1:200



Phase 0: Construction of the micropiles and concrete caps for the Verona System support completed before the System Verona Installation

Phase 1 – Plan

Scale 1:200



Phase 1: UP track closure. Removal of the Track and excavation of the Ballast until reahcing the top of the micropiles caps.

DRAWING N.	33	TITLE:	100% DESIGN – VERONA SYSTEM		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo	REVISION:		VERONA SYSTEM INSTALLATION PHASES – PHASE 0 AND 1	
APPROVED:	qp				

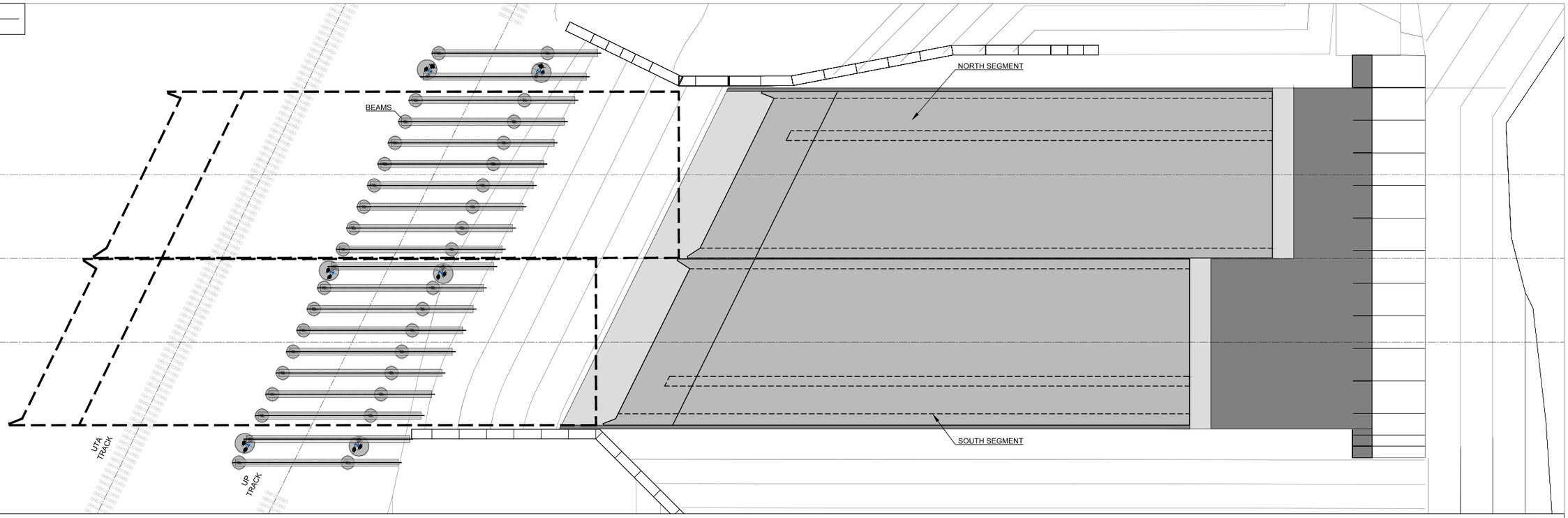
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Phase 2 – Plan

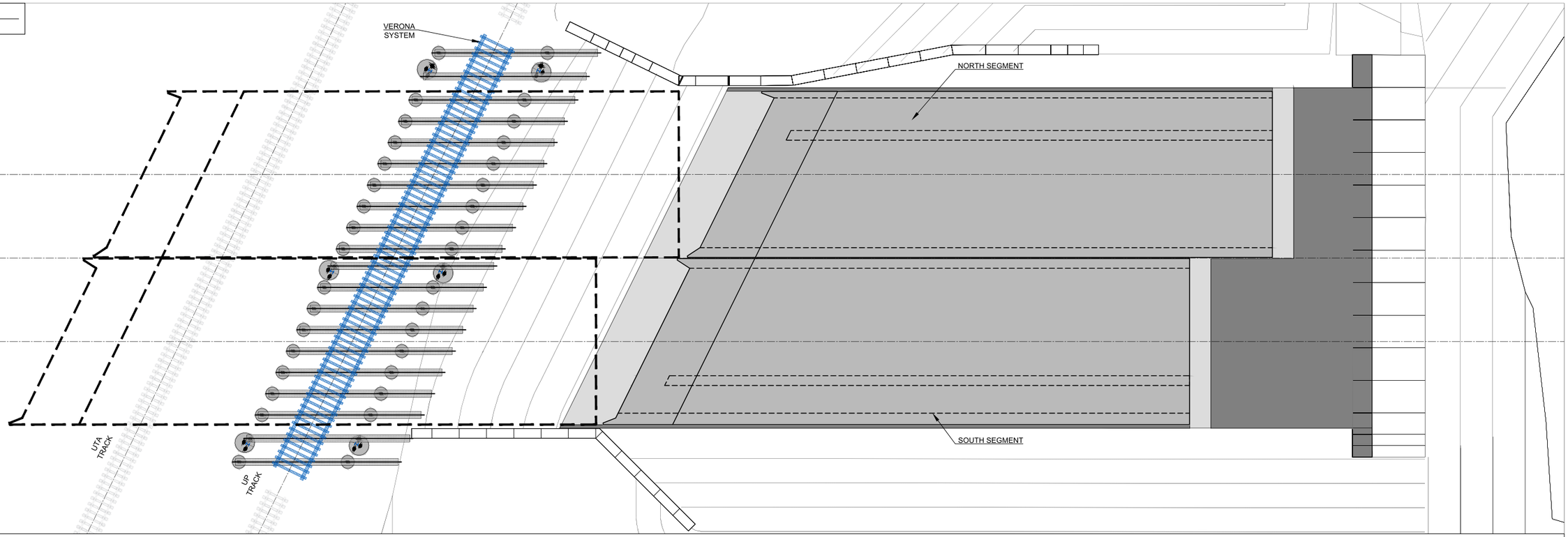
Scale 1:200



Phase 2: Transverse beams installation

Phase 3 – Plan

Scale 1:200



Phase 3: Verona System installation. Every module will be launched into position pre-assembled with steel ties and fasteners.

DRAWING N.	34	TITLE:	100% DESIGN – VERONA SYSTEM		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo	REVISION:		VERONA SYSTEM INSTALLATION PHASES – PHASE 2 AND 3	
APPROVED:	op				

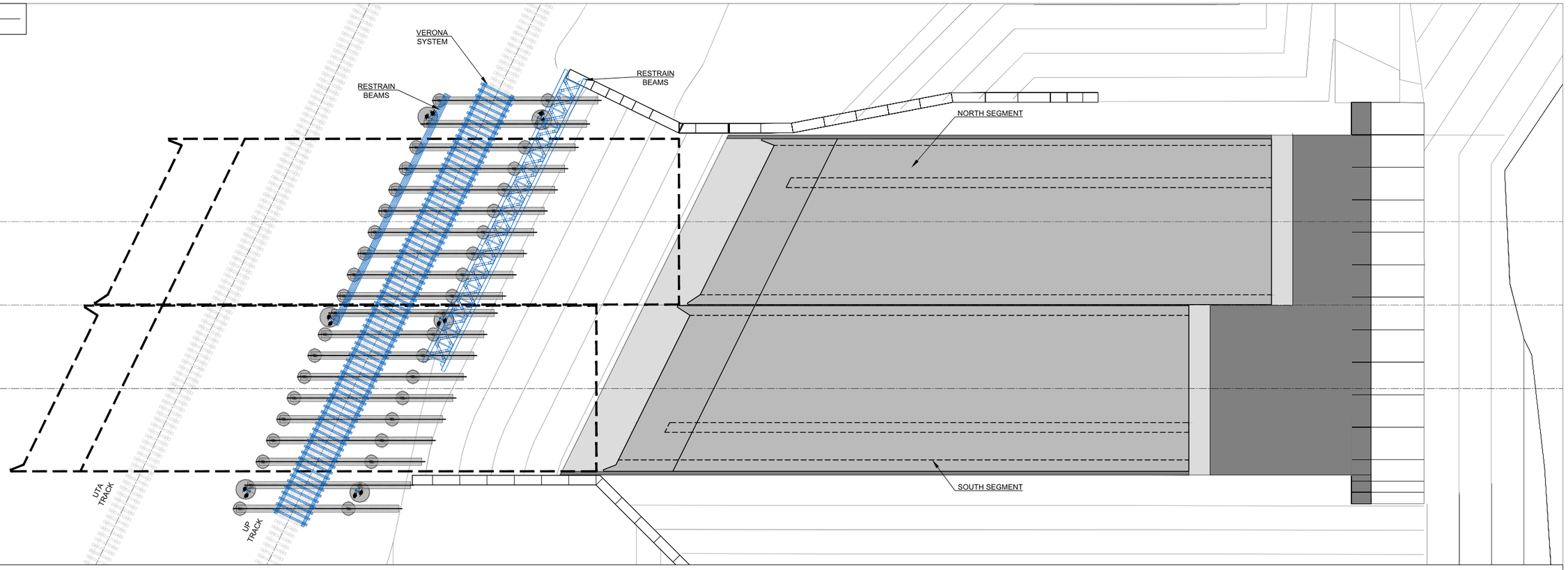
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

Phase 4 – Plan

Scale 1:200



Phase 4: UP Track placed back into position and fastened to the Verona System. The installation is completed with the restraining beams.

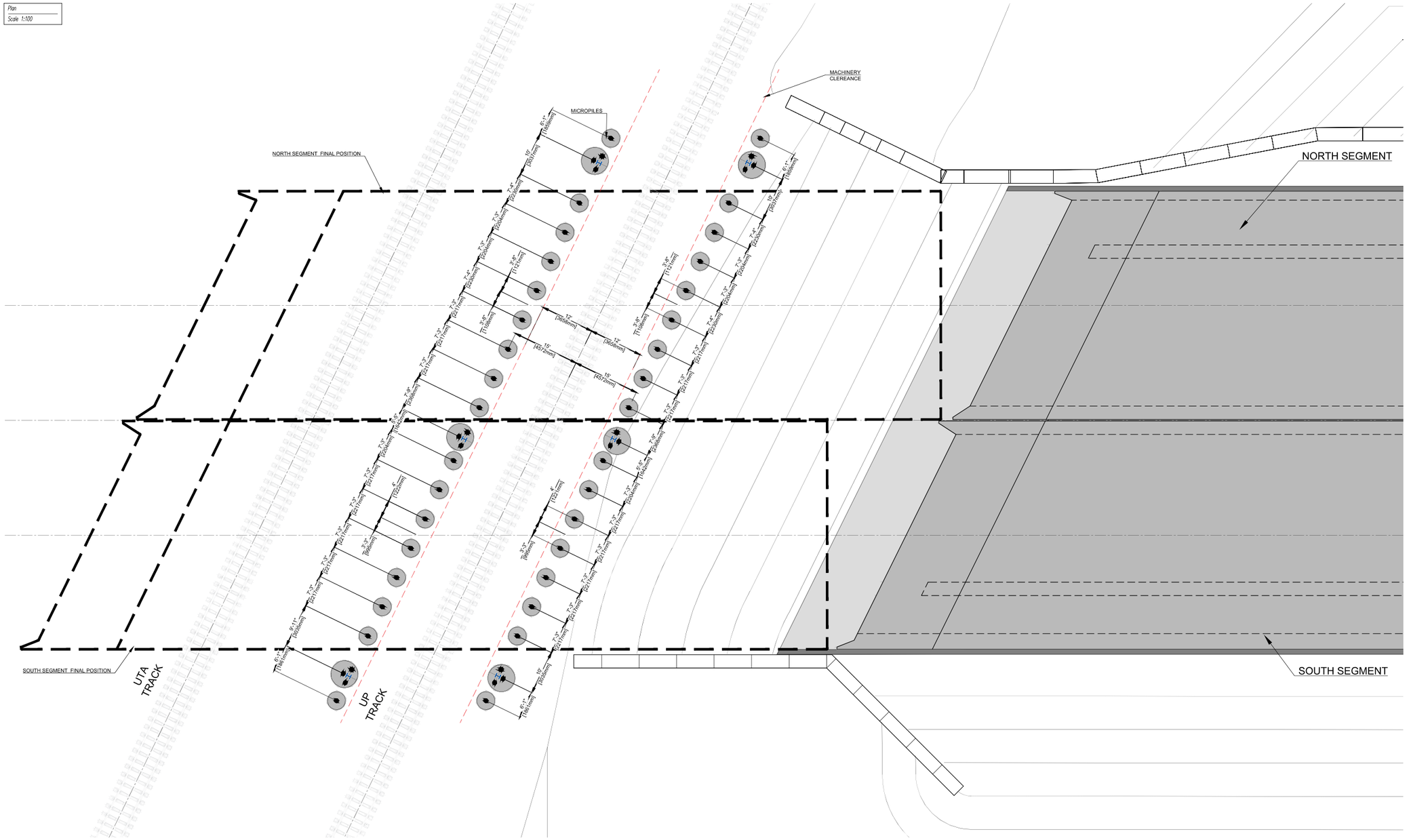
DRAWING N.	35	TITLE:	100% DESIGN – VERONA SYSTEM		CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo	REVISION:		VERONA SYSTEM INSTALLATION PHASES – PHASE 4	
APPROVED:	op				

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

Plan
Scale 1:100



DRAWING N.	J6	TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	21th MAY. 2025	14600 CROSSING – ROAD UNDERPASS BOX 1	
DRAWN:	drf	REVISION:	11th JUL. 2025		
CHECKED:	vpo			VERONA SYSTEM FOUNDATION	
APPROVED:	op				

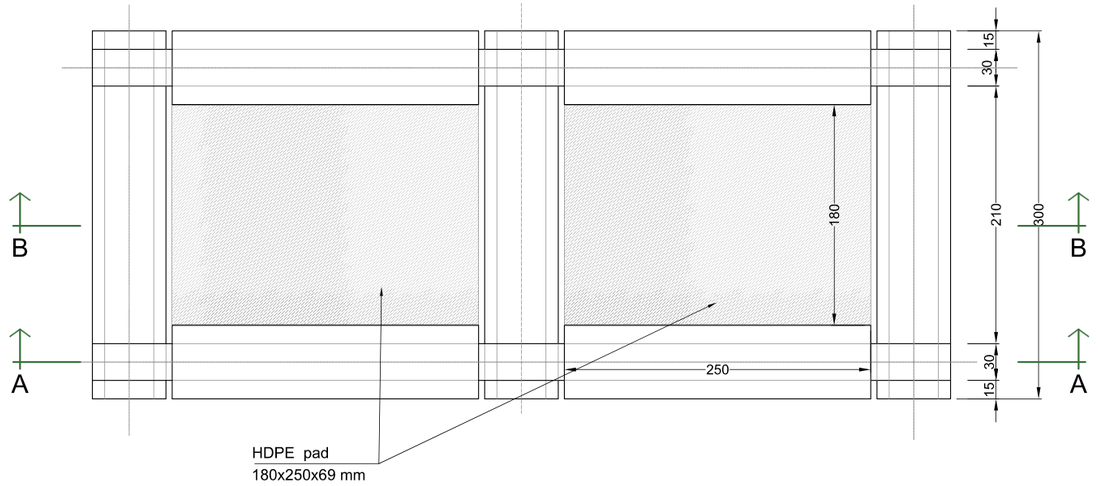
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

Roller

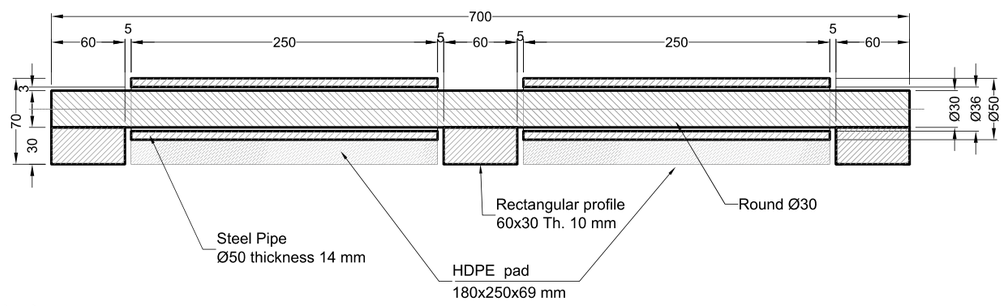
Plan

Scale 1:5



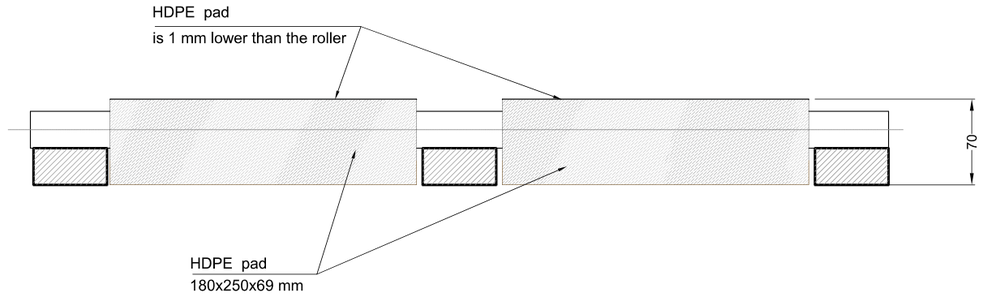
Section A-A

Scale1:5



Section B-B

Scale 1:5



PETRUCCO
box jacking systems

PETRUCCO USA LLC
1576 Daytonia Road
Miami Beach, FL 33141
+1 7862236621 | www.petrucco.com

Rev.	Date	Description		
3				
2				
1				
0	18–10–2024	14600 SOUTH–RAILROAD CROSSING – BOX JACKING METHOD STATEMENT	DR	

Project:	Date:	CLIENT:
14600 SOUTH–RAILROAD CROSSING	18–10–2024	CITY OF BLUFFDALE
	Written: DR / Revised: VPO	Scale: –

Object:

PROJECT SEQUENCE & METHOD STATEMENT

CODE:

PUSA_2021_18 Method Statement_rev.00

INDEX

1 MAIN PROJECT PHASES 3

2 EXCAVATION PLAN & METHODS ON EACH PHASE 6

2.1 Under UPRR Verona Bridges and active traffic 6
2.2 Excavation & Box Jacking at Open Air during UTA outage: 13

3 PETRUCCO EQUIPMENT 15

3.1 Power packs 15
3.2 Hydraulic Jacks 15
3.3 Jacking Spacers 16

4 JACKING OPERATIONS 17

4.1 Installation of Jacking System & Test: 17
4.2 Jacking at open air – UTA Phase: 18
4.2.1 Jacking Equipment: 19
4.2.2 General Jacking Sequence. 19

5 CONTINGENCY PLAN 22

5.1 Mechanical failure 22
5.2 Water table 23
5.3 Heavy Rain 23

6 ANNEX 1: SIMILAR PROJECT VOUCHURES & SUMMARIES: 25

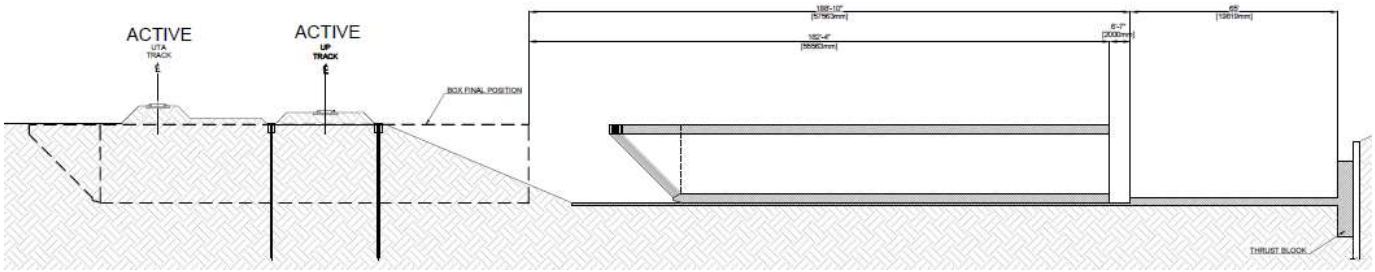
7 ANNEX 2: JACKING CAPACITY VS. ANTICIPATED FRICTIONS: 25

8 ANNEX 3: SITE TEMPLATE FOR JACKING FORCES RECORDS: 25

9 ANNEX 4: SITE TEMPLATE FOR SURVEY ALIGNMENT FEEDBACK: 25

1 MAIN PROJECT PHASES

PHASE 0 -
CASTING POSTION

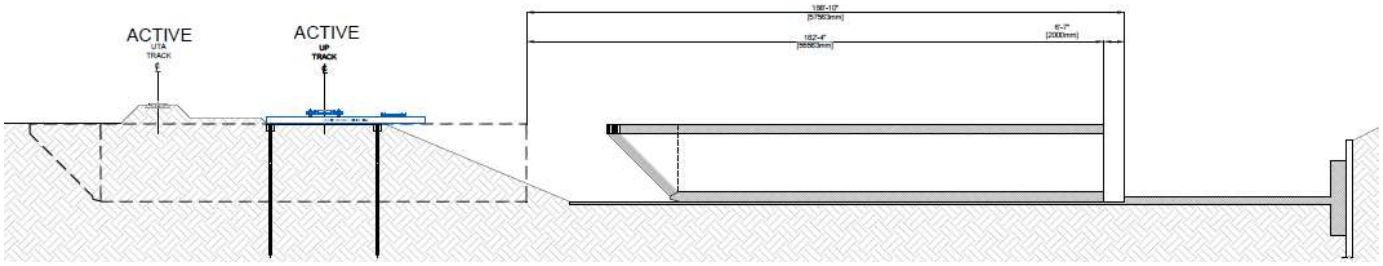


-Micro piles and plinths completed.
-Segments completed in casting position.
-Excavation front sloped at 2:1 and undisturbed during all construction activities, until phase 2.

PHASE 1 -
VERONA BRIDGE INSTALLATION

Preliminary actions prior the installation:
-Bridge modules preassembled offline and ready to be launched in position.
-Proper lifting plan, rail machinery and resources for the outage activities.

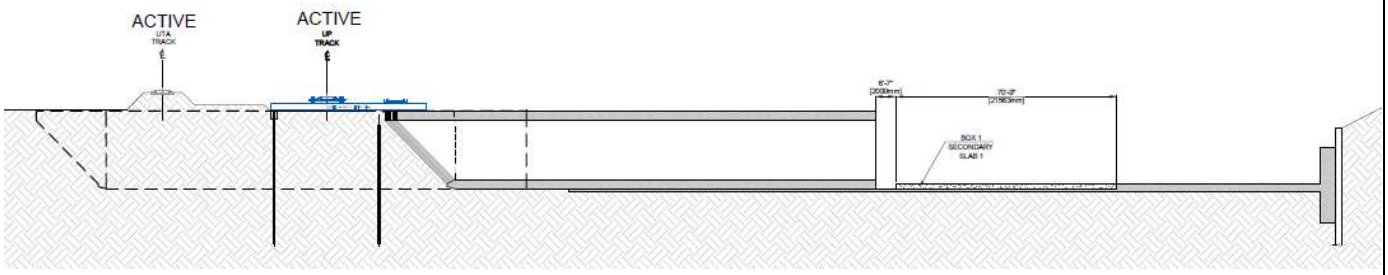
Phase 1 activities during UP Outage:
-Removal of UP existing track panel and excavation of bridges footprint.
-Installation of transverse beams on top of plinths.
-Launching of preassembled bridge modules.
-Bolted bridge joints and track geometry adjustments.
-Lattice Beam launching and connection to bridges.
-Restore track service.



-Prior to the bridge's installation, there will be approximately 7,5m=26ft of free jacking. This activity can take place anytime. Having the box closer to the yet undisturbed embankment, facilitates the launching of the Verona beams and preassembled bridges from the underpass top slab itself.
-Once the system is installed, excavation and jacking can start anytime since the system sits already on deep foundations.

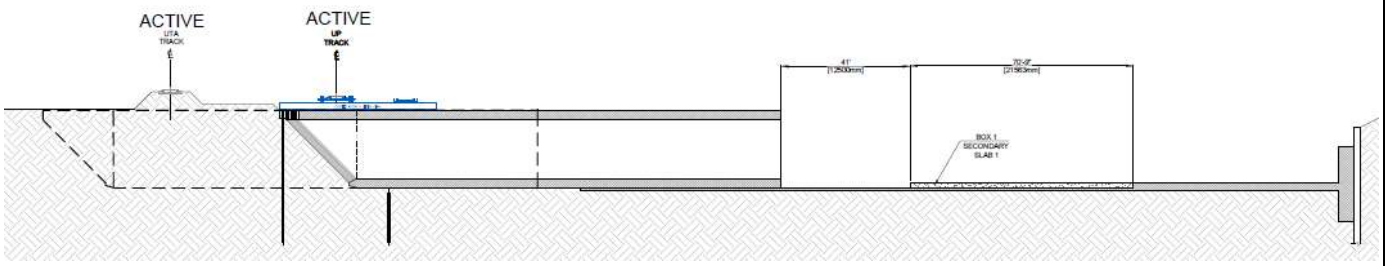
PHASE 2 -
JACKING UNDER UP ACTIVE TRACK

Preliminary actions prior the jacking through the embankment:
-Verona system installed on UP track.
-Excavation machinery, soil removal plan as well as trucks path well defined in advance.

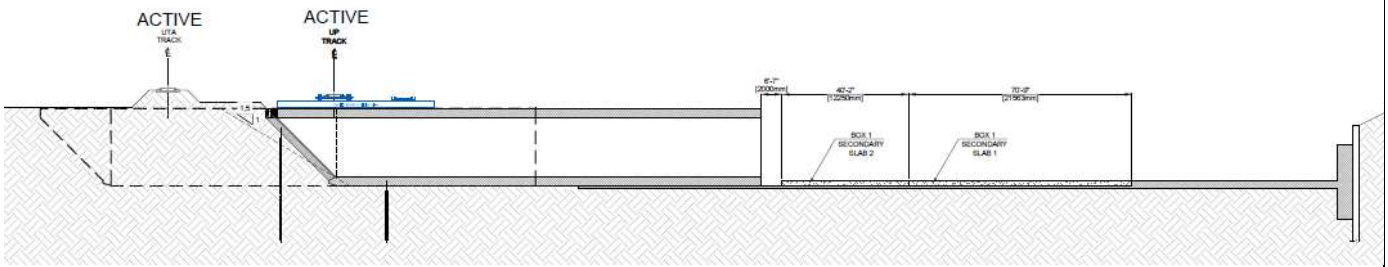


Phase 2 activities:
Excavation is performed only from inside the underpass, keeping at all times UP traffic active.
-This phase starts with a preliminary jacking, through the 2:1 embankment, to engage the segment with the Verona system. This preliminary activity is fast and takes approximately one single working day.
-From that point, once the box is engaged with the bridges by rollers, the expected daily production variates from 6' to 10'.
-As the box advances, it becomes a support of the temporary bridges itself. Removing the nº2 rows of micro piles sequentially from inside the underpass.

Considering the demolition of nº2 rows of micro piles, the duration for Phase 2 under UP active traffic can take between 8 to 10 days total.

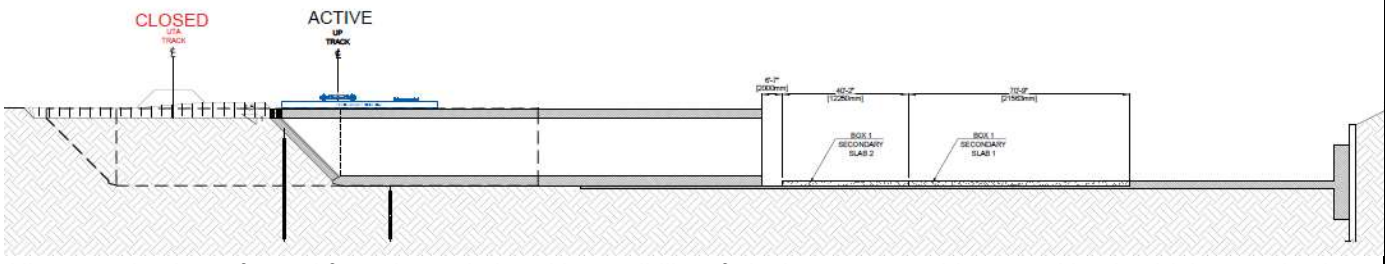


The end of Phase 2, is considered as a Control Stop, until UTA outage take place.

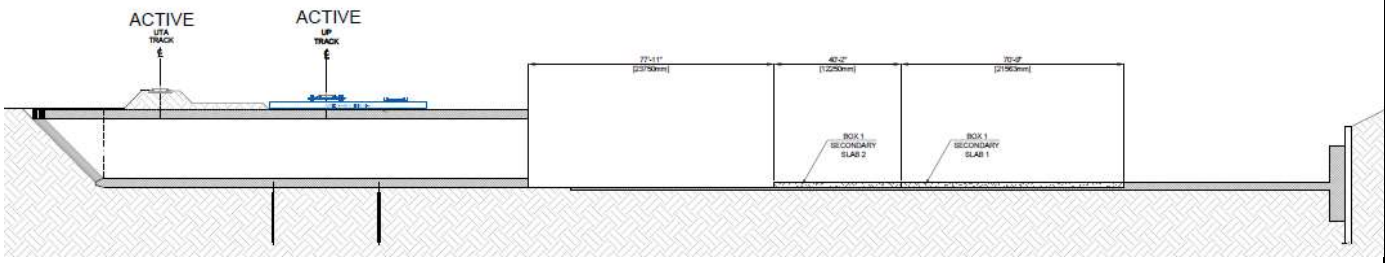


During the control stop, the whole Verona system sits already on top of the underpass, with all plinths removed, and last row of micro piles partially removed and not carrying loads.

PHASE 3 -
JACKING OPEN AIR DURING A UTA TRACK OUTAGE.



All excavation is performed from the outisde, with possibility of placing more machinery and having higher production rates than the previous phase. UP traffic keps active during this weekend UTA's closure phase.



At final position, UTA track is restored within the weekend closure, and traffic back to service.
Then, South Segment starts following the same sequence.

For details and full sequence, see Temporary Work Package Drawings.

The project will start with North segment, as per the sequence above explained. Once first segment is in position, South and last segment will be jacked side by side to the previous one.

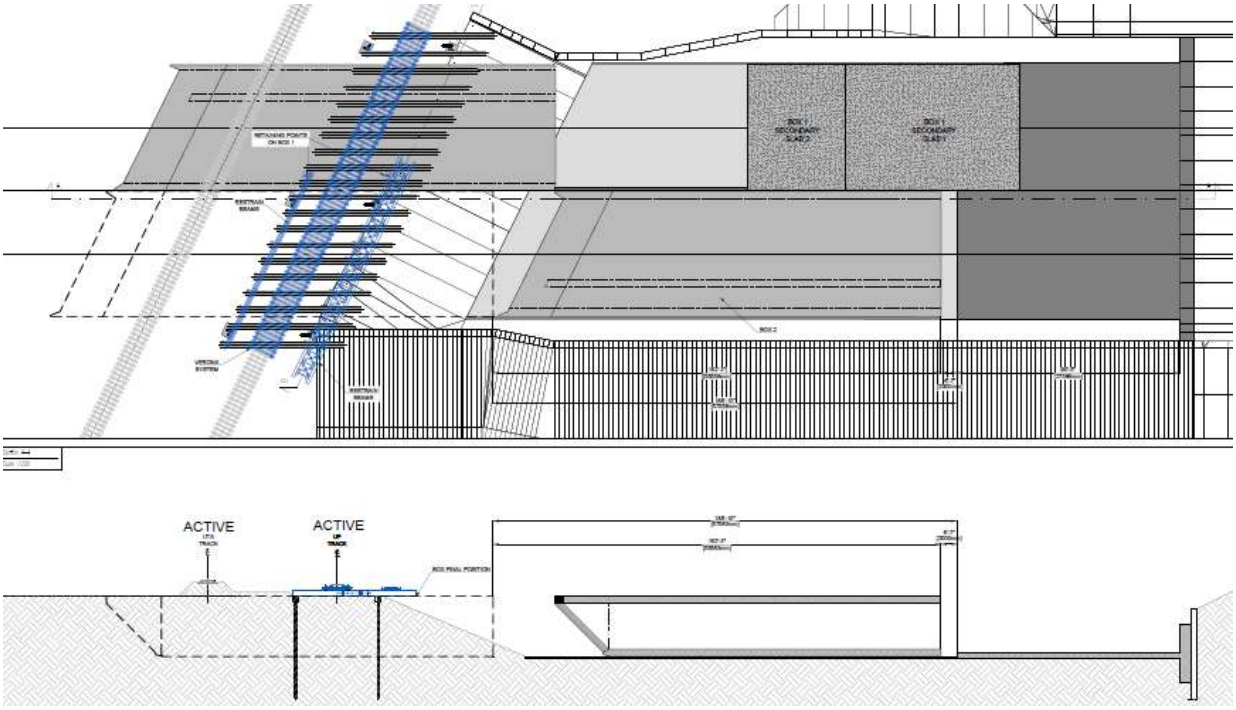


Figure 1 - Plan view with North segment in final position and South segment ready to start following the same sequence.

2 EXCAVATION PLAN & METHODS ON EACH PHASE

There are two main scenarios and approaches for the project excavation:
-Under UPRR active track → Excavation performed only from inside and in daily steps between 6 to 10'.
-Across UTA track during closure → Excavation is performed from outside, creating a path for spoil removal and continuous workflow.

2.1 Under UPRR Verona Bridges and active traffic

Key elements:
Segment nose, at a given 45º angle, allows to perform the excavation with regular earthworks machinery from inside the underpass, in safe conditions. Here are the three main purposes of this key element:

1-Provide shelter and proper working area for excavators at the front of the segment.
2-Act as an SOE, exceeding the repose angle of the surrounding granular soil. Allowing to jack against sloped and undisturbed sides. Minimizing or completely eliminating any potential over excavation on the sides. It works specially well on granular soils with certain cohesion such as the silty, silty sand soils expected on 14600 Crossing, where the underpass walls can cut through & shape the soil along its trajectory. Soil losses are not foreseen, and if any local loss happen, the bridges are designed to over span on purpose the box footprint.
3-Structurally designed to sustain the Verona system and the transverse beams. It allows the underpass, to support itself the rail bridge system gradually as the jacking proceeds.

Machinery commonly used:

On excavation front, outside the underpass:	*Intermediate level, outside the underpass:*	**Excavation front - Inside the box**	**Tale of the Box for spacers handling:**
N/A *Not apply at this stage under UP.*	*N/A* *Not apply at this stage under UP.*	Nº2-3 Excavators. -One of them will be small and located on the pedestrian cell.	Nº1 Excavator. Main purpose is to feed jacking spacer column by handling elements with chains.

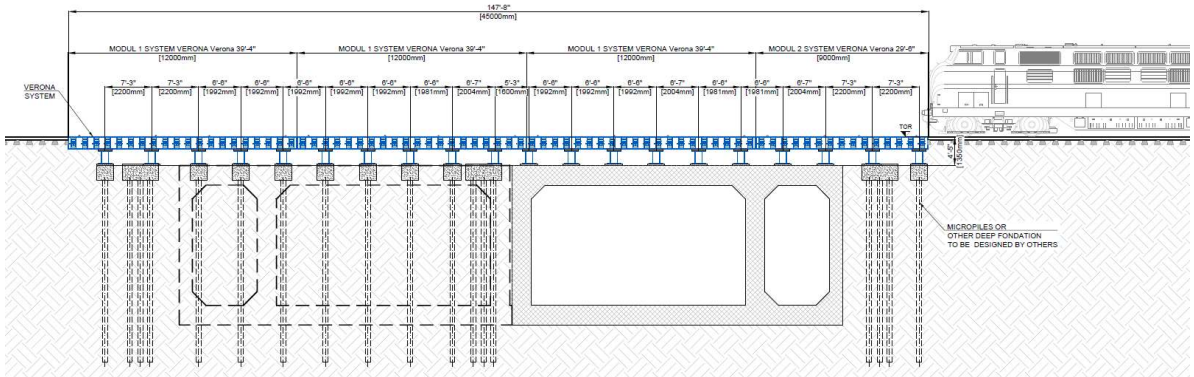


Figure 2 - Segments cross section with North Segment (right one) in final position.

-Machinery for spoiling, such as front loaders or similar, will be planned accordingly in order to achieve a proper workflow with the excavation and don´t slow down the operations.
-Fast attachments to machinery, such as jack hummer in case necessary, are recommended to be available at site, as well as spare parts.

References of excavation from inside the underpass with Verona system and active train traffic on top:



Figure 3 – Example nº1: Excavation and nose profile on granular soil, under Verona System and active traffic.
In this case, the nose had only 60º of inclination. Bluffdale structure will have 45º nose, covering even a smaller angle of repose.

Both pictures, show how the wall nose is fully in contact with the adjacent granular soil, and the excavation, performed from inside, allows the box to shape by itself through its trajectory the excavation sides.



Figure 4 - Example nº2: Excavation on granular soil with 45º nose inclination. Excavation front remains loaded on purpose after a jacking cycle.

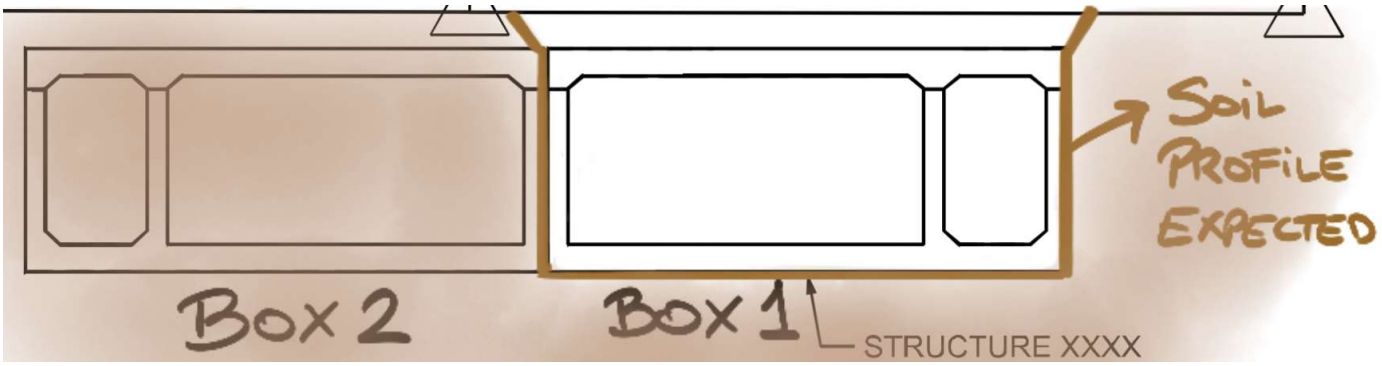


Figure 5 - Soil profile expected, with only local ballast loss on top.

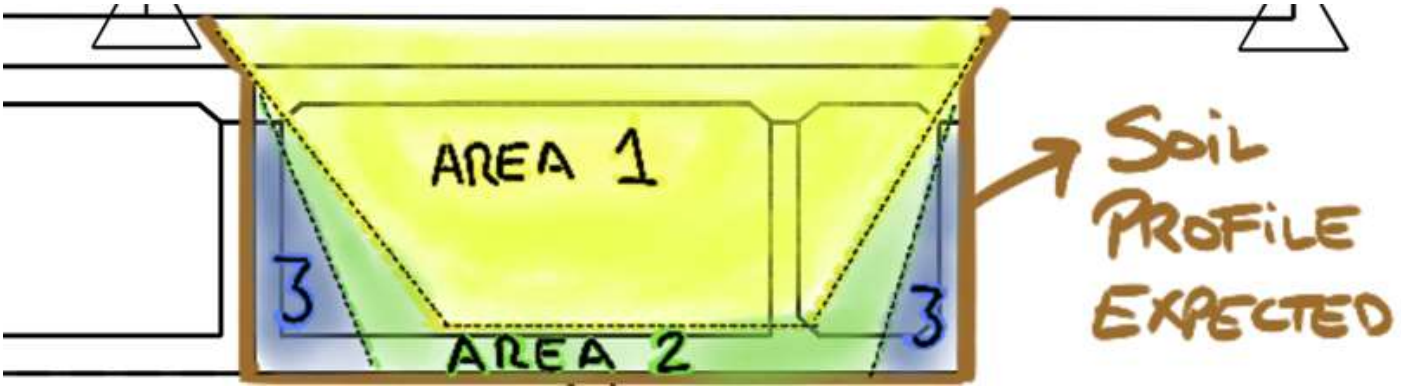
Each day, the excavation will be performed targeting only the foreseen production. Leaving the underpass in contact with the embankment at the end of each push.

Excavation phases:

-First (AREA 1) the upper part and central volume is excavated preparing space for the top slab nose to advance. Sides and bottom remain loaded with undisturbed soil. Ballast is foreseen to fall on the excavation front. At this point, Verona bridge is in place and over-span externally on both sides, protecting this expected ballast loss, which has no track purpose under the temporary bridges.

-Secondly (AREA 2) a trench in front of the base slab is prepared according with the targeted production. At this phase special attention must be placed to identify boulders if any, potential interferences or hard objects. With the geotechnical information received at 14600 crossing, this scenario is not foreseen.

-Last step (AREA 3), 1-2 hours prior the jacking, the still loaded sides are shaped with the excavator, if necessary, only to discard potential interferences. Leaving always a certain amount of soil to get shaped by the box itself with its advancement. The soil on the sloped sides, falls itself when scratched by the nose, leaving no side gaps.



This excavation approach gets repeated daily, for the whole jacking distance under UP active track.

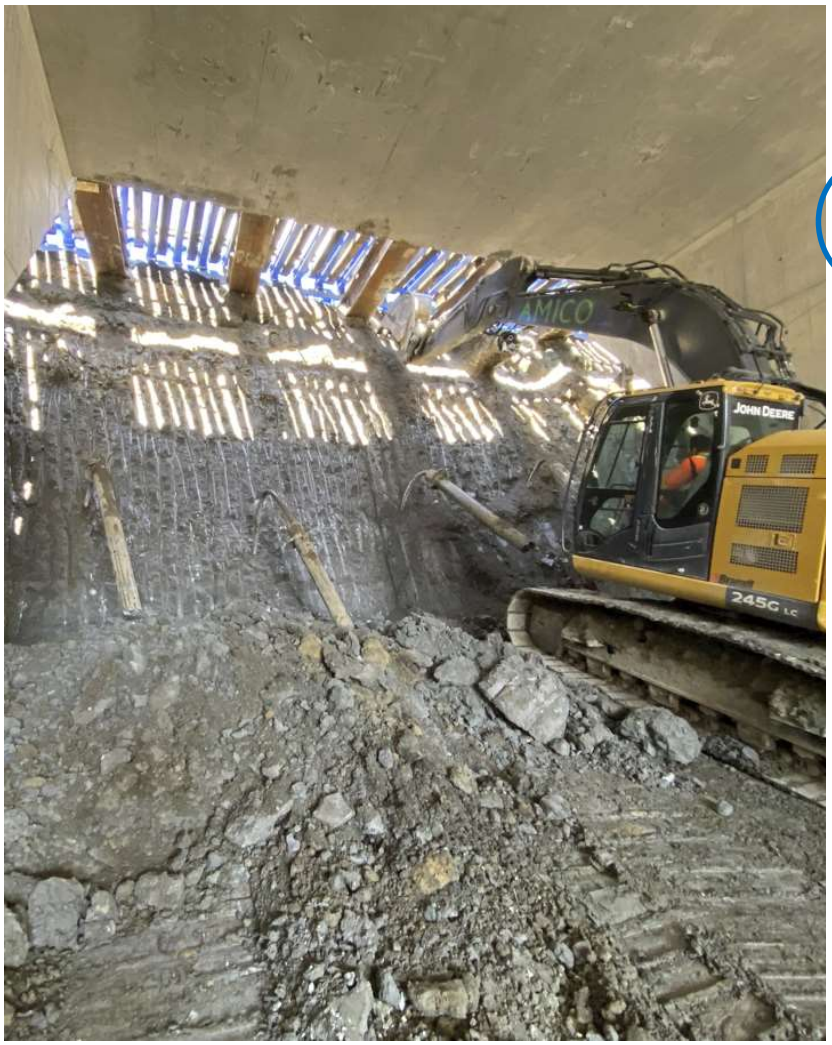


Figure 6 - Excavation under Verona Bridge with micro piles demolished/bended.



Figure 7 - Box nose close to Plinths.
(See upper right corner)

Once the Box gets close enough to a row of plinths, the loads are transferred manually, one beam at a time, to the top of the box. This activity of transferring the loads is achieved by simple manual jacks and 2-3 Petrucco representatives, it takes between 5 to 10 minutes per beam only.

At this point, with all loads transferred to the box, the demolition of the plinths & micro piles can start by cutting or torching them off.

Micro piles Demolition:
Two rows of micro piles will be demolished from inside the underpass. In the following figures, drawings and pictures the process is shown.

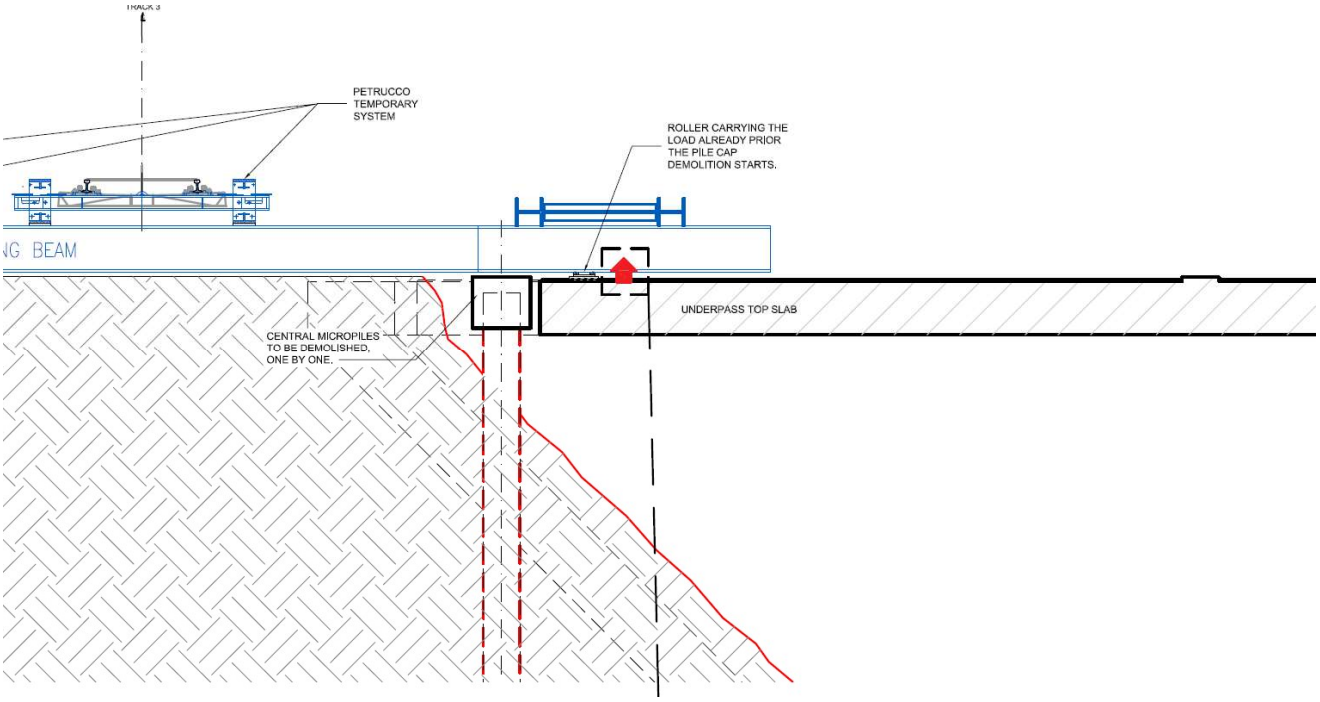


Figure 8 - Detail of transverse beam being momentarily lifted in order to remove shims on top of plinths and transfer the load to the underpass.

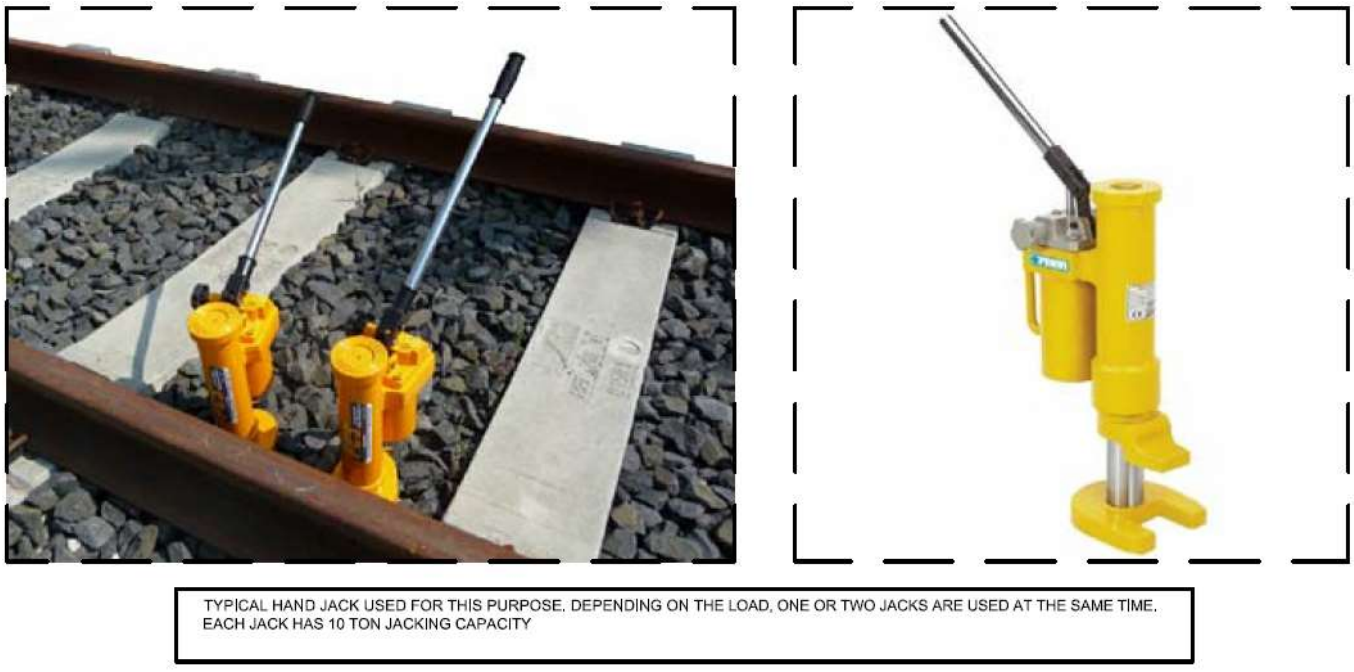


Figure 9 - Manual jacks used for load transfer from micro piles to underpass.

Each micro pile load is transferred to the top slab by temporary lifting the transverse beams and removing the shims in contact with the transverse beam and the Plinth intended to be demolished.

Next pictures & figure show the process of cutting/torching the micro piles.



Figure 10 - Micro piles demolition using a man lift.

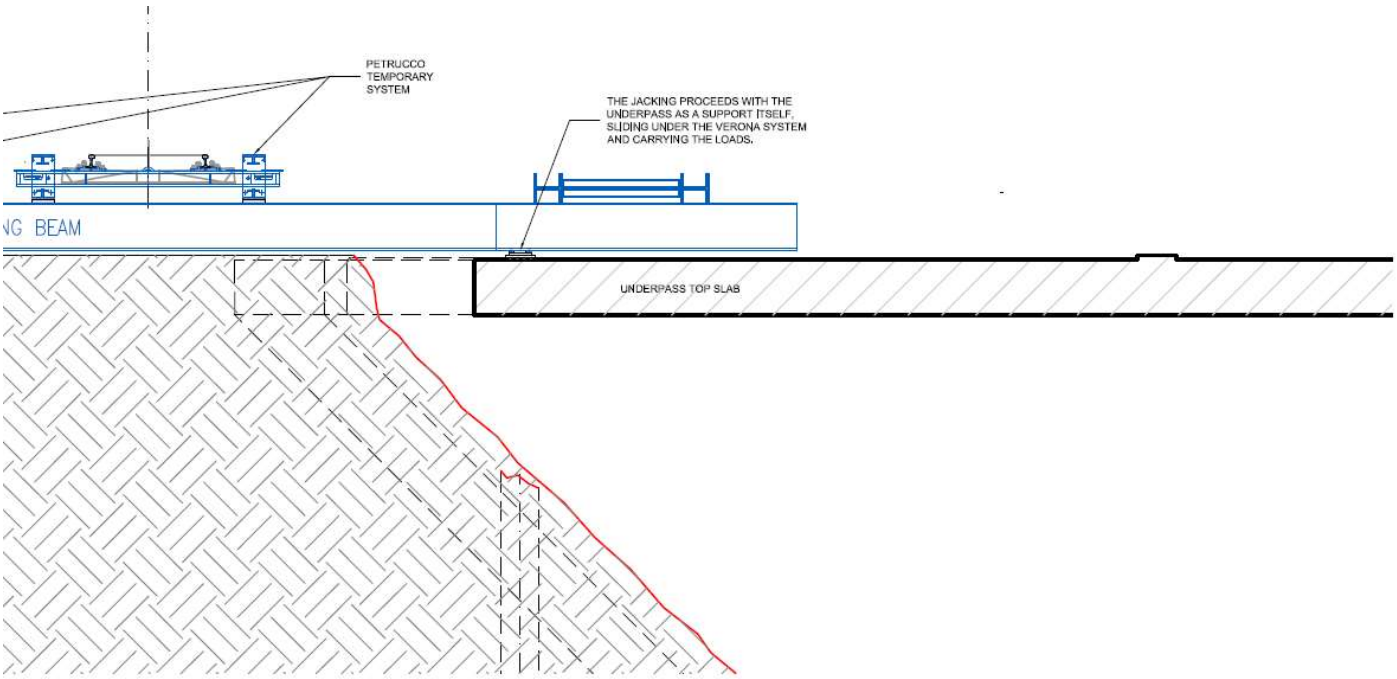


Figure 11 - Plinth fully removed, allowing box further movement even with micro piles partially removed.

This detail above is very similar to the scenario on the so called “Control Stop”, when UP track will be already fully supported by the box itself.

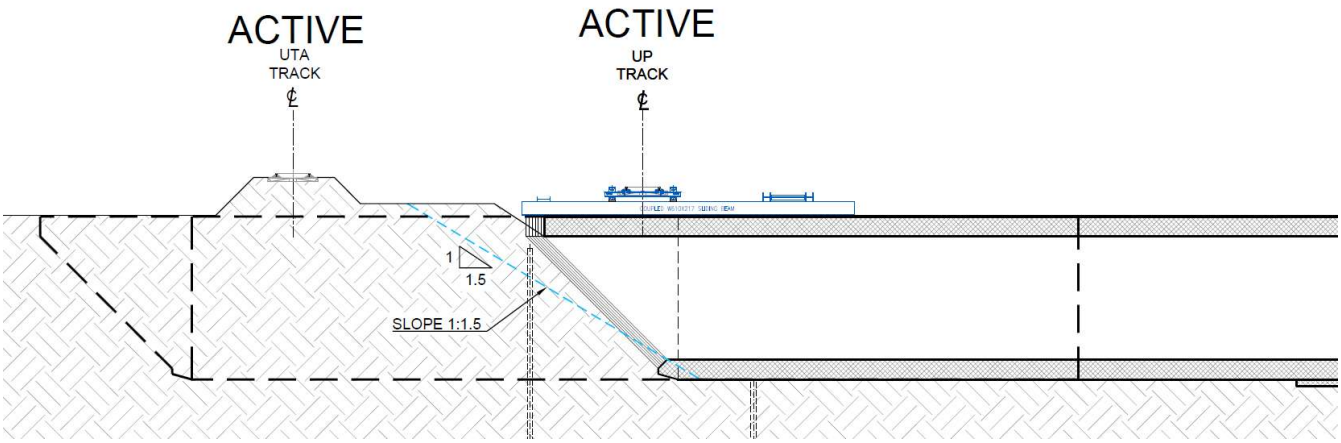


Figure 12 - End of Phase 2. Control Stop prior UTA Outage, Phase 3.

2.2 Excavation & Box Jacking at Open Air during UTA outage:

Preliminary actions prior the jacking:
-Machinery for excavating, soil removal as well as trucks path well defined in advance.
-Verona system installed on UP track.

OPEN AIR EXCAVATION DURING A UTA TRACK SHUTDOWN:
At this stage, the UTA track will be closed longer than its regular weekly 24hour non-operations window. It has been agreed that a 2 to 3 days outage, where the segment cross UTA embankment during non-stop operations of mainly Excavation & Jacking activities.

This approach is very common and Petrucco has completed dozens of grade separations within a similar or even shorter time frame. The approach is simple and straightforward, being the key a good organization at site.

Some recent examples:
-From 2019 to 2022, **nº7 under rail grade separations** were completed, all within 48hours window only, under LIRR. **Long Island Rail Road, part of MTA – Metropolitan Transport Authority of NY City, USA**.

-In 2022, a **major highway underpass** was jacked in place in **Mississauga, Canada**. With 6.000 metric tons and 148ft of jacking within 55 hours. Within that outage, all activities were completed:

Traffic signaling & detours.
Excavation + Demolition of old foundation & pavement.
Jacking 148ft.
Backfilling Asphalt & Paving 7 highway lanes.
Traffic restored.

Video and summary from Public Works Authority website:
https://www.metrolinx.com/en/discover/new-underpass-installed-at-hurontario-and-qew
(*) Additional examples and PDF project summaries attached as an Annex to this document for further references.
In 14600 Crossing, the weight of each segment is 4905ton = 10811kips and the jacking distance of Phase 3, during UTA outage **is 28m = 93ft** approximately.

UP Active track maintenance:
The jacking velocity in normal conditions, depends on the excavation production. However, once the jacking starts, a movement rate of 1,5m/hour = 5ft/hour is feasible. UP track will be maintained within tolerance, and corrections if any will be completed 1 hour prior any train passage.

Key elements & contingency:
-Proper machinery and earthworks flow sizing in order to allow a non-stop jacking operation. Usually, the excavation is in the critical path and the jacking follows its production.
-Spare parts and spare machinery in case of any breakdown.
-Alternative weekend identified in case an unlikely and extreme weather scenario is foreseen during this weekend outage and parties decide to postpone.

Machinery: (Proposed by Petrucco as a minimum, finally decided by CMGC)

On excavation front, outside the underpass at upper level.	**Intermediate level, outside the underpass:**	**Excavation front - Inside the box**	**Tale of the Box for spacers handling:**
Nº2 Excavators. -Depending on tracks loading areas, these excavators will be located to expedite this loading directly.	Nº1-2 Excavators. Main purpose is to feed the upper excavators and/or loaders at the same level, meanwhile creating a path and removing the central volume on the box trajectory.	Nº2-3 Excavators. -One of them will be small and located on the pedestrian cell.	Nº1 Excavator. Main purpose is to feed jacking spacer column by handling elements with chains.

There are different approaches for this excavation & spoiling process. To be agreed with CMGC operations team.

3 PETRUCCO EQUIPMENT

3.1 Power packs



Figure 13 Power Pack

Since there are different sizes and pressure Oil capacities. According with project requirements they will be designated to a specific location/task.

3.2 Hydraulic Jacks

Petrucco Group owns a large number of Jacks and Saddles that can be managed in many different combinations in order to achieve a proper performance of each work, taking into account each specific case and situation.

Jacks Capacity:

- 250 Tons

Saddles for 250 Tons Jacks:

- Capacity for 10 jacks@250tons



Figure 14 7 Hydraulic Jacks of 500 tons placed in a saddle.



Figure 15 Saddle for Jacks placing (capacity for 10 jacks@200tons)

3.3 Jacking Spacers

There are 4 different steel spacers used in Petrucco Box Jacking methodology:

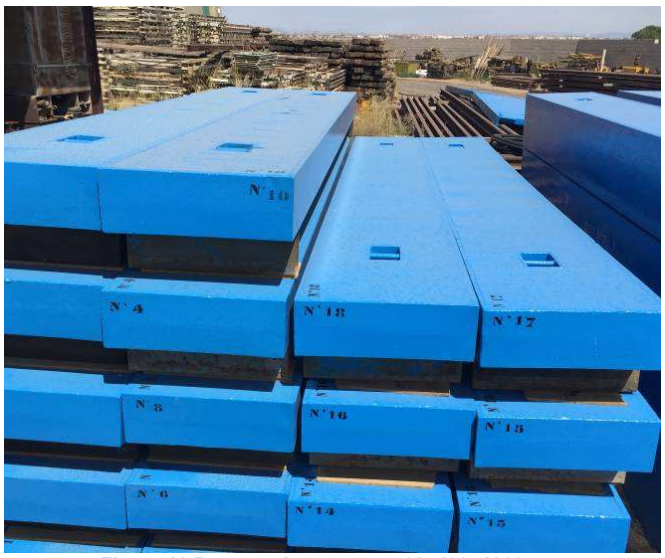


Figure 16 Rectangular spacers 500x400x4200 mm



Figure 17 Rectangular spacers 500x400x4200 mm



Figure 18 Double steel tubes L=3000 mm



Figure 19 Double steel tubes L=6000 mm

In cases where the total length of pushing and spacers columns is considerably big, like this project, it can be used a so called ´´Spacers Retain System´´ which ensures the horizontality of the column and keep it in contact with the ground.

For New Hyde Park project the “Spacers Retain System” will not be used as the Jacking length does not exceed 24m (80ft).

4 JACKING OPERATIONS

4.1 Installation of Jacking System & Test:

The installation is done as follows:

- Positioning of the jacking saddles, that works as frame to sustain and to keep in the right position the jacks. The jacking saddles are 4200 mm wide:
  - Saddles for 250ton jacks with capacity for 10 jacks.
- The jack saddles will be positioned at the back part of the structure by a lifter/crane against the base slab.
- Once the saddles are positioned the jacks will be handled to their place with a lifter/crane, all jacks are equipped with lifting rings and have a weight of 1 Ton.




Figure 20 Jacks Installation

- Positioning of the power pack inside of the box, close to the exit section to visually control the rear jacking station during the operations. (Weight 4 tons, heavier Petrucco element) A second spare power pack will be placed close to the main one.
- Hydraulic circuit completion. All the connections will be supervised by Petrucco personnel, the handling of the hydraulic tubes (both rigid and flexible) will be done by lifter/crane.
- Jacking system test. Once the hydraulic system is completely installed the power pack will be fueled and switched on. The jacking test consist in a first jacking to move the segment just about an inch or less to check if there is any problem in the circuit or in the construction of the segment. The pressure of the first move, and therefore the jacking force, are recorded.

4.2 Jacking at open air – UTA Phase:

Prior to start jacking:

- Clean the jacking area of all foreign materials including unused building materials.
- Remove all formworks and temporary bracing.
- Provide all necessary safety measures such as warning signs, barricades and lights if needed, to the working area of excavation so that all working employees will be notify from danger and hazards. Only Petrucco personnel and authorized CMGC representatives should be allowed in the boundaries of the jacking operations when applying pressure.
- Proper lighting inside & outside of the box.
- Plan the shifts and manpower schedule in a way that guarantee the proper sequence of the works, especially the heavy equipment working on earth movement.

As the excavation proceeds the jacking will follow step by step. The jacks have 21.26 inches of stroke, so each jacking step will be approx. 19,68 inches.

At this point, combined excavation & pushing activities are foreseen. This combination shall be well organized and coordinated in advance with the relevant site supervisors in order to achieve a proper workflow and a successful structure translation on time.

It is important to mention that the critical path for these kinds of works is given always by the excavation & mucking activities. The Box Jacking is faster, at any case, than the excavation and material removal, for this reason a good production rate in excavation and material removal is a must.



Figure 21 - Steel spacers column at final position.

4.2.1 Jacking Equipment:

These components are illustrated with images in the following pages.

The Jacking System is composed by:

- Hydraulic Power Pack, diesel powered
- Hydraulic Jacks, 250 ton
- Oil Distribution Circuit
- Steel spacers:
  - Rectangular spacers 500x500x4200 mm
  - Rectangular spacers 500x350x4200 mm
  - Double steel tubes L=3000 mm
  - Double steel tubes L=6000 mm

4.2.2 General Jacking Sequence.

There are several combinations of all Petrucco material depending on the site constraints and purposes, the following images show the general Layout/Sequence of spacers from short to long columns.

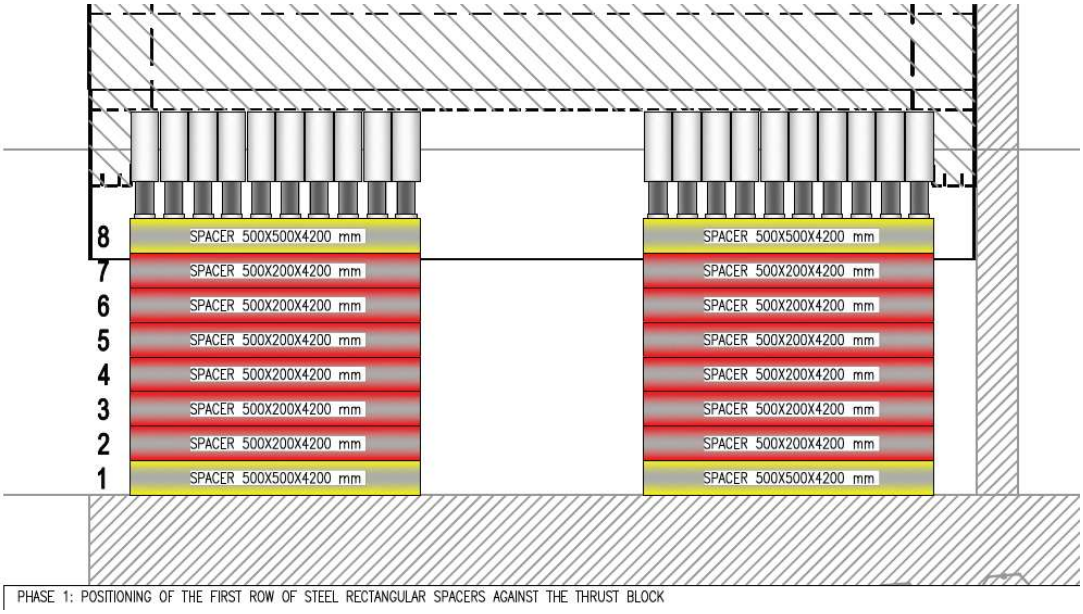


Figure 22 Jacking Sequence Type 1. (Rectangular spacers)

Spacers column Type 1: It is the most important combination of spacers since it is the used in all jacking phases by adding spacers of 0,5m each**.** The full column is composed by 2 rectangular big spacers (500x500x4200 mm) and 6 rectangular small (500x200x4200 mm) spacers. TOTAL LENGTH: 4m the jacks can push either against big or small spacers.

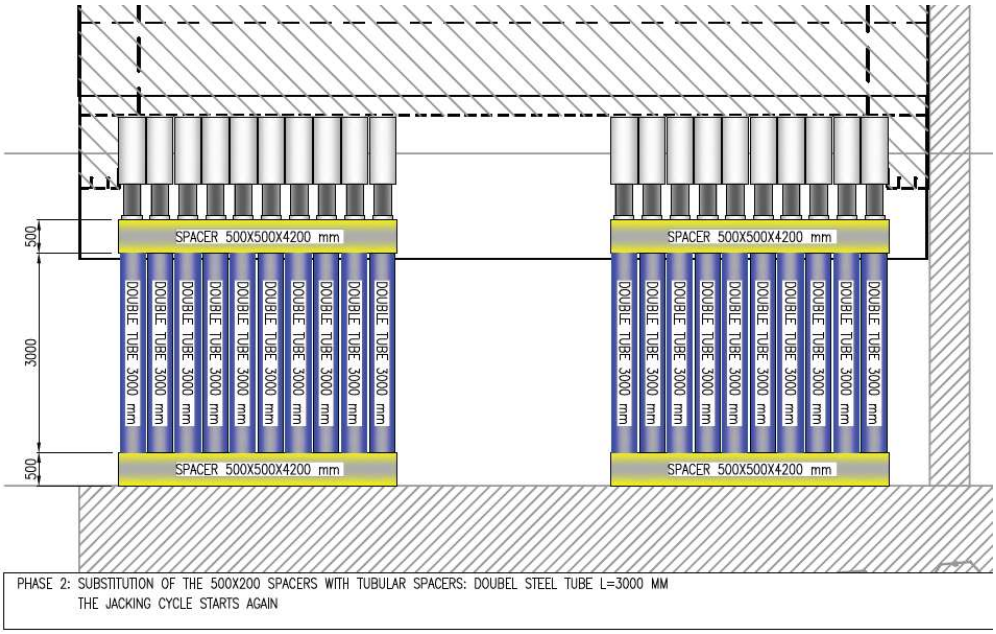


Figure 23 Jacking column Type 2. (3m steel tubes)

Spacers column Type 2: This second column type is composed by Double steel tubes L=3000mm and substitute the previous Type 1 once it is completed. The initial length remains the same, 4m, but now the jacking sequence of type 1 can start again adding rectangular spacers by 0,5m each, as it is shown in next figure.
TOTAL LENGTH: 4m + Type 1 as per needs. Maximum of 7,5m. The tubular spacers can be 10 or 8 per row, depending by the situation of the site and the pushing forces.

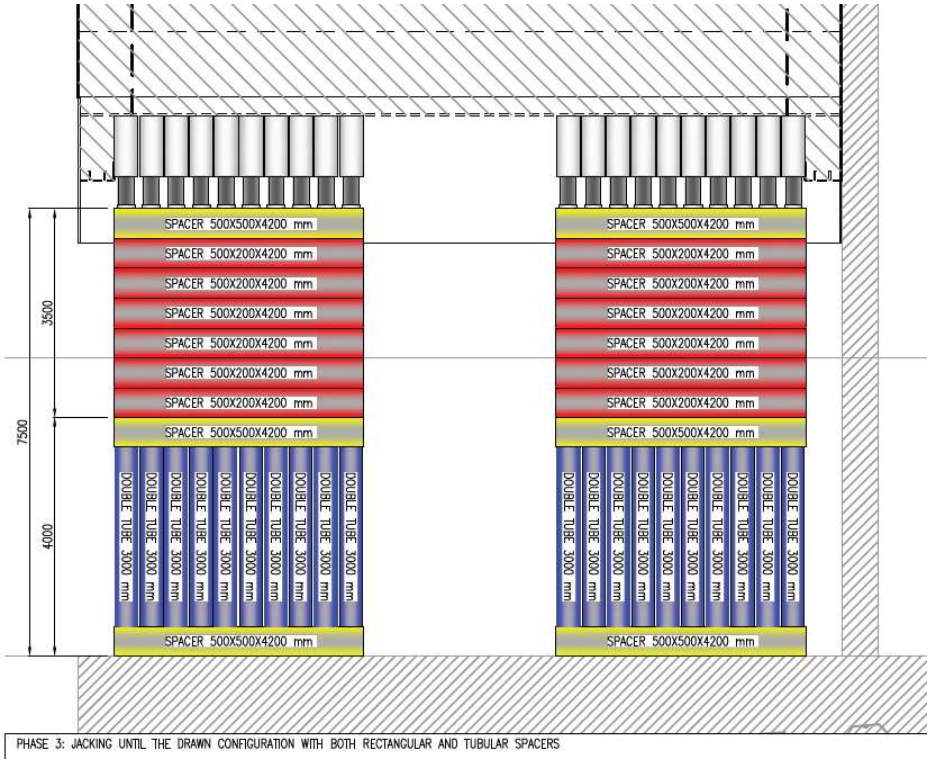


Figure 24 Jacking column Type 1 + Type 2 (Double tubular spacers 3000mm).

Spacers column Type 3: The third column Type of spacers is the used after Type 1 and type 2 combination is completed. It is composed by 6m tubular spacers. The initial length is 7m and as usual, the jacking sequence of Type 1 can start again adding rectangular spacers by 0,5m each, as it is shown in next figure. TOTAL LENGTH: 7m + Type 1 as per needs. Maximum of 10,5m.

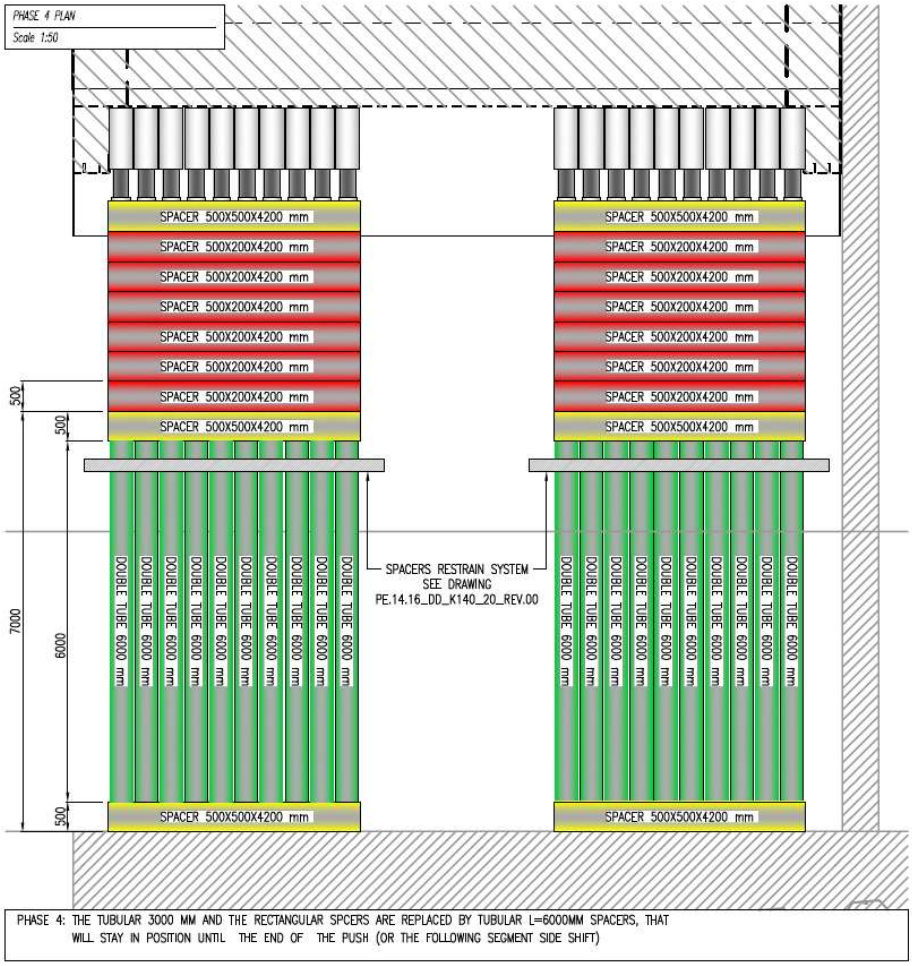


Figure 25 Jacking column Type 1 + Type 3 (Double tubular spacers 6000mm).

For bigger lengths, after the installation of the 6m tubular spacers, they will remain installed and type 1 & 2 can be combined as explained above. Furthermore, multiple groups of 3 and 6m tubular spacers can be added in order to make longer the pushing.

In case the total system of spacers reaches a considerable length, the so called" Spacers Retain system´" can be applied in order to minimize the eccentricity on the forces transmission and keep the spacers properly horizontal and attached to the Launch Slab.

The above described sequence of tubular and rectangular spacers can be modified as the spacers column works perfectly also with one tubular spacer in contact with another tubular spacer. The Petrucco people on site will decide the real sequence of the spacers depending on the site production and on what is considered better for the work. From a technical point of view the two solution are equivalent.

5 CONTINGENCY PLAN

In case of unforeseeable events or equipment breakdown, various contingency plans have been developed:

5.1 Mechanical failure

Event:

The source of pressure for the jacking, Hydraulic system, stop working or does it in a defective way.

Solution:

Spare jacks and power pack will be on site all time ready to be used if necessary. To have a quick reaction in case of breakdown, also spare parts for system components will be at site.



Figure 26 Hydraulic System spare parts.

Verona bridges components also will have spare parts available at site, however, once the system is closed and stiff, no minor parts losses are foreseen at any scenario.

5.2 Water table

In case the water table is above the skidding level, dewatering must be applied until the level is lowered below the skidding level. It is not possible to jack with the box proceeding at an elevation that is lower than the water table due to the following reasons:

1. The water would fill the room in front of the box, making the excavation difficult and less precise. This could lead to settlements of the box during jacking
2. The soil layer on which the box would run would be softened by the water. Also, this could make the pushing less precise.
3. The water coming inside of the box could led to solid transportation (especially with sandy or silty soils). This is very dangerous because this phenomenon led to the formation of sinkholes which is unpredictable and uncontrollable.
4. Having water coming inside of the box means also safety issues for the workers.

Solution:

If the foreseen water table level will become higher than expected, some dewatering system will have to be installed on site to bring, at least, the water 19,68 inches below the skidding level.

5.3 Heavy Rain

Event:
Usually the presence of the rain does not greatly affect these kinds of works. The functioning of the jacking system is not affected by the presence of the rain. In case of extraordinary weather phenomena, the safety of the work will be considered together by Petrucco and the rest of the CMGC team, if the situation will require it, the works can be suspended for the necessary time.

ACTIVITES UNDER UPRR
Under Verona System on UPRR track, rain won´t represent any risk.

UTA CLOSURE:
CMGC team will consider the weather forecast prior to the start of the works prior UTA track closure. If necessary, having a second date available will be evaluated for risk mitigation.

Solution:
-The slopes must be protected and stable and dewatering pumps ready in case it is required.
-Alternative date for UTA closure.

Pumps will be available at site to evacuate and lower the water level in case of heavy rain. Petrucco Hydraulic jacks can work under water, however, for a good excavation control at the front of the underpass, jacking activities will only occur in dry conditions.



Figure 27 Jacking Pit flooded (San Giorgio, Italy).



Figure 28 - Jacking pit flooded Orlando – USA

6 ANNEX 1: SIMILAR PROJECT VOUCHURES & SUMMARIES:

7 ANNEX 2: JACKING CAPACITY VS. ANTICIPATED FRICTIONS:

8 ANNEX 3: SITE TEMPLATE FOR JACKING FORCES RECORDS:

9 ANNEX 4: SITE TEMPLATE FOR SURVEY ALIGNMENT FEEDBACK:

EXPO MILANO 2015

CLIENT
ICS SPA

PROJECT NAME
EXPO MILANO

YEAR
2015

LOCATION
MILANO, ITALY

DESCRIPTION:
Jacking of two boxes of 8300 tons each under 10 railways (5 standard tracks and 5 switches) with over 1200 active trains a day. Rho area, dedicated to the arrival of EXPO visitors.

LAUNCH TYPE
☐Open pit
☐Partial diversion
☐Tunnel
☒Temporary bridges

TRAVEL DISTANCE
East box: 94.51m – 310'
West box: 94.51m – 310'

JACKING AVG. PRODUCTION
3.00 m/h

BOX SIZE
- Base: 9.75 m – 31' 11"
- Height: 9.00 m – 29' 6"
- Length: 91.35 m – 299' 8"

BOX WEIGHT
East box: 8300 ton – 16600 Kips
West box: 8300 ton – 16600 Kips

SHUTDOWN DURATION
0 hours

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

VIDEO LINK:
https://www.youtube.com/watch?v=4nKWkIUQ5_c

DRAWINGS

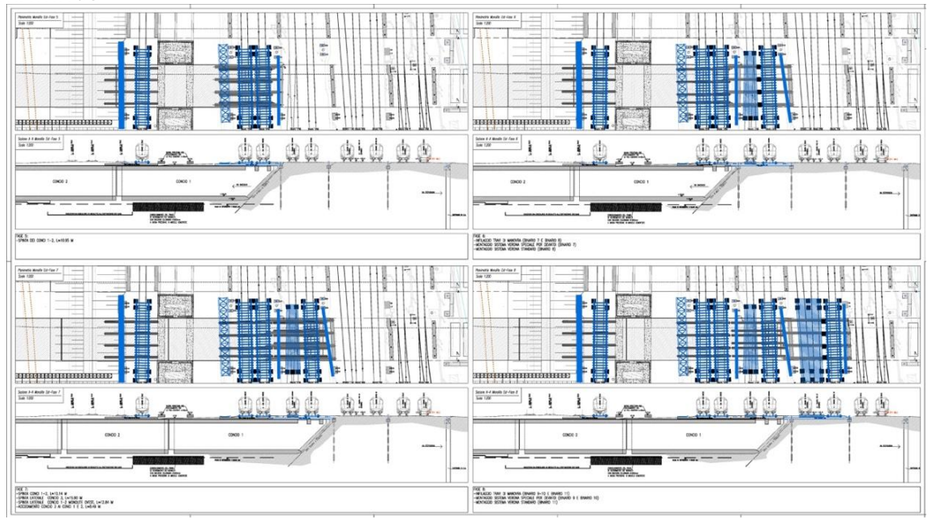
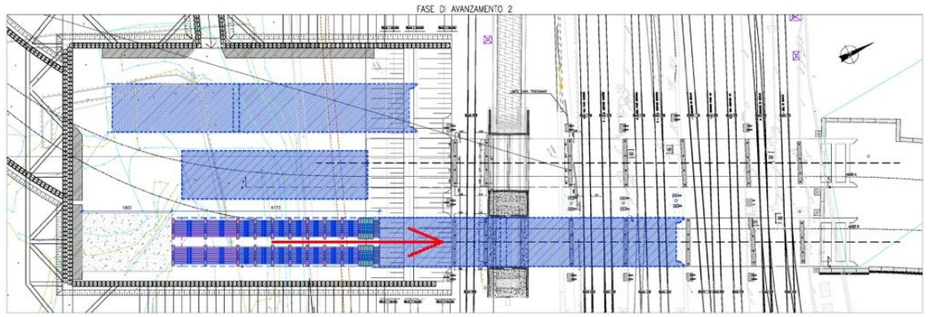


Figure 1 – Launch phases



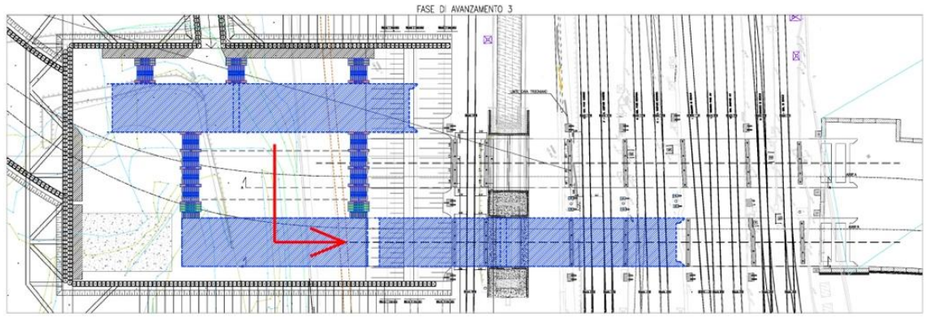


Figure 2 – Box Jacking phases

PICTURES



Figure 3 – Verona System



Figure 4 –Verona System

EXPO MILANO 2015

CLIENT
ICS SPA

PROJECT NAME
EXPO MILANO

YEAR
2015

LOCATION
MILANO, ITALY

DESCRIPTION:
Jacking of two boxes of 8300 tons each under 10 railways (5 standard tracks and 5 switches) with over 1200 active trains a day. Rho area, dedicated to the arrival of EXPO visitors.

LAUNCH TYPE
☐Open pit
☐Partial diversion
☐Tunnel
☒Temporary bridges

TRAVEL DISTANCE
East box: 94.51m – 310'
West box: 94.51m – 310'

JACKING AVG. PRODUCTION
3.00 m/h

BOX SIZE
- Base: 9.75 m – 31' 11"
- Height: 9.00 m – 29' 6"
- Length: 91.35 m – 299' 8"

BOX WEIGHT
East box: 8300 ton – 16600 Kips
West box: 8300 ton – 16600 Kips

SHUTDOWN DURATION
0 hours

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

VIDEO LINK:
https://www.youtube.com/watch?v=4nKWkIUQ5_c

PICTURES



Figure 5 – Jacking spacers



Figure 6 – Lateral push



Figure 7 – Boxes in their final position



Figure 8 – Verona System

LINEA DEL BRENNERO – BRESSANONE 2018

CLIENT
PAC SPA

PROJECT NAME
CIRCONVALAZIONE BRESSANONE

YEAR
2018

LOCATION
BRESSANONE, BOLZANO (BZ)
ITALY

DESCRIPTION:
Box Jacking under 2 active rail tracks in Bressanone, Italy. Petrucco temporary bridges were installed in curve and different elevations with the Verona system. Passengers and freight traffic worked normally during the whole activity.

LAUNCH TYPE
☐Open pit
☐Partial diversion
☐Tunnel
☒Temporary bridges

TRAVEL DISTANCE
25,20 m – 82 '8"

JACKING AVG. PRODUCTION
3.0 m/h

BOX SIZE
- Base: 13.60 m – 50' 2"
- Height: 12.38 m – 23' 11"
- Length: 38.18 m – 125' 3"

BOX WEIGHT
4100 ton – 9042 Kips

SHUTDOWN DURATION
0 hours

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

VIDEO LINK:
https://youtu.be/_OVTV6X-B34

DRAWINGS

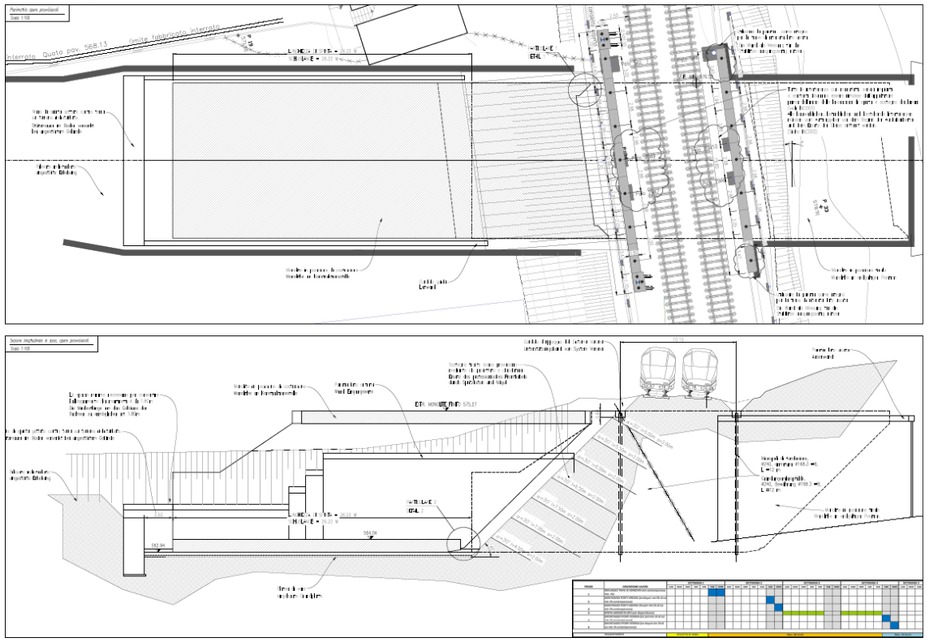


Figure 1 – Project plan

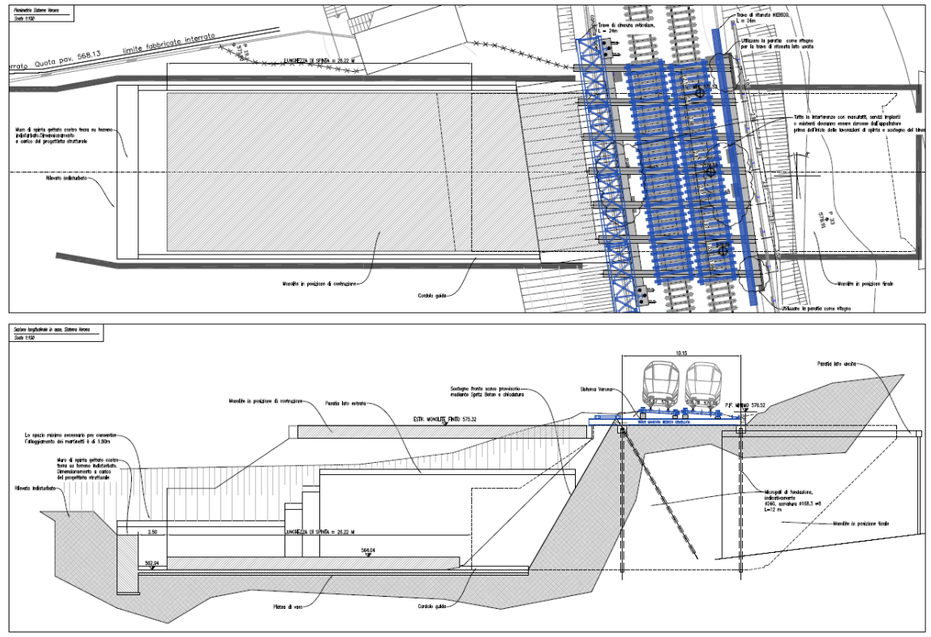


Figure 2 - Project temporary bridges

PICTURES



Figure 3 . Box construction



Figure 4 – Temporary briges

LINEA DEL BRENNERO – BRESSANONE 2018

CLIENT
PAC SPA

PROJECT NAME
CIRCONVALAZIONE BRESSANONE

YEAR
2018

LOCATION
BRESSANONE, BOLZANO (BZ)
ITALY

DESCRIPTION:
Box Jacking under 2 active rail tracks in Bressanone, Italy. Petrucco temporary bridges were installed in curve and different elevations with the Verona system. Passengers and freight traffic worked normally during the whole activity.

LAUNCH TYPE
☐Open pit
☐Partial diversion
☐Tunnel
☒Temporary bridges

TRAVEL DISTANCE
25,20 m – 82 '8"

JACKING AVG. PRODUCTION
3.0 m/h

BOX SIZE
- Base: 13.60 m – 50' 2"
- Height: 12.38 m – 23' 11"
- Length: 38.18 m – 125' 3"

BOX WEIGHT
4100 ton – 9042 Kips

SHUTDOWN DURATION
0 hours

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

VIDEO LINK:
https://youtu.be/_OVTV6X-B34

PICTURES

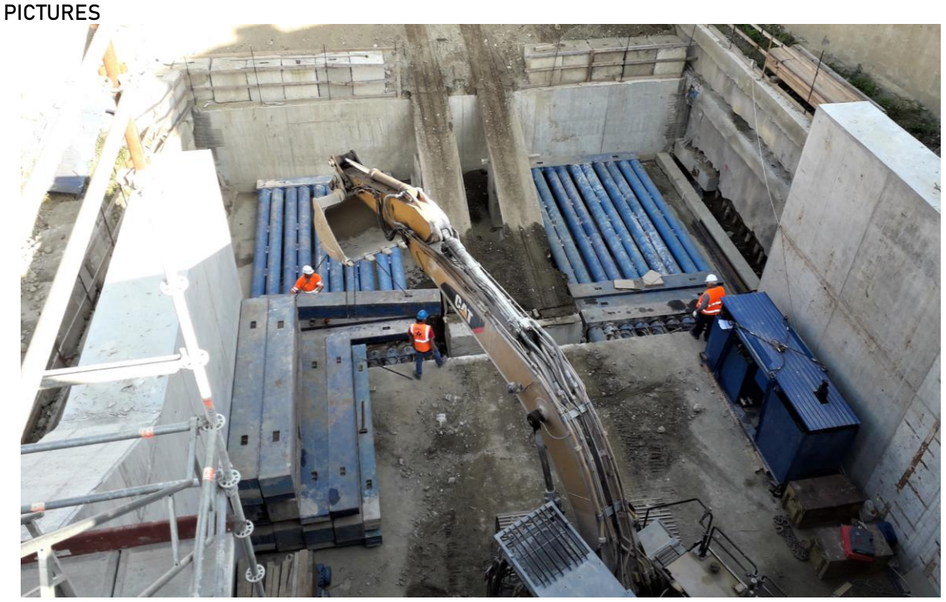


Figure 5 – Jacking system



Figure 6 – Temporary briges



Figure 7 – Secondary slab



Figure 8 – Completion jacking process

FOLLO LINE K140 CULVERT – OSLO 2018

CLIENT
BANE NOR – Norwegian Railways

PROJECT NAME
FOLLO LINE – K140 culvert

YEAR
2018

LOCATION
Oslo (NOR)

DESCRIPTION:
Box Jacking in partial shutdown of the Oslo central Station. Realized 10 days ahead of schedule.

LAUNCH TYPE
☒Open pit
☐Partial diversion
☐Tunnel
☐Temporary bridges

TRAVEL DISTANCE
Box 1: 47.00 m – 154' 2"
Box 2: 43.00 m – 141"

JACKING AVG. PRODUCTION
10 m/day (excavation and mucking from the inside)

BOXES SIZE
- Base: 12.80 m – 41' 11"
- Height: 9.28 m – 30' 5"
- Length: 43.00 m – 141'

BOX 1 WEIGHT
3285 ton – 7242 Kips

BOX 2 WEIGHT
3685 ton – 8124 Kips

SHUTDOWN DURATION
20 days

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

VIDEO LINK
https://youtu.be/xUkw--0lr7k

DRAWINGS

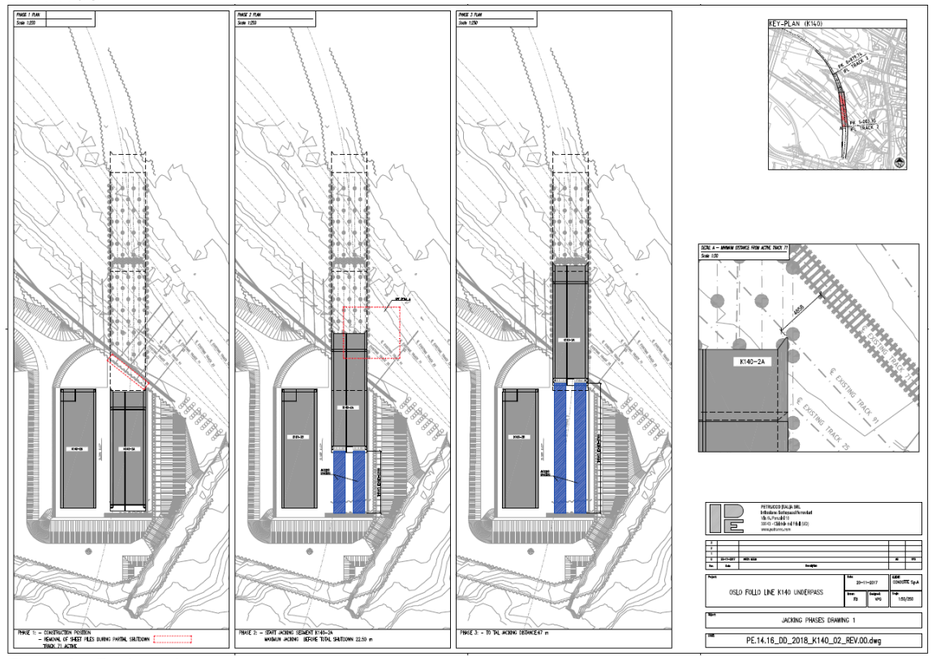


Figure 1 – Project phases

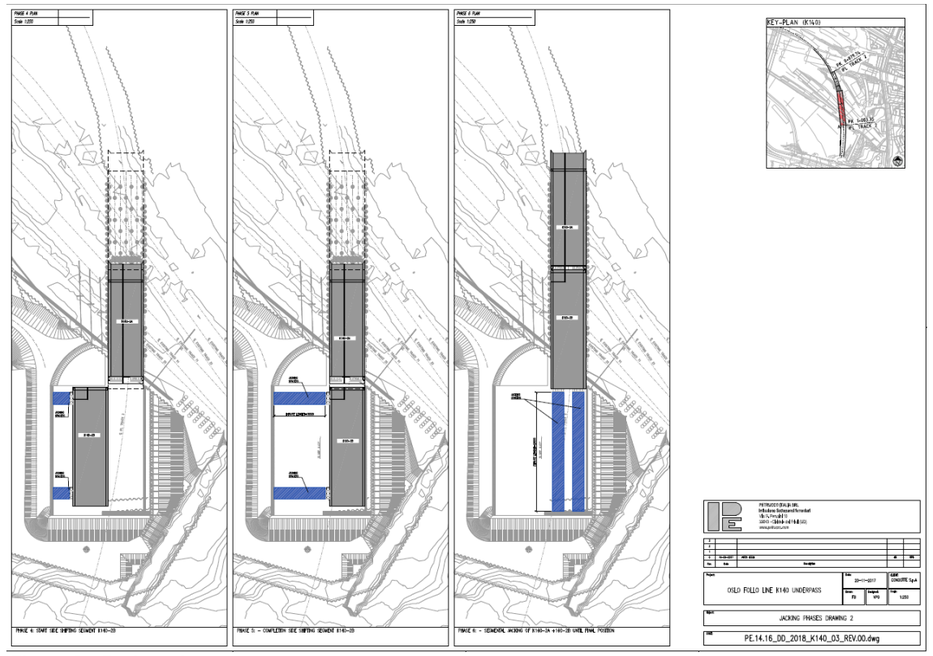


Figure 2 - Project phases

PICTURES



Figure 3 - Boxes in construction position



Figure 4 - Box 1 during jacking

FOLLO LINE K140 CULVERT – OSLO 2018

CLIENT
BANE NOR – Norwegian Railways

PROJECT NAME
FOLLO LINE – K140 culvert

YEAR
2018

LOCATION
Oslo (NOR)

DESCRIPTION:
Box Jacking in partial shutdown of the Oslo central Station. Realized 10 days ahead of schedule.

LAUNCH TYPE
☒Open pit
☐Partial diversion
☐Tunnel
☐Temporary bridges

TRAVEL DISTANCE
Box 1: 47.00 m – 154' 2"
Box 2: 43.00 m – 141"

JACKING AVG. PRODUCTION
10 m/day (excavation and mucking from the inside)

BOXES SIZE
- Base: 12.80 m – 41' 11"
- Height: 9.28 m – 30' 5"
- Length: 43.00 m – 141'

BOX 1 WEIGHT
3285 ton – 7242 Kips

BOX 2 WEIGHT
3685 ton – 8124 Kips

SHUTDOWN DURATION
20 days

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

VIDEO LINK
https://youtu.be/xUkw--0lr7k

PICTURES



Figure 5 - Box 1 during jacking

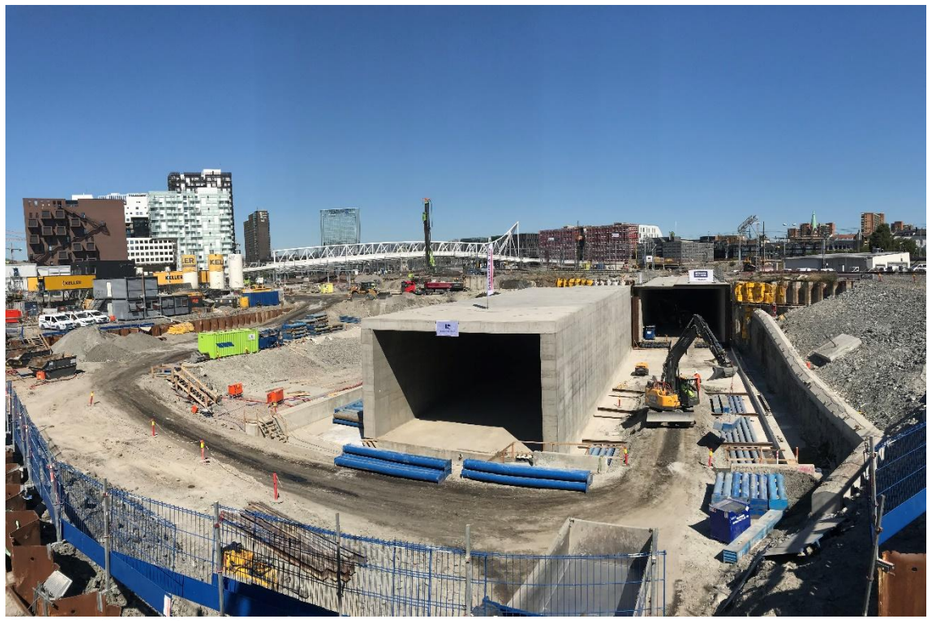


Figure 6 - Side shifting of box 2



Figure 7 - Box 2 at the end of the work

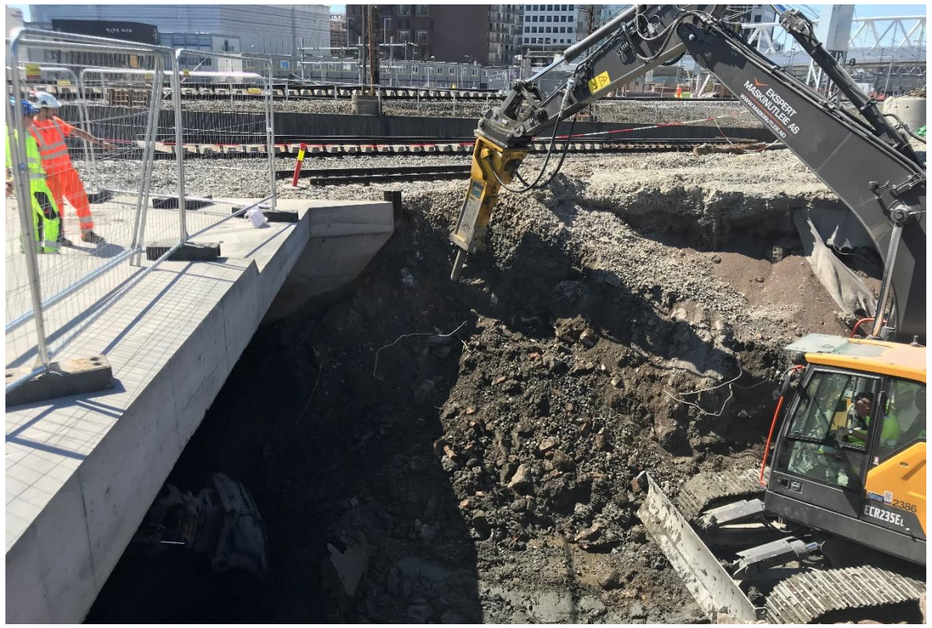


Figure 8 - Excavation

SPRESIANO – SIS – 2020

CLIENT
SIS SCPA

PROJECT NAME
OPERE DI ATTRAVERSAMENTO MS3E012-0
MONOLITE A SPINTA - LINEA TV – UD

YEAR
2020

LOCATION
SPRESIANO (TV), ITALY

DESCRIPTION:
Box Jacking under Treviso-Udine railway with Verona System. Construction site in Spresiano (TV), nearby Isonzo street.

LAUNCH TYPE
☐Open pit
☐Partial diversion
☐Tunnel
☒Temporary bridges

TRAVEL DISTANCE
42.50 m - 139' 5"

JACKING AVG. PRODUCTION
3.00 m/h

BOX SIZE
Number of boxes: 4
- Base: 16.70 m – 139' 5"
- Height: 12.20 m – 40' 5'
- Length: 42.50 m – 383' 10"

BOX WEIGHT
Weight of each of the 4 boxes:
6240 ton – 13756 Kips

SHUTDOWN DURATION
0 hours

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

DRAWINGS

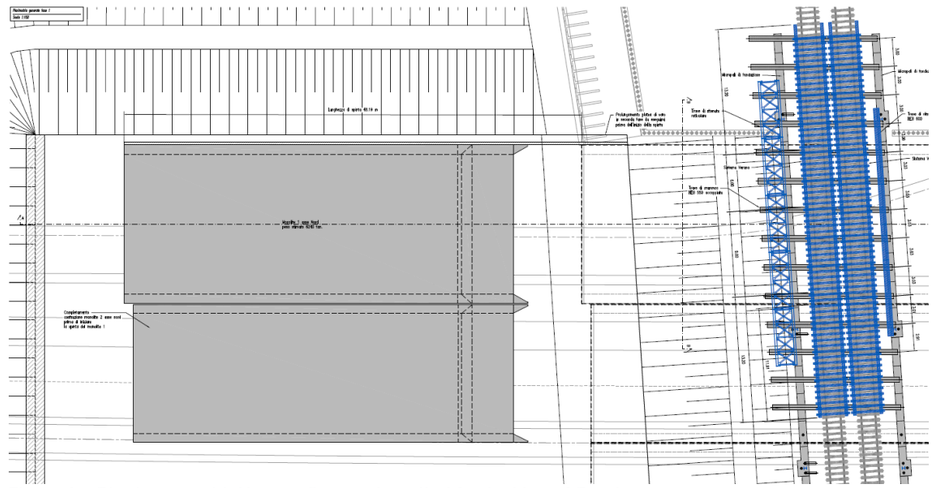


Figure 1 – Planimetry with Verona System installed for jacking of Box 1

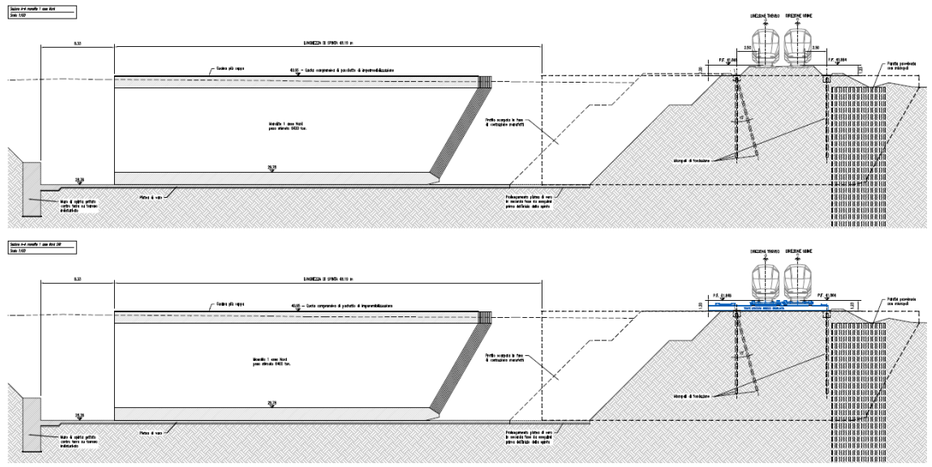


Figure 2 – Longitudinal section

PICTURES



Figure 3 – Verona System



Figure 4 – Box approaching the railway embankment and excavation from the inside

SPRESIANO – SIS – 2020

CLIENT
SIS SCPA

PROJECT NAME
OPERE DI ATTRAVERSAMENTO MS3E012-0
MONOLITE A SPINTA - LINEA TV – UD

YEAR
2020

LOCATION
SPRESIANO (TV), ITALY

DESCRIPTION:
Box Jacking under Treviso-Udine railway with Verona System. Construction site in Spresiano (TV), nearby Isonzo street.

LAUNCH TYPE
☐Open pit
☐Partial diversion
☐Tunnel
☒Temporary bridges

TRAVEL DISTANCE
42.50 m - 139' 5"

JACKING AVG. PRODUCTION
3.00 m/h

BOX SIZE
Number of boxes: 4
- Base: 16.70 m – 139' 5"
- Height: 12.20 m – 40' 5'
- Length: 42.50 m – 383' 10"

BOX WEIGHT
Weight of each of the 4 boxes:
6240 ton – 13756 Kips

SHUTDOWN DURATION
0 hours

EXCAVATION TYPOLOGY
☒from the inside
☐from the outside

PICTURES



Figure 5 – Box Jacking System



Figure 6 – Jacking column and secondary slab

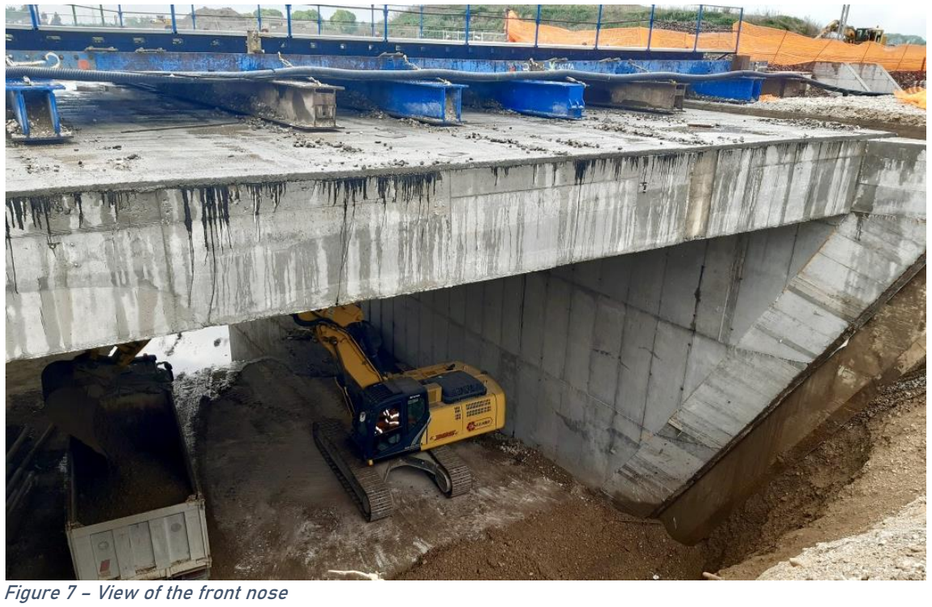


Figure 7 – View of the front nose



Figure 8 – Boxes in final position

QEW UNDERPASS – MISSISSAUGA, CANADA - 2022

CLIENT
MOBILINX

PROJECT NAME
QEW UNDERPASS FOR THE HURONTARIO LRT (HAZEL MCCALLION LINE) IN MISSISSAUGA

YEAR
2022

LOCATION
MISSISSAUGA, CANADA

DESCRIPTION:
Box Jacking operation of a 5020-ton concrete box in just 55 hours below the QEW in Mississauga, Canada. The "push box" was jacked with the open pit methodology using hydraulic jacks. The box was installed to form the new QEW underpass for the Hurontario light rail transit (LRT) line that will run from south Mississauga to Brampton.

LAUNCH TYPE
☒Open pit
☐Partial diversion
☐Tunnel
☐Temporary bridges

TRAVEL DISTANCE
44.00 m - 144' 4"

JACKING AVG. PRODUCTION
1,5 m/h

BOX SIZE
- Base: 17.50 m - 57' 4"
- Height: 7.50 m - 24' 7"
- Length: 53.50 m - 175' 6"

BOX WEIGHT
5020 ton - 11067 Kips

SHUTDOWN DURATION
55 hours (box jacking duration 30 hours)

EXCAVATION TYPOLOGY
☒from the inside
☒from the outside

DRAWINGS

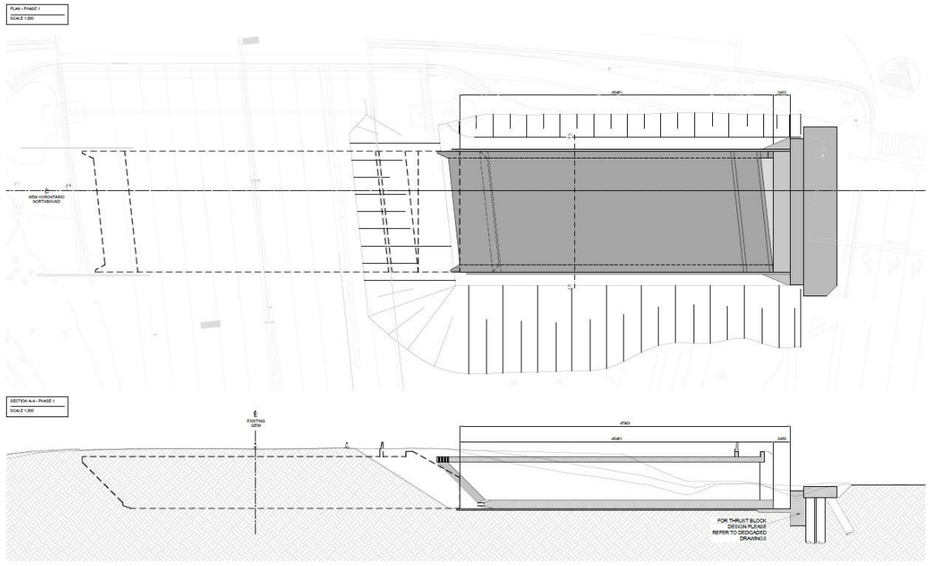


Figure 1 – Project plan

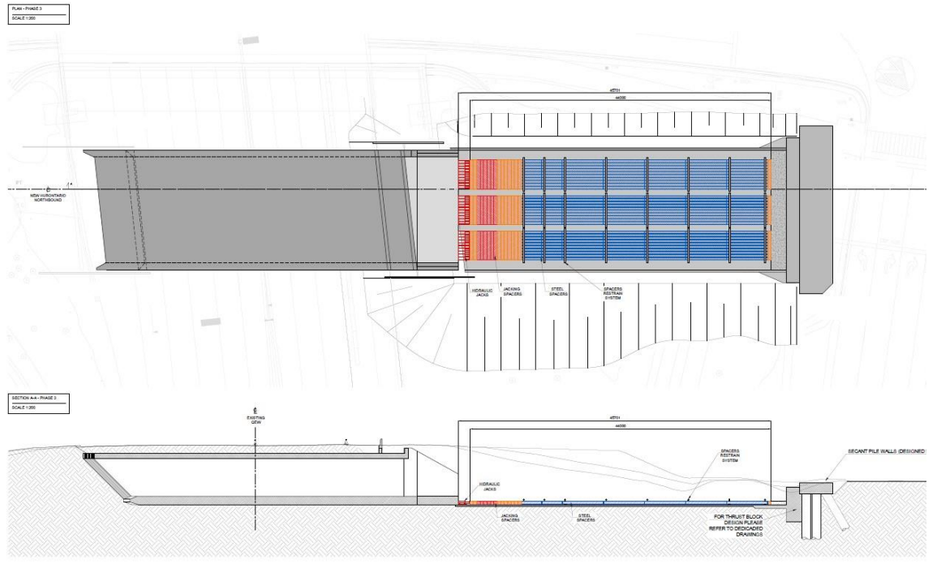


Figure 2 – Project phases

PICTURES



Figure 3 – Beginning of Box Jacking

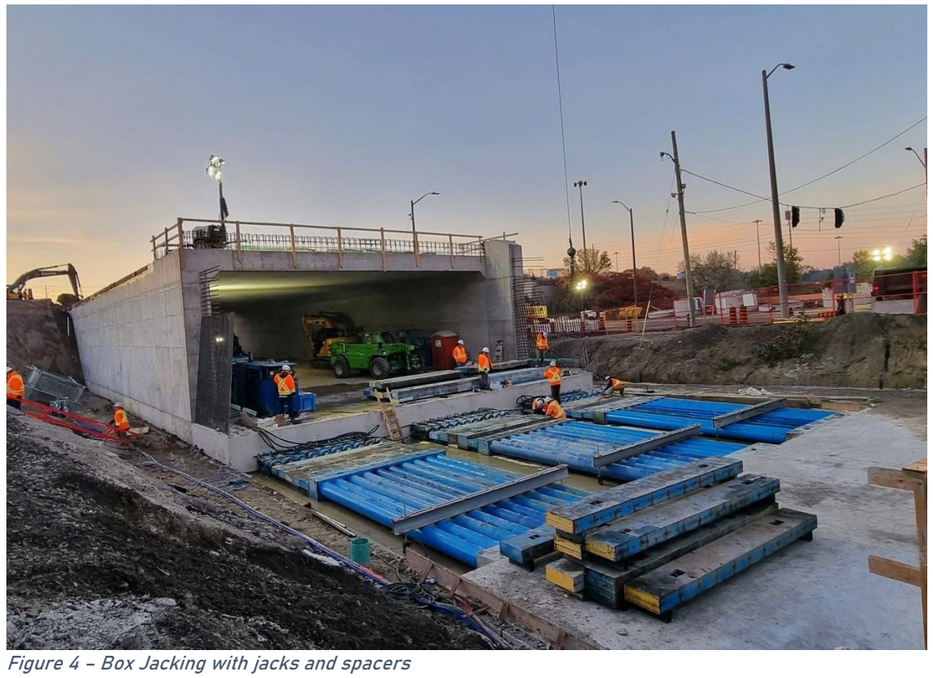


Figure 4 – Box Jacking with jacks and spacers

QEW UNDERPASS – MISSISSAUGA, CANADA - 2022

CLIENT
MOBILINX

PROJECT NAME
QEW UNDERPASS FOR THE HURONTARIO LRT (HAZEL MCCALLION LINE) IN MISSISSAUGA

YEAR
2022

LOCATION
MISSISSAUGA, CANADA

DESCRIPTION:
Box Jacking operation of a 5020-ton concrete box in just 55 hours below the QEW in Mississauga, Canada. The "push box" was jacked with the open pit methodology using hydraulic jacks. The box was installed to form the new QEW underpass for the Hurontario light rail transit (LRT) line that will run from south Mississauga to Brampton.

LAUNCH TYPE
☒Open pit
☐Partial diversion
☐Tunnel
☐Temporary bridges

TRAVEL DISTANCE
44.00 m - 144' 4"

JACKING AVG. PRODUCTION
1,5 m/h

BOX SIZE
- Base: 17.50 m - 57' 4"
- Height: 7.50 m - 24' 7"
- Length: 53.50 m - 175' 6"

BOX WEIGHT
5020 ton - 11067 Kips

SHUTDOWN DURATION
55 hours (box jacking duration 30 hours)

EXCAVATION TYPOLOGY
☒from the inside
☒from the outside

PICTURES



Figure 5 – Open pit box jacking and temporary road closure



Figure 6 – Excavation from the outside

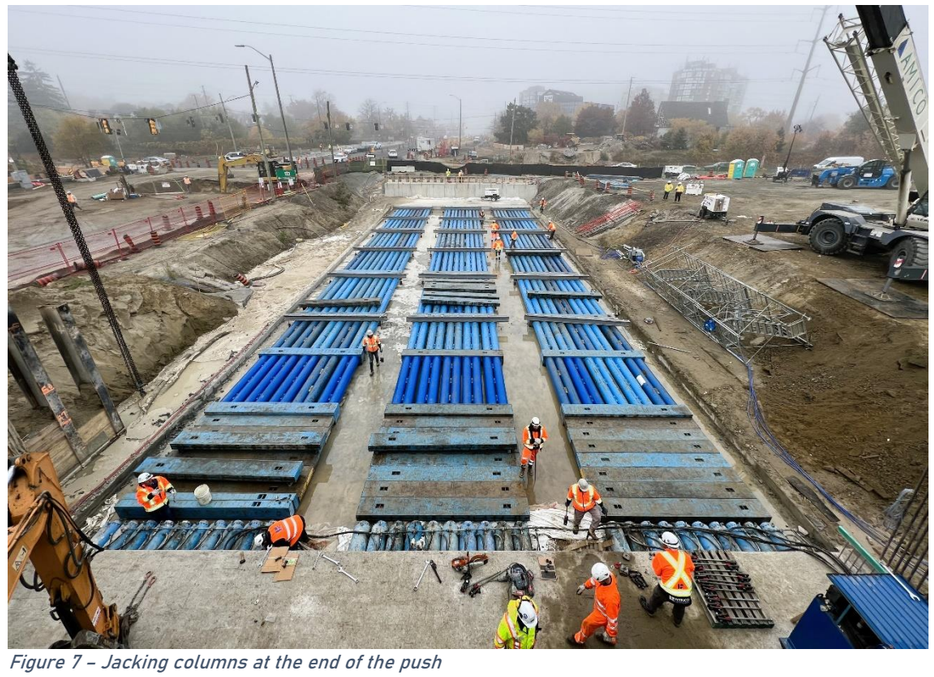


Figure 7 – Jacking columns at the end of the push



Figure 8 – Mobilinx and Petrucco teams at the end of the push

GERHART COLE

PO Box 880
Midvale, Utah 84047
801.849.0055
gerhartcole.com

TECHNICAL MEMORANDUM

To:	Mr. Cole Frost Ralph L. Wadsworth Construction Company 166 E. 14000 S., Ste. 200 Draper, UT 84020
From:	Andrew LeCheminant, PE (WY) Zachary Farnsworth
Reviewed by:	Brian Garrett, PE Richard Buhler, PE
Date:	July 10, 2025
Job Number:	22-1474a
Subject:	Temporary Micropile Design Submittal – **REVISION C** 14600 S Railroad Crossing 14600 S Roadway Improvement Project



INTRODUCTION AND BACKGROUND

This document serves as a design narrative for the temporary railroad support foundation piles that will be constructed by Ralph L. Wadsworth Construction (RLW) to facilitate the realignment of 14600 South as part of the 14600 S Roadway Improvement Project in Bluffdale, Utah. It is our understanding that Petrucco USA, LLC (Petrucco) will be utilizing the temporary deep foundations to support their Verona Bridge system which will be used to support the existing Union Pacific Railroad (UPRR) railroad track as two new box culverts are installed beneath the tracks. As requested by RLW, we have designed the deep foundations to consist of micropiles with the design detailed in the working drawings presented in Appendix A and supporting calculations presented in Appendix B.

The following details our understanding of this project:

1. Petrucco will use their box jacking techniques to push two, prefabricated box culverts under the existing UPRR track.
2. Prior to jacking the box culverts, Petrucco will replace a portion of the existing tracks with their Verona Bridge system, which will be used to support the tracks during the jacking of the box culverts.
3. During times approved by UPRR and prior to the placement of the Verona Bridge system, RLW will install temporary micropiles to support the Verona Bridge system.
4. Petrucco will jack the box culverts into place as RLW incrementally excavates under the tracks as the box is jacked into place. The box culverts will be advanced in phases with one box being placed prior to advancing the second box.
5. Each box is designed such that the temporary piling will be cut and removed as the box culvert advances and the support of the Verona Bridge system transfers from the piling to the box culverts. The micropiles will not have an unbraced length or be

exposed by the excavation at any point when loaded as detailed in the phasing plans submitted by Petrucco.

6. The Verona Bridge system is being designed for Petrucco by McNary, Bergeron & Johannesen Engineered Construction (MBJ). The design loads per pile (allowable stress design or working level) were developed and provided by MBJ to the project team in an email dated May 15, 2024 (included in Appendix C) and considered vertical bridge loads, lateral train traffic loads, and lateral box jacking loads. Additional design compression and tension loads for the restrain beam micropiles were developed and provided by MBJ to the project team in an email dated May 29, 2025 (included in Appendix C). The provided design loads are as follows:
    a. An axial load of 92 kips and a lateral load of 5 kips per sliding beam micropile.
    b. A lateral load of 33 kips per pile cap for the restrain beam micropiles.
    c. An axial load of 26 kips per pile in compression for the two restrain beam micropiles that are aligned with the vertical HP12x84 beam.
    d. An axial load of 50 kips in tension for the third restrain beam micropile that is offset from the vertical HP12x84 beam.
7. The connection of the deep foundation micropiles to the sliding beams and restrain beams, which are part of the Verona Bridge system will be designed by MBJ.

DESIGN BASIS

Gerhart Cole submitted a 100% Geotechnical Design Services memorandum dated May 13, 2024 for the railroad undercrossing box culverts for this project. In June and July of 2024, two additional test holes were drilled within the footprint of the planned box culverts, one on each side of the UPRR/UTA tracks. Test hole logs and information related to these test holes were included in the final Geotechnical Design Services memorandum dated May 21, 2025. Subsurface soil conditions have been interpreted based on information provided in the 100% geotechnical design memorandum and additional field studies. Based on this information, we anticipate that the subsurface soils generally consist of interbedded silty sand, sand with silt, and sandy clay layers.

Groundwater was found during drilling of the two additional test holes at approximately 17 feet and 18 feet below the existing ground surface which corresponds to a groundwater elevation of approximately 4440 and 4441 feet. A temporary piezometer was installed in the test hole on the east side of the tracks and groundwater was measured after drilling at approximately 12 feet below the existing ground surface. We understand that there will be some amount of dewatering to facilitate the excavation and construction of the box culverts; however, the extents and timing of the dewatering relative to the installation and use of the piling is currently unknown. As such, the piling was designed to account for water at a depth of 12 feet below the existing ground surface (approximately EL 4446 feet).

MICROPILE DESIGN

The design of the temporary micropiles was performed in general accordance with the guidance provided by the National Highway Institute “Micropile Design and Construction” FHWA NHI-05-039 (2005) and AREMA Chapter 8 (2024). According to Table 5-3 in

FHWA (2005) and for the types of soils described in the test hole logs, typical grout-to-ground bond ultimate strengths vary from 5 to 21 psi for gravity grouted micropiles (Type A). The minimum required bonded length was calculated based on an ultimate soil-to-grout bond stress value of 10 psi (3.6 kips/foot) and a 9 5/8-inch outside diameter temporary steel casing and grout body. The assumed bond-stress value is based on guidance provided in Post-Tensioning Institute (2014), the FHWA Micropile Design and Construction manual, and our experience with design and testing of micropiles in similar soils. The actual pullout resistance of the micropiles will be further assessed by performing verification pull tests on two pre-production piles and by proof testing four production piles and the design may be revised by Gerhart Cole (GC) based on the results of the testing. Details of the planned verification and proof testing are provided in the micropile working drawings. Note that for the sliding beam micropiles, a larger bar diameter center bar is required for the proof test piles than what is required for the remaining production micropiles. As such, the locations of the proof test piles have been pre-selected and are detailed in the working drawings.

Considering the provided lateral loads, the micropiles were designed with steel casing that is required to be left in place in the upper 16 to 18 feet of each micropile. Note however, that threaded joints in the steel casing are not permitted within the top 7 feet of the micropile below the bottom of the pile cap (plinth) for the restrain beam micropiles and are not permitted within the top 3 feet of the micropile below the bottom of the pile cap (plinth) for the sliding beam micropiles. The minimum required pile embedment, moment capacity, and pile head deflection were assessed using the computer software LPile (version 2022.12.10) for the sliding beam micropiles and the computer software Group (version 2016.10.10) for the restrain beam micropiles. Additionally, p-multipliers of 0.92 and 0.71 were applied to the lateral analyses of the leading and trailing piles, respectively, for the East restrain beam pile cap and a p-multiplier of 0.84 was applied to all piles for the West restrain beam pile cap. These values were calculated based on an assumed pile center to center spacing of 3’-3”. If the design of the pile cap requires that the pile spacing be less than 3’-3”, then GC should be notified and allowed to revise the design of the restrain beam driven piles as necessary. Supporting micropile design calculations are included in Appendix B.

SUMMARY AND RECOMMENDATIONS

The working drawings presented in Appendix A and the supporting calculations presented in Appendix B detail the design of the proposed temporary micropiles. We recommend that Petrucco and/or MBJ review this submittal for conformance to the load development and pile layout. We also recommend that all existing structures and utilities be visually located prior to the piling installation. The specified plan locations of the piling are based on the information in the provided 60% project drawings and should be field verified and checked against the final version of the project drawings prior to installation.

We also recommend that the UPRR tracks and railroad ties be frequently monitored for movement during construction of the piling and during their use while supporting the Verona Bridge System in accordance with the track monitoring plan that will be submitted by the project team.

LIMITATIONS

The assessments and recommendations presented in this document are based on our limited field studies, and on limited field studies and laboratory testing performed by others, as well as our understanding of the project's design and manner of construction. If the project's design or manner of construction changes, or if conditions are found that are different from those described, we should be notified immediately so that we can make revisions as necessary.

This document was prepared solely for the use of the addressee (our Client) for the specified project and may not contain sufficient information for other parties or uses.

We represent that our services are performed within the limitations prescribed by our Client, in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation, expressed or implied, and no warranty or guarantee is included or intended. We do not assume responsibility for the accuracy of information provided by others.

APPENDICES

Appendix A – Micropile Working Drawings
Appendix B – Micropile Calculations
Appendix C – Provided Pile Loading

REFERENCES

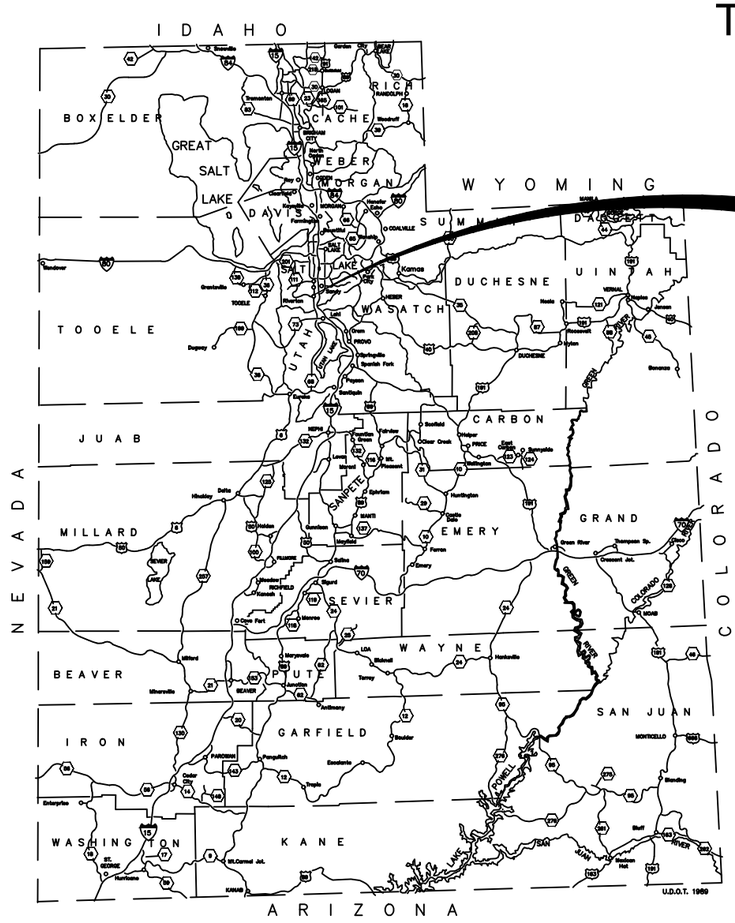
American Railway Engineering and Maintenance-of-Way Association [AREMA], (2024), Manual for Railway Engineering.

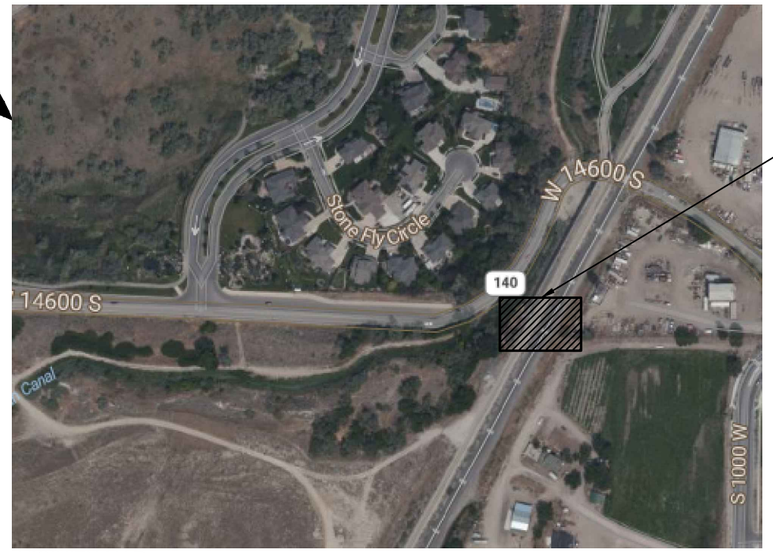
National Highway Institute [NHI], 2005, Micropile Design and Construction, FHWA NHI-05-039.

Post-Tensioning Institute [PTI], 2014, Recommendations for Prestressed Rock and Soil Anchors, PTI DC35.1-14.

APPENDIX A

14600 SOUTH REALIGNMENT PROJECT
TEMPORARY MICROPILE DESIGN
BLUFFDALE, UTAH





PROJECT LOCATION

VICINITY MAP
NTS

DRAWING INDEX

SHEET NO.	DRAWING TITLE
SHEET 1	DRAWING INDEX
SHEET 2	GENERAL NOTES
SHEET 3	SITE PLAN
SHEET 4	SECTION VIEWS
△C SHEET 5-6	TESTING DETAILS

CITY: BLUFFDALE COUNTY: SALT LAKE STATE: UTAH DATE: 10/17/2024	EXISTING DOT 254875M UP MP 725.66, PROVO SUB UTA MP S19.37 LATITUDE: 40.487195 LONGITUDE: -111.920975	PROPOSED DOT TBD UP MP 725.58, PROVO SUB UTA MP S19.45 LATITUDE: 40.486180 LONGITUDE: -111.921686

Know what's below. Call 811 before you dig.
BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
www.bluestakes.org
1-800-662-4111

CONTRACTOR:
RALPH L. WADSWORTH CONSTRUCTORS ENGINEERS
Draper, Utah
(801)553-1661

DESIGNER:
GERHART COLE
Midvale, Utah
(801)949-0055

14600 SOUTH REALIGNMENT PROJECT
BLUFFDALE, UTAH
TEMPORARY MICROPILE DESIGN

DRAWING INDEX

REVISION:	DATE:	DRAWN:	DESCRIPTION:
A	1/29/25	AWL	RESPONSE TO DRC
B	5/22/25	AWL	RESPONSE TO DRC
C	7/10/25	ZPF	RESPONSE TO DRC

REVISIONS

LICENSED PROFESSIONAL ENGINEER
BRIAN H. GARRETT
4939562
STATE OF UTAH

DATE: 10/17/2024	DESIGNED: AWL
PROJECT NUMBER: 22-1474a	DRAWN: AWL
SHEET NUMBER: 1 of 6	CHECKED: BHG
	APPROVED: BHG

1. GENERAL

1.1. The scope of work is outlined by these general notes as defined below and includes the installation of the proposed temporary micropiles to support the Verona System for the installation of the box culverts under the UPRR tracks as part of the 14600 South Realignment Project.

1.2. All utilities must be visually located prior to micropile installation.

2. MATERIALS

2.1. STEEL AND HARDWARE

2.1.1. Micropile tendons shall consist of solid threaded bar conforming to ASTM A615 with a minimum yield strength of 75 kips for #10 & #14 bars. All bars shall be straight and undamaged.

2.1.2. Temporary casing and casing left permanently in place shall have a minimum yield strength of 80 ksi and the minimum casing outside diameter shall be 9 5/8". The drilled hole diameter shall be a minimum 9 5/8". (B)

2.1.3. Hex nuts and couplers shall be manufactured by the tendon manufacturer.

2.1.4. Micropile tendons shall be installed with centralizers spaced no more than 10 feet o.c. and spaced no more than 5 feet from the top and bottom of the tendon. Centralizers shall be schedule 40 PVC and ½" smaller in diameter than the hole diameter to allow free grout flow.

2.1.5. PVC bond breaker for the verification test micropiles shall consist of 8-inch SCH 40 PVC.

2.1.6. Steel plates shall consist of ASTM A 36 mild steel (36 ksi min.) or better.

2.2. GROUT

2.2.1. Micropile grout shall be a neat cement consisting of Type 1L blended cement conforming to ASTM C595 or Portland Cement Type II conforming to ASTM C150 with a water to cement ratio between 0.45 to 0.55. (B)

2.2.2. Minimum 28-day compressive strength shall be 4000 psi in accordance with ASTM C109.

3. MICROPILE CONSTRUCTION SEQUENCE

3.1. Excavate to the micropile installation elevation.

3.2. Verification test pile installation and testing should be performed prior to production micropile installation.

3.3. Drill and install micropiles as detailed in these drawings using open hole methods and temporary steel casing. Place grout using either a grout tube or tremmie pipe beginning from the bottom of the hole. Casing shall be left in place in the upper 16 to 18 feet of each micropile (see section views).

3.4. Perform proof tests following the requirements of Testing Note 2 and on the piles shown.

3.5. Install micropile connection hardware.

3.6. Installation logs shall be kept by others for each hole and shall contain the following information:

3.6.1. Pile drilling duration and observations (e.g., difficulty/ease of drilling)

3.6.2. Information on soil encountered, including description of strata, water, etc.

3.6.3. Approximate final tip elevation

3.6.4. Cut-off elevation

3.6.5. Description of unusual installation behavior, conditions

3.6.6. Any deviations from the intended parameters

3.6.7. Grout quantities pumped

3.6.8. Pile materials and dimensions

4. CONSTRUCTION TOLERANCES

4.1.	Micropile Batter (from vertical):	2° of Design Batter
4.2.	Micropile Plan Location:	+/- 2"
4.3.	Micropile Casing Cut-off:	No less than shown
4.4.	Center Bar Cut-off Elevation:	+/- 1"
4.5.	Center Bar Plan Location:	+/- ¾" from Centerline

TESTING NOTES:

1. VERIFICATION LOAD TEST

1.1. PROCEDURE

1.1.1. Perform two verification tension load tests, one each within the extents of Box 1 and Box 2 (approximate loacations shown on Sheet 3, field location may be adjusted at the discretion of the contractor) following the Verification Test Load Schedule on this sheet and details provided on Sheets 5 and 6. Install one sacrificial test pile on the east side of the UPRR tracks and the other sacrificial test pile on the west side of the tracks using the same method and materials that will be employed for the production micropiles. (B)

Verification test A micropile shall have a bonded length of 15 feet and an unbonded length of 18 feet and consist of a #14 tendon, with a Design Load (DL) of 27 kips. Verification test B micropile shall have a bonded length of 51 feet and an unbonded length of 18 feet and consist of a #18 tendon, with a DL of 92 kips. (C)

1.1.2. The setup for each Tension Load Test shall be in accordance with ASTM D3689.

1.1.3. Hold each load increment stable for the time indicated in the testing load schedule listed on this sheet. (C)

1.1.4. Perform creep test at the 1.30 DL test load increment. Record movements at time intervals of 1, 2, 3, 4, 5, 6, 10, 20, 30, 40, 50, and 60 minutes.

1.2. ACCEPTANCE CRITERIA

1.2.1. The pile shall be considered successfully tested if the following conditions are met.

1.2.1.1. The measured total movement for the required load hold at the 1.30 DL should not exceed 0.04 inches between 1 and 10 minutes. If the movements are less than the 0.04 inches for this period, the micropile is considered acceptable with respect to creep. For verification load tests in which the measured total movement exceeds the criteria described above, the load is held for an additional 50-minute period of time. If the measured total movement over this additional time period does not exceed 0.08 inches between 6 and 60 minutes, then the micropile is considered acceptable with respect to creep. (C)

1.2.1.2. Demonstrate linear or decreasing creep rate throughout the creep load holding period.

1.2.1.3. Pullout failure does not occur before the 2.0 DL increment. Failure is defined as the load at which further increase in the test load simply results in continued pile movement.

2. PROOF LOAD TEST

2.1. PROCEDURE

2.1.1. Perform a minimum of four proof tension load tests on the production micropiles detailed on Sheet 3 and following the Proof Load Test Schedule and details provided on Sheet 5. The Design Load (DL) for all proof tests shall be as detailed in the micropile schedule on Sheet 3.

2.1.1.1. The production micropiles used for proof loading tests shall be the same design as all other micropiles, and installed with the same method and materials that will be employed for all other production micropiles, except for the size of the threaded bar. (B)

2.1.2. Hold each load increment stable for the time indicated in the testing load schedule.

2.2. Perform creep test at the 1.00 DL test load increment. Record movements at time intervals of 1, 2, 3, 4, 5, 6, 10, minutes. If pile top movement during the creep test between the 1 and 10 minute readings exceeds 0.04 inches, hold the creep test for an additional 50 minutes and record movements at 20, 30, 40, 50 and 60 minute time intervals.

2.3. ACCEPTANCE CRITERIA

2.3.1. The pile shall be considered successfully tested if the following conditions are met. (C)

2.3.2. The pile top movement at the end of the 1.30 DL creep test increment between the one (1) and ten (10) minute readings is less than 0.04 inches, or the movement between the six (6) and sixty (60) minute readings is less than 0.08 inches.

2.3.3. Demonstrate linear or decreasing creep rate throughout the creep load holding period.

2.3.4. Support the 1.60 DL increment without pullout failure occurring. Failure is defined as the load at which further increase in the test load simply results in continued pile movement.

3. GENERAL (B)

3.1. The Railroad must be present during testing for each Pile Load Test.

3.2. All data from the Pile Load Tests shall be submitted to the Railroad for review.

3.3. Pile Load Test procedures, acceptance criteria, and test reports shall be in accordance with the test procedures outlined in FHWA-NHI-05-039 (2005).

VERIFICATION TEST LOAD SCHEDULE

STEP	LOADING	APPLIED LOAD	HOLD TIME (MIN)
1	APPLY AL	*AL	2.5
2	CYCLE 1	0.15 DL	2.5
		0.30 DL	2.5
		0.45 DL	2.5
		*AL	1
3	CYCLE 2	0.15 DL	1
		0.45 DL	1
		0.60 DL	2.5
		0.75 DL	2.5
		0.90 DL	2.5
		1.00 DL	2.5
		*AL	1
4	CYCLE 3	0.15 DL	1
		1.00 DL	1
		1.15 DL	2.5
		1.30 DL	60
		1.45 DL	2.5
		*AL	1
5	CYCLE 4	0.15 DL	1
		1.45 DL	1
		1.60 DL	1
		1.75 DL	2.5
		1.90 DL	2.5
		2.00 DL	10
		1.50 DL	5
		1.00 DL	5
		0.50 DL	5
		*AL	5
TO FAILURE IF POSSIBLE WITHOUT EXCEEDING 0.9*Fy*A			N/A

PROOF TEST LOAD SCHEDULE

STEP	LOADING	APPLIED LOAD	HOLD TIME (MIN)
1	APPLY AL	*AL	1
2	LOAD CYCLE	0.15 DL	2.5
		0.30 DL	2.5
		0.45 DL	2.5
		0.60 DL	2.5
		0.75 DL	2.5
		0.90 DL	2.5
		1.00 DL	2.5 (C)
		1.15 DL	2.5
		1.30 DL	10 TO 60
		1.45 DL	2.5
		1.60 DL	2.5
3	UNLOAD CYCLE	1.30 DL	4
		1.00 DL	4
		0.75 DL	4
		0.50 DL	4
		0.25 DL	4
		*AL	1

* AL REPRESENTS A MINIMAL INITIAL ALIGNMENT LOAD APPLIED NO GREATER THAN 5% OF THE DESIGN LOAD (DL). RESET DIAL GAUGES TO ZERO AFTER INITIAL AL IS APPLIED.

	EXISTING	PROPOSED
CITY: BLUFFDALE	DOT 254875M	DOT TBD
COUNTY: SALT LAKE	UP MP 725.66, PROVO SUB	UP MP 725.58, PROVO SUB
STATE: UTAH	UTA MP S19.37	UTA MP S19.45
DATE: 10/17/2024	LATITUDE: 40.487195	LATITUDE: 40.486180
	LONGITUDE: -111.920975	LONGITUDE: -111.921686

Know what's below. Call 811 before you dig.
BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC.
www.bluestakes.org
1-800-662-4111

CONTRACTOR: RALPH L. WADSWORTH CONSTRUCTORS ENGINEERS
Draper, Utah
(801)553-1661

DESIGNER: GERHART COLE
Midvale, Utah
(801)949-0055

14600 SOUTH REALIGNMENT PROJECT
BLUFFDALE, UTAH
TEMPORARY MICROPILE DESIGN

GENERAL NOTES

REVISION:	DATE:	DESCRIPTION:	DRAWN:
A	1/29/25	RESPONSE TO DRC	AWL
B	5/22/25	RESPONSE TO DRC	AWL
C	7/10/25	RESPONSE TO DRC	ZPF

REVISIONS

LICENSED PROFESSIONAL ENGINEER
BRIAN H. GARRETT
4939562
STATE OF UTAH

DATE: 10/17/2024	DESIGNED: AWL
PROJECT NUMBER: 22-1474a	DRAWN: AWL
SHEET NUMBER: 2 of 6	CHECKED: BHG
	APPROVED: BHG

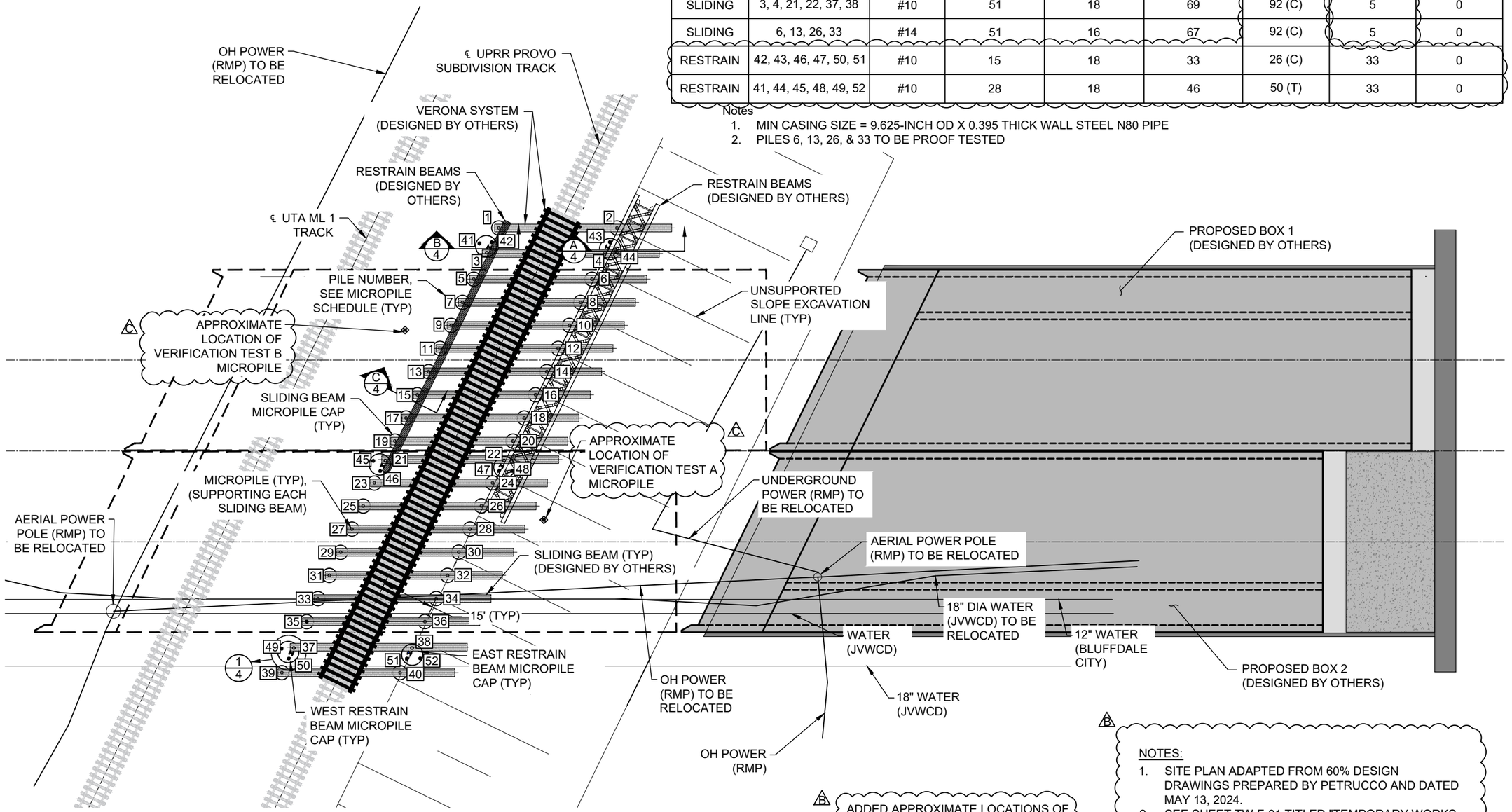
N

0 15 30 60

SITE PLAN SCALE IN FEET

MICROPILE SCHEDULE								
SUPPORT BEAM	PILE NUMBER	MIN. BAR SIZE	MIN. BONDED LENGTH (FT)	MIN. CASING / UNBONDED LENGTH (FT)	MIN. DRILLED HOLE LENGTH (FT)	AXIAL DESIGN LOAD (KIPS) B	LATERAL DESIGN LOAD (KIPS) A	BATTER FROM VERTICAL (DEG)
SLIDING	1, 2, 5, 7-12, 14-20, 23-25, 27-32, 34-36, 39, 40	#10	51	16	67	92 (C)	5	0
SLIDING	3, 4, 21, 22, 37, 38	#10	51	18	69	92 (C)	5	0
SLIDING	6, 13, 26, 33	#14	51	16	67	92 (C)	5	0
RESTRAIN	42, 43, 46, 47, 50, 51	#10	15	18	33	26 (C)	33	0
RESTRAIN	41, 44, 45, 48, 49, 52	#10	28	18	46	50 (T)	33	0

Notes
1. MIN CASING SIZE = 9.625-INCH OD X 0.395 THICK WALL STEEL N80 PIPE
2. PILES 6, 13, 26, & 33 TO BE PROOF TESTED



CITY: BLUFFDALE COUNTY: SALT LAKE STATE: UTAH DATE: 10/17/2024	EXISTING DOT 254875M UP MP 725.66, PROVO SUB UTA MP S19.37 LATITUDE: 40.487195 LONGITUDE: -111.920975	PROPOSED DOT TBD UP MP 725.58, PROVO SUB UTA MP S19.45 LATITUDE: 40.486180 LONGITUDE: -111.921686

Know what's below. Call 811 before you dig.
BLUE STAKES OF UTAH UTILITY NOTIFICATION CENTER, INC
www.bluestakes.org
1-800-662-4111

SITE PLAN
SCALE: 1" = 30'

B ADDED APPROXIMATE LOCATIONS OF VERIFICATION TEST PILES, REVISED RESTRAIN BEAM MICROPILE LAYOUT

B NOTES:
1. SITE PLAN ADAPTED FROM 60% DESIGN DRAWINGS PREPARED BY PETRUCCO AND DATED MAY 13, 2024.
2. SEE SHEET TW-F-01 TITLED "TEMPORARY WORKS MICROPILE CAP LAYOUT" PROVIDED BY MCNARY, BERGERON, AND JOHANNESEN FOR MICROPILE LAYOUT
3. FIELD VERIFY PROPOSED STRUCTURE LOCATION PRIOR TO MICROPILE INSTALLATION.
4. EXISTING UTILITIES MUST BE FIELD VERIFIED PRIOR TO MICROPILE INSTALLATION.

CONTRACTOR: RALPH L. WADSWORTH CONSTRUCTION, Draper, Utah (801)553-1661

DESIGNER: GERHART COLE, Midvale, Utah (801)849-0055

14600 SOUTH REALIGNMENT PROJECT
BLUFFDALE, UTAH
TEMPORARY MICROPILE DESIGN

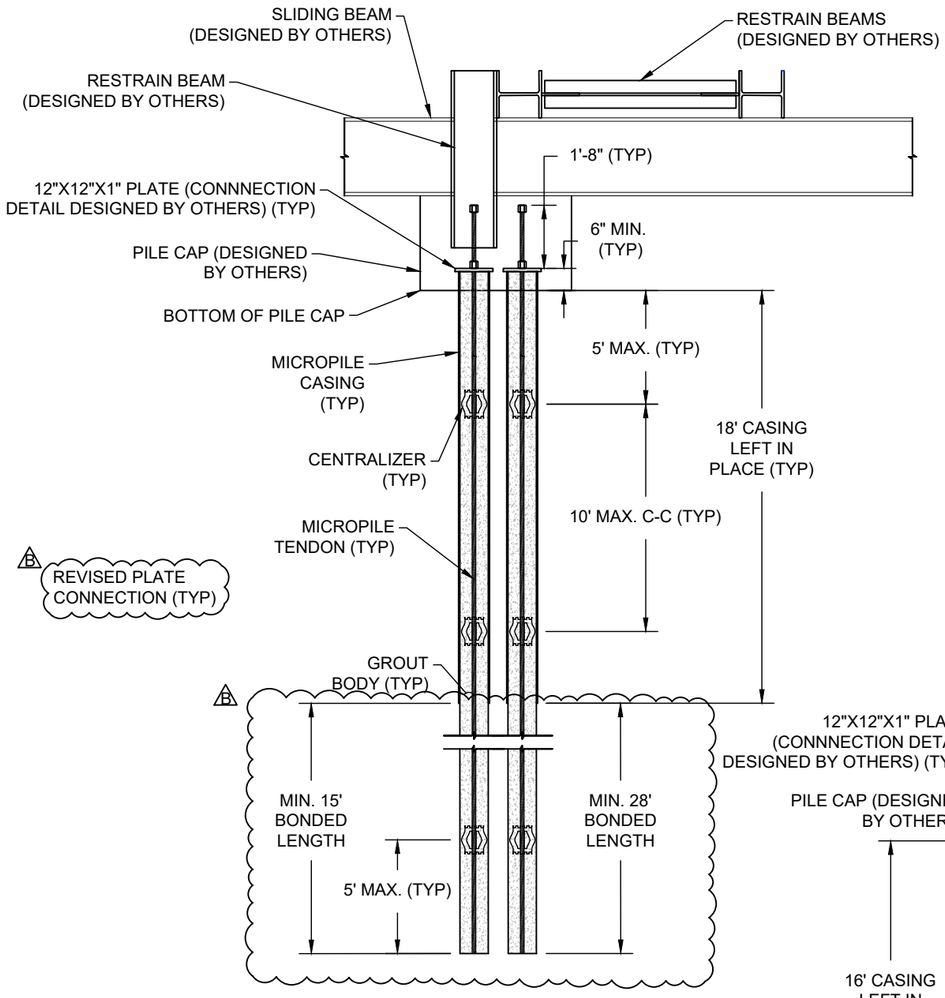
SITE PLAN

REVISION:	DATE:	DRAWN:	DESCRIPTION:
A	1/29/25	AWL	RESPONSE TO DRC
B	5/22/25	AWL	RESPONSE TO DRC
C	7/10/25	ZPF	RESPONSE TO DRC

REVISIONS

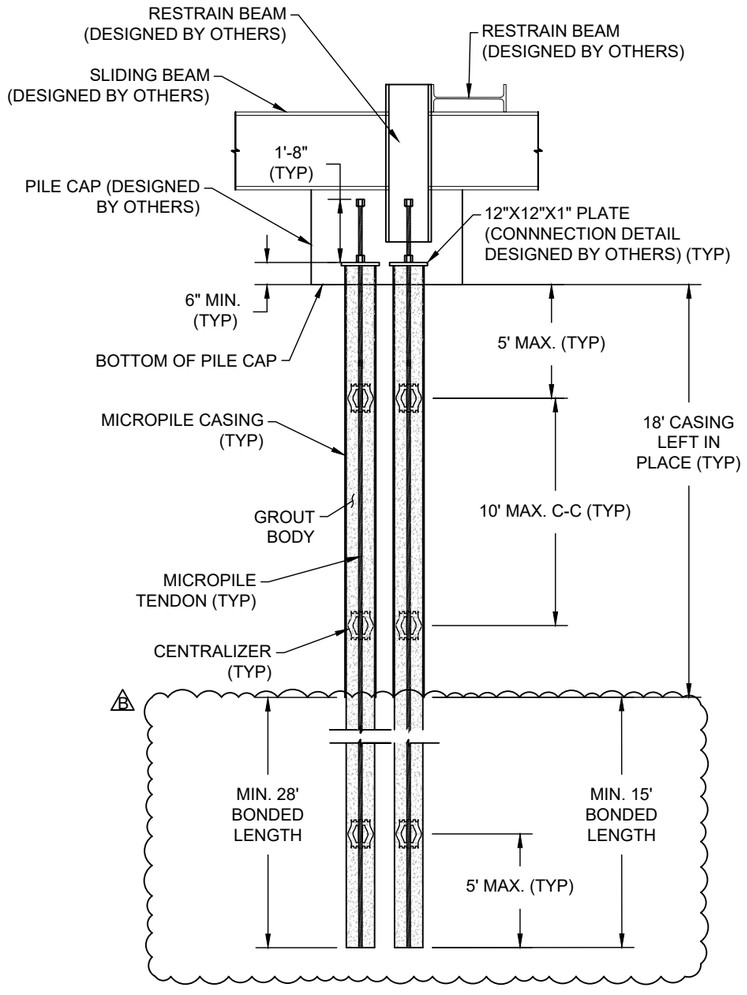
LICENSED PROFESSIONAL ENGINEER
BRIAN H. GARRETT
4939562
STATE OF UTAH

DATE: 10/17/2024	DESIGNED: AWL
PROJECT NUMBER: 22-1474a	DRAWN: AWL
SHEET NUMBER: 3 of 6	CHECKED: BHG
	APPROVED: BHG



A NOTE: THREADED JOINTS IN MICROPILE CASING FOR RESTRAIN BEAM MICROPILES NOT PERMITTED WITHIN THE TOP 7 FEET OF MICROPILE BELOW THE BOTTOM OF THE PILE CAP (PLINTH). THREADED JOINTS IN MICROPILE CASING FOR SLIDING BEAM MICROPILES NOT PERMITTED WITHIN THE TOP 3 FEET OF MICROPILE BELOW THE BOTTOM OF THE PILE CAP (PLINTH).

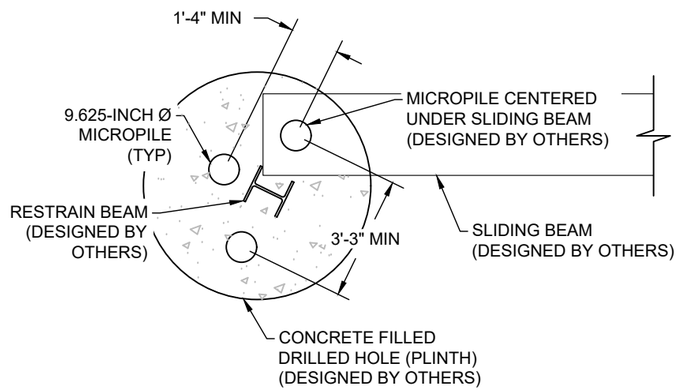
A/4 TYPICAL SECTION VIEW - EAST RESTRAIN BEAM CAP MICROPILES
NTS



B/4 TYPICAL SECTION VIEW - WEST RESTRAIN BEAM CAP MICROPILES
NTS

C/4 TYPICAL SECTION VIEW - SLIDING BEAM MICROPILES
NTS

CITY: BLUFFDALE COUNTY: SALT LAKE STATE: UTAH DATE: 10/17/2024	EXISTING DOT 254875M UP MP 725.66, PROVO SUB UTA MP S19.37 LATITUDE: 40.487195 LONGITUDE: -111.920975	PROPOSED DOT TBD UP MP 725.58, PROVO SUB UTA MP S19.45 LATITUDE: 40.486180 LONGITUDE: -111.921686



1/4 TYPICAL RESTRAIN BEAM PILE CAP PAN VIEW
NTS

Know what's below. Call 811 before you dig.
BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC.
www.bluestakes.org
1-800-662-4111

CONTRACTOR: RALPH L. WADSWORTH CONSTRUCTORS ENGINEERS
Draper, Utah
(801)553-1661

DESIGNER: GERHART COLE
Midvale, Utah
(801)949-0055

14600 SOUTH REALIGNMENT PROJECT
BLUFFDALE, UTAH
TEMPORARY MICROPILE DESIGN

SECTION VIEWS

REVISION:	DATE:	DRAWN:	DESCRIPTION:
A	1/29/25	AWL	RESPONSE TO DRC
B	5/22/25	AWL	RESPONSE TO DRC
C	7/10/25	ZPF	RESPONSE TO DRC

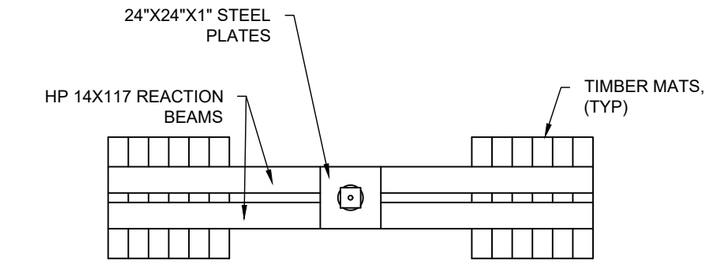
REVISIONS

LICENSED PROFESSIONAL ENGINEER
BRIAN H. GARRETT
4939562
STATE OF UTAH

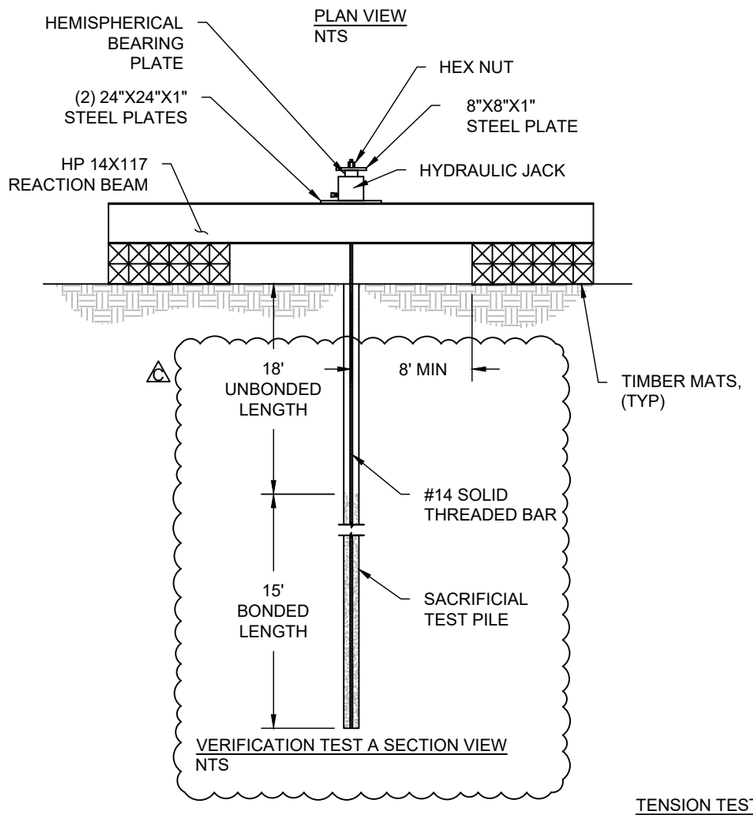
DATE: 10/17/2024	DESIGNED: AWL
PROJECT NUMBER: 22-1474a	DRAWN: AWL
SHEET NUMBER: 4 of 6	CHECKED: BHG
	APPROVED: BHG

TEST SETUP NOTES:

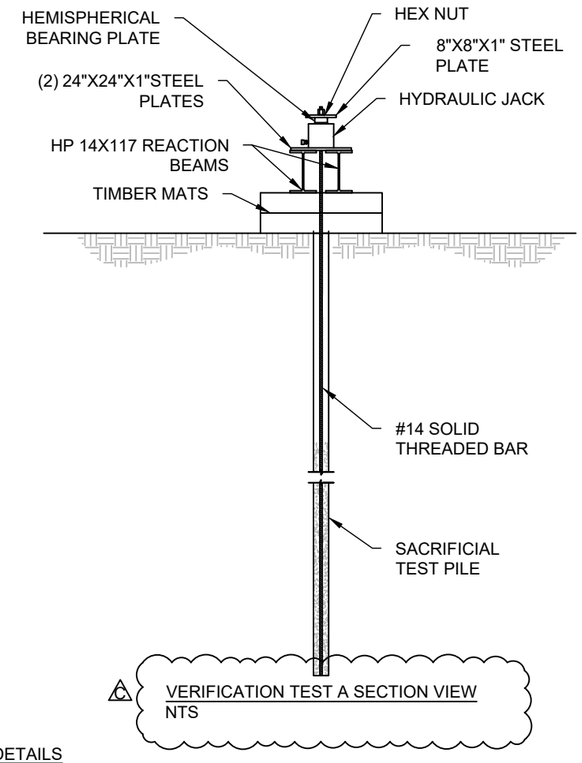
1. Use two dial gages setup on opposite sides of the bar each with a measurement precision of 0.001 inches.
2. Dial gages should be setup on an independent reference frame with support(s) at least 8 feet from the micropile and placed as far as practical from the timber mats.
3. Timber mat dimensions and layout to be field fit based on actual site conditions.
4. Load frame designed to support a maximum test load of 340 kips.



PLAN VIEW
NTS



VERIFICATION TEST A SECTION VIEW
NTS



VERIFICATION TEST A SECTION VIEW
NTS

TENSION TEST DETAILS
NTS

CITY: BLUFFDALE COUNTY: SALT LAKE STATE: UTAH DATE: 10/17/2024	EXISTING DOT 254875M UP MP 725.66, PROVO SUB UTA MP S19.37 LATITUDE: 40.487195 LONGITUDE: -111.920975	PROPOSED DOT TBD UP MP 725.58, PROVO SUB UTA MP S19.45 LATITUDE: 40.486180 LONGITUDE: -111.921686

Know what's below. Call 811 before you dig.
BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC.
www.bluestakes.org
1-800-662-4111

CONTRACTOR:
Ralph L. Wadsworth Construction
Draper, Utah
(801)553-1661

DESIGNER:
GERHART COLE
Midvale, Utah
(801)949-0055

14600 SOUTH REALIGNMENT PROJECT
BLUFFDALE, UTAH
TEMPORARY MICROPILE DESIGN

TESTING DETAILS

REVISION:	DATE:	DRAWN:	DESCRIPTION:
A	1/29/25	AWL	RESPONSE TO DRC
B	5/22/25	AWL	RESPONSE TO DRC
C	7/10/25	ZPF	RESPONSE TO DRC

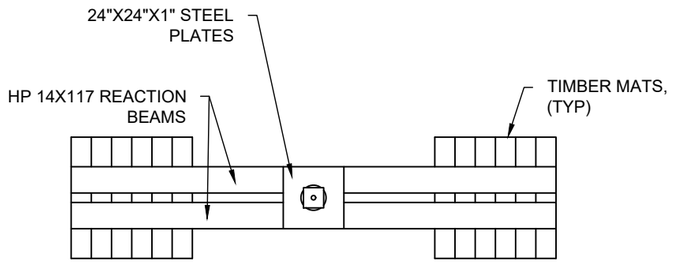
REVISIONS



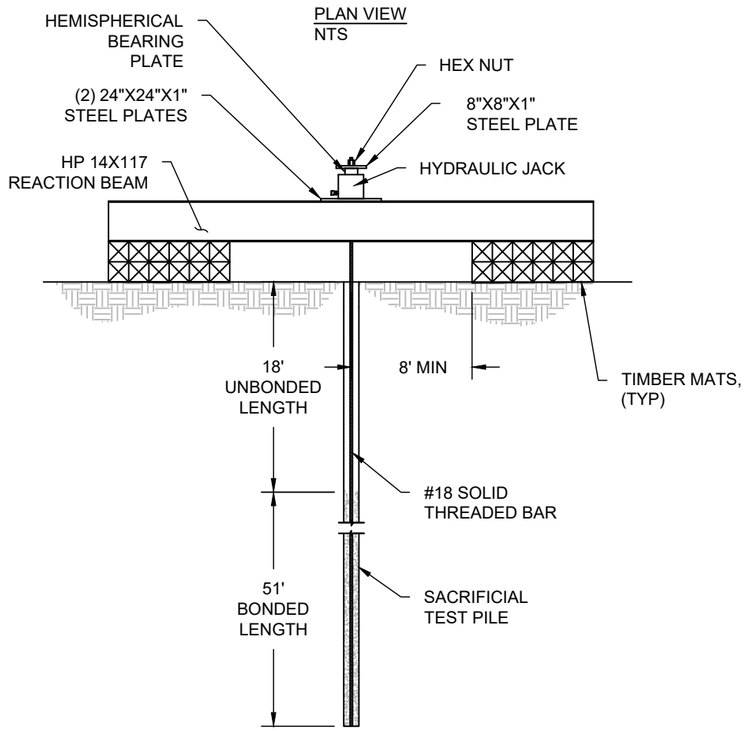
DATE: 10/17/2024	DESIGNED: AWL
PROJECT NUMBER: 22-1474a	DRAWN: AWL
SHEET NUMBER: 5 of 6	CHECKED: BHG
	APPROVED: BHG

TEST SETUP NOTES:

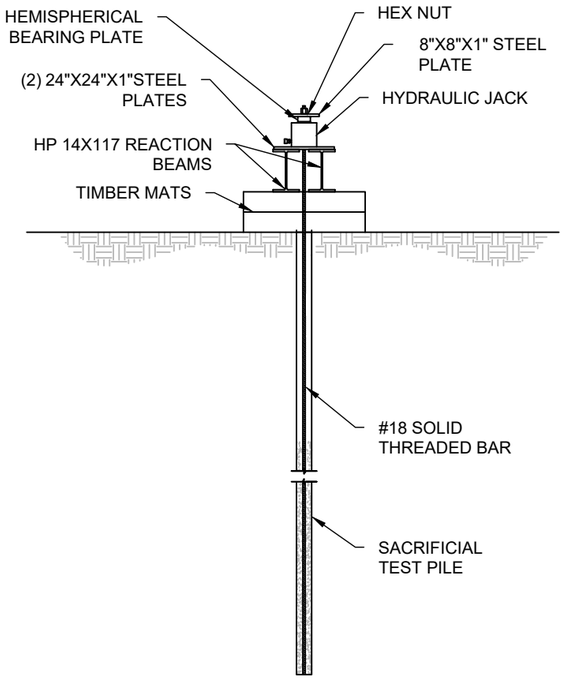
1. Use two dial gages setup on opposite sides of the bar each with a measurement precision of 0.001 inches.
2. Dial gages should be setup on an independent reference frame with support(s) at least 8 feet from the micropile and placed as far as practical from the timber mats.
3. Timber mat dimensions and layout to be field fit based on actual site conditions.
4. Load frame designed to support a maximum test load of 340 kips.



PLAN VIEW
NTS



VERIFICATION TEST B SECTION VIEW
NTS



VERIFICATION TEST B SECTION VIEW
NTS

TENSION TEST DETAILS
NTS

CITY: BLUFFDALE COUNTY: SALT LAKE STATE: UTAH DATE: 10/17/2024	EXISTING DOT 254875M UP MP 725.66, PROVO SUB UTA MP S19.37 LATITUDE: 40.487195 LONGITUDE: -111.920975	PROPOSED DOT TBD UP MP 725.58, PROVO SUB UTA MP S19.45 LATITUDE: 40.486180 LONGITUDE: -111.921686

△A NEW SHEET

Know what's below. Call 811 before you dig.
BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC.
www.bluestakes.org
1-800-662-4111

CONTRACTOR: Ralph L. Wadsworth Construction
Draper, Utah
(801)553-1661

DESIGNER: GERHART COLE
Midvale, Utah
(801)849-0055

14600 SOUTH REALIGNMENT PROJECT
BLUFFDALE, UTAH
TEMPORARY MICROPILE DESIGN

TESTING DETAILS

REVISION:	DATE:	DRAWN:	DESCRIPTION:
A	1/29/25	AWL	RESPONSE TO DRC
B	5/22/25	AWL	RESPONSE TO DRC
C	7/10/25	ZPF	RESPONSE TO DRC

REVISIONS

PROFESSIONAL ENGINEER
BRIAN H. GARRETT
4939562
STATE OF UTAH

DATE: 10/17/2024	DESIGNED: AWL
PROJECT NUMBER: 22-1474a	DRAWN: AWL
SHEET NUMBER: 6 of 6	CHECKED: BHG
	APPROVED: BHG

APPENDIX B

MICROPILE DESIGN

GERHART COLE

References: FHWA 2005
Date: 01/09/2025
Project: 14600 South Realignment
Client: RLW
Description: 92 kip Micropile - Sliding Beam Micropiles
Designed by: AWL
Checked by: BHG

Design Loads:

Compression	$DL_C := 92\ kip$		Compression Anchorage	$DL_{CA} := 92\ kip$
Tension	$DL_T := 0\ kip$		Tension Anchorage	$DL_{TA} := 0\ kip$
Lateral	$DL_L := 5\ kip$			

Material Properties & Geometry:

Grout:

$f'c := 4\ ksi$ Hole Diameter $D := 9.625\ in$ $D_{ft} := D$ $D_{ft} = 0.802\ ft$

Micropile Tendon:

Bar Size $\#10$ Bar Yield Strength $F_{yb} := 75\ ksi$ Bar Area of Steel $A_{sb} := 1.27\ in^2$

Outside Diameter $OD := 1.27\ in$

Uncased Allowable Structural Strength:

Allowable Comp. Steel $P_{cs} := 0.47 \cdot F_{yb} \cdot A_{sb}$ $P_{cs} = 44.77\ kip$

Area of Grout $A_g := \frac{\pi \cdot D^2}{4} - A_{sb}$ $A_g = 71.49\ in^2$

Allowable Comp. Grout $P_{cg} := 0.4 \cdot f'c \cdot A_g$ $P_{cg} = 114.38\ kip$

Allowable Comp. Strength $P_c := P_{cs} + P_{cg}$ $P_c = 159.15\ kip$ $(Eq.5-7)$

Allowable Tens. Steel $P_{ts} := 0.55 \cdot F_{yb} \cdot A_{sb}$ $P_{ts} = 52.39\ kip$ $(Eq.5-8)$

$\mathbf{Check_{BS}} := \text{if}\left(P_{cs} > 0.4 \cdot DL_C, \text{“OK”}, \text{“Increase Bar Size”}\right)$ $\mathbf{Check_{BS}} = \text{“OK”}$

$\mathbf{Check_C} := \text{if}\left(P_c > DL_C, \text{“OK”}, \text{“Fails in Compression”}\right)$ $\mathbf{Check_C} = \text{“OK”}$

$\mathbf{Check_T} := \text{if}\left(P_{ts} > DL_T, \text{“OK”}, \text{“Fails in Tension”}\right)$ $\mathbf{Check_T} = \text{“OK”}$

Cased Allowable Structural Strength:

Casing Yield Strength $F_y := 80\ ksi$

Plastic Section Modulus $Z_x := 33.67\ in^3$

Nominal Moment Resistance $M_n := Z_x \cdot F_y$ $M_n = 2693.6\ (kip \cdot in)$

Safety Factor for Flexure $\Omega := 1.67$

Allowable Moment Resistance $M_a := \frac{M_n}{\Omega}$ $M_a = 1612.93\ (kip \cdot in)$

Maximum Required Moment (From LPile) $M_r := 163.123\ kip \cdot in$

$\mathbf{Check_M} := \mathbf{if}\left(M_a > M_r, \text{“OK”}, \text{“Increase Casing Size”}\right)$ $\mathbf{Check_M} = \text{“OK”}$

Micropile Plan Location Construction Tolerance:

$Tolerance := 2\ in$

Moment Due to Eccentricity: $M_e := DL_C \cdot Tolerance = 184\ kip \cdot in$

$\mathbf{Check_E} := \mathbf{if}\left(M_a > M_e, \text{“OK”}, \text{“Increase Casing Size”}\right)$ $\mathbf{Check_E} = \text{“OK”}$

Micropiles Batter $Deg := 2\ deg$

Axial Load for Construction Tolerance Batter

$$AL_b := \frac{DL_L}{\sin(Deg)} = 143.3\ kip$$

Moment Due to Eccentricity & Batter:

$$M_{eb} := \left(DL_C + AL_b\right) \cdot Tolerance = 470.5\ kip \cdot in$$

$\mathbf{Check_{EB}} := \mathbf{if}\left(M_a > M_{eb}, \text{“OK”}, \text{“Increase Casing Size”}\right)$ $\mathbf{Check_{EB}} = \text{“OK”}$

Required Embedment Depth:

Bond Strength Factor of Safety $FOS := 2$

Ultimate Soil-Grout Bond Stress $\tau_{ult} := 10\ psi$ $\tau_{ult} = 1.44\ ksf$

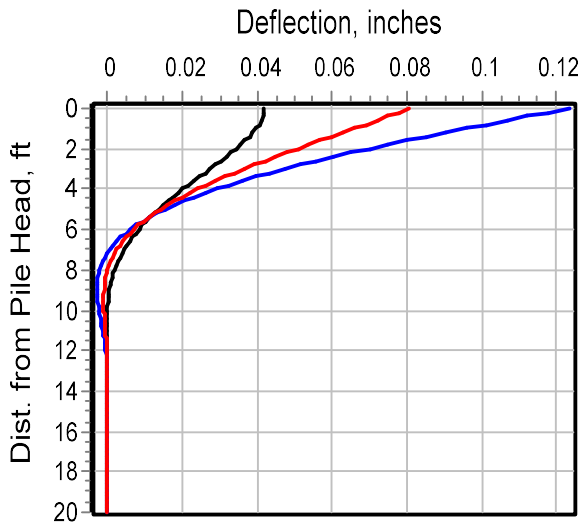
Ultimate Bond Strength $BS_{ult} := \pi \cdot D_{ft} \cdot \tau_{ult}$

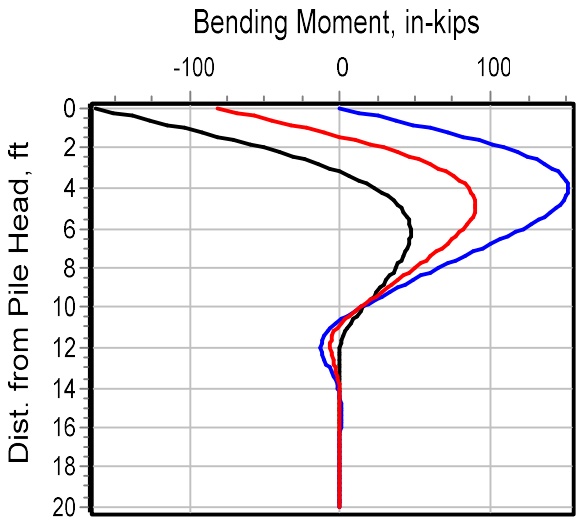
$$BS_{ult} = 3.629\ \frac{kip}{ft}$$

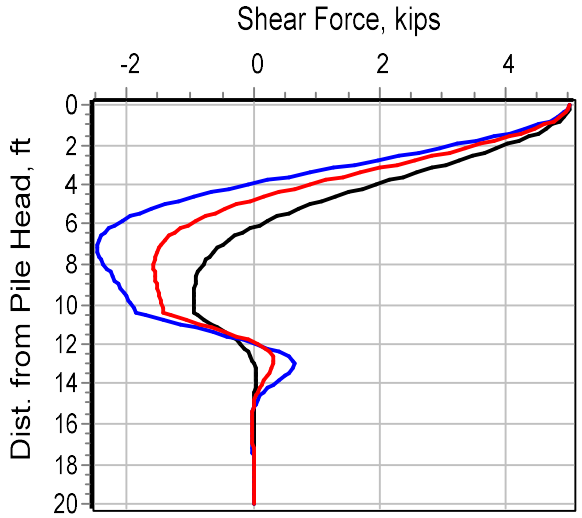
Minimum Required Bonded Length $L_b := \frac{DL_C}{\left(\frac{BS_{ult}}{FOS}\right)}$ $L_b = 50.7\ ft$

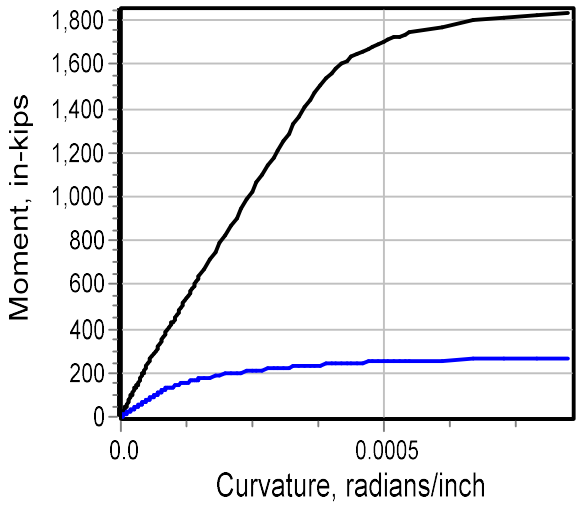
References:

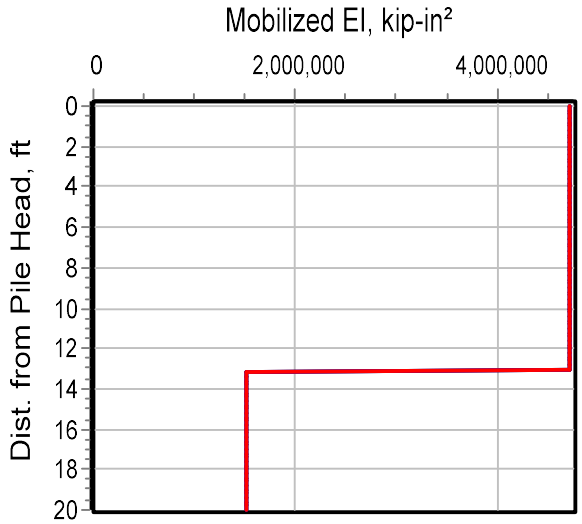
National Highway Institute [NHI], 2005, *Micropile Design and Construction,* FHWA NHI-05-039.

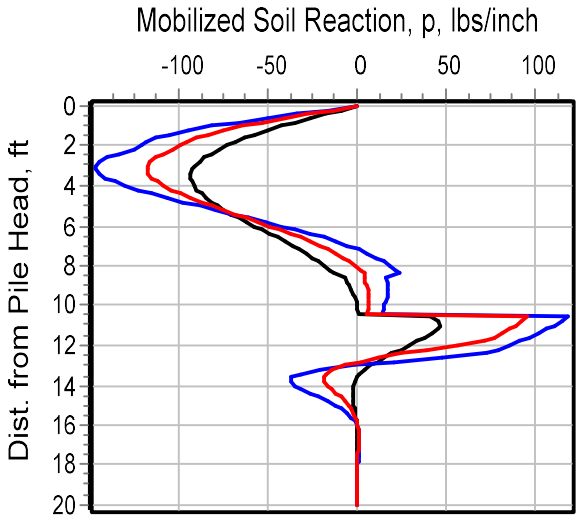

Deflection, inches
0
0.02
0.04
0.06
0.08
0.1
0.12
Dist. from Pile Head, ft
0
2
4
6
8
10
12
14
16
18
20


Bending Moment, in-kips
-100
0
100
Dist. from Pile Head, ft
0
2
4
6
8
10
12
14
16
18
20


Shear Force, kips
-2
0
2
4
Dist. from Pile Head, ft
0
2
4
6
8
10
12
14
16
18
20


1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Moment, in-kips
0.0
0.0005
Curvature, radians/inch


Mobilized EI, kip-in²
0
2,000,000
4,000,000
Dist. from Pile Head, ft
0
2
4
6
8
10
12
14
16
18
20


Mobilized Soil Reaction, p, lbs/inch
-100
-50
0
50
100
Dist. from Pile Head, ft
0
2
4
6
8
10
12
14
16
18
20

```
================================================================================

                    LPile for Windows, Version 2022-12.010

                Analysis of Individual Piles and Drilled Shafts
              Subjected to Lateral Loading Using the p-y Method
                          © 1985-2022 by Ensoft, Inc.
                              All Rights Reserved

================================================================================

This copy of LPile is being used by:

Gerhart Cole
Midvale, UT


Serial Number of Security Device: 293782100

This copy of LPile is licensed for exclusive use by:

Gerhart Cole Inc, Draper, Utah

Use of this software by employees of Gerhart Cole Inc
other than those of the office site in Draper, Utah
is a violation of the software license agreement.

--------------------------------------------------------------------------------
                             Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:
\PROJECTS\HDR\22-1474 14600 South SES\Analyses\Micropiles\

Name of input data file:
14600S_9.625x0.395-in_5000lb.lp12d

Name of output report file:
14600S_9.625x0.395-in_5000lb.lp12o

Name of plot output file:
14600S_9.625x0.395-in_5000lb.lp12p

Name of runtime message file:
14600S_9.625x0.395-in_5000lb.lp12r



--------------------------------------------------------------------------------
                           Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  September 19, 2024          Time:  10:34:08



--------------------------------------------------------------------------------
                                  Problem Title
--------------------------------------------------------------------------------

Project Name: 14600 South


Job Number: 22-1474a


Client:


Engineer:


Description:




--------------------------------------------------------------------------------
                         Program Options and Settings
--------------------------------------------------------------------------------
```

Computational Options:
 - Conventional Analysis
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:
 - Maximum number of iterations allowed = 500
 - Deflection tolerance for convergence = 1.0000E-05 in
 - Maximum allowable deflection = 100.0000 in
 - Number of pile increments = 100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - Analysis uses layering correction (Method of Georgiadis)
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Input of moment resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 2
Total length of pile = 20.000 ft
Depth of ground surface below top of pile = 0.0000 ft

Pile diameters used for p-y curve computations are defined using 4 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	9.6250
2	13.000	9.6250
3	13.000	9.6250
4	20.000	9.6250

Input Structural Properties for Pile Sections:

Pile Section No. 1:

   Section 1 is a drilled shaft with casing and pipe core
   Length of section = 13.000000 ft
   Section Diameter = 9.625000 in
   Eq. Diameter = 9.625000 in

Pile Section No. 2:

   Section 2 is a round drilled shaft, bored pile, or CIDH pile
   Length of section = 7.000000 ft
   Shaft Diameter = 9.625000 in
   Eq. Diameter = 9.625000 in

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by API RP-2A, 1987

Distance from top of pile to top of layer	=	0.0000 ft
Distance from top of pile to bottom of layer	=	8.500000 ft
Effective unit weight at top of layer	=	125.000000 pcf
Effective unit weight at bottom of layer	=	125.000000 pcf
Friction angle at top of layer	=	33.000000 deg.
Friction angle at bottom of layer	=	33.000000 deg.
Subgrade k at top of layer	=	95.000000 pci
Subgrade k at bottom of layer	=	95.000000 pci

Layer 2 is sand, p-y criteria by API RP-2A, 1987

Distance from top of pile to top of layer	=	8.500000 ft
Distance from top of pile to bottom of layer	=	10.500000 ft
Effective unit weight at top of layer	=	62.600000 pcf
Effective unit weight at bottom of layer	=	62.600000 pcf
Friction angle at top of layer	=	33.000000 deg.
Friction angle at bottom of layer	=	33.000000 deg.
Subgrade k at top of layer	=	60.000000 pci
Subgrade k at bottom of layer	=	60.000000 pci

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer	=	10.500000 ft
Distance from top of pile to bottom of layer	=	23.000000 ft
Effective unit weight at top of layer	=	57.600000 pcf
Effective unit weight at bottom of layer	=	57.600000 pcf
Undrained cohesion at top of layer	=	1250. psf
Undrained cohesion at bottom of layer	=	1250. psf
Epsilon-50 at top of layer	=	0.007000
Epsilon-50 at bottom of layer	=	0.007000

(Depth of the lowest soil layer extends 3.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Cohesion psf	Angle of Friction deg.	E50 or krm	kpy pci
1	API Sand	0.00 8.5000	125.0000 125.0000	-- --	33.0000 33.0000	-- --	95.0000 95.0000
2	API Sand	8.5000 10.5000	62.6000 62.6000	-- --	33.0000 33.0000	-- --	60.0000 60.0000
3	Stiff Clay w/o Free Water	10.5000 23.0000	57.6000 57.6000	1250. 1250.	-- --	0.00700 0.00700	-- --

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 3

Load Analysis No.	Load Type	Condition 1		Condition 2		Axial Thrust Force, lbs	Compute Top y vs. Pile Length	Run
1	2	V =	5000. lbs	S =	0.0000 in/in	92000.	No	Yes
2	1	V =	5000. lbs	M =	0.0000 in-lbs	92000.	No	Yes
3	1	V =	5000. lbs	M =	-81562. in-lbs	92000.	No	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with
specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 2

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile) with Casing and Pipe Core:

Length of Section	=	13.000000 ft
Outside Diameter of Casing	=	9.625000 in
Concrete Cover Thickness Inside Casing	=	3.000000 in
Casing Wall Thickness	=	0.395000 in
Moment of Inertia of Steel Casing	=	122.195929 in^4
Outside Diameter of Core	=	0.0000 in
Core Wall Thickness	=	0.0000 in
Moment of Inertia of Steel Core/Insert	=	0.0000 in^4
Yield Stress of Casing	=	50000. psi
Elastic Modulus of Casing	=	29000000. psi
Yield Stress of Core/Insert	=	75000. psi
Elastic Modulus of Core/Insert	=	29000000. psi
Number of Reinforcing Bars	=	1 bar
Area of Single Reinforcing Bar	=	1.270000 sq. in.
Area of All Reinforcing Bars	=	1.270000 sq. in.
Maximum Concrete Aggregate Size	=	0.750000 in
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in
Yield Stress of Reinforcing Bars	=	75000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Pile	=	72.759777 sq. in.
Area of Concrete	=	60.036001 sq. in.
Cross-sectional Area of Steel Casing	=	11.453776 sq. in.
Cross-sectional Area of Steel Core/Insert	=	0.0000 sq. in.
Area of All Steel (Casing, Core/Insert, and Bars)	=	12.723776 sq. in.
Area Ratio of All Steel to Gross Area	=	17.49 percent

Note that the core is assumed to be filled with concrete.

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	872.061 kips
Tensile Load for Cracking of Concrete	=	-67.540 kips
Nominal Axial Tensile Capacity	=	-667.939 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.270000	0.00000	0.00000

NOTE: The positions of the above rebars were computed by LPile

Concrete Properties:

Compressive Strength of Concrete	=	4000. psi
Modulus of Elasticity of Concrete	=	3604997. psi
Modulus of Rupture of Concrete	=	-474.34165 psi
Compression Strain at Peak Stress	=	0.001886
Tensile Strain at Fracture of Concrete	=	-0.0001154

Maximum Coarse Aggregate Size = 0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	92.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318-14, Section 21.2.3.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 92.000 kips

Bending Max Casing Stress rad/in. ksi	Bending Max Core Stress in-kip ksi	Run Msg	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi
0.00000125	5.8896854		4711748.	124.7823874	0.0001560	0.0001439	0.6339441	4.3715873
4.5216170	0.00000							
0.00000250	11.7832175		4713287.	64.7985097	0.0001620	0.0001379	0.6570850	4.3943435
4.6944029	0.00000							
0.00000375	17.6767407		4713798.	44.8043481	0.0001680	0.0001319	0.6801527	4.4171502
4.8672393	0.00000							
0.00000500	23.5702506		4714050.	34.8076155	0.0001740	0.0001259	0.7031472	4.4400074
5.0401261	0.00000							
0.00000625	29.4637428		4714199.	28.8098545	0.0001801	0.0001199	0.7260685	4.4629150
5.2130635	0.00000							
0.00000750	35.3572130		4714295.	24.8115793	0.0001861	0.0001139	0.7489166	4.4858732
5.3860513	0.00000							
0.00000875	41.2506567		4714361.	21.9558674	0.0001921	0.0001079	0.7716912	4.5088818
5.5590897	0.00000							
0.00001000	47.1440695		4714407.	19.8142576	0.0001981	0.0001019	0.7943924	4.5319410
5.7321785	0.00000							
0.00001125	53.0374470		4714440.	18.1487158	0.0002042	0.00009589	0.8170201	4.5550506
5.9053178	0.00000							
0.00001250	58.9307849		4714463.	16.8164217	0.0002102	0.00008989	0.8395742	4.5782107
6.0785076	0.00000							
0.00001375	64.8240788		4714478.	15.7264895	0.0002162	0.00008390	0.8620547	4.6014213
6.2517479	0.00000							
0.00001500	70.7173243		4714488.	14.8183287	0.0002223	0.00007790	0.8844614	4.6246824
6.4250387	0.00000							
0.00001625	76.6105169		4714493.	14.0499921	0.0002283	0.00007191	0.9067944	4.6479940
6.5983799	0.00000							
0.00001750	82.5036524		4714494.	13.3915174	0.0002344	0.00006591	0.9290535	4.6713561
6.7717717	0.00000							
0.00001875	88.3967263		4714492.	12.8209322	0.0002404	0.00005992	0.9512386	4.6947687
6.9452140	0.00000							
0.00002000	94.2897341		4714487.	12.3217572	0.0002464	0.00005394	0.9733498	4.7182317
7.1187067	0.00000							
0.00002125	100.1826717		4714479.	11.8813906	0.0002525	0.00004795	0.9953869	4.7417453
7.2922500	0.00000							
0.00002250	106.0755344		4714468.	11.4900310	0.0002585	0.00004196	1.0173498	4.7653094
7.4658437	0.00000							
0.00002375	111.9683180		4714455.	11.1399405	0.0002646	0.00003598	1.0392386	4.7889239
7.6394880	0.00000							
0.00002500	117.8610181		4714441.	10.8236154	0.0002706	0.00002997	1.0610530	4.8125890
7.8131827	0.00000							
0.00002625	123.7536302		4714424.	10.5387923	0.0002766	0.00002399	1.0827931	4.8363046
7.9869280	0.00000							
0.00002750	129.6461501		4714405.	10.2799244	0.0002827	0.00001801	1.1044588	4.8600706

8.1607237	0.00000						
0.00002875	135.5385732	4714385.	10.0436260	0.0002888	0.00001204	1.1260499	4.8838872
8.3345700	0.00000						
0.00003000	141.4308952	4714363.	9.8270761	0.0002948	0.00000606	1.1475665	4.9077543
8.5084668	0.00000						
0.00003125	147.3231116	4714340.	9.6279048	0.0003009	9.07740E-08	1.1690085	4.9316718
8.6824140	0.00000						
0.00003250	153.2152183	4714314.	9.4441068	0.0003069	-0.00000588	1.1903758	4.9556399
8.8564118	0.00000						
0.00003375	159.1072106	4714288.	9.2739741	0.0003130	-0.00001185	1.2116683	4.9796585
9.0304601	0.00000						
0.00003500	164.9990775	4714259.	9.1160423	0.0003191	-0.00001781	1.2328859	5.0037276
9.2045588	0.00000						
0.00003625	170.8907273	4714227.	8.9690490	0.0003251	-0.00002378	1.2540285	5.0278461
9.3787070	0.00000						
0.00003750	176.7819688	4714186.	8.8318993	0.0003312	-0.00002974	1.2750958	5.0520119
9.5529025	0.00000						
0.00003875	182.6725913	4714131.	8.7036392	0.0003373	-0.00003570	1.2960873	5.0762225
9.7271428	0.00000						
0.00004000	188.5623771	4714059.	8.5834323	0.0003433	-0.00004166	1.3170027	5.1004754
9.9014254	0.00000						
0.00004125	194.4511220	4713967.	8.4705428	0.0003494	-0.00004762	1.3378416	5.1247679
10.0757476	0.00000						
0.00004250	200.3386371	4713850.	8.3643228	0.0003555	-0.00005358	1.3586037	5.1490978
10.2501071	0.00000						
0.00004375	206.2247485	4713709.	8.2641989	0.0003616	-0.00005954	1.3792886	5.1734625
10.4245016	0.00000						
0.00004500	212.1092979	4713540.	8.1696606	0.0003676	-0.00006549	1.3998961	5.1978601
10.5989288	0.00000						
0.00004625	217.9921419	4713344.	8.0802540	0.0003737	-0.00007144	1.4204259	5.2222884
10.7733868	0.00000						
0.00004750	223.8731514	4713119.	7.9955726	0.0003798	-0.00007740	1.4408777	5.2467456
10.9478737	0.00000						
0.00004875	229.7522093	4712866.	7.9152517	0.0003859	-0.00008335	1.4612513	5.2712300
11.1223878	0.00000						
0.00005125	241.5040557	4712274.	7.7664109	0.0003980	-0.00009525	1.5017628	5.3202740
11.4714911	0.00000						
0.00005375	253.2469712	4711572.	7.6314697	0.0004102	-0.000107	1.5419590	5.3694091
11.8206856	0.00000						
0.00005625	259.6527219	4616048.	7.4651159	0.0004199	-0.000121	1.5737598	5.3476395
12.0989754	0.00000 C						
0.00005875	270.2682132	4600310.	7.3451281	0.0004315	-0.000134	1.6115736	5.3808739
12.4322692	0.00000 C						
0.00006125	280.8154182	4584742.	7.2343122	0.0004431	-0.000146	1.6489672	5.4130105
12.7644652	0.00000 C						
0.00006375	291.3029394	4569458.	7.1316568	0.0004546	-0.000159	1.6859567	5.4441656
13.0956796	0.00000 C						
0.00006625	301.7367241	4554517.	7.0362778	0.0004662	-0.000172	1.7225530	5.4744153
13.4259888	0.00000 C						
0.00006875	312.1226256	4539965.	6.9474235	0.0004776	-0.000184	1.7587677	5.5038437
13.7554765	0.00000 C						
0.00007125	322.4663446	4525843.	6.8644512	0.0004891	-0.000197	1.7946128	5.5325419
14.0842341	0.00000 C						
0.00007375	332.7727511	4512173.	6.7867899	0.0005005	-0.000209	1.8300993	5.5605933
14.4123449	0.00000 C						
0.00007625	343.0359086	4498832.	6.7138605	0.0005119	-0.000222	1.8652098	5.5878194
14.7396304	0.00000 C						
0.00007875	353.2701411	4485970.	6.6453476	0.0005233	-0.000235	1.8999800	5.6145371
15.0664074	0.00000 C						
0.00008125	363.4803696	4473605.	6.5808740	0.0005347	-0.000247	1.9344234	5.6408604
15.3927900	0.00000 C						
0.00008375	373.6584597	4461594.	6.5199847	0.0005460	-0.000260	1.9685166	5.6665570
15.7185461	0.00000 C						
0.00008625	383.8129111	4450005.	6.4624671	0.0005574	-0.000273	2.0022818	5.6918250
16.0438735	0.00000 C						
0.00008875	393.9503561	4438877.	6.4080670	0.0005687	-0.000286	2.0357388	5.7168476
16.3689554	0.00000 C						
0.00009125	404.0581298	4428034.	6.3564440	0.0005800	-0.000298	2.0688488	5.7412346
16.6934018	0.00000 C						
0.00009375	414.1573768	4417679.	6.3075403	0.0005913	-0.000311	2.1016756	5.7656040
17.0178306	0.00000 C						
0.00009625	424.2270140	4407553.	6.2609587	0.0006026	-0.000324	2.1341533	5.7892966
17.3415825	0.00000 C						
0.00009875	434.2904843	4397878.	6.2167305	0.0006139	-0.000337	2.1663555	5.8130364
17.6653817	0.00000 C						
0.0001013	444.3298836	4388443.	6.1745206	0.0006252	-0.000349	2.1982241	5.8362333
17.9886380	0.00000 C						
0.0001038	454.3599590	4379373.	6.1343077	0.0006364	-0.000362	2.2298074	5.8593696
18.3118336	0.00000 C						
0.0001063	464.3762963	4370600.	6.0959317	0.0006477	-0.000375	2.2610899	5.8822813
18.6348047	0.00000 C						

0.0001088	474.3753057	4362072.	6.0591909	0.0006589	-0.000388	2.2920599	5.9048424
18.9574252	0.00000 C						
0.0001113	484.3699412	4353887.	6.0241412	0.0006702	-0.000401	2.3227612	5.9275041
19.2801463	0.00000 C						
0.0001138	494.3451675	4345892.	5.9904981	0.0006814	-0.000413	2.3531410	5.9497074
19.6024090	0.00000 C						
0.0001163	504.3110000	4338159.	5.9582665	0.0006926	-0.000426	2.3832351	5.9718236
19.9245846	0.00000 C						
0.0001188	514.2724508	4330715.	5.9274255	0.0007039	-0.000439	2.4130608	5.9940394
20.2468597	0.00000 C						
0.0001213	524.2164620	4323435.	5.8977402	0.0007151	-0.000452	2.4425705	6.0158344
20.5687141	0.00000 C						
0.0001238	534.1513021	4316374.	5.8692216	0.0007263	-0.000465	2.4717949	6.0375370
20.8904761	0.00000 C						
0.0001263	544.0817564	4309558.	5.8418627	0.0007375	-0.000478	2.5007513	6.0593383
21.2123367	0.00000 C						
0.0001288	554.0032471	4302938.	5.8155437	0.0007488	-0.000490	2.5294221	6.0810421
21.5340999	0.00000 C						
0.0001313	563.9091987	4296451.	5.7901204	0.0007600	-0.000503	2.5577826	6.1023652
21.8554824	0.00000 C						
0.0001338	573.8107636	4290174.	5.7656761	0.0007712	-0.000516	2.5858756	6.1237862
22.1769628	0.00000 C						
0.0001363	583.7079348	4284095.	5.7421537	0.0007824	-0.000529	2.6137007	6.1453053
22.4985413	0.00000 C						
0.0001388	593.5961947	4278171.	5.7194534	0.0007936	-0.000542	2.6412397	6.1667127
22.8200080	0.00000 C						
0.0001413	603.4708817	4272360.	5.6974717	0.0008048	-0.000555	2.6684747	6.1877905
23.1411452	0.00000 C						
0.0001438	613.3411764	4266721.	5.6762801	0.0008160	-0.000568	2.6954421	6.2089658
23.4623798	0.00000 C						
0.0001463	623.2070721	4261245.	5.6558361	0.0008272	-0.000580	2.7221417	6.2302388
23.7837122	0.00000 C						
0.0001488	633.0685618	4255923.	5.6361019	0.0008384	-0.000593	2.7485733	6.2516095
24.1051423	0.00000 C						
0.0001588	672.4267901	4235759.	5.5631104	0.0008831	-0.000645	2.8514397	6.3358489
25.3896192	0.00000 C						
0.0001688	711.6885650	4217414.	5.4987968	0.0009279	-0.000696	2.9499052	6.4202213
26.6742291	0.00000 C						
0.0001788	750.8623844	4200629.	5.4417958	0.0009727	-0.000748	3.0440014	6.5051910
27.9594363	0.00000 C						
0.0001888	789.9354969	4185089.	5.3907818	0.0010175	-0.000799	3.1336626	6.5898817
29.2443645	0.00000 C						
0.0001988	828.9352353	4170743.	5.3451509	0.0010623	-0.000851	3.2190026	6.6760104
30.5307308	0.00000 C						
0.0002088	867.8411179	4157323.	5.3038929	0.0011072	-0.000902	3.2999190	6.7621455
31.8171033	0.00000 C						
0.0002188	906.6734705	4144793.	5.2666373	0.0011521	-0.000953	3.3764957	6.8497414
33.1049367	0.00000 C						
0.0002288	945.4266502	4133013.	5.2327938	0.0011970	-0.001005	3.4486940	6.9383636
34.3937964	0.00000 C						
0.0002388	984.0964207	4121870.	5.2018876	0.0012420	-0.001056	3.5164871	7.0276935
35.6833638	0.00000 C						
0.0002488	1023.	4111331.	5.1736910	0.0012870	-0.001107	3.5799111	7.1186442
36.9745520	0.00000 C						
0.0002588	1061.	4101321.	5.1478813	0.0013320	-0.001158	3.6389462	7.2111516
38.2672969	0.00000 C						
0.0002688	1100.	4091737.	5.1240514	0.0013771	-0.001210	3.6935319	7.3041191
39.5605019	0.00000 C						
0.0002788	1138.	4082576.	5.1021361	0.0014222	-0.001261	3.7437078	7.3987421
40.8553624	0.00000 C						
0.0002888	1176.	4073793.	5.0819377	0.0014674	-0.001312	3.7894569	7.4950315
42.1518894	0.00000 C						
0.0002988	1215.	4065349.	5.0632851	0.0015127	-0.001363	3.8307624	7.5929991
43.4500944	0.00000 C						
0.0003088	1253.	4057196.	5.0459812	0.0015579	-0.001414	3.8675955	7.6922230
44.7495558	0.00000 C						
0.0003188	1291.	4049303.	5.0298828	0.0016033	-0.001465	3.8999397	7.7925542
46.0501245	0.00000 C						
0.0003288	1329.	4041660.	5.0149439	0.0016487	-0.001516	3.9277954	7.8946031
47.3524109	0.00000 C						
0.0003388	1367.	4034243.	5.0010632	0.0016941	-0.001566	3.9511449	7.9983823
48.6564276	0.00000 C						
0.0003488	1404.	4027031.	4.9881508	0.0017396	-0.001617	3.9699702	8.1039041
49.9621869	0.00000 C						
0.0003588	1441.	4017238.	4.9774919	0.0017857	-0.001667	3.9843833	8.2253814
50.0000000	0.00000 CY						
0.0003688	1476.	4002917.	4.9700308	0.0018327	-0.001717	3.9942819	8.3748719
50.0000000	0.00000 CY						
0.0003788	1508.	3982272.	4.9656877	0.0018808	-0.001765	3.9993662	8.5542847
50.0000000	0.00000 CY						
0.0003888	1537.	3953613.	4.9627454	0.0019293	-0.001812	3.9998062	8.7469690

50.0000000	0.00000 CY						
0.0003988	1562.	3917249.	4.9595410	0.0019776	-0.001860	3.9999762	8.9349174
50.0000000	0.00000 CY						
0.0004088	1584.	3874169.	4.9547844	0.0020253	-0.001909	3.9995925	9.1026077
50.0000000	0.00000 CY						
0.0004188	1603.	3827092.	4.9492046	0.0020725	-0.001958	3.9985858	9.2575411
50.0000000	0.00000 CY						
0.0004288	1620.	3777700.	4.9433165	0.0021194	-0.002007	3.9986181	9.4054057
50.0000000	0.00000 CY						
0.0004388	1635.	3726877.	4.9373339	0.0021663	-0.002057	3.9984826	9.5486522
50.0000000	0.00000 CY						
0.0004488	1649.	3675160.	4.9314495	0.0022130	-0.002106	3.9991297	9.6897078
50.0000000	0.00000 CY						
0.0004588	1662.	3623152.	4.9256183	0.0022596	-0.002156	3.9999957	9.8280575
50.0000000	0.00000 CY						
0.0004688	1674.	3571213.	4.9198706	0.0023062	-0.002206	3.9999150	9.9641597
50.0000000	0.00000 CY						
0.0004788	1685.	3519629.	4.9142192	0.0023527	-0.002255	3.9996586	10.0982653
50.0000000	0.00000 CY						
0.0004888	1695.	3468265.	4.9086590	0.0023991	-0.002305	3.9991092	10.2303871
50.0000000	0.00000 CY						
0.0004988	1704.	3417450.	4.9033222	0.0024455	-0.002355	3.9981288	10.3625141
50.0000000	0.00000 CY						
0.0005088	1713.	3367504.	4.8980897	0.0024919	-0.002405	3.9999531	10.4930845
50.0000000	0.00000 CY						
0.0005188	1721.	3318350.	4.8931779	0.0025383	-0.002455	3.9994566	10.6254444
50.0000000	0.00000 CY						
0.0005288	1729.	3269918.	4.8883849	0.0025847	-0.002504	3.9982482	10.7567795
50.0000000	0.00000 CY						
0.0005388	1736.	3222463.	4.8835405	0.0026310	-0.002554	3.9999424	10.8845286
50.0000000	0.00000 CY						
0.0005488	1743.	3175830.	4.8792664	0.0026775	-0.002604	3.9991535	11.0185453
50.0000000	0.00000 CY						
0.0006088	1775.	2915879.	4.8556661	0.0029559	-0.002903	3.9997688	11.8066725
50.0000000	0.00000 CY						
0.0006688	1798.	2688524.	4.8368906	0.0032347	-0.003202	3.9985836	12.6062415
50.0000000	0.00000 CY						
0.0007288	1815.	2490034.	4.8224813	0.0035144	-0.003500	3.9995400	13.4327465
50.0000000	0.00000 CY						
0.0007888	1827.	2316212.	4.8114770	0.0037951	-0.003797	3.9991740	-14.333790
50.0000000	0.00000 CY						
0.0008488	1836.	2163343.	4.8030424	0.0040766	-0.004093	3.9964467	-15.631648
50.0000000	0.00000 CY						

Summary of Results for Nominal Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain	Max. Tens. Strain
1	92.000	1778.666	0.00300000	-0.00295060

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.75).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318,
or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial Load No.	Resist. Factor	Nominal Ax. Thrust kips	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	92.000000	1779.	59.800000	1156.	4078421.
1	0.75	92.000000	1779.	69.000000	1334.	4040622.
1	0.90	92.000000	1779.	82.800000	1601.	3831533.

Pile Section No. 2:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	7.000000 ft
Shaft Diameter	=	9.625000 in
Concrete Cover Thickness (to edge of long. rebar)	=	3.000000 in
Number of Reinforcing Bars	=	1 bar
Yield Stress of Reinforcing Bars	=	75000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	72.759777 sq. in.
Total Area of Reinforcing Steel	=	1.270000 sq. in.
Area Ratio of Steel Reinforcement	=	1.75 percent
Maximum Concrete Aggregate Size	=	0.750000 in
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	338.315 kips
Tensile Load for Cracking of Concrete	=	-33.982 kips
Nominal Axial Tensile Capacity	=	-95.250 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.270000	0.00000	0.00000

NOTE: The positions of the above rebars were computed by LPile

Concrete Properties:

Compressive Strength of Concrete	=	4000. psi
Modulus of Elasticity of Concrete	=	3604997. psi
Modulus of Rupture of Concrete	=	-474.34165 psi
Compression Strain at Peak Stress	=	0.001886
Tensile Strain at Fracture of Concrete	=	-0.0001154
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	92.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318-14, Section 21.2.3.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 92.000 kips

Run Msg	Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi

0.00000125	1.8862654	1509012.	237.2244863	0.0002965	0.0002845	1.1585692	8.4476134
0.00000250	3.7800207	1512008.	121.0215646	0.0003026	0.0002785	1.1798449	8.4705150
0.00000375	5.6737397	1512997.	82.2886026	0.0003086	0.0002725	1.2010586	8.4935628
0.00000500	7.5674046	1513481.	62.9231306	0.0003146	0.0002665	1.2222100	8.5167570
0.00000625	9.4609974	1513760.	51.3046546	0.0003207	0.0002605	1.2432990	8.5400975
0.00000750	11.3545003	1513933.	43.5596766	0.0003267	0.0002545	1.2643253	8.5635843
0.00000875	13.2478953	1514045.	38.0281261	0.0003327	0.0002485	1.2852887	8.5872174
0.00001000	15.1411644	1514116.	33.8799678	0.0003388	0.0002425	1.3061891	8.6109969
0.00001125	17.0342898	1514159.	30.6540710	0.0003449	0.0002366	1.3270262	8.6349227
0.00001250	18.9272535	1514180.	28.0737572	0.0003509	0.0002306	1.3477998	8.6589948
0.00001375	20.8200376	1514185.	25.9629585	0.0003570	0.0002246	1.3685098	8.6832133
0.00001500	22.7126242	1514175.	24.2042960	0.0003631	0.0002187	1.3891558	8.7075781
0.00001625	24.6049953	1514154.	22.7165076	0.0003691	0.0002127	1.4097378	8.7320894
0.00001750	26.4971331	1514122.	21.4415488	0.0003752	0.0002068	1.4302555	8.7567470
0.00001875	28.3890195	1514081.	20.3368539	0.0003813	0.0002008	1.4507087	8.7815510
0.00002000	30.2806366	1514032.	19.3704983	0.0003874	0.0001949	1.4710972	8.8065015
0.00002125	32.1719665	1513975.	18.5180692	0.0003935	0.0001890	1.4914209	8.8315984
0.00002250	34.0629913	1513911.	17.7605789	0.0003996	0.0001831	1.5116794	8.8568418
0.00002375	35.9536929	1513840.	17.0830372	0.0004057	0.0001771	1.5318726	8.8822317
0.00002500	37.8440534	1513762.	16.4734517	0.0004118	0.0001712	1.5520003	8.9077682
0.00002625	39.7340549	1513678.	15.9221145	0.0004180	0.0001653	1.5720623	8.9334511
0.00002750	41.6236793	1513588.	15.4210826	0.0004241	0.0001594	1.5920584	8.9592806
0.00002875	43.5129088	1513492.	14.9637945	0.0004302	0.0001535	1.6119883	8.9852567
0.00003000	45.4017253	1513391.	14.5447823	0.0004363	0.0001476	1.6318520	9.0113794
0.00003125	47.2901109	1513284.	14.1594529	0.0004425	0.0001417	1.6516491	9.0376488
0.00003250	49.1780475	1513171.	13.8039198	0.0004486	0.0001358	1.6713794	9.0640648
0.00003375	51.0655172	1513052.	13.4748724	0.0004548	0.0001299	1.6910429	9.0906276
0.00003500	52.9525020	1512929.	13.1694730	0.0004609	0.0001241	1.7106392	9.1173371
0.00003625	54.8389838	1512800.	12.8852752	0.0004671	0.0001182	1.7301682	9.1441933
0.00003750	56.7249446	1512665.	12.6201589	0.0004733	0.0001123	1.7496296	9.1711964
0.00003875	58.6103665	1512526.	12.3722776	0.0004794	0.0001065	1.7690233	9.1983463
0.00004000	60.4952313	1512381.	12.1400155	0.0004856	0.0001006	1.7883490	9.2256431
0.00004125	62.3795210	1512231.	11.9219527	0.0004918	0.00009475	1.8076065	9.2530868
0.00004250	64.2632177	1512076.	11.7168363	0.0004980	0.00008890	1.8267957	9.2806775
0.00004375	66.1463032	1511916.	11.5235568	0.0005042	0.00008306	1.8459163	9.3084151
0.00004500	68.0287594	1511750.	11.3411277	0.0005104	0.00007723	1.8649681	9.3362998
0.00004625	69.9105683	1511580.	11.1686692	0.0005166	0.00007139	1.8839510	9.3643316
0.00004750	71.7917119	1511404.	11.0053944	0.0005228	0.00006557	1.9028647	9.3925106
0.00004875	73.6721720	1511224.	10.8505967	0.0005290	0.00005975	1.9217089	9.4208367

0.00005125	77.4309693	1510848.	10.5639518	0.0005414	0.00004812	1.9591885	9.4779306
0.00005375	81.1868154	1510452.	10.3043497	0.0005539	0.00003652	1.9963880	9.5356138
0.00005625	84.9395651	1510037.	10.0681848	0.0005663	0.00002493	2.0333058	9.5938867
0.00005875	88.6890732	1509601.	9.8524654	0.0005788	0.00001336	2.0699403	9.6527498
0.00006125	92.4351943	1509146.	9.6546882	0.0005913	0.00000182	2.1062898	9.7122034
0.00006375	96.1777265	1508670.	9.4727421	0.0006039	-0.00000971	2.1423526	9.7722469
0.00006625	99.9159003	1508165.	9.3048278	0.0006164	-0.00002121	2.1781255	9.8328669
0.00006875	103.6484669	1507614.	9.1494021	0.0006290	-0.00003270	2.2136046	9.8940386
0.00007125	107.3740718	1507005.	9.0051368	0.0006416	-0.00004417	2.2487855	9.9557336
0.00007375	111.0914323	1506325.	8.8708837	0.0006542	-0.00005562	2.2836639	10.0179238
0.00007625	114.7993351	1505565.	8.7456456	0.0006669	-0.00006705	2.3182358	10.0805818
0.00007875	118.4967063	1504720.	8.6285531	0.0006795	-0.00007847	2.3524976	10.1436825
0.00008125	122.1825714	1503785.	8.5188442	0.0006922	-0.00008988	2.3864457	10.2072026
0.00008375	125.8560539	1502759.	8.4158487	0.0007048	-0.000101	2.4200769	10.2711202
0.00008625	129.5163775	1501639.	8.3189752	0.0007175	-0.000113	2.4533883	10.3354158
0.00008875	129.5163775	1459339.	8.1689648	0.0007250	-0.000129	2.4727557	10.2489992
0.00009125	129.7506122	1421925.	8.0729119	0.0007367	-0.000142	2.5028328	10.2834254
0.00009375	132.1841578	1409964.	7.9811189	0.0007482	-0.000154	2.5324113	10.3156010
0.00009625	134.5353718	1397770.	7.8933188	0.0007597	-0.000167	2.5615049	10.3456106
0.00009875	136.8097131	1385415.	7.8092449	0.0007712	-0.000179	2.5901284	10.3735612
0.0001013	139.0128016	1372966.	7.7286639	0.0007825	-0.000192	2.6182978	10.3995764
0.0001038	141.1503830	1360486.	7.6513712	0.0007938	-0.000205	2.6460309	10.4238031
0.0001063	143.2055914	1347817.	7.5769025	0.0008050	-0.000218	2.6732715	10.4455213
0.0001088	145.2023779	1335194.	7.5053237	0.0008162	-0.000231	2.7000950	10.4655570
0.0001113	147.1471942	1322671.	7.4365047	0.0008273	-0.000243	2.7265229	10.4841175
0.0001138	149.0379353	1310224.	7.3702259	0.0008384	-0.000256	2.7525488	10.5010788
0.0001163	150.8595335	1297716.	7.3061138	0.0008493	-0.000270	2.7781194	10.5157320
0.0001188	152.6430001	1285415.	7.2443932	0.0008603	-0.000283	2.8033406	10.5293275
0.0001213	154.3773833	1273216.	7.1847758	0.0008712	-0.000296	2.8281757	10.5413684
0.0001238	156.0556279	1261056.	7.1270238	0.0008820	-0.000309	2.8525977	10.5514593
0.0001263	157.7094569	1249184.	7.0714120	0.0008928	-0.000322	2.8767207	10.5610113
0.0001288	159.2961753	1237252.	7.0172722	0.0009035	-0.000336	2.9003906	10.5679956
0.0001313	160.8627341	1225621.	6.9650870	0.0009142	-0.000349	2.9237773	10.5745699
0.0001338	162.3770456	1214034.	6.9143432	0.0009248	-0.000363	2.9467642	10.5791667
0.0001363	163.8663357	1202689.	6.8652843	0.0009354	-0.000376	2.9694512	10.5830650
0.0001388	165.3106239	1191428.	6.8175662	0.0009459	-0.000390	2.9917649	10.5852443
0.0001413	166.7325198	1180407.	6.7713868	0.0009565	-0.000403	3.0137896	10.5868066
0.0001438	168.1091947	1169455.	6.7263748	0.0009669	-0.000417	3.0354397	10.5865400
0.0001463	169.4734053	1158793.	6.6828726	0.0009774	-0.000430	3.0568408	10.5861500
0.0001488	170.7849063	1148134.	6.6402887	0.0009877	-0.000444	3.0778370	10.5834138
0.0001588	175.8152423	1107498.	6.4817774	0.0010290	-0.000499	3.1589964	10.5655749

```
C
      0.0001688   180.4436336      1069296.     6.3390698     0.0010697     -0.000555     3.2354315     10.5323035
C
      0.0001788   184.7600990      1033623.     6.2099466     0.0011100     -0.000610     3.3075357     10.4876889
C
      0.0001888   188.7613140      1000060.     6.0922360     0.0011499     -0.000667     3.3753200     10.4301018
C
      0.0001988   192.5135561       968622.     5.9848366     0.0011895     -0.000723     3.4390927     10.3630014
C
      0.0002088   196.0438720       939132.     5.8862296     0.0012288     -0.000780     3.4989963     10.2874686
C
      0.0002188   199.3755361       911431.     5.7954695     0.0012678     -0.000838     3.5551564     10.2045218
C
      0.0002288   202.5308131       885381.     5.7117037     0.0013066     -0.000895     3.6076932     10.1153327
C
      0.0002388   205.5249327       860837.     5.6341153     0.0013451     -0.000953     3.6566943     10.0206488
C
      0.0002488   208.3494559       837586.     5.5618332     0.0013835     -0.001011     3.7021428      9.9188258
C
      0.0002588   211.0485616       815647.     5.4946994     0.0014218     -0.001069     3.7442450      9.8137380
C
      0.0002688   213.6406787       794942.     5.4323843     0.0014600     -0.001127     3.7830909      9.7071892
C
      0.0002788   216.0898242       775210.     5.3737582     0.0014979     -0.001185     3.8185487      9.5945331
C
      0.0002888   218.4511364       756541.     5.3192033     0.0015359     -0.001243     3.8508441      9.4818765
C
      0.0002988   220.7110080       738782.     5.2680950     0.0015738     -0.001302     3.8799322      9.3674466
C
      0.0003088   222.8791004       721876.     5.2201926     0.0016117     -0.001360     3.9058474      9.2520839
C
      0.0003188   224.9608665       705760.     5.1752741     0.0016496     -0.001418     3.9286121      9.1365246
C
      0.0003288   226.9654894       690389.     5.1331798     0.0016875     -0.001477     3.9482459      9.0218391
C
      0.0003388   228.8787253       675657.     5.0934339     0.0017254     -0.001535     3.9647105      8.9058032
C
      0.0003488   230.7392937       661618.     5.0564469     0.0017634     -0.001593     3.9780851      8.7946318
C
      0.0003588   232.4975100       648077.     5.0211653     0.0018013     -0.001652     3.9882594      8.6797478
C
      0.0003688   234.1974963       635112.     4.9881802     0.0018394     -0.001710     3.9953047      8.5689584
C
      0.0003788   235.8431689       622688.     4.9573994     0.0018776     -0.001768     3.9991875      8.4632484
C
      0.0003888   237.3889620       610647.     4.9278850     0.0019157     -0.001826     3.9991997      8.3539630
C
      0.0003988   238.8736772       599056.     4.9003210     0.0019540     -0.001884     3.9991049      8.2501127
C
      0.0004088   240.2960721       587880.     4.8745924     0.0019925     -0.001942     3.9988860      8.1520316
C
      0.0004188   241.6418747       577055.     4.8502774     0.0020311     -0.001999     3.9988348      8.0561941
C
      0.0004288   242.9077820       566549.     4.8271812     0.0020697     -0.002057     3.9999940      7.9614085
C
      0.0004388   244.1139671       556385.     4.8055963     0.0021085     -0.002115     3.9998858      -8.048091
C
      0.0004488   245.2639438       546549.     4.7853614     0.0021474     -0.002172     3.9995697      -8.494180
C
      0.0004588   246.3601555       537025.     4.7663675     0.0021866     -0.002229     3.9989346      -8.934722
C
      0.0004688   247.3843861       527753.     4.7482841     0.0022258     -0.002286     3.9996413      -9.376487
C
      0.0004788   248.3523073       518752.     4.7312709     0.0022651     -0.002343     3.9998147      -9.813365
C
      0.0004888   249.2739368       510023.     4.7152709     0.0023046     -0.002400     3.9990828     -10.244998
C
      0.0004988   250.1528212       501560.     4.7002084     0.0023442     -0.002456     3.9993851     -10.671656
C
      0.0005088   250.9829746       493333.     4.6861557     0.0023841     -0.002513     3.9997017     -11.092756
C
      0.0005188   251.7731826       485346.     4.6728535     0.0024240     -0.002569     3.9985188     -11.509025
C
      0.0005288   252.5148603       477569.     4.6601932     0.0024641     -0.002625     3.9999400     -11.924316
C
      0.0005388   253.2095696       469995.     4.6481831     0.0025042     -0.002681     3.9989830     -12.336946
C
      0.0005488   253.8725625       462638.     4.6370441     0.0025446     -0.002737     3.9999963     -12.745290
C
      0.0006088   257.1379460       422403.     4.5821893     0.0027894     -0.003070     3.9999760     -15.098274
C
```

```
    0.0006688   259.3648410       387835.     4.5439769     0.0030388     -0.003398     3.9984117    -17.320803
C
    0.0007288   260.7829795       357850.     4.5194979     0.0032936     -0.003721     3.9989472    -19.414039
C
    0.0007888   261.5420078       331591.     4.5032903     0.0035520     -0.004040     3.9979753    -21.383186
C
    0.0008488   261.7542171       308400.     4.4938388     0.0038141     -0.004355     3.9974259    -23.239476
C
```

Summary of Results for Nominal Moment Capacity for Section 2

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain	Max. Tens. Strain
1	92.000	259.019	0.00300000	-0.00334690

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.75).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318,
or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial Load No.	Resist. Factor	Nominal Ax. Thrust kips	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	92.000000	259.018501	59.800000	168.362026	1167479.
1	0.75	92.000000	259.018501	69.000000	194.263876	954001.
1	0.90	92.000000	259.018501	82.800000	233.116651	643355.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	No	0.00	68461.
2	8.5000	8.4999	Yes	No	68461.	53055.
3	10.5000	16.2684	No	No	121516.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

```
Shear force at pile head                          =       5000.0 lbs
Rotation of pile head                             =    0.000E+00 radians
Axial load at pile head                           =      92000.0 lbs
```

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.04201	-163123.	5000.	0.00	0.00	4.71E+09	0.00	0.00	0.00
0.2000	0.04191	-151114.	4990.	-8.00E-05	0.00	4.71E+09	-8.698	498.1185	0.00
0.4000	0.04162	-139138.	4958.	-1.54E-04	0.00	4.71E+09	-17.526	1011.	0.00
0.6000	0.04117	-127247.	4906.	-2.22E-04	0.00	4.71E+09	-26.243	1530.	0.00
0.8000	0.04056	-115493.	4832.	-2.83E-04	0.00	4.71E+09	-34.678	2052.	0.00
1.0000	0.03981	-103926.	4740.	-3.39E-04	0.00	4.71E+09	-42.695	2574.	0.00
1.2000	0.03893	-92593.	4628.	-3.89E-04	0.00	4.71E+09	-50.178	3093.	0.00
1.4000	0.03794	-81539.	4500.	-4.34E-04	0.00	4.71E+09	-57.023	3607.	0.00
1.6000	0.03685	-70804.	4355.	-4.72E-04	0.00	4.71E+09	-63.121	4111.	0.00
1.8000	0.03567	-60424.	4198.	-5.06E-04	0.00	4.71E+09	-68.342	4598.	0.00
2.0000	0.03442	-50432.	4029.	-5.34E-04	0.00	4.71E+09	-72.493	5055.	0.00
2.2000	0.03311	-40851.	3850.	-5.57E-04	0.00	4.71E+09	-76.620	5554.	0.00
2.4000	0.03175	-31707.	3660.	-5.76E-04	0.00	4.71E+09	-81.296	6146.	0.00
2.6000	0.03034	-23028.	3460.	-5.90E-04	0.00	4.71E+09	-85.182	6737.	0.00
2.8000	0.02892	-14837.	3252.	-5.99E-04	0.00	4.71E+09	-88.270	7326.	0.00
3.0000	0.02747	-7153.	3038.	-6.05E-04	0.00	4.71E+09	-90.570	7913.	0.00
3.2000	0.02601	10.8062	2818.	-6.07E-04	0.00	4.71E+09	-92.099	8498.	0.00
3.4000	0.02456	6644.	2596.	-6.05E-04	0.00	4.71E+09	-92.889	9079.	0.00
3.6000	0.02311	12741.	2373.	-6.00E-04	0.00	4.71E+09	-92.976	9657.	0.00
3.8000	0.02168	18301.	2151.	-5.92E-04	0.00	4.71E+09	-92.403	10231.	0.00
4.0000	0.02027	23327.	1931.	-5.82E-04	0.00	4.71E+09	-91.220	10803.	0.00
4.2000	0.01888	27825.	1714.	-5.69E-04	0.00	4.71E+09	-89.478	11372.	0.00
4.4000	0.01754	31804.	1502.	-5.53E-04	0.00	4.71E+09	-87.229	11938.	0.00
4.6000	0.01623	35278.	1296.	-5.36E-04	0.00	4.71E+09	-84.531	12502.	0.00
4.8000	0.01496	38260.	1096.	-5.18E-04	0.00	4.71E+09	-81.438	13064.	0.00
5.0000	0.01374	40769.	905.1185	-4.98E-04	0.00	4.71E+09	-78.007	13623.	0.00
5.2000	0.01257	42824.	722.3600	-4.76E-04	0.00	4.71E+09	-74.292	14181.	0.00
5.4000	0.01146	44447.	548.7929	-4.54E-04	0.00	4.71E+09	-70.347	14737.	0.00
5.6000	0.01039	45659.	384.9059	-4.31E-04	0.00	4.71E+09	-66.225	15291.	0.00
5.8000	0.00939	46485.	231.0651	-4.08E-04	0.00	4.71E+09	-61.975	15845.	0.00
6.0000	0.00844	46948.	87.5197	-3.84E-04	0.00	4.71E+09	-57.646	16397.	0.00
6.2000	0.00754	47074.	-45.593	-3.60E-04	0.00	4.71E+09	-53.281	16948.	0.00
6.4000	0.00671	46888.	-168.238	-3.36E-04	0.00	4.71E+09	-48.924	17499.	0.00
6.6000	0.00593	46415.	-280.481	-3.12E-04	0.00	4.71E+09	-44.612	18049.	0.00
6.8000	0.00521	45680.	-382.475	-2.89E-04	0.00	4.71E+09	-40.383	18598.	0.00
7.0000	0.00455	44707.	-474.455	-2.66E-04	0.00	4.71E+09	-36.267	19147.	0.00
7.2000	0.00394	43520.	-556.730	-2.43E-04	0.00	4.71E+09	-32.296	19696.	0.00
7.4000	0.00338	42142.	-629.676	-2.22E-04	0.00	4.71E+09	-28.493	20244.	0.00
7.6000	0.00287	40595.	-693.724	-2.00E-04	0.00	4.71E+09	-24.881	20792.	0.00
7.8000	0.00242	38901.	-749.356	-1.80E-04	0.00	4.71E+09	-21.479	21340.	0.00
8.0000	0.00201	37078.	-797.094	-1.61E-04	0.00	4.71E+09	-18.302	21887.	0.00
8.2000	0.00164	35146.	-837.491	-1.43E-04	0.00	4.71E+09	-15.362	22435.	0.00
8.4000	0.00132	33121.	-871.126	-1.25E-04	0.00	4.71E+09	-12.667	22982.	0.00
8.6000	0.00104	31019.	-894.074	-1.09E-04	0.00	4.71E+09	-6.457	14861.	0.00
8.8000	8.01E-04	28877.	-907.909	-9.36E-05	0.00	4.71E+09	-5.072	15206.	0.00
9.0000	5.94E-04	26703.	-918.612	-7.94E-05	0.00	4.71E+09	-3.847	15552.	0.00
9.2000	4.19E-04	24503.	-926.562	-6.64E-05	0.00	4.71E+09	-2.778	15898.	0.00
9.4000	2.75E-04	22285.	-932.129	-5.45E-05	0.00	4.71E+09	-1.861	16243.	0.00
9.6000	1.58E-04	20053.	-935.673	-4.37E-05	0.00	4.71E+09	-1.092	16589.	0.00
9.8000	6.53E-05	17813.	-937.536	-3.41E-05	0.00	4.71E+09	-0.461	16934.	0.00
10.0000	-5.51E-06	15568.	-938.041	-2.56E-05	0.00	4.71E+09	0.03969	17280.	0.00
10.2000	-5.73E-05	13321.	-937.489	-1.82E-05	0.00	4.71E+09	0.4210	17626.	0.00
10.4000	-9.29E-05	11076.	-936.149	-1.20E-05	0.00	4.71E+09	0.6954	17971.	0.00
10.6000	-1.15E-04	8833.	-885.816	-6.92E-06	0.00	4.71E+09	41.2489	861865.	0.00
10.8000	-1.26E-04	6827.	-781.990	-2.93E-06	0.00	4.71E+09	45.2724	861865.	0.00
11.0000	-1.29E-04	5081.	-672.104	1.03E-07	0.00	4.71E+09	46.2991	861865.	0.00
11.2000	-1.26E-04	3601.	-562.431	2.31E-06	0.00	4.71E+09	45.0952	861865.	0.00
11.4000	-1.18E-04	2380.	-457.544	3.84E-06	0.00	4.71E+09	42.3105	861865.	0.00
11.6000	-1.07E-04	1403.	-360.595	4.80E-06	0.00	4.71E+09	38.4809	861865.	0.00
11.8000	-9.48E-05	647.2578	-273.575	5.32E-06	0.00	4.71E+09	34.0353	861865.	0.00
12.0000	-8.16E-05	87.4871	-197.566	5.51E-06	0.00	4.71E+09	29.3056	861865.	0.00
12.2000	-6.83E-05	-303.493	-132.954	5.46E-06	0.00	4.71E+09	24.5375	861865.	0.00
12.4000	-5.54E-05	-553.103	-79.626	5.24E-06	0.00	4.71E+09	19.9027	861865.	0.00
12.6000	-4.32E-05	-688.011	-37.130	4.92E-06	0.00	4.71E+09	15.5106	861865.	0.00
12.8000	-3.18E-05	-733.501	-4.813	4.56E-06	0.00	4.71E+09	11.4206	861865.	0.00
13.0000	-2.13E-05	-713.125	18.0750	4.19E-06	0.00	4.71E+09	7.6526	861865.	0.00
13.2000	-1.17E-05	-648.591	32.2953	3.49E-06	0.00	1.51E+09	4.1976	861865.	0.00
13.4000	-4.54E-06	-559.650	39.2906	2.53E-06	0.00	1.51E+09	1.6318	861865.	0.00
13.6000	4.65E-07	-461.114	41.0483	1.72E-06	0.00	1.51E+09	-0.167	861865.	0.00
13.8000	3.71E-06	-363.378	39.2475	1.06E-06	0.00	1.51E+09	-1.334	861865.	0.00
14.0000	5.58E-06	-273.197	35.2444	5.58E-07	0.00	1.51E+09	-2.002	861865.	0.00
14.2000	6.39E-06	-194.452	30.0861	1.87E-07	0.00	1.51E+09	-2.296	861865.	0.00
14.4000	6.47E-06	-128.866	24.5419	-7.05E-08	0.00	1.51E+09	-2.324	861865.	0.00
14.6000	6.06E-06	-76.620	19.1435	-2.34E-07	0.00	1.51E+09	-2.175	861865.	0.00

14.8000	5.35E-06	-36.873	14.2290	-3.24E-07	0.00	1.51E+09	-1.921	861865.	0.00
15.0000	4.50E-06	-8.177	9.9850	-3.60E-07	0.00	1.51E+09	-1.616	861865.	0.00
15.2000	3.62E-06	11.2134	6.4856	-3.58E-07	0.00	1.51E+09	-1.300	861865.	0.00
15.4000	2.78E-06	23.1116	3.7260	-3.30E-07	0.00	1.51E+09	-1.000	861865.	0.00
15.6000	2.03E-06	29.2440	1.6495	-2.89E-07	0.00	1.51E+09	-0.731	861865.	0.00
15.8000	1.40E-06	31.1567	0.1701	-2.41E-07	0.00	1.51E+09	-0.502	861865.	0.00
16.0000	8.80E-07	30.1666	-0.812	-1.92E-07	0.00	1.51E+09	-0.316	861865.	0.00
16.2000	4.77E-07	27.3457	-1.396	-1.46E-07	0.00	1.51E+09	-0.171	861865.	0.00
16.4000	1.79E-07	23.5283	-1.679	-1.06E-07	0.00	1.51E+09	-0.06414	861865.	0.00
16.6000	-3.01E-08	19.3331	-1.743	-7.16E-08	0.00	1.51E+09	0.01080	861865.	0.00
16.8000	-1.65E-07	15.1934	-1.659	-4.41E-08	0.00	1.51E+09	0.05924	861865.	0.00
17.0000	-2.42E-07	11.3895	-1.484	-2.30E-08	0.00	1.51E+09	0.08686	861865.	0.00
17.2000	-2.75E-07	8.0820	-1.261	-7.50E-09	0.00	1.51E+09	0.09886	861865.	0.00
17.4000	-2.78E-07	5.3410	-1.022	3.17E-09	0.00	1.51E+09	0.09979	861865.	0.00
17.6000	-2.60E-07	3.1730	-0.791	9.94E-09	0.00	1.51E+09	0.09340	861865.	0.00
17.8000	-2.30E-07	1.5419	-0.579	1.37E-08	0.00	1.51E+09	0.08265	861865.	0.00
18.0000	-1.94E-07	0.3863	-0.396	1.52E-08	0.00	1.51E+09	0.06979	861865.	0.00
18.2000	-1.57E-07	-0.367	-0.245	1.52E-08	0.00	1.51E+09	0.05641	861865.	0.00
18.4000	-1.21E-07	-0.796	-0.125	1.43E-08	0.00	1.51E+09	0.04352	861865.	0.00
18.6000	-8.84E-08	-0.974	-0.03472	1.29E-08	0.00	1.51E+09	0.03173	861865.	0.00
18.8000	-5.92E-08	-0.969	0.02889	1.14E-08	0.00	1.51E+09	0.02127	861865.	0.00
19.0000	-3.38E-08	-0.840	0.06900	9.92E-09	0.00	1.51E+09	0.01215	861865.	0.00
19.2000	-1.16E-08	-0.642	0.08857	8.75E-09	0.00	1.51E+09	0.00417	861865.	0.00
19.4000	8.16E-09	-0.419	0.09006	7.90E-09	0.00	1.51E+09	-0.00293	861865.	0.00
19.6000	2.63E-08	-0.213	0.07519	7.40E-09	0.00	1.51E+09	-0.00945	861865.	0.00
19.8000	4.37E-08	-0.06131	0.04502	7.18E-09	0.00	1.51E+09	-0.01569	861865.	0.00
20.0000	6.08E-08	0.00	0.00	7.13E-09	0.00	1.51E+09	-0.02183	430933.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.04200718 inches
Computed slope at pile head = 0.000000 radians
Maximum bending moment = -163123. inch-lbs
Maximum shear force = 5000. lbs
Depth of maximum bending moment = 0.000000 feet below pile head
Depth of maximum shear force = 0.000000 feet below pile head
Number of iterations = 6
Number of zero deflection points = 4

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 5000.0 lbs
Applied moment at pile head = 0.0 in-lbs
Axial thrust load on pile head = 92000.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1235	0.00	5000.	-0.00233	0.00	4.71E+09	0.00	0.00	0.00
0.2000	0.1179	12515.	4981.	-0.00233	0.00	4.71E+09	-15.888	323.3602	0.00
0.4000	0.1123	24936.	4922.	-0.00232	0.00	4.71E+09	-33.044	705.9523	0.00
0.6000	0.1068	37165.	4822.	-0.00230	0.00	4.71E+09	-50.204	1128.	0.00
0.8000	0.1013	49100.	4682.	-0.00228	0.00	4.71E+09	-66.476	1575.	0.00
1.0000	0.09585	60647.	4505.	-0.00225	0.00	4.71E+09	-81.258	2035.	0.00
1.2000	0.09048	71719.	4295.	-0.00222	0.00	4.71E+09	-94.131	2497.	0.00
1.4000	0.08519	82241.	4056.	-0.00218	0.00	4.71E+09	-104.789	2952.	0.00
1.6000	0.08001	92150.	3795.	-0.00214	0.00	4.71E+09	-112.962	3388.	0.00
1.8000	0.07495	101398.	3517.	-0.00209	0.00	4.71E+09	-118.337	3790.	0.00
2.0000	0.07000	109952.	3230.	-0.00203	0.00	4.71E+09	-120.431	4129.	0.00
2.2000	0.06519	117801.	2936.	-0.00197	0.00	4.71E+09	-124.790	4594.	0.00
2.4000	0.06053	124918.	2626.	-0.00191	0.00	4.71E+09	-133.526	5295.	0.00
2.6000	0.05601	131252.	2298.	-0.00185	0.00	4.71E+09	-140.042	6001.	0.00
2.8000	0.05166	136764.	1957.	-0.00178	0.00	4.71E+09	-144.288	6703.	0.00
3.0000	0.04747	141430.	1608.	-0.00171	0.00	4.71E+09	-146.324	7397.	0.00
3.2000	0.04346	145237.	1257.	-0.00164	0.00	4.71E+09	-146.292	8079.	0.00

3.4000	0.03962	148185.	908.0577	-0.00156	0.00	4.71E+09	-144.389	8746.	0.00
3.6000	0.03597	150285.	565.7894	-0.00148	0.00	4.71E+09	-140.835	9397.	0.00
3.8000	0.03250	151556.	233.7507	-0.00141	0.00	4.71E+09	-135.864	10034.	0.00
4.0000	0.02921	152028.	-84.931	-0.00133	0.00	4.71E+09	-129.704	10656.	0.00
4.2000	0.02611	151736.	-387.664	-0.00125	0.00	4.71E+09	-122.574	11266.	0.00
4.4000	0.02320	150721.	-672.363	-0.00118	0.00	4.71E+09	-114.676	11865.	0.00
4.6000	0.02047	149028.	-937.412	-0.00110	0.00	4.71E+09	-106.197	12454.	0.00
4.8000	0.01792	146707.	-1182.	-0.00102	0.00	4.71E+09	-97.306	13034.	0.00
5.0000	0.01555	143809.	-1404.	-9.51E-04	0.00	4.71E+09	-88.152	13607.	0.00
5.2000	0.01335	140387.	-1605.	-8.78E-04	0.00	4.71E+09	-78.873	14175.	0.00
5.4000	0.01133	136495.	-1783.	-8.08E-04	0.00	4.71E+09	-69.587	14738.	0.00
5.6000	0.00948	132186.	-1939.	-7.39E-04	0.00	4.71E+09	-60.400	15297.	0.00
5.8000	0.00778	127515.	-2073.	-6.73E-04	0.00	4.71E+09	-51.407	15852.	0.00
6.0000	0.00624	122534.	-2186.	-6.10E-04	0.00	4.71E+09	-42.687	16406.	0.00
6.2000	0.00486	117292.	-2278.	-5.49E-04	0.00	4.71E+09	-34.313	16957.	0.00
6.4000	0.00361	111841.	-2351.	-4.90E-04	0.00	4.71E+09	-26.344	17507.	0.00
6.6000	0.00250	106224.	-2405.	-4.35E-04	0.00	4.71E+09	-18.831	18056.	0.00
6.8000	0.00152	100487.	-2442.	-3.82E-04	0.00	4.71E+09	-11.817	18604.	0.00
7.0000	6.69E-04	94671.	-2463.	-3.33E-04	0.00	4.71E+09	-5.335	19152.	0.00
7.2000	-7.16E-05	88814.	-2468.	-2.86E-04	0.00	4.71E+09	0.5874	19699.	0.00
7.4000	-7.03E-04	82950.	-2460.	-2.42E-04	0.00	4.71E+09	5.9324	20246.	0.00
7.6000	-0.00123	77111.	-2441.	-2.01E-04	0.00	4.71E+09	10.6872	20793.	0.00
7.8000	-0.00167	71324.	-2410.	-1.64E-04	0.00	4.71E+09	14.8461	21340.	0.00
8.0000	-0.00202	65616.	-2370.	-1.29E-04	0.00	4.71E+09	18.4090	21887.	0.00
8.2000	-0.00229	60005.	-2322.	-9.67E-05	0.00	4.71E+09	21.3816	22434.	0.00
8.4000	-0.00248	54512.	-2268.	-6.76E-05	0.00	4.71E+09	23.7748	22981.	0.00
8.6000	-0.00261	49149.	-2220.	-4.12E-05	0.00	4.71E+09	16.1717	14860.	0.00
8.8000	-0.00268	43873.	-2180.	-1.75E-05	0.00	4.71E+09	16.9838	15206.	0.00
9.0000	-0.00270	38691.	-2139.	3.50E-06	0.00	4.71E+09	17.4685	15552.	0.00
9.2000	-0.00266	33605.	-2097.	2.19E-05	0.00	4.71E+09	17.6444	15897.	0.00
9.4000	-0.00259	28617.	-2055.	3.77E-05	0.00	4.71E+09	17.5333	16243.	0.00
9.6000	-0.00248	23726.	-2013.	5.11E-05	0.00	4.71E+09	17.1594	16588.	0.00
9.8000	-0.00235	18932.	-1973.	6.19E-05	0.00	4.71E+09	16.5498	16934.	0.00
10.0000	-0.00219	14231.	-1934.	7.04E-05	0.00	4.71E+09	15.7343	17280.	0.00
10.2000	-0.00201	9619.	-1897.	7.64E-05	0.00	4.71E+09	14.7448	17625.	0.00
10.4000	-0.00182	5090.	-1863.	8.02E-05	0.00	4.71E+09	13.6162	17971.	0.00
10.6000	-0.00162	639.9311	-1705.	8.16E-05	0.00	4.71E+09	118.2053	174810.	0.00
10.8000	-0.00143	-3130.	-1426.	8.10E-05	0.00	4.71E+09	114.5020	192641.	0.00
11.0000	-0.00123	-6239.	-1156.	7.86E-05	0.00	4.71E+09	110.4797	214872.	0.00
11.2000	-0.00105	-8712.	-895.812	7.48E-05	0.00	4.71E+09	106.1470	242829.	0.00
11.4000	-8.75E-04	-10572.	-646.630	6.99E-05	0.00	4.71E+09	101.5045	278457.	0.00
11.6000	-7.14E-04	-11847.	-408.974	6.42E-05	0.00	4.71E+09	96.5419	324721.	0.00
11.8000	-5.67E-04	-12564.	-183.646	5.80E-05	0.00	4.71E+09	91.2317	386376.	0.00
12.0000	-4.35E-04	-12754.	28.4534	5.15E-05	0.00	4.71E+09	85.5177	471604.	0.00
12.2000	-3.19E-04	-12450.	226.2220	4.51E-05	0.00	4.71E+09	79.2895	595985.	0.00
12.4000	-2.19E-04	-11688.	408.1561	3.90E-05	0.00	4.71E+09	72.3223	794011.	0.00
12.6000	-1.32E-04	-10508.	551.9101	3.33E-05	0.00	4.71E+09	47.4727	861865.	0.00
12.8000	-5.86E-05	-9053.	634.1427	2.83E-05	0.00	4.71E+09	21.0545	861865.	0.00
13.0000	3.87E-06	-7477.	657.7400	2.41E-05	0.00	4.71E+09	-1.390	861865.	0.00
13.2000	5.72E-05	-5907.	631.4084	1.75E-05	0.00	1.51E+09	-20.553	861865.	0.00
13.4000	8.81E-05	-4454.	568.7765	9.33E-06	0.00	1.51E+09	-31.640	861865.	0.00
13.6000	1.02E-04	-3181.	486.8438	3.27E-06	0.00	1.51E+09	-36.637	861865.	0.00
13.8000	1.04E-04	-2118.	398.1435	-9.38E-07	0.00	1.51E+09	-37.280	861865.	0.00
14.0000	9.75E-05	-1269.	311.3827	-3.63E-06	0.00	1.51E+09	-35.021	861865.	0.00
14.2000	8.64E-05	-621.994	232.1323	-5.14E-06	0.00	1.51E+09	-31.021	861865.	0.00
14.4000	7.29E-05	-152.974	163.5037	-5.75E-06	0.00	1.51E+09	-26.169	861865.	0.00
14.6000	5.88E-05	165.3639	106.7715	-5.74E-06	0.00	1.51E+09	-21.108	861865.	0.00
14.8000	4.53E-05	362.0645	61.9155	-5.32E-06	0.00	1.51E+09	-16.272	861865.	0.00
15.0000	3.32E-05	464.9084	28.0680	-4.66E-06	0.00	1.51E+09	-11.934	861865.	0.00
15.2000	2.29E-05	498.8507	3.8687	-3.90E-06	0.00	1.51E+09	-8.232	861865.	0.00
15.4000	1.45E-05	485.1998	-12.268	-3.12E-06	0.00	1.51E+09	-5.215	861865.	0.00
15.6000	7.97E-06	441.3423	-21.959	-2.38E-06	0.00	1.51E+09	-2.862	861865.	0.00
15.8000	3.10E-06	380.8446	-26.731	-1.72E-06	0.00	1.51E+09	-1.114	861865.	0.00
16.0000	-3.10E-07	313.7942	-27.935	-1.17E-06	0.00	1.51E+09	0.1112	861865.	0.00
16.2000	-2.52E-06	247.2738	-26.714	-7.26E-07	0.00	1.51E+09	0.9066	861865.	0.00
16.4000	-3.80E-06	185.8886	-23.990	-3.82E-07	0.00	1.51E+09	1.3631	861865.	0.00
16.6000	-4.36E-06	132.2896	-20.477	-1.29E-07	0.00	1.51E+09	1.5648	861865.	0.00
16.8000	-4.41E-06	87.6572	-16.697	4.61E-08	0.00	1.51E+09	1.5851	861865.	0.00
17.0000	-4.14E-06	52.1243	-13.012	1.57E-07	0.00	1.51E+09	1.4853	861865.	0.00
17.2000	-3.66E-06	25.1285	-9.653	2.19E-07	0.00	1.51E+09	1.3141	861865.	0.00
17.4000	-3.09E-06	5.6929	-6.746	2.43E-07	0.00	1.51E+09	1.1084	861865.	0.00
17.6000	-2.49E-06	-7.361	-4.342	2.42E-07	0.00	1.51E+09	0.8948	861865.	0.00
17.8000	-1.93E-06	-15.257	-2.439	2.24E-07	0.00	1.51E+09	0.6914	861865.	0.00
18.0000	-1.42E-06	-19.166	-0.998	1.97E-07	0.00	1.51E+09	0.5089	861865.	0.00
18.2000	-9.82E-07	-20.136	0.03559	1.65E-07	0.00	1.51E+09	0.3527	861865.	0.00
18.4000	-6.24E-07	-19.068	0.7277	1.34E-07	0.00	1.51E+09	0.2241	861865.	0.00
18.6000	-3.39E-07	-16.702	1.1425	1.06E-07	0.00	1.51E+09	0.1216	861865.	0.00
18.8000	-1.17E-07	-13.631	1.3388	8.15E-08	0.00	1.51E+09	0.04198	861865.	0.00
19.0000	5.27E-08	-10.312	1.3664	6.25E-08	0.00	1.51E+09	-0.01893	861865.	0.00
19.2000	1.83E-07	-7.099	1.2648	4.86E-08	0.00	1.51E+09	-0.06571	861865.	0.00
19.4000	2.86E-07	-4.263	1.0627	3.96E-08	0.00	1.51E+09	-0.103	861865.	0.00

19.6000	3.73E-07	-2.016	0.7786	3.46E-08	0.00	1.51E+09	-0.134	861865.	0.00
19.8000	4.52E-07	-0.540	0.4230	3.26E-08	0.00	1.51E+09	-0.162	861865.	0.00
20.0000	5.29E-07	0.00	0.00	3.21E-08	0.00	1.51E+09	-0.190	430933.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 2:

Pile-head deflection = 0.12351314 inches
Computed slope at pile head = -0.0023309 radians
Maximum bending moment = 152028. inch-lbs
Maximum shear force = 5000. lbs
Depth of maximum bending moment = 4.00000000 feet below pile head
Depth of maximum shear force = 0.000000 feet below pile head
Number of iterations = 8
Number of zero deflection points = 4

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 5000.0 lbs
Applied moment at pile head = -81562.0 in-lbs
Axial thrust load on pile head = 92000.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.08064	-81562.	5000.	-0.00113	0.00	4.71E+09	0.00	0.00	0.00
0.2000	0.07788	-69307.	4984.	-0.00117	0.00	4.71E+09	-13.400	412.9623	0.00
0.4000	0.07502	-57122.	4935.	-0.00120	0.00	4.71E+09	-27.148	868.4704	0.00
0.6000	0.07210	-45087.	4854.	-0.00123	0.00	4.71E+09	-40.505	1348.	0.00
0.8000	0.06912	-33280.	4742.	-0.00125	0.00	4.71E+09	-53.023	1841.	0.00
1.0000	0.06610	-21774.	4601.	-0.00126	0.00	4.71E+09	-64.420	2339.	0.00
1.2000	0.06306	-10637.	4434.	-0.00127	0.00	4.71E+09	-74.504	2836.	0.00
1.4000	0.06000	71.4037	4245.	-0.00127	0.00	4.71E+09	-83.128	3325.	0.00
1.6000	0.05694	10301.	4037.	-0.00127	0.00	4.71E+09	-90.153	3800.	0.00
1.8000	0.05390	20011.	3814.	-0.00126	0.00	4.71E+09	-95.396	4248.	0.00
2.0000	0.05088	29169.	3582.	-0.00125	0.00	4.71E+09	-98.554	4649.	0.00
2.2000	0.04789	37756.	3340.	-0.00123	0.00	4.71E+09	-102.475	5135.	0.00
2.4000	0.04495	45748.	3088.	-0.00121	0.00	4.71E+09	-108.333	5784.	0.00
2.6000	0.04207	53111.	2822.	-0.00119	0.00	4.71E+09	-112.712	6430.	0.00
2.8000	0.03925	59820.	2548.	-0.00116	0.00	4.71E+09	-115.642	7071.	0.00
3.0000	0.03651	65855.	2269.	-0.00113	0.00	4.71E+09	-117.191	7704.	0.00
3.2000	0.03384	71208.	1987.	-0.00109	0.00	4.71E+09	-117.453	8330.	0.00
3.4000	0.03126	75876.	1706.	-0.00105	0.00	4.71E+09	-116.539	8946.	0.00
3.6000	0.02878	79864.	1429.	-0.00102	0.00	4.71E+09	-114.566	9554.	0.00
3.8000	0.02639	83184.	1158.	-9.74E-04	0.00	4.71E+09	-111.658	10154.	0.00
4.0000	0.02411	85851.	894.1566	-9.31E-04	0.00	4.71E+09	-107.935	10746.	0.00
4.2000	0.02192	87887.	640.4131	-8.86E-04	0.00	4.71E+09	-103.518	11332.	0.00
4.4000	0.01985	89317.	397.9702	-8.41E-04	0.00	4.71E+09	-98.518	11911.	0.00
4.6000	0.01789	90169.	168.0935	-7.96E-04	0.00	4.71E+09	-93.046	12485.	0.00
4.8000	0.01603	90475.	-48.204	-7.50E-04	0.00	4.71E+09	-87.202	13054.	0.00
5.0000	0.01429	90268.	-250.144	-7.04E-04	0.00	4.71E+09	-81.082	13619.	0.00
5.2000	0.01266	89585.	-437.172	-6.58E-04	0.00	4.71E+09	-74.775	14180.	0.00
5.4000	0.01113	88460.	-608.935	-6.12E-04	0.00	4.71E+09	-68.362	14739.	0.00
5.6000	0.00972	86932.	-765.271	-5.68E-04	0.00	4.71E+09	-61.918	15295.	0.00
5.8000	0.00841	85038.	-906.189	-5.24E-04	0.00	4.71E+09	-55.513	15850.	0.00
6.0000	0.00720	82814.	-1032.	-4.81E-04	0.00	4.71E+09	-49.208	16402.	0.00
6.2000	0.00610	80297.	-1143.	-4.40E-04	0.00	4.71E+09	-43.059	16954.	0.00
6.4000	0.00509	77524.	-1239.	-4.00E-04	0.00	4.71E+09	-37.116	17504.	0.00
6.6000	0.00418	74528.	-1321.	-3.61E-04	0.00	4.71E+09	-31.423	18053.	0.00
6.8000	0.00336	71342.	-1390.	-3.24E-04	0.00	4.71E+09	-26.016	18602.	0.00
7.0000	0.00262	67999.	-1446.	-2.88E-04	0.00	4.71E+09	-20.930	19150.	0.00
7.2000	0.00197	64527.	-1491.	-2.55E-04	0.00	4.71E+09	-16.190	19698.	0.00
7.4000	0.00140	60955.	-1524.	-2.23E-04	0.00	4.71E+09	-11.818	20246.	0.00
7.6000	9.04E-04	57308.	-1548.	-1.93E-04	0.00	4.71E+09	-7.830	20793.	0.00
7.8000	4.77E-04	53610.	-1563.	-1.64E-04	0.00	4.71E+09	-4.237	21341.	0.00
8.0000	1.15E-04	49881.	-1569.	-1.38E-04	0.00	4.71E+09	-1.048	21888.	0.00

8.2000	-1.86E-04	46140.	-1568.	-1.14E-04	0.00	4.71E+09	1.7372	22435.	0.00
8.4000	-4.30E-04	42405.	-1561.	-9.10E-05	0.00	4.71E+09	4.1194	22982.	0.00
8.6000	-6.23E-04	38688.	-1551.	-7.04E-05	0.00	4.71E+09	3.8559	14861.	0.00
8.8000	-7.68E-04	34989.	-1541.	-5.16E-05	0.00	4.71E+09	4.8659	15206.	0.00
9.0000	-8.70E-04	31314.	-1528.	-3.47E-05	0.00	4.71E+09	5.6408	15552.	0.00
9.2000	-9.35E-04	27668.	-1514.	-1.97E-05	0.00	4.71E+09	6.1918	15898.	0.00
9.4000	-9.65E-04	24055.	-1499.	-6.56E-06	0.00	4.71E+09	6.5325	16243.	0.00
9.6000	-9.66E-04	20476.	-1483.	4.77E-06	0.00	4.71E+09	6.6787	16589.	0.00
9.8000	-9.42E-04	16934.	-1467.	1.43E-05	0.00	4.71E+09	6.6488	16934.	0.00
10.0000	-8.98E-04	13428.	-1451.	2.20E-05	0.00	4.71E+09	6.4630	17280.	0.00
10.2000	-8.37E-04	9958.	-1436.	2.80E-05	0.00	4.71E+09	6.1437	17626.	0.00
10.4000	-7.63E-04	6522.	-1422.	3.22E-05	0.00	4.71E+09	5.7158	17971.	0.00
10.6000	-6.82E-04	3119.	-1300.	3.46E-05	0.00	4.71E+09	95.5234	336094.	0.00
10.8000	-5.97E-04	264.9664	-1075.	3.55E-05	0.00	4.71E+09	92.4611	371644.	0.00
11.0000	-5.12E-04	-2056.	-857.071	3.50E-05	0.00	4.71E+09	89.0372	417567.	0.00
11.2000	-4.29E-04	-3864.	-647.896	3.35E-05	0.00	4.71E+09	85.2752	477159.	0.00
11.4000	-3.51E-04	-5181.	-448.139	3.12E-05	0.00	4.71E+09	81.1887	555445.	0.00
11.6000	-2.79E-04	-6029.	-258.579	2.84E-05	0.00	4.71E+09	76.7780	660386.	0.00
11.8000	-2.15E-04	-6435.	-80.018	2.52E-05	0.00	4.71E+09	72.0234	805389.	0.00
12.0000	-1.58E-04	-6425.	74.5343	2.19E-05	0.00	4.71E+09	56.7700	861865.	0.00
12.2000	-1.09E-04	-6087.	189.8020	1.87E-05	0.00	4.71E+09	39.2864	861865.	0.00
12.4000	-6.82E-05	-5522.	266.3154	1.58E-05	0.00	4.71E+09	24.4748	861865.	0.00
12.6000	-3.37E-05	-4815.	310.1898	1.31E-05	0.00	4.71E+09	12.0872	861865.	0.00
12.8000	-5.05E-06	-4039.	326.8708	1.09E-05	0.00	4.71E+09	1.8136	861865.	0.00
13.0000	1.86E-05	-3251.	321.0227	9.04E-06	0.00	4.71E+09	-6.687	861865.	0.00
13.2000	3.83E-05	-2502.	296.4856	6.22E-06	0.00	1.51E+09	-13.760	861865.	0.00
13.4000	4.85E-05	-1831.	259.0837	2.78E-06	0.00	1.51E+09	-17.408	861865.	0.00
13.6000	5.16E-05	-1259.	215.9393	3.19E-07	0.00	1.51E+09	-18.546	861865.	0.00
13.8000	5.00E-05	-794.349	172.1353	-1.31E-06	0.00	1.51E+09	-17.958	861865.	0.00
14.0000	4.53E-05	-432.513	131.0498	-2.29E-06	0.00	1.51E+09	-16.280	861865.	0.00
14.2000	3.90E-05	-164.299	94.7009	-2.76E-06	0.00	1.51E+09	-14.010	861865.	0.00
14.4000	3.21E-05	23.2726	64.0703	-2.88E-06	0.00	1.51E+09	-11.515	861865.	0.00
14.6000	2.52E-05	144.5089	39.3900	-2.74E-06	0.00	1.51E+09	-9.052	861865.	0.00
14.8000	1.89E-05	213.5561	20.3840	-2.46E-06	0.00	1.51E+09	-6.787	861865.	0.00
15.0000	1.34E-05	243.4376	6.4632	-2.10E-06	0.00	1.51E+09	-4.814	861865.	0.00
15.2000	8.84E-06	245.5046	-3.124	-1.71E-06	0.00	1.51E+09	-3.175	861865.	0.00
15.4000	5.22E-06	229.1960	-9.182	-1.33E-06	0.00	1.51E+09	-1.873	861865.	0.00
15.6000	2.46E-06	202.0187	-12.491	-9.86E-07	0.00	1.51E+09	-0.885	861865.	0.00
15.8000	4.84E-07	169.6738	-13.761	-6.90E-07	0.00	1.51E+09	-0.174	861865.	0.00
16.0000	-8.49E-07	136.2692	-13.604	-4.47E-07	0.00	1.51E+09	0.3050	861865.	0.00
16.2000	-1.66E-06	104.5735	-12.522	-2.55E-07	0.00	1.51E+09	0.5968	861865.	0.00
16.4000	-2.08E-06	76.2787	-10.911	-1.12E-07	0.00	1.51E+09	0.7453	861865.	0.00
16.6000	-2.20E-06	52.2502	-9.069	-9.42E-09	0.00	1.51E+09	0.7892	861865.	0.00
16.8000	-2.12E-06	32.7494	-7.209	5.82E-08	0.00	1.51E+09	0.7615	861865.	0.00
17.0000	-1.92E-06	17.6236	-5.468	9.82E-08	0.00	1.51E+09	0.6890	861865.	0.00
17.2000	-1.65E-06	6.4600	-3.930	1.17E-07	0.00	1.51E+09	0.5922	861865.	0.00
17.4000	-1.36E-06	-1.295	-2.636	1.21E-07	0.00	1.51E+09	0.4866	861865.	0.00
17.6000	-1.07E-06	-6.246	-1.593	1.15E-07	0.00	1.51E+09	0.3828	861865.	0.00
17.8000	-8.01E-07	-8.990	-0.788	1.03E-07	0.00	1.51E+09	0.2875	861865.	0.00
18.0000	-5.70E-07	-10.074	-0.198	8.82E-08	0.00	1.51E+09	0.2046	861865.	0.00
18.2000	-3.77E-07	-9.977	0.2106	7.23E-08	0.00	1.51E+09	0.1355	861865.	0.00
18.4000	-2.23E-07	-9.095	0.4692	5.71E-08	0.00	1.51E+09	0.08003	861865.	0.00
18.6000	-1.03E-07	-7.750	0.6097	4.37E-08	0.00	1.51E+09	0.03705	861865.	0.00
18.8000	-1.30E-08	-6.188	0.6598	3.26E-08	0.00	1.51E+09	0.00468	861865.	0.00
19.0000	5.35E-08	-4.597	0.6424	2.41E-08	0.00	1.51E+09	-0.01920	861865.	0.00
19.2000	1.02E-07	-3.115	0.5752	1.79E-08	0.00	1.51E+09	-0.03677	861865.	0.00
19.4000	1.39E-07	-1.844	0.4710	1.40E-08	0.00	1.51E+09	-0.05008	861865.	0.00
19.6000	1.69E-07	-0.860	0.3379	1.18E-08	0.00	1.51E+09	-0.06086	861865.	0.00
19.8000	1.96E-07	-0.227	0.1803	1.10E-08	0.00	1.51E+09	-0.07047	861865.	0.00
20.0000	2.22E-07	0.00	0.00	1.08E-08	0.00	1.51E+09	-0.07976	430933.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 3:

```
Pile-head deflection             =     0.08064359 inches
Computed slope at pile head      =     -0.0011326 radians
Maximum bending moment           =         90475. inch-lbs
Maximum shear force              =          5000. lbs
Depth of maximum bending moment  =     4.80000000 feet below pile head
Depth of maximum shear force     =       0.000000 feet below pile head
Number of iterations             =              6
Number of zero deflection points =              4
```

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

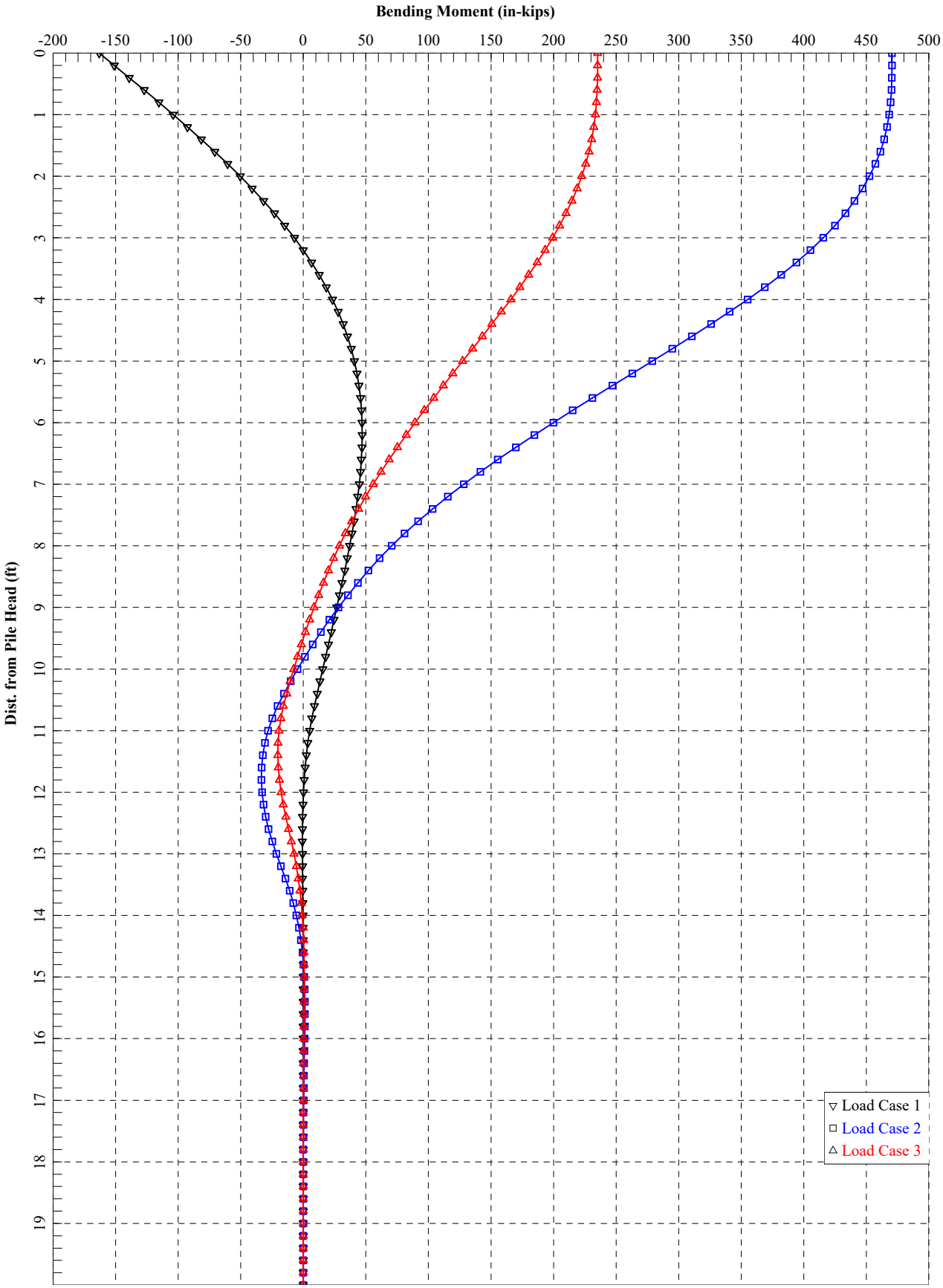
Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	5000.	S, rad	0.00	92000.	0.04201	0.00	5000.	-163123.
2	V, lb	5000.	M, in-lb	0.00	92000.	0.1235	-0.00233	5000.	152028.
3	V, lb	5000.	M, in-lb	-81562.	92000.	0.08064	-0.00113	5000.	90475.

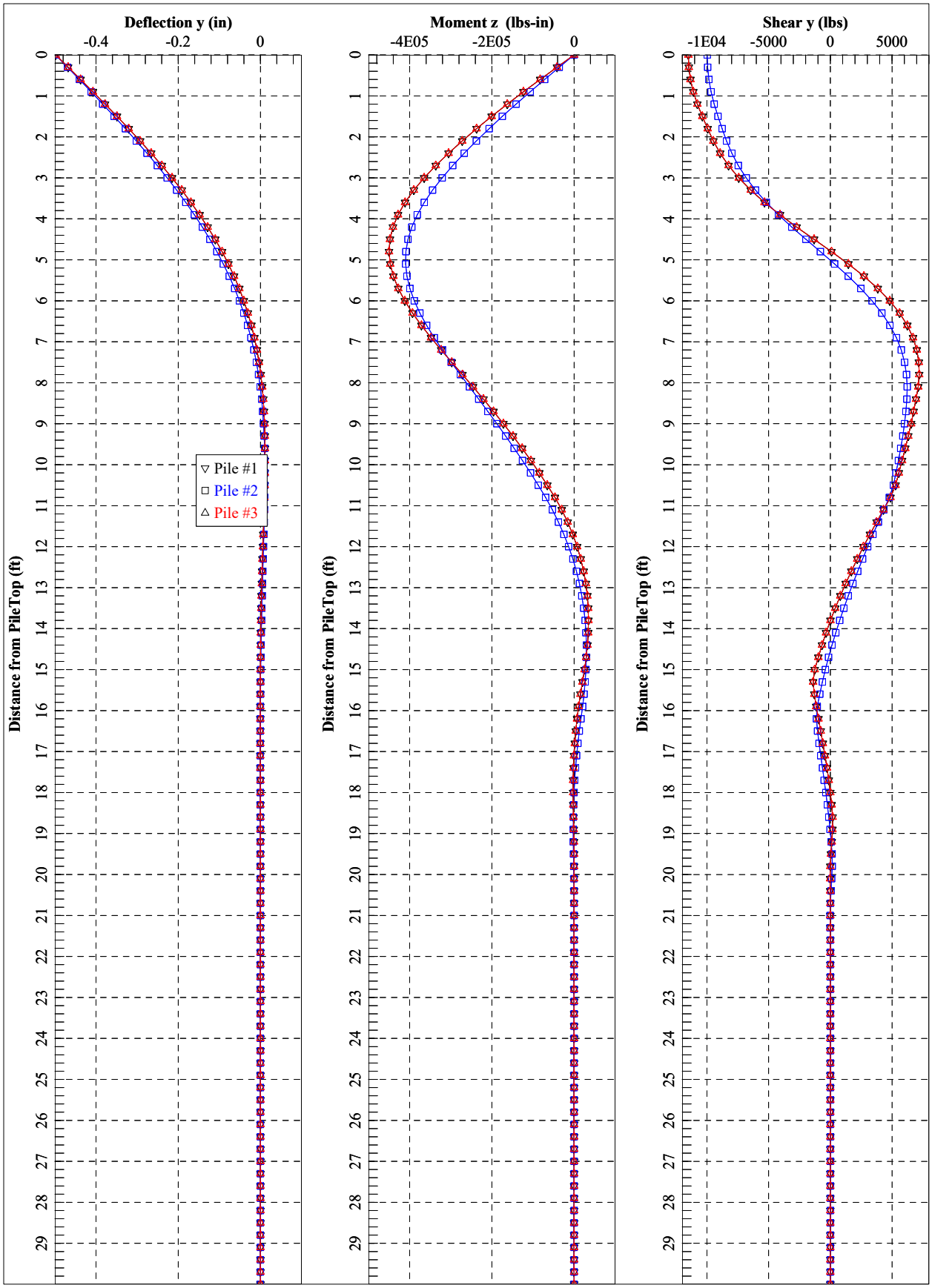
Maximum pile-head deflection = 0.1235131408 inches
Maximum pile-head rotation = -0.0023309357 radians = -0.133553 deg.

The analysis ended normally.

Sliding Beam Micropiles Considering Construction Tolerances



East Restrain Beam Micropiles



```
==============================================================================

                 GROUP for Windows, Version 2016.10.10

                  Serial Number : 157432285

                  Analysis of A Group of Piles
               Subjected to Axial and Lateral Loading

                (c) Copyright ENSOFT, Inc., 1987-2015
                     All Rights Reserved

==============================================================================


This program is licensed to :

Gerhart Cole, Inc
Draper, UT

Path to file locations      : J:\PROJECTS\HDR\22-1474 14600 South SES\Analyses\Micropiles\Group\
Name of input data file     : 33 kip.gp10r
Name of output echo file    : 33 kip.gp10e
Name of output results file : 33 kip.gp10o
Name of output summary file : 33 kip.gp10t
Name of plot output file    : 33 kip.gp10p
Name of runtime file        : 33 kip.gp10r


------------------------------------------------------------------------------
                      Time and Date of Analysis
------------------------------------------------------------------------------

          Date:  October 08, 2024     Time:  15:50:16




           *****     INPUT INFORMATION     *****


New Group

ANALYSIS TYPE = 3D ANALYSIS

ADJUST DEPTH FOR BATTER PILES

GENERATE LOAD-DISP (AND T-R) CURVES BASED ON SOIL PROFILE

EXTEND INTERPOLATION FOR L-DP (AND T-R) CURVES

UNITS SYSTEM  = ENGL


* TABLE B *  PILE CAP OPTIONS

LENGTH,YY    ( FT ) =    3.000
WIDTH, ZZ    ( FT ) =    5.000
THICKNESS,XX ( FT ) =    1.000

* PILE CAP DIMENSIONS ARE NOT CONSIDERED
  FOR THE PILE GROUP ANALYSIS



* TABLE C *  LOAD AND CONTROL PARAMETERS


** LOAD CASES **


NUMBER OF LOAD CASES :    1


LOAD CASE    :     1
CASE NAME    : Load Case
LOAD TYPE    : Live, LL
```

SCALE FACTOR : 1.0000

* CONCENTRATED LOADS *

NL	VERT.LOAD LBS	HR.LOAD Y LBS	HR.LOAD Z LBS	MOMENT X LBS-IN	MOMENT Y LBS-IN	MOMENT Z LBS-IN	COORD X FT	COORD Y FT	COORD Z FT
1	0.00	-3.30E+04	0.00	0.00	0.00	0.00	0.00	0.00	1.64

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,LBS	HOR.LOAD Y,LBS	HOR.LOAD Z,LBS
0.00000	-33000.0	0.00000

MOMENT X,LBS-IN	MOMENT Y,LBS-IN	MOMENT Z,LBS-IN
6.49440E+05	0.00000	0.00000

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-04 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS ONLY AT PILE CAP

* TABLE D * ARRANGEMENT OF PILE GROUPS

GROUP	CONN.Z-Z	CONN.Y-Y	PILE PROP	P-Y CURVE	L-S CURVE	T-R CURVE	R-F-L SET
1	PIN	PIN	1	0	1 G	1 G	0
2	PIN	PIN	1	0	1 G	1 G	0
3	PIN	PIN	1	0	1 G	1 G	0

GROUP	CorX,FT	CorY,FT	CorZ,FT	ALPHA,DEG	BETA,DEG	THETA,DEG	GROUND,FT	SPz,LBS-IN	SPy,LBS-IN
1	0.000	0.000	0.000	0.000	90.00	0.000	0.000	0.000	0.000
2	0.000	1.333	1.640	0.000	90.00	0.000	0.000	0.000	0.000
3	0.000	0.000	3.280	0.000	90.00	0.000	0.000	0.000	0.000

* TABLE E * PILE GEOMETRY AND PROPERTIES
PILE TYPE = 1 - DRIVEN PILE
= 2 - DRILLED SHAFT

PROP	SECTS	INC	PILE TYPE	LENGTH, FT
1	1	100	2	30.000

* PILE SECTIONS *

PROP	SECT	FROM,FT	TO,FT	CROSS SECT
1	1	0.00000	30.0000	1

* PILE CROSS SECTIONS *

CROSS SECTION : 1
SECTION NAME : Cased

TYPE : NONLINEAR
CROSS SECTION TYPE : ROUND CONC. SHAFT, CASING (AND STEEL SECTION)
CONCRETE DIAMETER : 8.83500 IN
CONCRETE FC : 4000.00 LBS/IN**2
DIAMETER CASING : 9.62500 IN
THICKNESS CASING : 0.39500 IN
ES CASING : 2.90000E+07 LBS/IN**2
FY CASING : 80000.0 LBS/IN**2
NUMBER REBARS : 1
DIAMETER REINF. : 1.27000 IN
AREA REINFORCEMENT : 1.27000 IN**2
ES REINFORCEMENT : 2.90000E+07 LBS/IN**2
FY REINFORCEMENT : 75000.0 LBS/IN**2
REINF. LAYOUT : MANUAL
REINF. COORDS : IN IN
- REBAR 1 : 0.00000 0.00000
EQ. YOUNG MODULUS : 8.04592E+06 LBS/IN**2

* PILE CROSS SECTIONS PROPERTIES *

NONLINEAR SECTIONS

SECT	DIAM,IN	AREA,IN**2	Iz,IN**4	Iy,IN**4	GJ,LBS-IN**2	EIz IND	EIy IND	Mn,LBS-IN	Vn,LBS
1	8.8350	72.760	0.0000	0.0000	3.5885E+09	0	0	0.0000	0.0000

* TABLE F * SOIL DATA

SOILS INFORMATION

GROUND SURFACE = 0.00000 FT

4 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SAND USING API CRITERIA

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	0.00000	8.50000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	125.000	125.000
FRICTION ANGLE	(DEGREES)	33.0000	33.0000
P-Y SUBGRADE MODULUS	(LBS/IN**3)	95.0000	95.0000
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	12.5000 (S)	1175.56 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	0.00000	0.00000

LAYER 2
THE SOIL IS A SAND USING API CRITERIA

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	8.50000	10.5000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	62.6000	62.6000
FRICTION ANGLE	(DEGREES)	33.0000	33.0000
P-Y SUBGRADE MODULUS	(LBS/IN**3)	60.0000	60.0000
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	1175.56 (S)	1261.99 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	0.00000	0.00000

LAYER 3
THE SOIL IS A STIFF CLAY WITHOUT FREE WATER

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	10.5000	23.5000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	57.6000	57.6000
UNDRAINED COHESION, C	(LBS/FT**2)	1250.00	1250.00
STRAIN AT 50% STRESS		7.00000E-03	7.00000E-03
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	687.500 (S)	1100.00 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	0.00000	0.00000

LAYER 4
THE SOIL IS A STIFF CLAY WITHOUT FREE WATER

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	23.5000	50.0000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	52.6000	52.6000
UNDRAINED COHESION, C	(LBS/FT**2)	2000.00	2000.00
STRAIN AT 50% STRESS		6.00000E-03	6.00000E-03
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	1100.00 (S)	1100.00 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	18000.0 (T)	18000.0 (T)

Notes : Program estimated values for listed parameters
if zero input values were entered:
(S) ULTIMATE UNIT SIDE FRICTION for Drilled Shafts
(T) ULTIMATE UNIT TIP RESISTANCE for Drilled Shafts

* TABLE H * AXIAL LOAD VS DISPLACEMENT

AXIAL LOAD-DISPLACEMENT CURVES GENERATED INTERNALLY

NUM OF CURVES 1

CURVE 1 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,LBS
-2.01599	-47952.7
-1.01599	-47952.7
-0.51654	-49287.7
-0.11755	-51682.2
-0.0676602	-51559.1
-0.0204732	-30829.2
-0.0110011	-18077.9

-2.20073E-03	-3624.09
-2.20073E-04	-362.409
0.00000	0.00000
2.26643E-04	376.891
2.26643E-03	3768.91
0.0113281	18783.5
0.0210452	31952.3
0.0700128	55450.6
0.12088	57075.9
0.52199	58133.7
1.02155	56996.7
2.02176	57339.8

* TABLE I * TORS. MOM. VS ANGLE ROT.

TORQUE-ROTATION CURVES GENERATED INTERNALLY

NUM OF CURVES 1

CURVE 1 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,LBS-IN
-0.46427	-2.11813E+05
-0.23789	-2.11813E+05
-0.12510	-2.17621E+05
-0.0352468	-2.27428E+05
-0.0241331	-2.30529E+05
-0.0108163	-1.65105E+05
-6.62951E-03	-1.13612E+05
-1.40008E-03	-25711.6
-1.40008E-04	-2571.16
0.00000	0.00000
1.40008E-04	2571.16
1.40008E-03	25711.6
6.62951E-03	1.13612E+05
0.0108163	1.65105E+05
0.0241331	2.30529E+05
0.0352468	2.27428E+05
0.12510	2.17621E+05
0.23789	2.11813E+05
0.46427	2.11813E+05

* TABLE J * MOMENT CURVATURE SETS

USER DEFINED MOMENT CURVATURE

NUM OF SETS : 1

CURVE SET 1 NUM OF CURVES 1

CURVE 1 AXIAL LOAD 0.000E+00 LBS

POINT	MOMENT LBS-IN	CURVATURE RADIAN/IN
1	0.00000	0.00000

INTERNALLY GENERATED MOMENT CURVATURE

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
S = stress in steel section has reached yield stress.
G = stress in casing section has reached yield stress.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

```
     ------------------------------------------------------------------------------
         Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
                        Section: 1 (Cased), Z Axis
     ------------------------------------------------------------------------------

     Input Axial Thrust Forces:
     --------------------------

     Number of Axial Thrust Force Values = 1

        Number     Axial Thrust Force
                          lbs
        ------     ------------------
           1               0.000

          Axial Thrust Force =       0.000  lbs ,127

         Bending       Bending       Bending       Depth to      Max Comp      Max Tens    Max Concrete   Max
Reinf     Max Casing   Run
        Curvature      Moment       Stiffness       N Axis        Strain        Strain        Stress
Stress         Stress     Msg
         rad/in.       in-lb          lb-in2          in          in/in         in/in         in/in          psi
          psi
       ------------ ------------ ------------ ------------ ------------ ------------ ------------
------------ ------------  ---
        0.000000000      0.000000                                0.0000000     0.0000000         0.000
0.000         0.000
        0.000001250   5977.538139  4782030511.6     4.8125000     0.0000060    -0.0000060        23.142
-22.779      -172.636
        0.000002500  11951.937307  4780774923.1     4.8125000     0.0000120    -0.0000120        46.216
-45.558      -345.272
        0.000003750  17923.197504  4779519334.5     4.8125000     0.0000180    -0.0000180        69.224
68.337      -517.908
        0.000005000  23891.318729  4778263746.0     4.8125000     0.0000241    -0.0000241        92.164
-91.116      -690.544
        0.000006250  29856.300983  4777008157.5     4.8125000     0.0000301    -0.0000301       115.037
-113.895      -863.180
        0.000007500  35818.144265  4775752568.9     4.8125000     0.0000361    -0.0000361       137.843
-136.674     -1035.815
        0.000008750  41776.848577  4774496980.4     4.8125000     0.0000421    -0.0000421       160.582
-159.453     -1208.451
        0.000010000  47732.413916  4773241391.9     4.8125000     0.0000481    -0.0000481       183.254
-182.232     -1381.087
        0.000011250  53684.840285  4771985803.3     4.8125000     0.0000541    -0.0000541       205.858
-205.011     -1553.723
        0.000012500  59634.127682  4770730214.8     4.8125000     0.0000602    -0.0000602       228.396
-227.790     -1726.359
        0.000013750  65580.276108  4769474626.3     4.8125000     0.0000662    -0.0000662       250.866
-250.569     -1898.995
        0.000015000  71523.285563  4768219037.7     4.8125000     0.0000722    -0.0000722       273.269
-273.348     -2071.631
        0.000016250  77463.156046  4766963449.2     4.8125000     0.0000782    -0.0000782       295.606
-296.127     -2244.267
        0.000017500  83399.887558  4765707860.7     4.8125000     0.0000842    -0.0000842       317.874
-318.906     -2416.903
        0.000018750  89333.480099  4764452272.2     4.8125000     0.0000902    -0.0000902       340.076
-341.685     -2589.539
        0.000020000  95263.933668  4763196683.6     4.8125000     0.0000962    -0.0000962       362.211
-364.464     -2762.174
        0.000021250  101191.24827  4761941095.1     4.8125000     0.0001023    -0.0001023       384.278
-387.243      2934.810
        0.000022500  107115.42389  4760685506.6     4.8125000     0.0001083    -0.0001083       406.279
-410.021     -3107.446
        0.000023750  113036.46055  4759429918.0     4.8125000     0.0001143    -0.0001143       428.212
-432.800     -3280.082
        0.000025000  118954.35823  4758174329.5     4.8125000     0.0001203    -0.0001203       450.078
-455.579     -3452.718  C
        0.000026250  124869.11694  4756918741.0     4.8125000     0.0001263    -0.0001263       471.877
-478.358     -3625.354  C
        0.000027500  130049.84188  4729085159.7     4.8024239     0.0001321    -0.0001326       492.509
-509.173     -3806.026  C
        0.000028750  134583.24318  4681156284.8     4.7839097     0.0001375    -0.0001392       512.019
-547.754     -3994.463  C
        0.000030000  138762.75703  4625425234.6     4.7611532     0.0001428    -0.0001459       530.790
-591.367     -4187.934  C
        0.000031250  143307.58898  4585842847.6     4.7443908     0.0001483    -0.0001525       550.023
-631.198     -4377.622  C
        0.000032500  147093.31924  4525948284.6     4.7175152     0.0001533    -0.0001595       567.748
-681.777     -4578.057  C
```

```
        0.000033750  151398.02836  4485867507.1     4.6987973     0.0001586    -0.0001663       586.242
-726.319     -4772.456  C
        0.000035000  155625.97356  4446456387.6     4.6796223     0.0001638    -0.0001731       604.441
-772.682     -4968.676  C
        0.000036250  159792.05641  4408056728.7     4.6601339     0.0001689    -0.0001800       622.360
-820.765     -5166.616  C
        0.000037500  163910.31489  4370941730.7     4.6404587     0.0001740    -0.0001869       640.016
-870.464     -5366.172  C
        0.000038750  168661.93717  4352566120.7     4.6306582     0.0001794    -0.0001935       658.917
-910.493     -5556.058  C
        0.000040000  172711.67364  4317791841.2     4.6109177     0.0001844    -0.0002006       676.134
-962.763     -5758.185  C
        0.000041250  176746.44790  4284762373.4     4.5912538     0.0001894    -0.0002076       693.128
-1016.372     -5961.651  C
        0.000042500  181416.20446  4268616575.6     4.5815663     0.0001947    -0.0002143       711.520
-1059.111     -6154.247  C
        0.000043750  186067.21492  4252964912.5     4.5719374     0.0002000    -0.0002211       729.778
-1102.478     -6347.471  C
        0.000045000  190701.72778  4237816173.0     4.5623773     0.0002053    -0.0002278       747.905
-1146.453     -6541.303  C
        0.000046250  194695.74543  4209637739.1     4.5433053     0.0002101    -0.0002350       764.212
-1203.879     -6748.586  C
        0.000047500  199310.96714  4196020361.0     4.5340042     0.0002154    -0.0002418       782.063
-1249.229     -6943.793  C
        0.000048750  203917.64654  4182926083.1     4.5248098     0.0002206    -0.0002486       799.795
-1295.102     -7139.523  C
        0.000050000  208517.81383  4170356276.8     4.5157310     0.0002258    -0.0002555       817.414
-1341.474     -7335.752  C
        0.000052500  217706.45045  4146789532.6     4.4979549     0.0002361    -0.0002692       852.325
-1435.612     -7729.603  C
        0.000055000  227440.42884  4135280524.5     4.4895011     0.0002469    -0.0002825       888.628
-1517.459     -8111.164  C
        0.000057500  236603.91691  4114850729.0     4.4726045     0.0002572    -0.0002963       922.759
-1614.609     -8508.027  C
        0.000060000  246295.25025  4104920837.6     4.4646394     0.0002679    -0.0003096       958.370
-1698.669     -8891.802  C
        0.000062500  255969.38772  4095510203.7     4.4568550     0.0002786    -0.0003230       993.670
-1783.557     -9276.403  C
        0.000065000  265142.97894  4079122753.1     4.4413555     0.0002887    -0.0003369      1026.788
-1884.114     -9676.675  C
        0.000067500  274806.05097  4071200755.3     4.4341495     0.0002993    -0.0003504      1061.476
-1970.686    -10062.960  C
        0.000070000  284463.17861  4063759694.7     4.4271529     0.0003099    -0.0003638      1095.884
-2057.877    -10449.866  C
        0.000072500  294117.12256  4056787897.6     4.4203728     0.0003205    -0.0003773      1130.019
-2145.628    -10837.330  C
        0.000075000  304193.64348  4055915246.5     4.4208950     0.0003316    -0.0003903      1165.787
-2218.480    -11209.896  C
        0.000077500  313829.38495  4049411418.8     4.4143443     0.0003421    -0.0004038      1199.395
-2307.153    -11598.283  C
        0.000080000  323468.05955  4043350744.5     4.4080235     0.0003526    -0.0004174      1232.752
-2396.242    -11987.085  C
        0.000082500  333111.87227  4037719664.0     4.4019395     0.0003632    -0.0004309      1265.867
-2485.679    -12376.236  C
        0.000085000  343134.58260  4036877442.5     4.4024799     0.0003742    -0.0004439      1300.638
-2559.671    -12749.942  C
        0.000087500  352771.12606  4031670012.3     4.3966446     0.0003847    -0.0004575      1333.265
-2649.764    -13139.749  C
        0.000090000  362775.24951  4030836105.9     4.3971910     0.0003957    -0.0004705      1367.570
-2724.043    -13513.743  C
        0.000092500  372408.35665  4026036288.3     4.3916108     0.0004062    -0.0004841      1399.724
-2814.682    -13904.095  C
        0.000095000  382394.92906  4025209779.7     4.3921628     0.0004173    -0.0004971      1433.566
-2889.232    -14278.359  C
        0.000097500  392028.07498  4020800769.2     4.3868440     0.0004277    -0.0005107      1465.262
-2980.305    -14669.146  C
        0.000100000  401998.09504  4019980950.6     4.3874014     0.0004387    -0.0005238      1498.644
-3055.105    -15043.659  C
        0.000102500  411634.41024  4015945466.0     4.3823503     0.0004492    -0.0005374      1529.898
-3146.499    -15434.767  C
        0.000105000  421588.82490  4015131665.8     4.3829129     0.0004602    -0.0005504      1562.825
-3221.528    -15809.510  C
        0.000107500  431231.08543  4011451957.7     4.3781359     0.0004706    -0.0005640      1593.651
-3313.125    -16200.821  C
        0.000110000  441170.78940  4010643540.2     4.3787034     0.0004817    -0.0005771      1626.124
-3388.362    -16575.772  C
        0.000112500  451106.36339  4009834341.4     4.3792716     0.0004927    -0.0005901      1658.386
-3463.516    -16950.640  C
        0.000115000  460747.22867  4006497640.7     4.3747793     0.0005031    -0.0006038      1688.561
-3555.467    -17342.305  C
        0.000117500  470668.96691  4005693335.6     4.3753522     0.0005141    -0.0006168      1720.374
```

```
-3630.806    -17717.357  C
        0.000120000  480586.58898  4004888241.7     4.3759257     0.0005251    -0.0006299      1751.976
-3706.061    -18092.327  C
        0.000122500  490229.65684  4001874749.9     4.3717243     0.0005355    -0.0006435      1781.519
-3798.198    -18484.178  C
        0.000125000  500134.24656  4001073972.6     4.3723024     0.0005465    -0.0006566      1812.676
-3873.615    -18859.308  C
        0.000127500  510034.73104  4000272400.5     4.3728811     0.0005575    -0.0006696      1843.621
-3948.947    -19234.355  C
        0.000130000  519683.07580  3997562121.7     4.3689769     0.0005680    -0.0006833      1872.552
-4041.096    -19626.217  C
        0.000132500  529571.25020  3996764152.6     4.3695600     0.0005790    -0.0006963      1903.054
-4116.569    -20001.404  C
        0.000135000  539455.34947  3995965551.8     4.3701437     0.0005900    -0.0007094      1933.345
-4191.955    -20376.504  C
        0.000137500  549335.36115  3995166263.1     4.3707280     0.0006010    -0.0007225      1963.425
-4267.254    -20751.517  C
        0.000140000  559211.27989  3994366285.1     4.3713130     0.0006120    -0.0007355      1993.294
-4342.465    -21126.442  C
        0.000142500  568852.30624  3991946008.8     4.3677197     0.0006224    -0.0007492      2021.174
-4434.861    -21518.551  C
        0.000145000  578716.64439  3991149271.8     4.3683089     0.0006334    -0.0007622      2050.603
-4510.186    -21893.590  C
        0.000147500  588576.88008  3990351729.5     4.3688988     0.0006444    -0.0007753      2079.820
-4585.424    -22268.543  C
        0.000150000  598433.02331  3989553488.9     4.3694893     0.0006554    -0.0007883      2108.825
-4660.575    -22643.407  C
        0.000160000  637601.13127  3985007070.6     4.3679954     0.0006989    -0.0008411      2220.974
-4978.242    -24159.930  C
        0.000170000  676720.25701  3980707394.3     4.3668379     0.0007424    -0.0008939      2329.777
-5295.055    -25675.598  C
        0.000180000  715952.56555  3977514253.2     4.3692492     0.0007865    -0.0009460      2436.783
-5593.966    -27173.364  C
        0.000190000  754952.72061  3973435371.8     4.3684563     0.0008300    -0.0009987      2538.815
-5909.085    -28687.339  C
        0.000200000  794046.34259  3970231713.1     4.3708993     0.0008742    -0.0010508      2638.962
-6205.944    -30183.054  C
        0.000210000  833073.59149  3967017102.5     4.3733530     0.0009184    -0.0011028      2735.678
-6501.297    -31677.262  C
        0.000220000  871888.70894  3963130495.4     4.3729533     0.0009620    -0.0011555      2827.504
-6813.408    -33188.228  C
        0.000230000  910777.50550  3959902198.0     4.3754391     0.0010064    -0.0012074      2917.311
-7106.551    -34680.227  C
        0.000240000  949598.98646  3956662443.8     4.3779359     0.0010507    -0.0012593      3003.654
-7398.152    -36170.683  C
        0.000250000  988234.08590  3952936343.8     4.3779386     0.0010945    -0.0013118      3085.247
-7706.365    -37677.752  C
        0.000260000  1026916.9893  3949680728.2     4.3804682     0.0011389    -0.0013636      3164.627
-7995.569    -39165.811  C
        0.000270000  1065629.5528  3946776121.7     4.3852092     0.0011840    -0.0014147      3241.585
-8266.237    -40635.335  C
        0.000280000  1104296.4130  3943915761.0     4.3903130     0.0012293    -0.0014657      3315.203
-8530.651    -42098.604  C
        0.000290000  1142775.4942  3940605152.4     4.3928545     0.0012739    -0.0015173      3383.980
-8813.960    -43580.769  C
        0.000300000  1181184.6507  3937282169.3     4.3954074     0.0013186    -0.0015689      3449.204
-9095.678    -45061.342  C
        0.000310000  1219434.3334  3933659140.1     4.3959154     0.0013627    -0.0016210      3509.915
-9394.281    -46558.800  C
        0.000320000  1257701.5913  3930317473.0     4.3985025     0.0014075    -0.0016725      3568.023
-9673.332    -48036.707  C
        0.000330000  1295897.7994  3926963028.8     4.4011015     0.0014524    -0.0017239      3622.538
-9950.750    -49512.981  C
        0.000340000  1334022.4254  3923595369.0     4.4037125     0.0014973    -0.0017752      3673.445
-10226.543    -50987.629  C
        0.000350000  1372075.0324  3920214378.3     4.4063355     0.0015422    -0.0018265      3720.730
-10500.699    -52460.640  C
        0.000360000  1410055.1783  3916819939.9     4.4089707     0.0015872    -0.0018778      3764.377
-10773.207    -53932.003  C
        0.000370000  1447962.4159  3913411935.1     4.4116182     0.0016323    -0.0019290      3804.371
-11044.054    -55401.706  C
        0.000380000  1485796.2926  3909990243.8     4.4142781     0.0016774    -0.0019801      3840.697
-11313.228    -56869.736  C
        0.000390000  1523556.3502  3906554744.1     4.4169505     0.0017226    -0.0020311      3873.339
-11580.719    -58336.082  C
        0.000400000  1561189.1834  3902972958.7     4.4180269     0.0017672    -0.0020828      3901.855
-11865.160    -59819.379  C
        0.000410000  1598801.1599  3899515024.2     4.4207366     0.0018125    -0.0021337      3927.135
-12129.571    -61282.645  C
        0.000420000  1636337.9444  3896042724.9     4.4234592     0.0018579    -0.0021846      3948.686
-12392.265    -62744.195  C
```

```
        0.000430000  1673799.1679  3892556204.5     4.4261949     0.0019033    -0.0022355      3966.491
-12653.203    -64203.989  C
        0.000440000  1711184.2813  3889055185.0     4.4289439     0.0019487    -0.0022863      3980.535
-12912.387    -65662.028  C
        0.000450000  1748492.7920  3885539538.0     4.4317061     0.0019943    -0.0023370      3990.800
-13169.802    -67118.298  C
        0.000460000  1785724.1991  3882009128.6     4.4344819     0.0020399    -0.0023876      3997.270
-13425.435    -68572.787  C
        0.000470000  1822877.9938  3878463816.8     4.4372712     0.0020855    -0.0024382      3999.927
-13679.273    -70025.480  C
        0.000480000  1859950.8546  3874897613.9     4.4400775     0.0021312    -0.0024888      3999.118
-13931.257    -71476.319  C
        0.000490000  1896938.1297  3871302305.6     4.4429055     0.0021770    -0.0025392      3999.477
-14181.305    -72925.222  C
        0.000500000  1933840.8208  3867681641.8     4.4457534     0.0022229    -0.0025896      3999.694
-14429.424    -74372.197  C
        0.000510000  1970660.4527  3864040103.5     4.4486189     0.0022688    -0.0026400      3999.816
-14675.631    -75817.260  C
        0.000520000  2007399.1790  3860383036.7     4.4514991     0.0023148    -0.0026902      3999.878
-14919.954    -77260.438  C
        0.000530000  2044059.5395  3856716112.4     4.4543910     0.0023608    -0.0027404      3999.902
-15162.427    -78701.767  C
        0.000540000  2080599.4565  3852961956.7     4.4572529     0.0024069    -0.0027906      3999.895
-15403.693    -80000.000  CG
        0.000550000  2116234.9554  3847699919.1     4.4594131     0.0024527    -0.0028411      3999.848
-15654.494    -80000.000  CG
        0.000600000  2267486.9677  3779144946.3     4.4490830     0.0026694    -0.0031056      3999.809
-17257.361    -80000.000  CG
        0.000650000  2383692.5228  3667219266.0     4.4152834     0.0028699    -0.0033863      3999.796
-19332.599    -80000.000  CG
        0.000700000  2469080.9027  3527258432.6     4.3871952     0.0030710    -0.0036665      3998.701
-21389.912    -80000.000  CG
        0.000750000  2530030.0961  3373373461.6     4.3714096     0.0032786    -0.0039402      3999.673
-23261.100    -80000.000  CG
        0.000800000  2576649.6643  3220812080.5     4.3609584     0.0034888    -0.0042112      3999.858
-25054.307    -80000.000  CG
        0.000850000  2613493.3763  3074698089.8     4.3522463     0.0036994    -0.0044818      3999.604
-26834.960    -80000.000  CG


     ------------------------------------------------------------------------------
        Summary of Results for Nominal (Unfactored) Moment Capacity for Section
                                    Z Axis
     ------------------------------------------------------------------------------

         Load            Axial Thrust        Nominal Mom. Cap.      Max. Comp.
          No.                lb                   in-lb               Strain
         ----         ----------------     ------------------     ------------
           1                 0.000            2413854.79           0.00300000


     ------------------------------------------------------------------------------
         Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
                        Section: 1 (Cased), Y Axis
     ------------------------------------------------------------------------------

     Input Axial Thrust Forces:
     --------------------------

     Number of Axial Thrust Force Values = 1

        Number     Axial Thrust Force
                          lbs
        ------     ------------------
           1               0.000

          Axial Thrust Force =       0.000  lbs ,127

         Bending       Bending       Bending       Depth to      Max Comp      Max Tens    Max Concrete   Max
Reinf     Max Casing   Run
        Curvature      Moment       Stiffness       N Axis        Strain        Strain        Stress
Stress        Stress     Msg
         rad/in.       in-lb          lb-in2          in          in/in         in/in         in/in          psi
          psi
       ------------- ------------- ------------- ------------- ------------- ------------- -------------
------------- -------------  ---
        0.000000000      0.000000                                 0.0000000     0.0000000         0.000
0.000         0.000
        0.000001250   5977.538139  4782030511.6     4.8125000     0.0000060    -0.0000060        23.142
```

```
-22.779      -172.636
        0.000002500  11951.937307  4780774923.1     4.8125000     0.0000120    -0.0000120        46.216
-45.558      -345.272
        0.000003750  17923.197504  4779519334.5     4.8125000     0.0000180    -0.0000180        69.224
68.337      -517.908
        0.000005000  23891.318729  4778263746.0     4.8125000     0.0000241    -0.0000241        92.164
-91.116      -690.544
        0.000006250  29856.300983  4777008157.5     4.8125000     0.0000301    -0.0000301       115.037
-113.895      -863.180
        0.000007500  35818.144265  4775752568.9     4.8125000     0.0000361    -0.0000361       137.843
-136.674     -1035.815
        0.000008750  41776.848577  4774496980.4     4.8125000     0.0000421    -0.0000421       160.582
-159.453     -1208.451
        0.000010000  47732.413916  4773241391.9     4.8125000     0.0000481    -0.0000481       183.254
-182.232     -1381.087
        0.000011250  53684.840285  4771985803.3     4.8125000     0.0000541    -0.0000541       205.858
-205.011     -1553.723
        0.000012500  59634.127682  4770730214.8     4.8125000     0.0000602    -0.0000602       228.396
-227.790     -1726.359
        0.000013750  65580.276108  4769474626.3     4.8125000     0.0000662    -0.0000662       250.866
-250.569     -1898.995
        0.000015000  71523.285563  4768219037.7     4.8125000     0.0000722    -0.0000722       273.269
-273.348     -2071.631
        0.000016250  77463.156046  4766963449.2     4.8125000     0.0000782    -0.0000782       295.606
-296.127     -2244.267
        0.000017500  83399.887558  4765707860.7     4.8125000     0.0000842    -0.0000842       317.874
-318.906     -2416.903
        0.000018750  89333.480099  4764452272.2     4.8125000     0.0000902    -0.0000902       340.076
-341.685     -2589.539
        0.000020000  95263.933668  4763196683.6     4.8125000     0.0000962    -0.0000962       362.211
-364.464     -2762.174
        0.000021250  101191.24827  4761941095.1     4.8125000     0.0001023    -0.0001023       384.278
-387.243      2934.810
        0.000022500  107115.42389  4760685506.6     4.8125000     0.0001083    -0.0001083       406.279
-410.021     -3107.446
        0.000023750  113036.46055  4759429918.0     4.8125000     0.0001143    -0.0001143       428.212
-432.800     -3280.082
        0.000025000  118954.35823  4758174329.5     4.8125000     0.0001203    -0.0001203       450.078
-455.579     -3452.718  C
        0.000026250  124869.11694  4756918741.0     4.8125000     0.0001263    -0.0001263       471.877
-478.358     -3625.354  C
        0.000027500  130049.84188  4729085159.7     4.8024239     0.0001321    -0.0001326       492.509
-509.173     -3806.026  C
        0.000028750  134583.24318  4681156284.8     4.7839097     0.0001375    -0.0001392       512.019
-547.754     -3994.463  C
        0.000030000  138762.75703  4625425234.6     4.7611532     0.0001428    -0.0001459       530.790
-591.367     -4187.934  C
        0.000031250  143307.58898  4585842847.6     4.7443908     0.0001483    -0.0001525       550.023
-631.198     -4377.622  C
        0.000032500  147093.31924  4525948284.6     4.7175152     0.0001533    -0.0001595       567.748
-681.777     -4578.057  C
        0.000033750  151398.02836  4485867507.1     4.6987973     0.0001586    -0.0001663       586.242
-726.319     -4772.456  C
        0.000035000  155625.97356  4446456387.6     4.6796223     0.0001638    -0.0001731       604.441
-772.682     -4968.676  C
        0.000036250  159792.05641  4408056728.7     4.6601339     0.0001689    -0.0001800       622.360
-820.765     -5166.616  C
        0.000037500  163910.31489  4370941730.7     4.6404587     0.0001740    -0.0001869       640.016
-870.464     -5366.172  C
        0.000038750  168661.93717  4352566120.7     4.6306582     0.0001794    -0.0001935       658.917
-910.493     -5556.058  C
        0.000040000  172711.67364  4317791841.2     4.6109177     0.0001844    -0.0002006       676.134
-962.763     -5758.185  C
        0.000041250  176746.44790  4284762373.4     4.5912538     0.0001894    -0.0002076       693.128
-1016.372     -5961.651  C
        0.000042500  181416.20446  4268616575.6     4.5815663     0.0001947    -0.0002143       711.520
-1059.111     -6154.247  C
        0.000043750  186067.21492  4252964912.5     4.5719374     0.0002000    -0.0002211       729.778
-1102.478     -6347.471  C
        0.000045000  190701.72778  4237816173.0     4.5623773     0.0002053    -0.0002278       747.905
-1146.453     -6541.303  C
        0.000046250  194695.74543  4209637739.1     4.5433053     0.0002101    -0.0002350       764.212
-1203.879     -6748.586  C
        0.000047500  199310.96714  4196020361.0     4.5340042     0.0002154    -0.0002418       782.063
-1249.229     -6943.793  C
        0.000048750  203917.64654  4182926083.1     4.5248098     0.0002206    -0.0002486       799.795
-1295.102     -7139.523  C
        0.000050000  208517.81383  4170356276.8     4.5157310     0.0002258    -0.0002555       817.414
-1341.474     -7335.752  C
        0.000052500  217706.45045  4146789532.6     4.4979549     0.0002361    -0.0002692       852.325
-1435.612     -7729.603  C
```

```
        0.000055000  227440.42884  4135280524.5     4.4895011     0.0002469    -0.0002825       888.628
-1517.459     -8111.164  C
        0.000057500  236603.91691  4114850729.0     4.4726045     0.0002572    -0.0002963       922.759
-1614.609     -8508.027  C
        0.000060000  246295.25025  4104920837.6     4.4646394     0.0002679    -0.0003096       958.370
-1698.669     -8891.802  C
        0.000062500  255969.38772  4095510203.7     4.4568550     0.0002786    -0.0003230       993.670
-1783.557     -9276.403  C
        0.000065000  265142.97894  4079122753.1     4.4413555     0.0002887    -0.0003369      1026.788
-1884.114     -9676.675  C
        0.000067500  274806.05097  4071200755.3     4.4341495     0.0002993    -0.0003504      1061.476
-1970.686    -10062.960  C
        0.000070000  284463.17861  4063759694.7     4.4271529     0.0003099    -0.0003638      1095.884
-2057.877    -10449.866  C
        0.000072500  294117.12256  4056787897.6     4.4203728     0.0003205    -0.0003773      1130.019
-2145.628    -10837.330  C
        0.000075000  304193.64348  4055915246.5     4.4208950     0.0003316    -0.0003903      1165.787
-2218.480    -11209.896  C
        0.000077500  313829.38495  4049411418.8     4.4143443     0.0003421    -0.0004038      1199.395
-2307.153    -11598.283  C
        0.000080000  323468.05955  4043350744.5     4.4080235     0.0003526    -0.0004174      1232.752
-2396.242    -11987.085  C
        0.000082500  333111.87227  4037719664.0     4.4019395     0.0003632    -0.0004309      1265.867
-2485.679    -12376.236  C
        0.000085000  343134.58260  4036877442.5     4.4024799     0.0003742    -0.0004439      1300.638
-2559.671    -12749.942  C
        0.000087500  352771.12606  4031670012.3     4.3966446     0.0003847    -0.0004575      1333.265
-2649.764    -13139.749  C
        0.000090000  362775.24951  4030836105.9     4.3971910     0.0003957    -0.0004705      1367.570
-2724.043    -13513.743  C
        0.000092500  372408.35665  4026036288.3     4.3916108     0.0004062    -0.0004841      1399.724
-2814.682    -13904.095  C
        0.000095000  382394.92906  4025209779.7     4.3921628     0.0004173    -0.0004971      1433.566
-2889.232    -14278.359  C
        0.000097500  392028.07498  4020800769.2     4.3868440     0.0004277    -0.0005107      1465.262
-2980.305    -14669.146  C
        0.000100000  401998.09504  4019980950.6     4.3874014     0.0004387    -0.0005238      1498.644
-3055.105    -15043.659  C
        0.000102500  411634.41024  4015945466.0     4.3823503     0.0004492    -0.0005374      1529.898
-3146.499    -15434.767  C
        0.000105000  421588.82490  4015131665.8     4.3829129     0.0004602    -0.0005504      1562.825
-3221.528    -15809.510  C
        0.000107500  431231.08543  4011451957.7     4.3781359     0.0004706    -0.0005640      1593.651
-3313.125    -16200.821  C
        0.000110000  441170.78940  4010643540.2     4.3787034     0.0004817    -0.0005771      1626.124
-3388.362    -16575.772  C
        0.000112500  451106.36339  4009834341.4     4.3792716     0.0004927    -0.0005901      1658.386
-3463.516    -16950.640  C
        0.000115000  460747.22867  4006497640.7     4.3747793     0.0005031    -0.0006038      1688.561
-3555.467    -17342.305  C
        0.000117500  470668.96691  4005693335.6     4.3753522     0.0005141    -0.0006168      1720.374
-3630.806    -17717.357  C
        0.000120000  480586.58898  4004888241.7     4.3759257     0.0005251    -0.0006299      1751.976
-3706.061    -18092.327  C
        0.000122500  490229.65684  4001874749.9     4.3717243     0.0005355    -0.0006435      1781.519
-3798.198    -18484.178  C
        0.000125000  500134.24656  4001073972.6     4.3723024     0.0005465    -0.0006566      1812.676
-3873.615    -18859.308  C
        0.000127500  510034.73104  4000272400.5     4.3728811     0.0005575    -0.0006696      1843.621
-3948.947    -19234.355  C
        0.000130000  519683.07580  3997562121.7     4.3689769     0.0005680    -0.0006833      1872.552
-4041.096    -19626.217  C
        0.000132500  529571.25020  3996764152.6     4.3695600     0.0005790    -0.0006963      1903.054
-4116.569    -20001.404  C
        0.000135000  539455.34947  3995965551.8     4.3701437     0.0005900    -0.0007094      1933.345
-4191.955    -20376.504  C
        0.000137500  549335.36115  3995166263.1     4.3707280     0.0006010    -0.0007225      1963.425
-4267.254    -20751.517  C
        0.000140000  559211.27989  3994366285.1     4.3713130     0.0006120    -0.0007355      1993.294
-4342.465    -21126.442  C
        0.000142500  568852.30624  3991946008.8     4.3677197     0.0006224    -0.0007492      2021.174
-4434.861    -21518.551  C
        0.000145000  578716.64439  3991149271.8     4.3683089     0.0006334    -0.0007622      2050.603
-4510.186    -21893.590  C
        0.000147500  588576.88008  3990351729.5     4.3688988     0.0006444    -0.0007753      2079.820
-4585.424    -22268.543  C
        0.000150000  598433.02331  3989553488.9     4.3694893     0.0006554    -0.0007883      2108.825
-4660.575    -22643.407  C
        0.000160000  637601.13127  3985007070.6     4.3679954     0.0006989    -0.0008411      2220.974
-4978.242    -24159.930  C
        0.000170000  676720.25701  3980707394.3     4.3668379     0.0007424    -0.0008939      2329.777
```

```
-5295.055    -25675.598  C
        0.000180000  715952.56555  3977514253.2     4.3692492     0.0007865    -0.0009460      2436.783
-5593.966    -27173.364  C
        0.000190000  754952.72061  3973435371.8     4.3684563     0.0008300    -0.0009987      2538.815
-5909.085    -28687.339  C
        0.000200000  794046.34259  3970231713.1     4.3708993     0.0008742    -0.0010508      2638.962
-6205.944    -30183.054  C
        0.000210000  833073.59149  3967017102.5     4.3733530     0.0009184    -0.0011028      2735.678
-6501.297    -31677.262  C
        0.000220000  871888.70894  3963130495.4     4.3729533     0.0009620    -0.0011555      2827.504
-6813.408    -33188.228  C
        0.000230000  910777.50550  3959902198.0     4.3754391     0.0010064    -0.0012074      2917.311
-7106.551    -34680.227  C
        0.000240000  949598.98646  3956662443.8     4.3779359     0.0010507    -0.0012593      3003.654
-7398.152    -36170.683  C
        0.000250000  988234.08590  3952936343.8     4.3779386     0.0010945    -0.0013118      3085.247
-7706.365    -37677.752  C
        0.000260000  1026916.9893  3949680728.2     4.3804682     0.0011389    -0.0013636      3164.627
-7995.569    -39165.811  C
        0.000270000  1065629.5528  3946776121.7     4.3852092     0.0011840    -0.0014147      3241.585
-8266.237    -40635.335  C
        0.000280000  1104296.4130  3943915761.0     4.3903130     0.0012293    -0.0014657      3315.203
-8530.651    -42098.604  C
        0.000290000  1142775.4942  3940605152.4     4.3928545     0.0012739    -0.0015173      3383.980
-8813.960    -43580.769  C
        0.000300000  1181184.6507  3937282169.3     4.3954074     0.0013186    -0.0015689      3449.204
-9095.678    -45061.342  C
        0.000310000  1219434.3334  3933659140.1     4.3959154     0.0013627    -0.0016210      3509.915
-9394.281    -46558.800  C
        0.000320000  1257701.5913  3930317473.0     4.3985025     0.0014075    -0.0016725      3568.023
-9673.332    -48036.707  C
        0.000330000  1295897.7994  3926963028.8     4.4011015     0.0014524    -0.0017239      3622.538
-9950.750    -49512.981  C
        0.000340000  1334022.4254  3923595369.0     4.4037125     0.0014973    -0.0017752      3673.445
-10226.543    -50987.629  C
        0.000350000  1372075.0324  3920214378.3     4.4063355     0.0015422    -0.0018265      3720.730
-10500.699    -52460.640  C
        0.000360000  1410055.1783  3916819939.9     4.4089707     0.0015872    -0.0018778      3764.377
-10773.207    -53932.003  C
        0.000370000  1447962.4159  3913411935.1     4.4116182     0.0016323    -0.0019290      3804.371
-11044.054    -55401.706  C
        0.000380000  1485796.2926  3909990243.8     4.4142781     0.0016774    -0.0019801      3840.697
-11313.228    -56869.736  C
        0.000390000  1523556.3502  3906554744.1     4.4169505     0.0017226    -0.0020311      3873.339
-11580.719    -58336.082  C
        0.000400000  1561189.1834  3902972958.7     4.4180269     0.0017672    -0.0020828      3901.855
-11865.160    -59819.379  C
        0.000410000  1598801.1599  3899515024.2     4.4207366     0.0018125    -0.0021337      3927.135
-12129.571    -61282.645  C
        0.000420000  1636337.9444  3896042724.9     4.4234592     0.0018579    -0.0021846      3948.686
-12392.265    -62744.195  C
        0.000430000  1673799.1679  3892556204.5     4.4261949     0.0019033    -0.0022355      3966.491
-12653.203    -64203.989  C
        0.000440000  1711184.2813  3889055185.0     4.4289439     0.0019487    -0.0022863      3980.535
-12912.387    -65662.028  C
        0.000450000  1748492.7920  3885539538.0     4.4317061     0.0019943    -0.0023370      3990.800
-13169.802    -67118.298  C
        0.000460000  1785724.1991  3882009128.6     4.4344819     0.0020399    -0.0023876      3997.270
-13425.435    -68572.787  C
        0.000470000  1822877.9938  3878463816.8     4.4372712     0.0020855    -0.0024382      3999.927
-13679.273    -70025.480  C
        0.000480000  1859950.8546  3874897613.9     4.4400775     0.0021312    -0.0024888      3999.118
-13931.257    -71476.319  C
        0.000490000  1896938.1297  3871302305.6     4.4429055     0.0021770    -0.0025392      3999.477
-14181.305    -72925.222  C
        0.000500000  1933840.8208  3867681641.8     4.4457534     0.0022229    -0.0025896      3999.694
-14429.424    -74372.197  C
        0.000510000  1970660.4527  3864040103.5     4.4486189     0.0022688    -0.0026400      3999.816
-14675.631    -75817.260  C
        0.000520000  2007399.1790  3860383036.7     4.4514991     0.0023148    -0.0026902      3999.878
-14919.954    -77260.438  C
        0.000530000  2044059.5395  3856716112.4     4.4543910     0.0023608    -0.0027404      3999.902
-15162.427    -78701.767  C
        0.000540000  2080599.4565  3852961956.7     4.4572529     0.0024069    -0.0027906      3999.895
-15403.693    -80000.000  CG
        0.000550000  2116234.9554  3847699919.1     4.4594131     0.0024527    -0.0028411      3999.848
-15654.494    -80000.000  CG
        0.000600000  2267486.9677  3779144946.3     4.4490830     0.0026694    -0.0031056      3999.809
-17257.361    -80000.000  CG
        0.000650000  2383692.5228  3667219266.0     4.4152834     0.0028699    -0.0033863      3999.796
-19332.599    -80000.000  CG
```

```
       0.000700000  2469080.9027  3527258432.6     4.3871952     0.0030710    -0.0036665      3998.701
-21389.912    -80000.000  CG
       0.000750000  2530030.0961  3373373461.6     4.3714096     0.0032786    -0.0039402      3999.673
-23261.100    -80000.000  CG
       0.000800000  2576649.6643  3220812080.5     4.3609584     0.0034888    -0.0042112      3999.858
-25054.307    -80000.000  CG
       0.000850000  2613493.3763  3074698089.8     4.3522463     0.0036994    -0.0044818      3999.604
-26834.960    -80000.000  CG
```

Summary of Results for Nominal (Unfactored) Moment Capacity for Section
Y Axis

Load No.	Axial Thrust lb	Nominal Mom. Cap. in-lb	Max. Comp. Strain
1	0.000	2413854.79	0.00300000

* TABLE K * REDUCTION FACTORS

AVERAGE DIAMETER IS USED TO GET RATIO S/B

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS ALONG Y-DIRECTION
ESTIMATED ASSUMING MOVEMENT IN THE DIRECTION OF Y-FORCE (-)

GROUP NO	P-FACTOR	Y-FACTOR
1	0.9179	1.0000
2	0.7095	1.0000
3	0.9179	1.0000

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS ALONG Z-DIRECTION
ESTIMATED ASSUMING MOVEMENT IN THE DIRECTION OF Z-FORCE (+)

GROUP NO	P-FACTOR	Y-FACTOR
1	0.6791	1.0000
2	0.7369	1.0000
3	0.9189	1.0000

```
================================================================================

                 GROUP for Windows, Version 2016.10.10

                  Serial Number : 157432285

                  Analysis of A Group of Piles
                Subjected to Axial and Lateral Loading

                 (c) Copyright ENSOFT, Inc., 1987-2015
                       All Rights Reserved

================================================================================


--------------------------------------------------------------------------------
                     Time and Date of Analysis
--------------------------------------------------------------------------------

          Date:  October 08, 2024     Time:  15:50:16



            *****     COMPUTATION RESULTS     *****


New Group



            *****     LOAD CASES RESULTS      *****


LOAD CASE :     1
CASE NAME : Load Case
LOAD TYPE : Live, LL

  REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
  ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

       GROUP NO     P-FACTOR     Y-FACTOR

           1           0.9179       1.0000
           2           0.7095       1.0000
           3           0.9179       1.0000


* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

      VERT. LOAD, LBS    HOR. LOAD Y, LBS   HOR. LOAD Z, LBS
            0.00000           -33000.0           0.00000

     MOMENT X ,LBS-IN    MOMENT Y,LBS-IN    MOMENT Z,LBS-IN
        6.49440E+05            0.00000            0.00000

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

       VERTICAL ,IN      HORIZONTAL Y,IN     HORIZONTAL Z,IN
       -6.78417E-15           -0.49813       -3.32574E-13

     ANGLE ROT. X,RAD    ANGLE ROT. Y,RAD    ANGLE ROT. Z,RAD
        6.88442E-14        -4.62798E-24        7.76815E-16


  THE GLOBAL STRUCTURAL COORDINATE SYSTEM
  ---------------------------------------

  * PILE TOP DISPLACEMENTS *

 PILE GROUP   DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
```

1	-6.7842E-15	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
2	-1.9213E-14	-0.4981	7.6893E-13	6.8844E-14	-4.6280E-24	7.7681E-16
3	-6.7842E-15	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
MINIMUM	-1.9213E-14	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	2	1	1	1	1	1
MAXIMUM	-6.7842E-15	-0.4981	7.6893E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	1	1	2	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,LBS	FOR. Y,LBS	FOR. Z,LBS	MOM X,LBS-IN	MOM Y,LBS-IN	MOM Z,LBS-IN
1	-1.1222E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	-2.0483E-08
2	-3.1689E-08	-9978.3	1.6738E-08	0.0000	0.0000	0.0000
3	-1.1222E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	0.0000
MINIMUM	-3.1689E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	-1.1222E-08	-9978.3	1.6738E-08	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	-6.8147E-15	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
2	-1.9244E-14	-0.4981	7.6893E-13	6.8844E-14	-4.6280E-24	7.7681E-16
3	-6.8147E-15	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
MINIMUM	-1.9244E-14	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	2	1	1	1	1	1
MAXIMUM	-6.8147E-15	-0.4981	7.6893E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	1	1	2	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,LBS	LAT. y,LBS	LAT. z,LBS	MOM x,LBS-IN	MOM y,LBS-IN	MOM z,LBS-IN
1	-1.1222E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	-2.0483E-08
2	-3.1690E-08	-9978.3	1.6738E-08	0.0000	0.0000	0.0000
3	-1.1222E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	0.0000
MINIMUM	-3.1690E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	-1.1222E-08	-9978.3	1.6738E-08	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

PILE GROUP	STRESS,LBS/IN**2
1	4.5669E-10
2	4.3554E-10
3	1.5424E-10
MINIMUM	1.5424E-10
Pile N.	3
MAXIMUM	4.5669E-10
Pile N.	1

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR LBS-IN	MOMENT y-DIR LBS-IN	SHEAR y-DIR LBS	SHEAR z-DIR LBS	SOIL REACT y-DIR LBS/IN	SOIL REACT z-DIR LBS/IN	TOTAL STRESS LBS/IN**2	FLEX. RIG. z-DIR LBS-IN**2	FLEX. RIG. y-DIR LBS-IN**2
1	-0.4981	-3.3257E-13	-4.5027E+05	-3.3631E-07	-1.1511E+04	-8.3679E-09	-395.98	-2.8268E-10	1.5424E-10	4.0099E+09	4.7820E+09
x(FT)	0.0000	0.0000	4.8000	4.8000	0.0000	0.0000	4.5000	4.5000	23.400	4.8000	0.0000
2	-0.4981	-1.7203E-14	-4.1002E+05	-5.0545E-08	-9978.3	-1.0595E-08	-326.52	-2.0441E-10			

```
4.3554E-10  4.0166E+09  4.7820E+09
     x(FT)      0.0000      10.500      5.1000      14.700      0.0000      8.4000      4.8000      11.100
0.0000      5.1000      0.0000
       3      -0.4981 -3.3257E-13 -4.5027E+05 -3.3631E-07 -1.1511E+04 -8.3679E-09     -395.98 -2.8268E-10
1.5424E-10  4.0099E+09  4.7820E+09
     x(FT)      0.0000      0.0000      4.8000      4.8000      0.0000      0.0000      4.5000      4.5000
0.0000      4.8000      0.0000

      Min.      -0.4981 -3.3257E-13 -4.5027E+05 -3.3631E-07 -1.1511E+04 -1.0595E-08     -395.98 -2.8268E-10
1.5424E-10  4.0099E+09  4.7820E+09
   Pile N.       1           1           1           1           1           2           1           1
1           1           1
```

* MAXIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR	DISPL. z-DIR	MOMENT z-DIR	MOMENT y-DIR	SHEAR y-DIR	SHEAR z-DIR	SOIL REACT y-DIR	SOIL REACT z-DIR	TOTAL FLEX. RIG. STRESS	FLEX. RIG. z-DIR	FLEX. RIG. y-DIR
	IN	IN	LBS-IN	LBS-IN	LBS	LBS	LBS/IN	LBS/IN	LBS/IN**2	LBS-IN**2	LBS-IN**2
1	0.011186	7.6563E-15	3.5138E+04	2.5420E-08	7200.9	5.2756E-09	159.38	1.1478E-10	6648.8	4.7820E+09	4.7820E+09
x(FT)	9.6000	9.9000	13.800	14.100	7.8000	8.1000	10.800	10.800	4.8000	11.700	0.0000
2	0.010859	7.6893E-13	3.0013E+04	7.0649E-07	6234.6	1.6738E-08	125.46	5.4019E-10	6054.4	4.7820E+09	4.7820E+09
x(FT)	10.200	0.0000	14.400	5.1000	8.1000	0.0000	10.800	4.8000	5.1000	12.600	0.0000
3	0.011186	7.6563E-15	3.5138E+04	2.5420E-08	7200.9	5.2756E-09	159.38	1.1478E-10	6648.8	4.7820E+09	4.7820E+09
x(FT)	9.6000	9.9000	13.800	14.100	7.8000	8.1000	10.800	10.800	4.8000	16.500	0.0000
Max.	0.011186	7.6893E-13	3.5138E+04	7.0649E-07	7200.9	1.6738E-08	159.38	5.4019E-10	6648.8	4.7820E+09	4.7820E+09
Pile N.	1	2	1	2	1	2	1	2	1	1	1

***** SUMMARY FOR LOAD CASES AND COMBINATIONS *****

***** LOAD CASES RESULTS *****

LOAD CASE : 1

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,LBS	LOAD Y,LBS	LOAD Z,LBS	MOM X,LBS-IN	MOM Y,LBS-IN	MOM Z,LBS-IN
0.00000	-33000.0	0.00000	6.49440E+05	0.00000	0.00000

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
-6.78417E-15	-0.49813	-3.32574E-13	6.88442E-14	-4.62798E-24	7.76815E-16

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
MINIMUM	-1.9213E-14	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	2	1	1	1	1	1
MAXIMUM	-6.7842E-15	-0.4981	7.6893E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	1	1	2	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,LBS	FOR. Y,LBS	FOR. Z,LBS	MOM X,LBS-IN	MOM Y,LBS-IN	MOM Z,LBS-IN
MINIMUM	-3.1689E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	-1.1222E-08	-9978.3	1.6738E-08	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
MINIMUM	-1.9244E-14	-0.4981	-3.3257E-13	6.8844E-14	-4.6280E-24	7.7681E-16

Pile N.	2	1	1	1	1	1
MAXIMUM	-6.8147E-15	-0.4981	7.6893E-13	6.8844E-14	-4.6280E-24	7.7681E-16
Pile N.	1	1	2	1	1	1

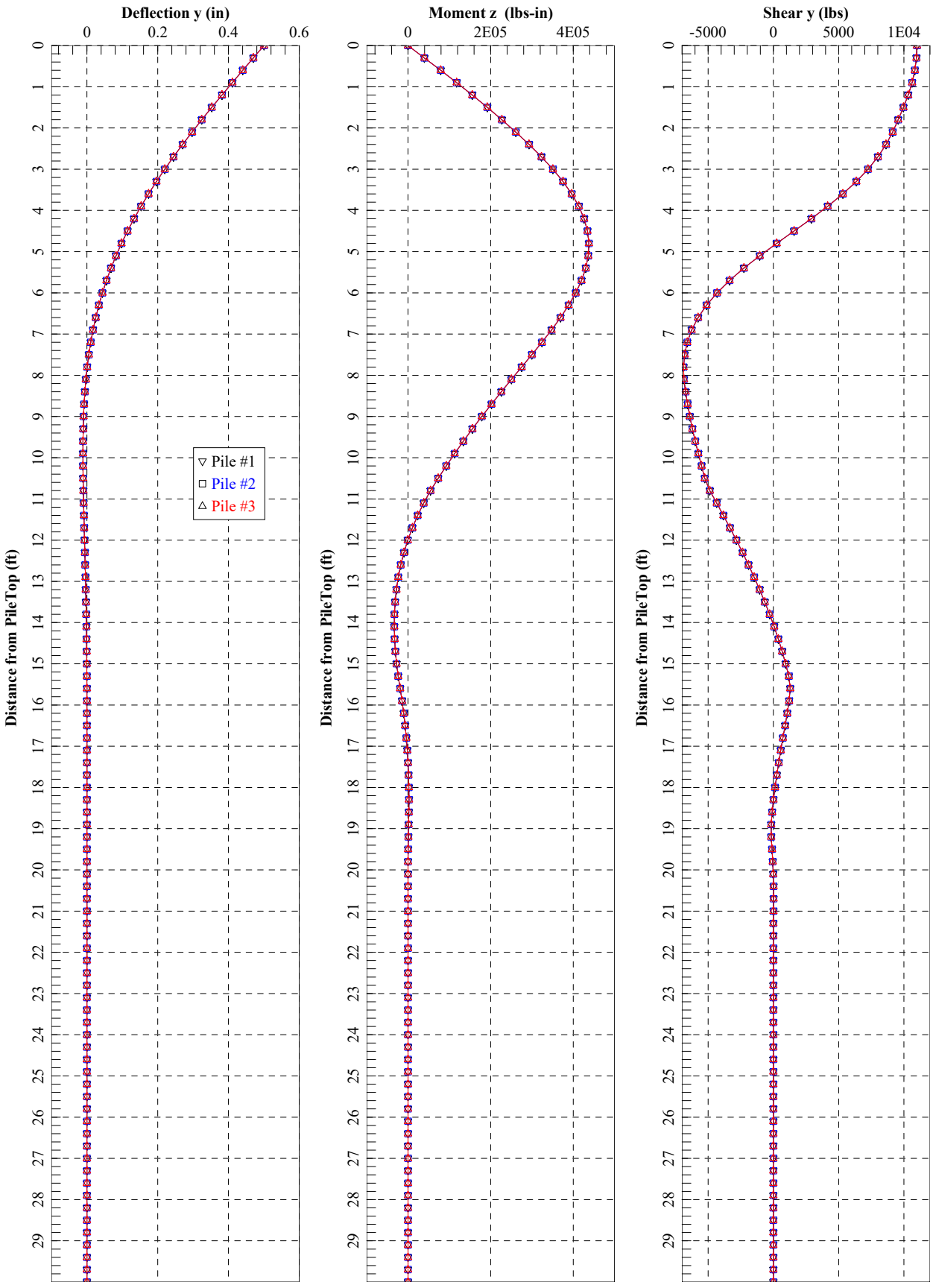
* PILE TOP REACTIONS, LOCAL *

	AXIAL,LBS	LAT. y,LBS	LAT. z,LBS	MOM x,LBS-IN	MOM y,LBS-IN	MOM z,LBS-IN
	**********	**********	**********	**********	**********	**********
MINIMUM	-3.1690E-08	-1.1511E+04	-8.3679E-09	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	-1.1222E-08	-9978.3	1.6738E-08	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR LBS-IN	MOMENT y-DIR LBS-IN	SHEAR y-DIR LBS	SHEAR z-DIR LBS	SOIL REACT y-DIR LBS/IN	SOIL REACT z-DIR LBS/IN	TOTAL STRESS LBS/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-0.4981	-3.3257E-13	-4.5027E+05	-3.3631E-07	-1.1511E+04	-1.0595E-08	-395.98	-2.8268E-10	1.5424E-10
Pile N.	1	1	1	1	1	2	1	1	1
Max.	0.011186	7.6893E-13	3.5138E+04	7.0649E-07	7200.9	1.6738E-08	159.38	5.4019E-10	6648.8
Pile N.	1	2	1	2	1	2	1	2	1

West Restrain Beam Micropiles



```
================================================================================

                 GROUP for Windows, Version 2016.10.10

                  Serial Number : 157432285

                  Analysis of A Group of Piles
               Subjected to Axial and Lateral Loading

                (c) Copyright ENSOFT, Inc., 1987-2015
                     All Rights Reserved

================================================================================


This program is licensed to :

Gerhart Cole, Inc
Draper, UT

Path to file locations      : J:\PROJECTS\HDR\22-1474 14600 South SES\Analyses\Micropiles\Group\
Name of input data file     : 33 kip opposite.gp10r
Name of output echo file    : 33 kip opposite.gp10e
Name of output results file : 33 kip opposite.gp10o
Name of output summary file : 33 kip opposite.gp10t
Name of plot output file    : 33 kip opposite.gp10p
Name of runtime file        : 33 kip opposite.gp10r


--------------------------------------------------------------------------------
                      Time and Date of Analysis
--------------------------------------------------------------------------------

          Date:  October 08, 2024     Time:  15:47:01




           *****     INPUT INFORMATION     *****


New Group

ANALYSIS TYPE = 3D ANALYSIS

ADJUST DEPTH FOR BATTER PILES

GENERATE LOAD-DISP (AND T-R) CURVES BASED ON SOIL PROFILE

EXTEND INTERPOLATION FOR L-DP (AND T-R) CURVES

UNITS SYSTEM  = ENGL


* TABLE B *  PILE CAP OPTIONS

LENGTH,YY    ( FT ) =    3.000
WIDTH, ZZ    ( FT ) =    5.000
THICKNESS,XX ( FT ) =    1.000

* PILE CAP DIMENSIONS ARE NOT CONSIDERED
  FOR THE PILE GROUP ANALYSIS



* TABLE C *  LOAD AND CONTROL PARAMETERS


** LOAD CASES **


NUMBER OF LOAD CASES :    1


LOAD CASE    :     1
CASE NAME    : Load Case
LOAD TYPE    : Live, LL
```

SCALE FACTOR : 1.0000

* CONCENTRATED LOADS *

NL	VERT.LOAD LBS	HR.LOAD Y LBS	HR.LOAD Z LBS	MOMENT X LBS-IN	MOMENT Y LBS-IN	MOMENT Z LBS-IN	COORD X FT	COORD Y FT	COORD Z FT
1	0.00	3.30E+04	0.00	0.00	0.00	0.00	0.00	0.00	1.64

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

VER.LOAD X,LBS	HOR.LOAD Y,LBS	HOR.LOAD Z,LBS
0.00000	33000.0	0.00000

MOMENT X,LBS-IN	MOMENT Y,LBS-IN	MOMENT Z,LBS-IN
-6.49440E+05	0.00000	0.00000

* THE LOADING IS STATIC *

* CONTROL PARAMETERS *
TOLERANCE ON CONVERGENCE OF PILE CAP MOVEMENT = 1.00000E-04
TOLERANCE ON DETERMINATION OF PILE DEFLECTIONS = 1.00000E-04 IN
MAX NO OF ITERATIONS ALLOWED FOR FOUNDATION ANALYSIS = 100
MAXIMUM NO OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
FACTOR TO APPLY THE LOAD IN INCREMENTS = 1.0000
MINIMUM FACTOR FOR LOAD INCREMENTS = 1.0000
PRINT RESULTS ONLY AT PILE CAP

* TABLE D * ARRANGEMENT OF PILE GROUPS

GROUP	CONN.Z-Z	CONN.Y-Y	PILE PROP	P-Y CURVE	L-S CURVE	T-R CURVE	R-F-L SET
1	PIN	PIN	1	0	1 G	1 G	0
2	PIN	PIN	1	0	1 G	1 G	0
3	PIN	PIN	1	0	1 G	1 G	0

GROUP	CorX,FT	CorY,FT	CorZ,FT	ALPHA,DEG	BETA,DEG	THETA,DEG	GROUND,FT	SPz,LBS-IN	SPy,LBS-IN
1	0.000	0.000	0.000	0.000	90.00	0.000	0.000	0.000	0.000
2	0.000	1.333	1.640	0.000	90.00	0.000	0.000	0.000	0.000
3	0.000	0.000	3.280	0.000	90.00	0.000	0.000	0.000	0.000

* TABLE E * PILE GEOMETRY AND PROPERTIES
PILE TYPE = 1 - DRIVEN PILE
= 2 - DRILLED SHAFT

PROP	SECTS	INC	PILE TYPE	LENGTH, FT
1	1	100	2	30.000

* PILE SECTIONS *

PROP	SECT	FROM,FT	TO,FT	CROSS SECT
1	1	0.00000	30.0000	1

* PILE CROSS SECTIONS *

CROSS SECTION : 1
SECTION NAME : Cased

TYPE : NONLINEAR
CROSS SECTION TYPE : ROUND CONC. SHAFT, CASING (AND STEEL SECTION)
CONCRETE DIAMETER : 8.83500 IN
CONCRETE FC : 4000.00 LBS/IN**2
DIAMETER CASING : 9.62500 IN
THICKNESS CASING : 0.39500 IN
ES CASING : 2.90000E+07 LBS/IN**2
FY CASING : 80000.0 LBS/IN**2
NUMBER REBARS : 1
DIAMETER REINF. : 1.27000 IN
AREA REINFORCEMENT : 1.27000 IN**2
ES REINFORCEMENT : 2.90000E+07 LBS/IN**2
FY REINFORCEMENT : 75000.0 LBS/IN**2
REINF. LAYOUT : MANUAL
REINF. COORDS : IN IN
- REBAR 1 : 0.00000 0.00000
EQ. YOUNG MODULUS : 8.04592E+06 LBS/IN**2

* PILE CROSS SECTIONS PROPERTIES *

NONLINEAR SECTIONS

SECT	DIAM,IN	AREA,IN**2	Iz,IN**4	Iy,IN**4	GJ,LBS-IN**2	EIz IND	EIy IND	Mn,LBS-IN	Vn,LBS
1	8.8350	72.760	0.0000	0.0000	3.5885E+09	0	0	0.0000	0.0000

* TABLE F * SOIL DATA

SOILS INFORMATION

GROUND SURFACE = 0.00000 FT

4 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SAND USING API CRITERIA

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	0.00000	8.50000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	125.000	125.000
FRICTION ANGLE	(DEGREES)	33.0000	33.0000
P-Y SUBGRADE MODULUS	(LBS/IN**3)	95.0000	95.0000
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	12.5000 (S)	1175.56 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	0.00000	0.00000

LAYER 2
THE SOIL IS A SAND USING API CRITERIA

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	8.50000	10.5000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	62.6000	62.6000
FRICTION ANGLE	(DEGREES)	33.0000	33.0000
P-Y SUBGRADE MODULUS	(LBS/IN**3)	60.0000	60.0000
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	1175.56 (S)	1261.99 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	0.00000	0.00000

LAYER 3
THE SOIL IS A STIFF CLAY WITHOUT FREE WATER

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	10.5000	23.5000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	57.6000	57.6000
UNDRAINED COHESION, C	(LBS/FT**2)	1250.00	1250.00
STRAIN AT 50% STRESS		7.00000E-03	7.00000E-03
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	687.500 (S)	1100.00 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	0.00000	0.00000

LAYER 4
THE SOIL IS A STIFF CLAY WITHOUT FREE WATER

		TOP OF LAYER	BOTTOM OF LAYER
X COORDINATE	(FT)	23.5000	50.0000
EFFECTIVE UNIT WEIGHT	(LBS/FT**3)	52.6000	52.6000
UNDRAINED COHESION, C	(LBS/FT**2)	2000.00	2000.00
STRAIN AT 50% STRESS		6.00000E-03	6.00000E-03
ULTIMATE UNIT SIDE FRICTION	(LBS/FT**2)	1100.00 (S)	1100.00 (S)
ULTIMATE UNIT TIP RESISTANCE	(LBS/FT**2)	18000.0 (T)	18000.0 (T)

Notes : Program estimated values for listed parameters
if zero input values were entered:
(S) ULTIMATE UNIT SIDE FRICTION for Drilled Shafts
(T) ULTIMATE UNIT TIP RESISTANCE for Drilled Shafts

* TABLE H * AXIAL LOAD VS DISPLACEMENT

AXIAL LOAD-DISPLACEMENT CURVES GENERATED INTERNALLY

NUM OF CURVES 1

CURVE 1 NUM OF POINTS 19

DISPLACEMENT, IN	AXIAL LOAD,LBS
-2.01599	-47952.7
-1.01599	-47952.7
-0.51654	-49287.7
-0.11755	-51682.2
-0.0676602	-51559.1
-0.0204732	-30829.2
-0.0110011	-18077.9

-2.20073E-03	-3624.09
-2.20073E-04	-362.409
0.00000	0.00000
2.26643E-04	376.891
2.26643E-03	3768.91
0.0113281	18783.5
0.0210452	31952.3
0.0700128	55450.6
0.12088	57075.9
0.52199	58133.7
1.02155	56996.7
2.02176	57339.8

* TABLE I * TORS. MOM. VS ANGLE ROT.

TORQUE-ROTATION CURVES GENERATED INTERNALLY

NUM OF CURVES 1

CURVE 1 NUM OF POINTS 19

ROT. ANGLE,Rad.	TORS.MOMEN,LBS-IN
-0.46427	-2.11813E+05
-0.23789	-2.11813E+05
-0.12510	-2.17621E+05
-0.0352468	-2.27428E+05
-0.0241331	-2.30529E+05
-0.0108163	-1.65105E+05
-6.62951E-03	-1.13612E+05
-1.40008E-03	-25711.6
-1.40008E-04	-2571.16
0.00000	0.00000
1.40008E-04	2571.16
1.40008E-03	25711.6
6.62951E-03	1.13612E+05
0.0108163	1.65105E+05
0.0241331	2.30529E+05
0.0352468	2.27428E+05
0.12510	2.17621E+05
0.23789	2.11813E+05
0.46427	2.11813E+05

* TABLE J * MOMENT CURVATURE SETS

USER DEFINED MOMENT CURVATURE

NUM OF SETS : 1

CURVE SET 1 NUM OF CURVES 1

CURVE 1 AXIAL LOAD 0.000E+00 LBS

POINT	MOMENT LBS-IN	CURVATURE RADIAN/IN
1	0.00000	0.00000

INTERNALLY GENERATED MOMENT CURVATURE

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
S = stress in steel section has reached yield stress.
G = stress in casing section has reached yield stress.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

```
     ------------------------------------------------------------------------------
         Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
                        Section: 1 (Cased), Z Axis
     ------------------------------------------------------------------------------

     Input Axial Thrust Forces:
     --------------------------

     Number of Axial Thrust Force Values = 1

        Number     Axial Thrust Force
                          lbs
        ------     ------------------
           1               0.000

          Axial Thrust Force =       0.000  lbs ,127

         Bending       Bending       Bending       Depth to      Max Comp      Max Tens    Max Concrete   Max
Reinf     Max Casing   Run
        Curvature      Moment       Stiffness       N Axis        Strain        Strain        Stress
Stress         Stress     Msg
         rad/in.       in-lb          lb-in2          in          in/in         in/in         in/in          psi
          psi
       ------------ ------------ ------------ ------------ ------------ ------------ ------------
------------ ------------  ---
        0.000000000      0.000000                                0.0000000     0.0000000         0.000
0.000         0.000
        0.000001250   5977.538139  4782030511.6     4.8125000     0.0000060    -0.0000060        23.142
-22.779      -172.636
        0.000002500  11951.937307  4780774923.1     4.8125000     0.0000120    -0.0000120        46.216
-45.558      -345.272
        0.000003750  17923.197504  4779519334.5     4.8125000     0.0000180    -0.0000180        69.224
68.337      -517.908
        0.000005000  23891.318729  4778263746.0     4.8125000     0.0000241    -0.0000241        92.164
-91.116      -690.544
        0.000006250  29856.300983  4777008157.5     4.8125000     0.0000301    -0.0000301       115.037
-113.895      -863.180
        0.000007500  35818.144265  4775752568.9     4.8125000     0.0000361    -0.0000361       137.843
-136.674     -1035.815
        0.000008750  41776.848577  4774496980.4     4.8125000     0.0000421    -0.0000421       160.582
-159.453     -1208.451
        0.000010000  47732.413916  4773241391.9     4.8125000     0.0000481    -0.0000481       183.254
-182.232     -1381.087
        0.000011250  53684.840285  4771985803.3     4.8125000     0.0000541    -0.0000541       205.858
-205.011     -1553.723
        0.000012500  59634.127682  4770730214.8     4.8125000     0.0000602    -0.0000602       228.396
-227.790     -1726.359
        0.000013750  65580.276108  4769474626.3     4.8125000     0.0000662    -0.0000662       250.866
-250.569     -1898.995
        0.000015000  71523.285563  4768219037.7     4.8125000     0.0000722    -0.0000722       273.269
-273.348     -2071.631
        0.000016250  77463.156046  4766963449.2     4.8125000     0.0000782    -0.0000782       295.606
-296.127     -2244.267
        0.000017500  83399.887558  4765707860.7     4.8125000     0.0000842    -0.0000842       317.874
-318.906     -2416.903
        0.000018750  89333.480099  4764452272.2     4.8125000     0.0000902    -0.0000902       340.076
-341.685     -2589.539
        0.000020000  95263.933668  4763196683.6     4.8125000     0.0000962    -0.0000962       362.211
-364.464     -2762.174
        0.000021250  101191.24827  4761941095.1     4.8125000     0.0001023    -0.0001023       384.278
-387.243      2934.810
        0.000022500  107115.42389  4760685506.6     4.8125000     0.0001083    -0.0001083       406.279
-410.021     -3107.446
        0.000023750  113036.46055  4759429918.0     4.8125000     0.0001143    -0.0001143       428.212
-432.800     -3280.082
        0.000025000  118954.35823  4758174329.5     4.8125000     0.0001203    -0.0001203       450.078
-455.579     -3452.718  C
        0.000026250  124869.11694  4756918741.0     4.8125000     0.0001263    -0.0001263       471.877
-478.358     -3625.354  C
        0.000027500  130049.84188  4729085159.7     4.8024239     0.0001321    -0.0001326       492.509
-509.173     -3806.026  C
        0.000028750  134583.24318  4681156284.8     4.7839097     0.0001375    -0.0001392       512.019
-547.754     -3994.463  C
        0.000030000  138762.75703  4625425234.6     4.7611532     0.0001428    -0.0001459       530.790
-591.367     -4187.934  C
        0.000031250  143307.58898  4585842847.6     4.7443908     0.0001483    -0.0001525       550.023
-631.198     -4377.622  C
        0.000032500  147093.31924  4525948284.6     4.7175152     0.0001533    -0.0001595       567.748
-681.777     -4578.057  C
```

```
        0.000033750  151398.02836  4485867507.1     4.6987973     0.0001586    -0.0001663       586.242
-726.319     -4772.456  C
        0.000035000  155625.97356  4446456387.6     4.6796223     0.0001638    -0.0001731       604.441
-772.682     -4968.676  C
        0.000036250  159792.05641  4408056728.7     4.6601339     0.0001689    -0.0001800       622.360
-820.765     -5166.616  C
        0.000037500  163910.31489  4370941730.7     4.6404587     0.0001740    -0.0001869       640.016
-870.464     -5366.172  C
        0.000038750  168661.93717  4352566120.7     4.6306582     0.0001794    -0.0001935       658.917
-910.493     -5556.058  C
        0.000040000  172711.67364  4317791841.2     4.6109177     0.0001844    -0.0002006       676.134
-962.763     -5758.185  C
        0.000041250  176746.44790  4284762373.4     4.5912538     0.0001894    -0.0002076       693.128
-1016.372     -5961.651  C
        0.000042500  181416.20446  4268616575.6     4.5815663     0.0001947    -0.0002143       711.520
-1059.111     -6154.247  C
        0.000043750  186067.21492  4252964912.5     4.5719374     0.0002000    -0.0002211       729.778
-1102.478     -6347.471  C
        0.000045000  190701.72778  4237816173.0     4.5623773     0.0002053    -0.0002278       747.905
-1146.453     -6541.303  C
        0.000046250  194695.74543  4209637739.1     4.5433053     0.0002101    -0.0002350       764.212
-1203.879     -6748.586  C
        0.000047500  199310.96714  4196020361.0     4.5340042     0.0002154    -0.0002418       782.063
-1249.229     -6943.793  C
        0.000048750  203917.64654  4182926083.1     4.5248098     0.0002206    -0.0002486       799.795
-1295.102     -7139.523  C
        0.000050000  208517.81383  4170356276.8     4.5157310     0.0002258    -0.0002555       817.414
-1341.474     -7335.752  C
        0.000052500  217706.45045  4146789532.6     4.4979549     0.0002361    -0.0002692       852.325
-1435.612     -7729.603  C
        0.000055000  227440.42884  4135280524.5     4.4895011     0.0002469    -0.0002825       888.628
-1517.459     -8111.164  C
        0.000057500  236603.91691  4114850729.0     4.4726045     0.0002572    -0.0002963       922.759
-1614.609     -8508.027  C
        0.000060000  246295.25025  4104920837.6     4.4646394     0.0002679    -0.0003096       958.370
-1698.669     -8891.802  C
        0.000062500  255969.38772  4095510203.7     4.4568550     0.0002786    -0.0003230       993.670
-1783.557     -9276.403  C
        0.000065000  265142.97894  4079122753.1     4.4413555     0.0002887    -0.0003369      1026.788
-1884.114     -9676.675  C
        0.000067500  274806.05097  4071200755.3     4.4341495     0.0002993    -0.0003504      1061.476
-1970.686    -10062.960  C
        0.000070000  284463.17861  4063759694.7     4.4271529     0.0003099    -0.0003638      1095.884
-2057.877    -10449.866  C
        0.000072500  294117.12256  4056787897.6     4.4203728     0.0003205    -0.0003773      1130.019
-2145.628    -10837.330  C
        0.000075000  304193.64348  4055915246.5     4.4208950     0.0003316    -0.0003903      1165.787
-2218.480    -11209.896  C
        0.000077500  313829.38495  4049411418.8     4.4143443     0.0003421    -0.0004038      1199.395
-2307.153    -11598.283  C
        0.000080000  323468.05955  4043350744.5     4.4080235     0.0003526    -0.0004174      1232.752
-2396.242    -11987.085  C
        0.000082500  333111.87227  4037719664.0     4.4019395     0.0003632    -0.0004309      1265.867
-2485.679    -12376.236  C
        0.000085000  343134.58260  4036877442.5     4.4024799     0.0003742    -0.0004439      1300.638
-2559.671    -12749.942  C
        0.000087500  352771.12606  4031670012.3     4.3966446     0.0003847    -0.0004575      1333.265
-2649.764    -13139.749  C
        0.000090000  362775.24951  4030836105.9     4.3971910     0.0003957    -0.0004705      1367.570
-2724.043    -13513.743  C
        0.000092500  372408.35665  4026036288.3     4.3916108     0.0004062    -0.0004841      1399.724
-2814.682    -13904.095  C
        0.000095000  382394.92906  4025209779.7     4.3921628     0.0004173    -0.0004971      1433.566
-2889.232    -14278.359  C
        0.000097500  392028.07498  4020800769.2     4.3868440     0.0004277    -0.0005107      1465.262
-2980.305    -14669.146  C
        0.000100000  401998.09504  4019980950.6     4.3874014     0.0004387    -0.0005238      1498.644
-3055.105    -15043.659  C
        0.000102500  411634.41024  4015945466.0     4.3823503     0.0004492    -0.0005374      1529.898
-3146.499    -15434.767  C
        0.000105000  421588.82490  4015131665.8     4.3829129     0.0004602    -0.0005504      1562.825
-3221.528    -15809.510  C
        0.000107500  431231.08543  4011451957.7     4.3781359     0.0004706    -0.0005640      1593.651
-3313.125    -16200.821  C
        0.000110000  441170.78940  4010643540.2     4.3787034     0.0004817    -0.0005771      1626.124
-3388.362    -16575.772  C
        0.000112500  451106.36339  4009834341.4     4.3792716     0.0004927    -0.0005901      1658.386
-3463.516    -16950.640  C
        0.000115000  460747.22867  4006497640.7     4.3747793     0.0005031    -0.0006038      1688.561
-3555.467    -17342.305  C
        0.000117500  470668.96691  4005693335.6     4.3753522     0.0005141    -0.0006168      1720.374
```

```
-3630.806    -17717.357  C
        0.000120000  480586.58898  4004888241.7     4.3759257     0.0005251    -0.0006299      1751.976
-3706.061    -18092.327  C
        0.000122500  490229.65684  4001874749.9     4.3717243     0.0005355    -0.0006435      1781.519
-3798.198    -18484.178  C
        0.000125000  500134.24656  4001073972.6     4.3723024     0.0005465    -0.0006566      1812.676
-3873.615    -18859.308  C
        0.000127500  510034.73104  4000272400.5     4.3728811     0.0005575    -0.0006696      1843.621
-3948.947    -19234.355  C
        0.000130000  519683.07580  3997562121.7     4.3689769     0.0005680    -0.0006833      1872.552
-4041.096    -19626.217  C
        0.000132500  529571.25020  3996764152.6     4.3695600     0.0005790    -0.0006963      1903.054
-4116.569    -20001.404  C
        0.000135000  539455.34947  3995965551.8     4.3701437     0.0005900    -0.0007094      1933.345
-4191.955    -20376.504  C
        0.000137500  549335.36115  3995166263.1     4.3707280     0.0006010    -0.0007225      1963.425
-4267.254    -20751.517  C
        0.000140000  559211.27989  3994366285.1     4.3713130     0.0006120    -0.0007355      1993.294
-4342.465    -21126.442  C
        0.000142500  568852.30624  3991946008.8     4.3677197     0.0006224    -0.0007492      2021.174
-4434.861    -21518.551  C
        0.000145000  578716.64439  3991149271.8     4.3683089     0.0006334    -0.0007622      2050.603
-4510.186    -21893.590  C
        0.000147500  588576.88008  3990351729.5     4.3688988     0.0006444    -0.0007753      2079.820
-4585.424    -22268.543  C
        0.000150000  598433.02331  3989553488.9     4.3694893     0.0006554    -0.0007883      2108.825
-4660.575    -22643.407  C
        0.000160000  637601.13127  3985007070.6     4.3679954     0.0006989    -0.0008411      2220.974
-4978.242    -24159.930  C
        0.000170000  676720.25701  3980707394.3     4.3668379     0.0007424    -0.0008939      2329.777
-5295.055    -25675.598  C
        0.000180000  715952.56555  3977514253.2     4.3692492     0.0007865    -0.0009460      2436.783
-5593.966    -27173.364  C
        0.000190000  754952.72061  3973435371.8     4.3684563     0.0008300    -0.0009987      2538.815
-5909.085    -28687.339  C
        0.000200000  794046.34259  3970231713.1     4.3708993     0.0008742    -0.0010508      2638.962
-6205.944    -30183.054  C
        0.000210000  833073.59149  3967017102.5     4.3733530     0.0009184    -0.0011028      2735.678
-6501.297    -31677.262  C
        0.000220000  871888.70894  3963130495.4     4.3729533     0.0009620    -0.0011555      2827.504
-6813.408    -33188.228  C
        0.000230000  910777.50550  3959902198.0     4.3754391     0.0010064    -0.0012074      2917.311
-7106.551    -34680.227  C
        0.000240000  949598.98646  3956662443.8     4.3779359     0.0010507    -0.0012593      3003.654
-7398.152    -36170.683  C
        0.000250000  988234.08590  3952936343.8     4.3779386     0.0010945    -0.0013118      3085.247
-7706.365    -37677.752  C
        0.000260000  1026916.9893  3949680728.2     4.3804682     0.0011389    -0.0013636      3164.627
-7995.569    -39165.811  C
        0.000270000  1065629.5528  3946776121.7     4.3852092     0.0011840    -0.0014147      3241.585
-8266.237    -40635.335  C
        0.000280000  1104296.4130  3943915761.0     4.3903130     0.0012293    -0.0014657      3315.203
-8530.651    -42098.604  C
        0.000290000  1142775.4942  3940605152.4     4.3928545     0.0012739    -0.0015173      3383.980
-8813.960    -43580.769  C
        0.000300000  1181184.6507  3937282169.3     4.3954074     0.0013186    -0.0015689      3449.204
-9095.678    -45061.342  C
        0.000310000  1219434.3334  3933659140.1     4.3959154     0.0013627    -0.0016210      3509.915
-9394.281    -46558.800  C
        0.000320000  1257701.5913  3930317473.0     4.3985025     0.0014075    -0.0016725      3568.023
-9673.332    -48036.707  C
        0.000330000  1295897.7994  3926963028.8     4.4011015     0.0014524    -0.0017239      3622.538
-9950.750    -49512.981  C
        0.000340000  1334022.4254  3923595369.0     4.4037125     0.0014973    -0.0017752      3673.445
-10226.543    -50987.629  C
        0.000350000  1372075.0324  3920214378.3     4.4063355     0.0015422    -0.0018265      3720.730
-10500.699    -52460.640  C
        0.000360000  1410055.1783  3916819939.9     4.4089707     0.0015872    -0.0018778      3764.377
-10773.207    -53932.003  C
        0.000370000  1447962.4159  3913411935.1     4.4116182     0.0016323    -0.0019290      3804.371
-11044.054    -55401.706  C
        0.000380000  1485796.2926  3909990243.8     4.4142781     0.0016774    -0.0019801      3840.697
-11313.228    -56869.736  C
        0.000390000  1523556.3502  3906554744.1     4.4169505     0.0017226    -0.0020311      3873.339
-11580.719    -58336.082  C
        0.000400000  1561189.1834  3902972958.7     4.4180269     0.0017672    -0.0020828      3901.855
-11865.160    -59819.379  C
        0.000410000  1598801.1599  3899515024.2     4.4207366     0.0018125    -0.0021337      3927.135
-12129.571    -61282.645  C
        0.000420000  1636337.9444  3896042724.9     4.4234592     0.0018579    -0.0021846      3948.686
-12392.265    -62744.195  C
```

```
        0.000430000  1673799.1679  3892556204.5     4.4261949     0.0019033    -0.0022355      3966.491
-12653.203    -64203.989  C
        0.000440000  1711184.2813  3889055185.0     4.4289439     0.0019487    -0.0022863      3980.535
-12912.387    -65662.028  C
        0.000450000  1748492.7920  3885539538.0     4.4317061     0.0019943    -0.0023370      3990.800
-13169.802    -67118.298  C
        0.000460000  1785724.1991  3882009128.6     4.4344819     0.0020399    -0.0023876      3997.270
-13425.435    -68572.787  C
        0.000470000  1822877.9938  3878463816.8     4.4372712     0.0020855    -0.0024382      3999.927
-13679.273    -70025.480  C
        0.000480000  1859950.8546  3874897613.9     4.4400775     0.0021312    -0.0024888      3999.118
-13931.257    -71476.319  C
        0.000490000  1896938.1297  3871302305.6     4.4429055     0.0021770    -0.0025392      3999.477
-14181.305    -72925.222  C
        0.000500000  1933840.8208  3867681641.8     4.4457534     0.0022229    -0.0025896      3999.694
-14429.424    -74372.197  C
        0.000510000  1970660.4527  3864040103.5     4.4486189     0.0022688    -0.0026400      3999.816
-14675.631    -75817.260  C
        0.000520000  2007399.1790  3860383036.7     4.4514991     0.0023148    -0.0026902      3999.878
-14919.954    -77260.438  C
        0.000530000  2044059.5395  3856716112.4     4.4543910     0.0023608    -0.0027404      3999.902
-15162.427    -78701.767  C
        0.000540000  2080599.4565  3852961956.7     4.4572529     0.0024069    -0.0027906      3999.895
-15403.693    -80000.000  CG
        0.000550000  2116234.9554  3847699919.1     4.4594131     0.0024527    -0.0028411      3999.848
-15654.494    -80000.000  CG
        0.000600000  2267486.9677  3779144946.3     4.4490830     0.0026694    -0.0031056      3999.809
-17257.361    -80000.000  CG
        0.000650000  2383692.5228  3667219266.0     4.4152834     0.0028699    -0.0033863      3999.796
-19332.599    -80000.000  CG
        0.000700000  2469080.9027  3527258432.6     4.3871952     0.0030710    -0.0036665      3998.701
-21389.912    -80000.000  CG
        0.000750000  2530030.0961  3373373461.6     4.3714096     0.0032786    -0.0039402      3999.673
-23261.100    -80000.000  CG
        0.000800000  2576649.6643  3220812080.5     4.3609584     0.0034888    -0.0042112      3999.858
-25054.307    -80000.000  CG
        0.000850000  2613493.3763  3074698089.8     4.3522463     0.0036994    -0.0044818      3999.604
-26834.960    -80000.000  CG


    ------------------------------------------------------------------------------
       Summary of Results for Nominal (Unfactored) Moment Capacity for Section
                                    Z Axis
    ------------------------------------------------------------------------------

        Load           Axial Thrust        Nominal Mom. Cap.      Max. Comp.
         No.                lb                 in-lb               Strain
        ----         ----------------     ------------------     ------------
          1                0.000            2413854.79           0.00300000


    ------------------------------------------------------------------------------
        Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
                        Section: 1 (Cased), Y Axis
    ------------------------------------------------------------------------------

    Input Axial Thrust Forces:
    --------------------------

    Number of Axial Thrust Force Values = 1

       Number     Axial Thrust Force
                          lbs
       ------     ------------------
          1               0.000

         Axial Thrust Force =       0.000  lbs ,127

        Bending       Bending       Bending       Depth to      Max Comp      Max Tens    Max Concrete   Max
Reinf     Max Casing   Run
       Curvature      Moment       Stiffness       N Axis        Strain        Strain        Stress
Stress        Stress     Msg
        rad/in.       in-lb          lb-in2          in          in/in         in/in         in/in          psi
         psi
     ------------- ------------- ------------- ------------- ------------- ------------- -------------
------------ ------------  ---
        0.000000000      0.000000                                 0.0000000     0.0000000         0.000
0.000         0.000
        0.000001250   5977.538139  4782030511.6     4.8125000     0.0000060    -0.0000060        23.142
```

```
-22.779      -172.636
        0.000002500  11951.937307  4780774923.1     4.8125000     0.0000120    -0.0000120        46.216
-45.558      -345.272
        0.000003750  17923.197504  4779519334.5     4.8125000     0.0000180    -0.0000180        69.224
68.337      -517.908
        0.000005000  23891.318729  4778263746.0     4.8125000     0.0000241    -0.0000241        92.164
-91.116      -690.544
        0.000006250  29856.300983  4777008157.5     4.8125000     0.0000301    -0.0000301       115.037
-113.895      -863.180
        0.000007500  35818.144265  4775752568.9     4.8125000     0.0000361    -0.0000361       137.843
-136.674     -1035.815
        0.000008750  41776.848577  4774496980.4     4.8125000     0.0000421    -0.0000421       160.582
-159.453     -1208.451
        0.000010000  47732.413916  4773241391.9     4.8125000     0.0000481    -0.0000481       183.254
-182.232     -1381.087
        0.000011250  53684.840285  4771985803.3     4.8125000     0.0000541    -0.0000541       205.858
-205.011     -1553.723
        0.000012500  59634.127682  4770730214.8     4.8125000     0.0000602    -0.0000602       228.396
-227.790     -1726.359
        0.000013750  65580.276108  4769474626.3     4.8125000     0.0000662    -0.0000662       250.866
-250.569     -1898.995
        0.000015000  71523.285563  4768219037.7     4.8125000     0.0000722    -0.0000722       273.269
-273.348     -2071.631
        0.000016250  77463.156046  4766963449.2     4.8125000     0.0000782    -0.0000782       295.606
-296.127     -2244.267
        0.000017500  83399.887558  4765707860.7     4.8125000     0.0000842    -0.0000842       317.874
-318.906     -2416.903
        0.000018750  89333.480099  4764452272.2     4.8125000     0.0000902    -0.0000902       340.076
-341.685     -2589.539
        0.000020000  95263.933668  4763196683.6     4.8125000     0.0000962    -0.0000962       362.211
-364.464     -2762.174
        0.000021250  101191.24827  4761941095.1     4.8125000     0.0001023    -0.0001023       384.278
-387.243      2934.810
        0.000022500  107115.42389  4760685506.6     4.8125000     0.0001083    -0.0001083       406.279
-410.021     -3107.446
        0.000023750  113036.46055  4759429918.0     4.8125000     0.0001143    -0.0001143       428.212
-432.800     -3280.082
        0.000025000  118954.35823  4758174329.5     4.8125000     0.0001203    -0.0001203       450.078
-455.579     -3452.718  C
        0.000026250  124869.11694  4756918741.0     4.8125000     0.0001263    -0.0001263       471.877
-478.358     -3625.354  C
        0.000027500  130049.84188  4729085159.7     4.8024239     0.0001321    -0.0001326       492.509
-509.173     -3806.026  C
        0.000028750  134583.24318  4681156284.8     4.7839097     0.0001375    -0.0001392       512.019
-547.754     -3994.463  C
        0.000030000  138762.75703  4625425234.6     4.7611532     0.0001428    -0.0001459       530.790
-591.367     -4187.934  C
        0.000031250  143307.58898  4585842847.6     4.7443908     0.0001483    -0.0001525       550.023
-631.198     -4377.622  C
        0.000032500  147093.31924  4525948284.6     4.7175152     0.0001533    -0.0001595       567.748
-681.777     -4578.057  C
        0.000033750  151398.02836  4485867507.1     4.6987973     0.0001586    -0.0001663       586.242
-726.319     -4772.456  C
        0.000035000  155625.97356  4446456387.6     4.6796223     0.0001638    -0.0001731       604.441
-772.682     -4968.676  C
        0.000036250  159792.05641  4408056728.7     4.6601339     0.0001689    -0.0001800       622.360
-820.765     -5166.616  C
        0.000037500  163910.31489  4370941730.7     4.6404587     0.0001740    -0.0001869       640.016
-870.464     -5366.172  C
        0.000038750  168661.93717  4352566120.7     4.6306582     0.0001794    -0.0001935       658.917
-910.493     -5556.058  C
        0.000040000  172711.67364  4317791841.2     4.6109177     0.0001844    -0.0002006       676.134
-962.763     -5758.185  C
        0.000041250  176746.44790  4284762373.4     4.5912538     0.0001894    -0.0002076       693.128
-1016.372     -5961.651  C
        0.000042500  181416.20446  4268616575.6     4.5815663     0.0001947    -0.0002143       711.520
-1059.111     -6154.247  C
        0.000043750  186067.21492  4252964912.5     4.5719374     0.0002000    -0.0002211       729.778
-1102.478     -6347.471  C
        0.000045000  190701.72778  4237816173.0     4.5623773     0.0002053    -0.0002278       747.905
-1146.453     -6541.303  C
        0.000046250  194695.74543  4209637739.1     4.5433053     0.0002101    -0.0002350       764.212
-1203.879     -6748.586  C
        0.000047500  199310.96714  4196020361.0     4.5340042     0.0002154    -0.0002418       782.063
-1249.229     -6943.793  C
        0.000048750  203917.64654  4182926083.1     4.5248098     0.0002206    -0.0002486       799.795
-1295.102     -7139.523  C
        0.000050000  208517.81383  4170356276.8     4.5157310     0.0002258    -0.0002555       817.414
-1341.474     -7335.752  C
        0.000052500  217706.45045  4146789532.6     4.4979549     0.0002361    -0.0002692       852.325
-1435.612     -7729.603  C
```

```
        0.000055000  227440.42884  4135280524.5     4.4895011     0.0002469    -0.0002825       888.628
-1517.459     -8111.164  C
        0.000057500  236603.91691  4114850729.0     4.4726045     0.0002572    -0.0002963       922.759
-1614.609     -8508.027  C
        0.000060000  246295.25025  4104920837.6     4.4646394     0.0002679    -0.0003096       958.370
-1698.669     -8891.802  C
        0.000062500  255969.38772  4095510203.7     4.4568550     0.0002786    -0.0003230       993.670
-1783.557     -9276.403  C
        0.000065000  265142.97894  4079122753.1     4.4413555     0.0002887    -0.0003369      1026.788
-1884.114     -9676.675  C
        0.000067500  274806.05097  4071200755.3     4.4341495     0.0002993    -0.0003504      1061.476
-1970.686    -10062.960  C
        0.000070000  284463.17861  4063759694.7     4.4271529     0.0003099    -0.0003638      1095.884
-2057.877    -10449.866  C
        0.000072500  294117.12256  4056787897.6     4.4203728     0.0003205    -0.0003773      1130.019
-2145.628    -10837.330  C
        0.000075000  304193.64348  4055915246.5     4.4208950     0.0003316    -0.0003903      1165.787
-2218.480    -11209.896  C
        0.000077500  313829.38495  4049411418.8     4.4143443     0.0003421    -0.0004038      1199.395
-2307.153    -11598.283  C
        0.000080000  323468.05955  4043350744.5     4.4080235     0.0003526    -0.0004174      1232.752
-2396.242    -11987.085  C
        0.000082500  333111.87227  4037719664.0     4.4019395     0.0003632    -0.0004309      1265.867
-2485.679    -12376.236  C
        0.000085000  343134.58260  4036877442.5     4.4024799     0.0003742    -0.0004439      1300.638
-2559.671    -12749.942  C
        0.000087500  352771.12606  4031670012.3     4.3966446     0.0003847    -0.0004575      1333.265
-2649.764    -13139.749  C
        0.000090000  362775.24951  4030836105.9     4.3971910     0.0003957    -0.0004705      1367.570
-2724.043    -13513.743  C
        0.000092500  372408.35665  4026036288.3     4.3916108     0.0004062    -0.0004841      1399.724
-2814.682    -13904.095  C
        0.000095000  382394.92906  4025209779.7     4.3921628     0.0004173    -0.0004971      1433.566
-2889.232    -14278.359  C
        0.000097500  392028.07498  4020800769.2     4.3868440     0.0004277    -0.0005107      1465.262
-2980.305    -14669.146  C
        0.000100000  401998.09504  4019980950.6     4.3874014     0.0004387    -0.0005238      1498.644
-3055.105    -15043.659  C
        0.000102500  411634.41024  4015945466.0     4.3823503     0.0004492    -0.0005374      1529.898
-3146.499    -15434.767  C
        0.000105000  421588.82490  4015131665.8     4.3829129     0.0004602    -0.0005504      1562.825
-3221.528    -15809.510  C
        0.000107500  431231.08543  4011451957.7     4.3781359     0.0004706    -0.0005640      1593.651
-3313.125    -16200.821  C
        0.000110000  441170.78940  4010643540.2     4.3787034     0.0004817    -0.0005771      1626.124
-3388.362    -16575.772  C
        0.000112500  451106.36339  4009834341.4     4.3792716     0.0004927    -0.0005901      1658.386
-3463.516    -16950.640  C
        0.000115000  460747.22867  4006497640.7     4.3747793     0.0005031    -0.0006038      1688.561
-3555.467    -17342.305  C
        0.000117500  470668.96691  4005693335.6     4.3753522     0.0005141    -0.0006168      1720.374
-3630.806    -17717.357  C
        0.000120000  480586.58898  4004888241.7     4.3759257     0.0005251    -0.0006299      1751.976
-3706.061    -18092.327  C
        0.000122500  490229.65684  4001874749.9     4.3717243     0.0005355    -0.0006435      1781.519
-3798.198    -18484.178  C
        0.000125000  500134.24656  4001073972.6     4.3723024     0.0005465    -0.0006566      1812.676
-3873.615    -18859.308  C
        0.000127500  510034.73104  4000272400.5     4.3728811     0.0005575    -0.0006696      1843.621
-3948.947    -19234.355  C
        0.000130000  519683.07580  3997562121.7     4.3689769     0.0005680    -0.0006833      1872.552
-4041.096    -19626.217  C
        0.000132500  529571.25020  3996764152.6     4.3695600     0.0005790    -0.0006963      1903.054
-4116.569    -20001.404  C
        0.000135000  539455.34947  3995965551.8     4.3701437     0.0005900    -0.0007094      1933.345
-4191.955    -20376.504  C
        0.000137500  549335.36115  3995166263.1     4.3707280     0.0006010    -0.0007225      1963.425
-4267.254    -20751.517  C
        0.000140000  559211.27989  3994366285.1     4.3713130     0.0006120    -0.0007355      1993.294
-4342.465    -21126.442  C
        0.000142500  568852.30624  3991946008.8     4.3677197     0.0006224    -0.0007492      2021.174
-4434.861    -21518.551  C
        0.000145000  578716.64439  3991149271.8     4.3683089     0.0006334    -0.0007622      2050.603
-4510.186    -21893.590  C
        0.000147500  588576.88008  3990351729.5     4.3688988     0.0006444    -0.0007753      2079.820
-4585.424    -22268.543  C
        0.000150000  598433.02331  3989553488.9     4.3694893     0.0006554    -0.0007883      2108.825
-4660.575    -22643.407  C
        0.000160000  637601.13127  3985007070.6     4.3679954     0.0006989    -0.0008411      2220.974
-4978.242    -24159.930  C
        0.000170000  676720.25701  3980707394.3     4.3668379     0.0007424    -0.0008939      2329.777
```

```
-5295.055    -25675.598  C
        0.000180000  715952.56555  3977514253.2     4.3692492     0.0007865    -0.0009460      2436.783
-5593.966    -27173.364  C
        0.000190000  754952.72061  3973435371.8     4.3684563     0.0008300    -0.0009987      2538.815
-5909.085    -28687.339  C
        0.000200000  794046.34259  3970231713.1     4.3708993     0.0008742    -0.0010508      2638.962
-6205.944    -30183.054  C
        0.000210000  833073.59149  3967017102.5     4.3733530     0.0009184    -0.0011028      2735.678
-6501.297    -31677.262  C
        0.000220000  871888.70894  3963130495.4     4.3729533     0.0009620    -0.0011555      2827.504
-6813.408    -33188.228  C
        0.000230000  910777.50550  3959902198.0     4.3754391     0.0010064    -0.0012074      2917.311
-7106.551    -34680.227  C
        0.000240000  949598.98646  3956662443.8     4.3779359     0.0010507    -0.0012593      3003.654
-7398.152    -36170.683  C
        0.000250000  988234.08590  3952936343.8     4.3779386     0.0010945    -0.0013118      3085.247
-7706.365    -37677.752  C
        0.000260000  1026916.9893  3949680728.2     4.3804682     0.0011389    -0.0013636      3164.627
-7995.569    -39165.811  C
        0.000270000  1065629.5528  3946776121.7     4.3852092     0.0011840    -0.0014147      3241.585
-8266.237    -40635.335  C
        0.000280000  1104296.4130  3943915761.0     4.3903130     0.0012293    -0.0014657      3315.203
-8530.651    -42098.604  C
        0.000290000  1142775.4942  3940605152.4     4.3928545     0.0012739    -0.0015173      3383.980
-8813.960    -43580.769  C
        0.000300000  1181184.6507  3937282169.3     4.3954074     0.0013186    -0.0015689      3449.204
-9095.678    -45061.342  C
        0.000310000  1219434.3334  3933659140.1     4.3959154     0.0013627    -0.0016210      3509.915
-9394.281    -46558.800  C
        0.000320000  1257701.5913  3930317473.0     4.3985025     0.0014075    -0.0016725      3568.023
-9673.332    -48036.707  C
        0.000330000  1295897.7994  3926963028.8     4.4011015     0.0014524    -0.0017239      3622.538
-9950.750    -49512.981  C
        0.000340000  1334022.4254  3923595369.0     4.4037125     0.0014973    -0.0017752      3673.445
-10226.543    -50987.629  C
        0.000350000  1372075.0324  3920214378.3     4.4063355     0.0015422    -0.0018265      3720.730
-10500.699    -52460.640  C
        0.000360000  1410055.1783  3916819939.9     4.4089707     0.0015872    -0.0018778      3764.377
-10773.207    -53932.003  C
        0.000370000  1447962.4159  3913411935.1     4.4116182     0.0016323    -0.0019290      3804.371
-11044.054    -55401.706  C
        0.000380000  1485796.2926  3909990243.8     4.4142781     0.0016774    -0.0019801      3840.697
-11313.228    -56869.736  C
        0.000390000  1523556.3502  3906554744.1     4.4169505     0.0017226    -0.0020311      3873.339
-11580.719    -58336.082  C
        0.000400000  1561189.1834  3902972958.7     4.4180269     0.0017672    -0.0020828      3901.855
-11865.160    -59819.379  C
        0.000410000  1598801.1599  3899515024.2     4.4207366     0.0018125    -0.0021337      3927.135
-12129.571    -61282.645  C
        0.000420000  1636337.9444  3896042724.9     4.4234592     0.0018579    -0.0021846      3948.686
-12392.265    -62744.195  C
        0.000430000  1673799.1679  3892556204.5     4.4261949     0.0019033    -0.0022355      3966.491
-12653.203    -64203.989  C
        0.000440000  1711184.2813  3889055185.0     4.4289439     0.0019487    -0.0022863      3980.535
-12912.387    -65662.028  C
        0.000450000  1748492.7920  3885539538.0     4.4317061     0.0019943    -0.0023370      3990.800
-13169.802    -67118.298  C
        0.000460000  1785724.1991  3882009128.6     4.4344819     0.0020399    -0.0023876      3997.270
-13425.435    -68572.787  C
        0.000470000  1822877.9938  3878463816.8     4.4372712     0.0020855    -0.0024382      3999.927
-13679.273    -70025.480  C
        0.000480000  1859950.8546  3874897613.9     4.4400775     0.0021312    -0.0024888      3999.118
-13931.257    -71476.319  C
        0.000490000  1896938.1297  3871302305.6     4.4429055     0.0021770    -0.0025392      3999.477
-14181.305    -72925.222  C
        0.000500000  1933840.8208  3867681641.8     4.4457534     0.0022229    -0.0025896      3999.694
-14429.424    -74372.197  C
        0.000510000  1970660.4527  3864040103.5     4.4486189     0.0022688    -0.0026400      3999.816
-14675.631    -75817.260  C
        0.000520000  2007399.1790  3860383036.7     4.4514991     0.0023148    -0.0026902      3999.878
-14919.954    -77260.438  C
        0.000530000  2044059.5395  3856716112.4     4.4543910     0.0023608    -0.0027404      3999.902
-15162.427    -78701.767  C
        0.000540000  2080599.4565  3852961956.7     4.4572529     0.0024069    -0.0027906      3999.895
-15403.693    -80000.000  CG
        0.000550000  2116234.9554  3847699919.1     4.4594131     0.0024527    -0.0028411      3999.848
-15654.494    -80000.000  CG
        0.000600000  2267486.9677  3779144946.3     4.4490830     0.0026694    -0.0031056      3999.809
-17257.361    -80000.000  CG
        0.000650000  2383692.5228  3667219266.0     4.4152834     0.0028699    -0.0033863      3999.796
-19332.599    -80000.000  CG
```

```
       0.000700000  2469080.9027  3527258432.6     4.3871952     0.0030710    -0.0036665      3998.701
-21389.912    -80000.000  CG
       0.000750000  2530030.0961  3373373461.6     4.3714096     0.0032786    -0.0039402      3999.673
-23261.100    -80000.000  CG
       0.000800000  2576649.6643  3220812080.5     4.3609584     0.0034888    -0.0042112      3999.858
-25054.307    -80000.000  CG
       0.000850000  2613493.3763  3074698089.8     4.3522463     0.0036994    -0.0044818      3999.604
-26834.960    -80000.000  CG
```

Summary of Results for Nominal (Unfactored) Moment Capacity for Section
Y Axis

Load No.	Axial Thrust lb	Nominal Mom. Cap. in-lb	Max. Comp. Strain
1	0.000	2413854.79	0.00300000

* TABLE K * REDUCTION FACTORS

AVERAGE DIAMETER IS USED TO GET RATIO S/B

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS ALONG Y-DIRECTION
ESTIMATED ASSUMING MOVEMENT IN THE DIRECTION OF Y-FORCE (+)

GROUP NO	P-FACTOR	Y-FACTOR
1	0.8423	1.0000
2	0.8426	1.0000
3	0.8423	1.0000

REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS ALONG Z-DIRECTION
ESTIMATED ASSUMING MOVEMENT IN THE DIRECTION OF Z-FORCE (+)

GROUP NO	P-FACTOR	Y-FACTOR
1	0.6791	1.0000
2	0.7369	1.0000
3	0.9189	1.0000

```
================================================================================

                 GROUP for Windows, Version 2016.10.10

                  Serial Number : 157432285

                 Analysis of A Group of Piles
               Subjected to Axial and Lateral Loading

                (c) Copyright ENSOFT, Inc., 1987-2015
                     All Rights Reserved

================================================================================

--------------------------------------------------------------------------------
                    Time and Date of Analysis
--------------------------------------------------------------------------------

          Date:  October 08, 2024     Time:  15:47:01



            *****     COMPUTATION RESULTS     *****


New Group



            *****     LOAD CASES RESULTS      *****


LOAD CASE :     1
CASE NAME : Load Case
LOAD TYPE : Live, LL

  REDUCTION FACTORS FOR CLOSELY-SPACED PILE GROUPS, COMBINED Y AND Z DIRECTIONS
  ESTIMATED USING MOVEMENT IN THE DIRECTION OF PILE CAP DISPLACEMENTS

       GROUP NO     P-FACTOR     Y-FACTOR

           1           0.8423       1.0000
           2           0.8426       1.0000
           3           0.8423       1.0000


* TABLE L *   COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

      VERT. LOAD, LBS    HOR. LOAD Y, LBS   HOR. LOAD Z, LBS
            0.00000            33000.0            0.00000

     MOMENT X ,LBS-IN    MOMENT Y,LBS-IN    MOMENT Z,LBS-IN
       -6.49440E+05            0.00000            0.00000

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

       VERTICAL ,IN      HORIZONTAL Y,IN     HORIZONTAL Z,IN
        6.85636E-15            0.50014       -4.47178E-12

     ANGLE ROT. X,RAD    ANGLE ROT. Y,RAD    ANGLE ROT. Z,RAD
        8.38351E-13         2.50202E-24         1.30607E-15


  THE GLOBAL STRUCTURAL COORDINATE SYSTEM
  ---------------------------------------

  * PILE TOP DISPLACEMENTS *

 PILE GROUP   DISP. X,IN   DISP. Y,IN   DISP. Z,IN   ROT. X,RAD   ROT. Y,RAD   ROT. Z,RAD
```

1	6.8564E-15	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
2	-1.4041E-14	0.5001	8.9418E-12	8.3835E-13	2.5020E-24	1.3061E-15
3	6.8564E-15	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
MINIMUM	-1.4041E-14	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	2	1	1	1	1	1
MAXIMUM	6.8564E-15	0.5001	8.9418E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	1	1	2	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,LBS	FOR. Y,LBS	FOR. Z,LBS	MOM X,LBS-IN	MOM Y,LBS-IN	MOM Z,LBS-IN
1	1.1452E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	-2.0483E-08
2	-2.3072E-08	1.1001E+04	2.1406E-07	0.0000	0.0000	0.0000
3	1.1452E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	0.0000
MINIMUM	-2.3072E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	1.1452E-08	1.1001E+04	2.1406E-07	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	6.8870E-15	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
2	-1.4010E-14	0.5001	8.9418E-12	8.3835E-13	2.5020E-24	1.3061E-15
3	6.8870E-15	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
MINIMUM	-1.4010E-14	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	2	1	1	1	1	1
MAXIMUM	6.8870E-15	0.5001	8.9418E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	1	1	2	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,LBS	LAT. y,LBS	LAT. z,LBS	MOM x,LBS-IN	MOM y,LBS-IN	MOM z,LBS-IN
1	1.1453E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	-2.0483E-08
2	-2.3071E-08	1.1001E+04	2.1406E-07	0.0000	0.0000	0.0000
3	1.1453E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	0.0000
MINIMUM	-2.3071E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	1.1453E-08	1.1001E+04	2.1406E-07	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

PILE GROUP	STRESS,LBS/IN**2
1	4.5985E-10
2	3.1709E-10
3	1.5740E-10
MINIMUM	1.5740E-10
Pile N.	3
MAXIMUM	4.5985E-10
Pile N.	1

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR LBS-IN	MOMENT y-DIR LBS-IN	SHEAR y-DIR LBS	SHEAR z-DIR LBS	SOIL REACT y-DIR LBS/IN	SOIL REACT z-DIR LBS/IN	TOTAL STRESS LBS/IN**2	FLEX. RIG. z-DIR LBS-IN**2	FLEX. RIG. y-DIR LBS-IN**2
1	-0.011170	-4.4718E-12	-3.3355E+04	-4.3736E-06	-6882.2	-1.0703E-07	-147.64	-3.5540E-09	1.5740E-10	4.0109E+09	4.7820E+09
x(FT)	9.9000	0.0000	14.100	5.1000	7.8000	0.0000	10.800	4.8000	24.000	4.8000	0.0000
2	-0.011164	-2.0424E-13	-3.3428E+04	-6.4818E-07	-6883.4	-1.3536E-07	-147.67	-2.8255E-09			

```
3.1709E-10  4.0109E+09  4.7820E+09
     x(FT)      9.9000      10.200      14.100      14.100      7.8000      8.1000      10.800      10.800
0.0000      4.8000      0.0000
       3    -0.011170 -4.4718E-12 -3.3355E+04 -4.3736E-06     -6882.2 -1.0703E-07     -147.64 -3.5540E-09
1.5740E-10  4.0109E+09  4.7820E+09
     x(FT)      9.9000      0.0000      14.100      5.1000      7.8000      0.0000      10.800      4.8000
0.0000      4.8000      0.0000

      Min.   -0.011170 -4.4718E-12 -3.3428E+04 -4.3736E-06     -6883.4 -1.3536E-07     -147.67 -3.5540E-09
1.5740E-10  4.0109E+09  4.7820E+09
   Pile N.       1           1           2           1           2           2           2           1
1           1           1
```

* MAXIMUM VALUES AND LOCATIONS *

```
     PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT  SOIL REACT
TOTAL    FLEX. RIG.  FLEX. RIG.
             y-DIR       z-DIR       z-DIR       y-DIR       y-DIR       z-DIR       y-DIR       z-DIR
STRESS       z-DIR       y-DIR
               IN          IN        LBS-IN      LBS-IN        LBS         LBS       LBS/IN      LBS/IN
LBS/IN**2   LBS-IN**2   LBS-IN**2
    ******  **********  **********  **********  **********  **********  **********  **********  **********
**********  **********  **********
        1       0.5001  1.0221E-13  4.3779E+05  3.2330E-07  1.0999E+04  6.7680E-08      371.98  1.4129E-09
6464.5  4.7820E+09  4.7820E+09
     x(FT)      0.0000      10.200      4.8000      14.100      0.0000      8.1000      4.5000      10.800
4.8000      12.000      0.0000
        2       0.5001  8.9418E-12  4.3785E+05  8.7467E-06  1.1001E+04  2.1406E-07      372.07  7.1081E-09
6465.4  4.7820E+09  4.7820E+09
     x(FT)      0.0000      0.0000      4.8000      5.1000      0.0000      0.0000      4.5000      4.8000
4.8000      16.800      2.1000
        3       0.5001  1.0221E-13  4.3779E+05  3.2330E-07  1.0999E+04  6.7680E-08      371.98  1.4129E-09
6464.5  4.7820E+09  4.7820E+09
     x(FT)      0.0000      10.200      4.8000      14.100      0.0000      8.1000      4.5000      10.800
4.8000      18.000      0.0000

      Max.      0.5001  8.9418E-12  4.3785E+05  8.7467E-06  1.1001E+04  2.1406E-07      372.07  7.1081E-09
6465.4  4.7820E+09  4.7820E+09
   Pile N.       1           2           2           2           2           2           2           2
2           1           1
```

***** SUMMARY FOR LOAD CASES AND COMBINATIONS *****

***** LOAD CASES RESULTS *****

LOAD CASE : 1

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,LBS	LOAD Y,LBS	LOAD Z,LBS	MOM X,LBS-IN	MOM Y,LBS-IN	MOM Z,LBS-IN
0.00000	33000.0	0.00000	-6.49440E+05	0.00000	0.00000

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
6.85636E-15	0.50014	-4.47178E-12	8.38351E-13	2.50202E-24	1.30607E-15

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
MINIMUM	-1.4041E-14	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	2	1	1	1	1	1
MAXIMUM	6.8564E-15	0.5001	8.9418E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	1	1	2	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,LBS	FOR. Y,LBS	FOR. Z,LBS	MOM X,LBS-IN	MOM Y,LBS-IN	MOM Z,LBS-IN
MINIMUM	-2.3072E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	1.1452E-08	1.1001E+04	2.1406E-07	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
MINIMUM	-1.4010E-14	0.5001	-4.4718E-12	8.3835E-13	2.5020E-24	1.3061E-15

Pile N.	2	1	1	1	1	1
MAXIMUM	6.8870E-15	0.5001	8.9418E-12	8.3835E-13	2.5020E-24	1.3061E-15
Pile N.	1	1	2	1	1	1

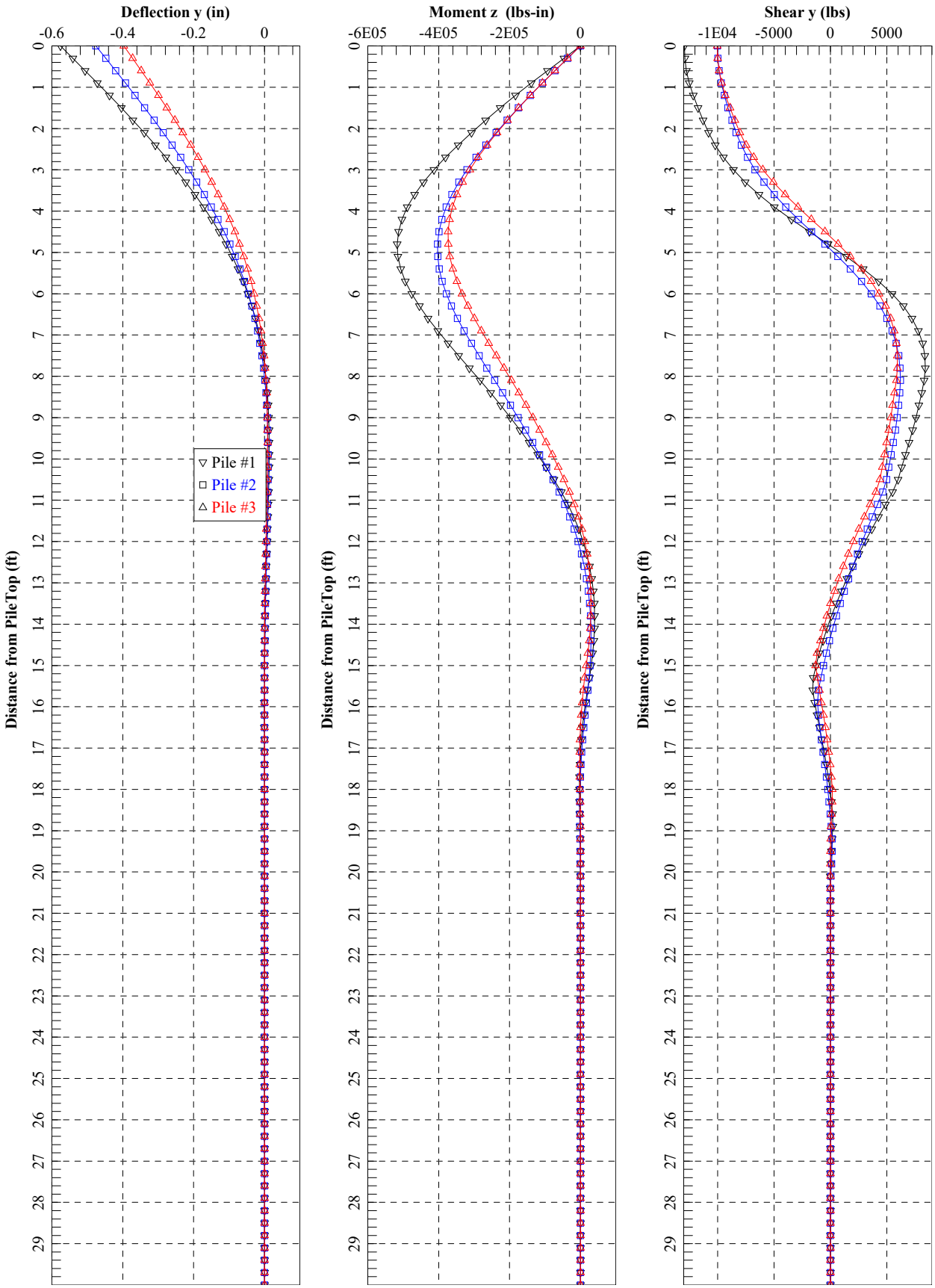
* PILE TOP REACTIONS, LOCAL *

	AXIAL,LBS	LAT. y,LBS	LAT. z,LBS	MOM x,LBS-IN	MOM y,LBS-IN	MOM z,LBS-IN
	**********	**********	**********	**********	**********	**********
MINIMUM	-2.3071E-08	1.0999E+04	-1.0703E-07	0.0000	0.0000	-2.0483E-08
Pile N.	2	1	1	1	1	1
MAXIMUM	1.1453E-08	1.1001E+04	2.1406E-07	0.0000	0.0000	0.0000
Pile N.	1	2	2	1	1	2

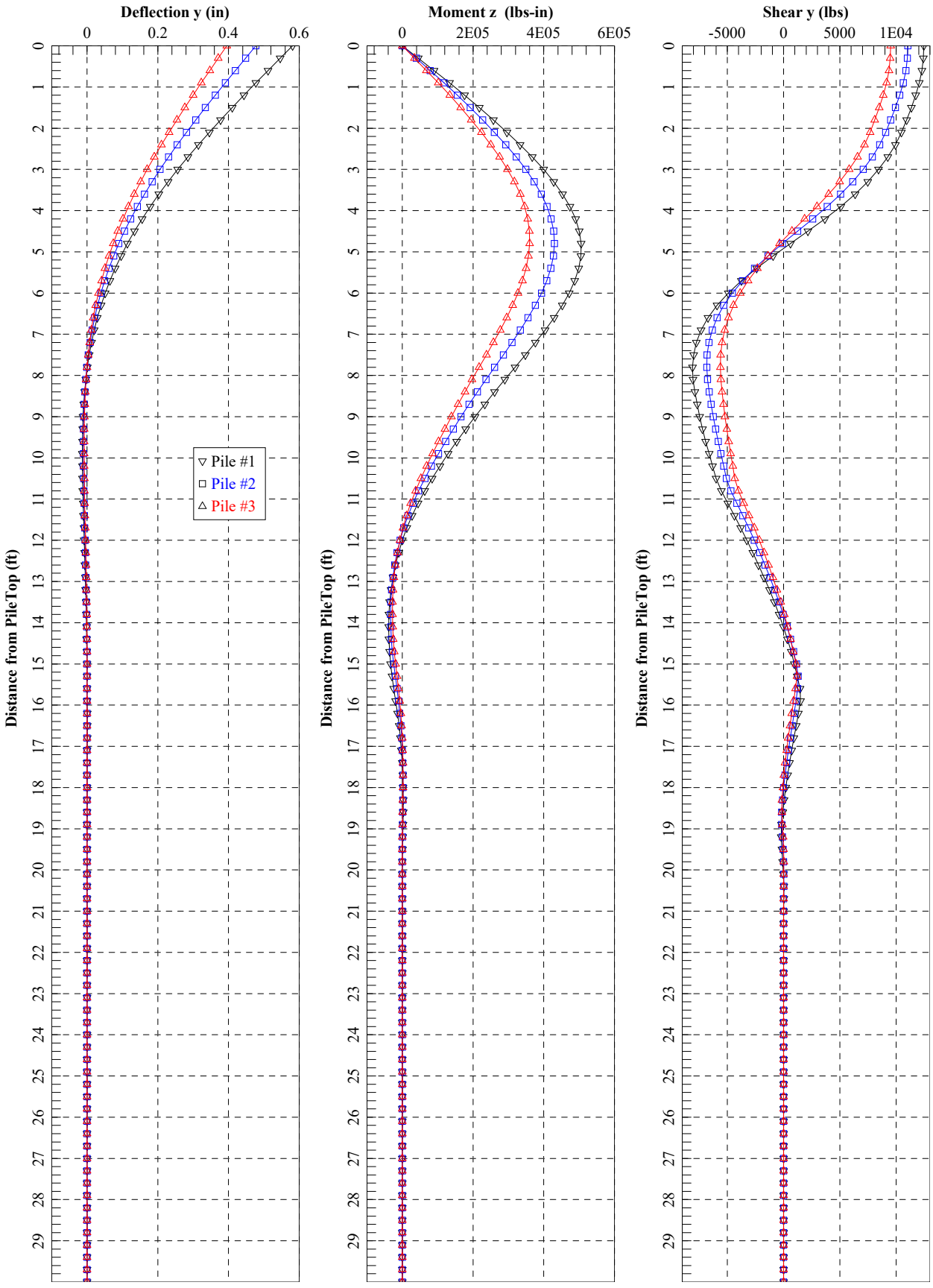
* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR IN	DISPL. z-DIR IN	MOMENT z-DIR LBS-IN	MOMENT y-DIR LBS-IN	SHEAR y-DIR LBS	SHEAR z-DIR LBS	SOIL REACT y-DIR LBS/IN	SOIL REACT z-DIR LBS/IN	TOTAL STRESS LBS/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-0.011170	-4.4718E-12	-3.3428E+04	-4.3736E-06	-6883.4	-1.3536E-07	-147.67	-3.5540E-09	1.5740E-10
Pile N.	1	1	2	1	2	2	2	1	1
Max.	0.5001	8.9418E-12	4.3785E+05	8.7467E-06	1.1001E+04	2.1406E-07	372.07	7.1081E-09	6465.4
Pile N.	1	2	2	2	2	2	2	2	2

East Restrain Beam Micropiles
Considering Construction Tolerances



West Restrain Beam Micropiles
Considering Construction Tolerances



MICROPILE CASING THREADED JOINT DESIGN

GERHART COLE

References: FHWA 2005
Date: 12/31/2024
Project: 14600 South Realignment
Client: RLW
Description: Casing Threaded Joint Capacity
Designed by: AWL
Checked by: BHG

Design Loads: Compression $DL_C := 92\ kip$ Tension $DL_T := 0\ kip$

Material Properties & Geometry: Casing Size: 9.625" x 0.395"

Casing Outside Diameter $OD := 9.625\ in$ Casing Wall Thickness $t_w := 0.395\ in$

Casing Inside Diameter $ID := OD - 2 \cdot t_w$ $ID = 8.835\ in$

Casing Area $A_{casing} := \frac{\pi}{4}\left(OD^2 - ID^2\right) = 11.454\ in^2$

Casing Yield Strength $F_y := 80\ ksi$

Threaded Joint Section Modulus

$$S_{joint} := \frac{\frac{\pi}{64} \cdot \left(\left(OD - t_w\right)^4 - ID^4\right)}{\frac{\left(OD - t_w\right)}{2}} \qquad S_{joint} = 12.39\ in^3 \qquad (Eq.5-26)$$

Threaded Joint Maximum Allowable Bending Moment

Axial Stress $f_a := \frac{DL_C}{A_{casing}} = 8.032\ ksi$

Allowable Axial Stress $F_a := 0.47 \cdot F_y = 37.6\ ksi$ $(Pg.5-16)$

Allowable Bending Stress $F_b := 0.55 \cdot F_y = 44\ ksi$ $(Pg.5-16)$

Buckling Potential is Negligible, $F'_e >>> f_a$ $F'_e := \infty$

$$M_{max\,(joint)} := S_{joint}\left(1 - \frac{f_a}{F_a}\right) \cdot \left(1 - \frac{f_a}{F'_e}\right) \cdot F_b \qquad (Eq.5-27)$$

$$M_{max_joint} := S_{joint}\left(1 - \frac{f_a}{F_a}\right) \cdot (1 - 0) \cdot F_b = 428.716\ (kip \cdot in)$$

$M_{max}SlidingBeamMicropile := 470.500\ kip \cdot in$ (From Lpile Analysis)

if $M_{max}SlidingBeamMicropile \le M_{max_joint}$ = "Limit Threaded Joint Depth"
"OK"
else
"Limit Threaded Joint Depth"

$M_{max}WestRestrainBeamMicropile := 505.350\ kip \cdot in$ (From Group Analysis)

if $M_{max}WestRestrainBeamMicropile \le M_{max_joint}$ = "Limit Threaded Joint Depth"
"OK"
else
"Limit Threaded Joint Depth"

$M_{max}EastRestrainBeamMicropile := 517.040\ kip \cdot in$ (From Group Analysis)

if $M_{max}EastRestrainBeamMicropile \le M_{max_joint}$ = "Limit Threaded Joint Depth"
"OK"
else
"Limit Threaded Joint Depth"

Sliding Beam Cap (From Lpile Analysis)

Depth (ft)	Moment (kip·in)
0.0	470.500
0.4	470.400
0.8	469.433
1.2	466.639
1.6	461.187
2.0	452.554
2.4	440.588
2.8	424.938
3.2	405.315

Depth taken from bottom of the pile cap (plinth)

Threaded joints in micropile casing not permitted within the top 3 feet of micropile below the bottom of the pile cap (plinth)

East Restrain Beam Cap

Depth (ft)	Moment (kip·in)
3.0	413.495
3.3	442.723
3.6	467.890
3.9	488.392
4.2	503.673
4.5	513.306
4.8	517.039
5.1	514.864
5.4	507.009
5.7	493.923
6.0	476.210
6.3	454.582
6.6	429.783
6.9	402.572

West Restrain Beam Cap

Depth (ft)	Moment (kip·in)
3.0	399.517
3.3	428.282
3.6	453.290
3.9	473.974
4.2	489.809
4.5	500.355
4.8	505.346
5.1	504.716
5.4	498.625
5.7	487.444
6.0	471.694
6.3	452.022
6.6	429.114
6.9	403.678

(From Group Analyses)

Depth taken from bottom of the pile cap (plinth)

Threaded joints in micropile casing not permitted within the top 7 feet of micropile below the bottom of the pile cap (plinth)

References:

National Highway Institute [NHI], 2005, *Micropile Design and Construction,* FHWA NHI-05-039.

GERHART COLE

Date: 07/07/2025
Project: 14600 South Realignment
Client: RLW
Description: Micropile Tension Test

Designed by: AWL
Checked by: BHG

Tension Test Bar Check:

Design Load Verification Test A (15 ft bonded length) $DL_{VT} := 27\ kip$

Design Load Proof Test $DL_{PT} := 92\ kip$

Micropile Proof Test Tendon:

Bar Size #14 Bar Yield Strength $F_{yb} := 75\ ksi$ Bar Area of Steel $A_{sb} := 2.25\ in^2$

Bar Yield $F_y := F_{yb} \cdot A_{sb} = 168.75\ kip$

Allowable Test Load $TL_{Allow} := 0.9 \cdot F_y = 151.875\ kip$

Proof Test Load $PTL := 1.6 \cdot DL_{PT} = 147.2\ kip$

Verification Test Load $VTL := 2.0 \cdot DL_{VT} = 54\ kip$

$\mathbf{Check_{TL}} := \mathbf{if}\left(VTL < TL_{Allow}, \text{“OK”}, \text{“Increase Bar Size”}\right)$ $\mathbf{Check_{TL}} = \text{“OK”}$

$\mathbf{Check_{TL1}} := \mathbf{if}\left(PTL < TL_{Allow}, \text{“OK”}, \text{“Increase Bar Size”}\right)$ $\mathbf{Check_{TL1}} = \text{“OK”}$

Design Load Verification Test B (51 ft bonded length) $DL_{VT2} := 92\ kip$

Micropile Verification Test Tendon:

Bar Size #18 Bar Yield Strength $F_{yb2} := 75\ ksi$ Bar Area of Steel $A_{sb2} := 4\ in^2$

Bar Yield $F_{y2} := F_{yb2} \cdot A_{sb2} = 300\ kip$

Allowable Test Load $TL_{Allow2} := 0.9 \cdot F_{y2} = 270\ kip$

Verification Test Load $VTL_2 := 2.0 \cdot DL_{VT2} = 184\ kip$

$\mathbf{Check_{TL2}} := \mathbf{if}\left(VTL_2 < TL_{Allow2}, \text{“OK”}, \text{“Increase Bar Size”}\right)$ $\mathbf{Check_{TL2}} = \text{“OK”}$

GERHART COLE

References: FHWA 2005
Date: 06/02/2025
Project: 14600 South Realignment
Client: RLW
Description: Restrain Beam Micropiles - Axial Loads
Designed by: AWL
Checked by: BHG

Design Loads: Compression $DL_C := 26\ kip$
Tension $DL_T := 50\ kip$

Material Properties & Geometry:

Grout:
$f'c := 4\ ksi$ Hole Diameter $D := 9.625\ in$ $D_{ft} := D$ $D_{ft} = 0.802\ ft$

Micropile Tendon:
Bar Size $\#10$ Bar Yield Strength $F_{yb} := 75\ ksi$ Bar Area of Steel $A_{sb} := 1.27\ in^2$

Outside Diameter $OD := 1.27\ in$

Uncased Allowable Structural Strength:

Allowable Comp. Steel $P_{cs} := 0.47 \cdot F_{yb} \cdot A_{sb}$ $P_{cs} = 44.77\ kip$

Area of Grout $A_g := \frac{\pi \cdot D^2}{4} - A_{sb}$ $A_g = 71.49\ in^2$

Allowable Comp. Grout $P_{cg} := 0.4 \cdot f'c \cdot A_g$ $P_{cg} = 114.38\ kip$

Allowable Comp. Strength $P_c := P_{cs} + P_{cg}$ $P_c = 159.15\ kip$ $(Eq.5-7)$

Allowable Tens. Steel $P_{ts} := 0.55 \cdot F_{yb} \cdot A_{sb}$ $P_{ts} = 52.39\ kip$ $(Eq.5-8)$

$\mathbf{Check_{BS}} := \mathbf{if}\left(P_{cs} > 0.4 \cdot DL_C, \text{“OK”}, \text{“Increase Bar Size”}\right)$ $\mathbf{Check_{BS}} = \text{“OK”}$

$\mathbf{Check_C} := \mathbf{if}\left(P_c > DL_C, \text{“OK”}, \text{“Fails in Compression”}\right)$ $\mathbf{Check_C} = \text{“OK”}$

$\mathbf{Check_T} := \mathbf{if}\left(P_{ts} > DL_T, \text{“OK”}, \text{“Fails in Tension”}\right)$ $\mathbf{Check_T} = \text{“OK”}$

Required Embedment Depth:

Bond Strength Factor of Safety $FOS := 2$

Ultimate Soil-Grout Bond Stress $\tau_{ult} := 10\ psi$ $\tau_{ult} = 1.44\ ksf$

Ultimate Bond Strength $BS_{ult} := \pi \cdot D_{ft} \cdot \tau_{ult}$

$$BS_{ult} = 3.629\ \frac{kip}{ft}$$

Minimum Required Bonded Length - Compression $L_{bc} := \frac{DL_C}{\left(\frac{BS_{ult}}{FOS}\right)}$ $L_{bc} = 14.3\ ft$

Minimum Required Bonded Length - Tension $L_{bt} := \frac{DL_T}{\left(\frac{BS_{ult}}{FOS}\right)}$ $L_{bt} = 27.6\ ft$

References:

National Highway Institute [NHI], 2005, *Micropile Design and Construction,* FHWA NHI-05-039.

APPENDIX C

Brian Garrett

From: Alex Belenguer <abelenguer@mcnarybergeron.com>
Sent: Wednesday, May 15, 2024 3:20 PM
To: Jim Deschenes
Cc: Diego Rodríguez; Cole Frost; Richard Buhler; Brian Garrett; Vincenzo Perrotta Orgnani - Petrucco Italia srl; McCune, David; Riccardo Castracani Petrucco; Jeff Mehle
Subject: Re: 146th South
Attachments: PUSA_2021_18_BLUFFDALE_60pct_2C_Loads for DESIGN.pdf

Jim,

See attached micropile reactions by stage and location. There are small reductions to what was sent previously, and included the lattice support combined caps. Let me know if you have any questions at this time.

Thanks,

Alex Belenguer, PE
Bridge Engineer
Office: 303.450.6900
Direct: 720.614.5357



On Mon, May 13, 2024 at 12:07 PM Alex Belenguer <abelenguer@mcnarybergeron.com> wrote:

> Jim,
>
> Sorry for not having provided a response to your comments until now. To answer your questions:
>
> -20kips horiz. In combination with vertical 175kips?
> The loads we provided are for each micropile. Lateral load is in combination with vertical loads, per Arema Ch. 8 combinations attached. These combinations are for the Alternate Live Load, heavier than Cooper E 80. Note that the max. lateral loads are not concurrent with maximum vertical loads. Main contribution is for traction / braking forces as David McCune pointed out. I included options with and without CWR since we are not familiar with site conditions yet, and can update accordingly. Also, load transitions for each construction stage. I will provide loads per micropile for each stage in a follow-up email.
>
> -Are 20kip lateral force applied for ALL micro piles? Or only on battered piles.
> The horizontal loads are provided assuming the maneuver beams are connected to all micropile caps and no CWR exists. As these connections are removed during the box jacking the loads are transferred to the lattice beam and/or rails. I will provide loads per micropile for each stage in a follow-up email.

I will be attending the meeting today to clarify any points you may have.

Thanks,

Alex Belenguer, PE
Bridge Engineer
Office: 303.450.6900
Direct: 720.614.5357



On Wed, May 1, 2024 at 2:20 PM Jim Deschenes <jdeschenes@wadsco.com> wrote:

> See attached for a few questions/clarifications.
>
> Thanks,
>
> Jim
>
> ---
>
> **From:** Diego Rodríguez <diego@petrucco.com>
> **Sent:** Monday, April 29, 2024 12:46 PM
> **To:** Cole Frost <CFrost@wadsco.com>; Richard Buhler <richardb@gerhartcole.com>
> **Cc:** Brian Garrett <brian@gerhartcole.com>; Vincenzo Perrotta Orgnani - Petrucco Italia srl <vincenzo@petruccosrl.it>; Jim Deschenes <jdeschenes@wadsco.com>; McCune, David <David.McCune@hdrinc.com>; Alex Belenguer <abelenguer@mcnarybergeron.com>; Riccardo Castracani Petrucco <rcastracani@petruccousa.com>
> **Subject:** R: 146th South
>
> **[EXTERNAL]**
>
> All,

Attached is the Check done by McNary Bergeron regarding:
-**Micro piles distribution/spacing**: The quantity won´t change from Option 2C Concept, previously submitted at 30%. See attached. (nº20 Transverse Beams for UPRR)

-**Loads:** The team can move forward with the loads considered in the document.

Considering the deadline for next submission, that should allow you to move forward. Anything else let us know.

Alex Belenguer, from McNary Bergeron is in cc in case you want to directly ask any question or clarification.

Thanks

Eng. Diego Rodríguez

PETRUCCO SA
Rotonda de Pitágoras, 1, Nave 508
28806 Alcalá de Henares
Madrid, Spain.
mob: +34 615411097
tel: +34 91 8870563
fax: +34 91 8807026

www.petrucco.com

diego@petrucco.com

Da: Cole Frost <CFrost@wadsco.com>
Inviato: miércoles, 17 de abril de 2024 15:12
A: Diego Rodríguez <diego@petrucco.com>; Richard Buhler <richardb@gerhartcole.com>
Cc: Brian Garrett <brian@gerhartcole.com>; Vincenzo Perrotta Orgnani - Petrucco Italia srl <vincenzo@petruccosrl.it>; Jim Deschenes <jdeschenes@wadsco.com>
Oggetto: Re: 146th South

Jim within our office is working on the monitoring plan.

If you have something previously utilized, we would be more than happy to have you send it our way.

Cole Frost, P.E.

Director

Ralph L. Wadsworth

From: Diego Rodríguez <diego@petrucco.com>
Sent: Wednesday, April 17, 2024 8:28:33 AM
To: Cole Frost <CFrost@wadsco.com>; Richard Buhler <richardb@gerhartcole.com>
Cc: Brian Garrett <brian@gerhartcole.com>; Vincenzo Perrotta Orgnani - Petrucco Italia srl <vincenzo@petruccosrl.it>
Subject: R: 146th South

[EXTERNAL]

Good morning Cole and Richard,

Yes, the plan is us (our designer) providing layout of the micro piles and loads.

There are few details to close, as the strategy for the final velocity in place during the operations, which directly relates with the loads. We are working on that.

Previous preliminary checks were done already so as soon as the point is clarified, shouldn´t take more than couple of days to provide those loads.

We will come back to you regarding this point.

Any other deliverable we can help with, we are at your disposal, let us know (Monitoring & contingency plan inputs, or others)

Thanks

Eng. Diego Rodríguez

PETRUCCO SA
Rotonda de Pitágoras, 1, Nave 508
28806 Alcalá de Henares
Madrid, Spain.
mob: +34 615411097
tel: +34 91 8870563
fax: +34 91 8807026

www.petrucco.com

diego@petrucco.com

Da: Cole Frost <CFrost@wadsco.com>
Inviato: miércoles, 17 de abril de 2024 4:14
A: Richard Buhler <richardb@gerhartcole.com>
Cc: Brian Garrett <brian@gerhartcole.com>; Diego Rodríguez <diego@petrucco.com>
Oggetto: RE: 146th South

Richard,

I have copied Diego to this email. Are the loads on the trams CMGC site Diego?

Thanks

Cole Frost, P.E.

Director of Preconstruction

166 E. 14000 South

Draper, UT 84020

O: 801-553-1661

M: 801-301-7047

F: 801-553-1696

From: Richard Buhler <richardb@gerhartcole.com>
Sent: Tuesday, April 16, 2024 7:25 AM
To: Cole Frost <CFrost@wadsco.com>
Cc: Brian Garrett <brian@gerhartcole.com>
Subject: 146th South

[EXTERNAL]

Cole,

We wanted to get the proposal over to you to do the micropile design for the Verona Bridge Support have you received anything yet on layout or loads from Petrucco? Or maybe you have a general idea of the micro piles of what you need from us and we can get started on the proposal just want to make sure we get what you need in time for the next submittal. Let us know.

Thanks

Richard

Richard R. Buhler, PE
Project Engineer
O: 801.849.0055

M: 435.760.2460
Licenses: UT, NV, OR

GERHART COLE

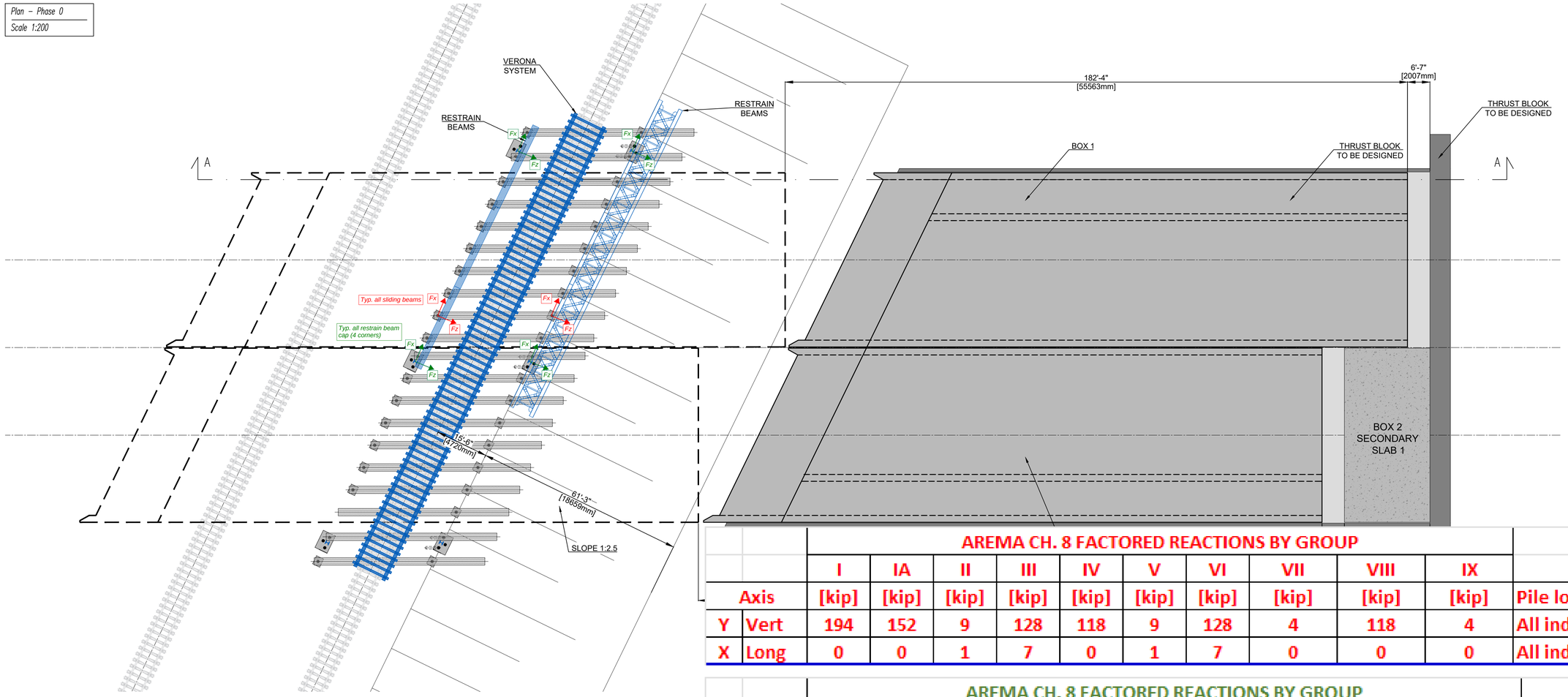
[EXTERNAL EMAIL NOTICE]: This message was sent from outside of the company. Please do not click links or open attachments unless you recognize the source of this email and know the content is safe. Please forward all suspicious emails to phish-alert@strlco.com or use the Phish Alert button in Outlook. **Original Sender:** richardb@gerhartcole.com

[EXTERNAL EMAIL NOTICE]: This message was sent from outside of the company. Please do not click links or open attachments unless you recognize the source of this email and know the content is safe. Please forward all suspicious emails to phish-alert@strlco.com or use the Phish Alert button in Outlook. **Original Sender:** diego@petrucco.com

[EXTERNAL EMAIL NOTICE]: This message was sent from outside of the company. Please do not click links or open attachments unless you recognize the source of this email and know the content is safe. Please forward all suspicious emails to phish-alert@strlco.com or use the Phish Alert button in Outlook. **Original Sender:** diego@petrucco.com

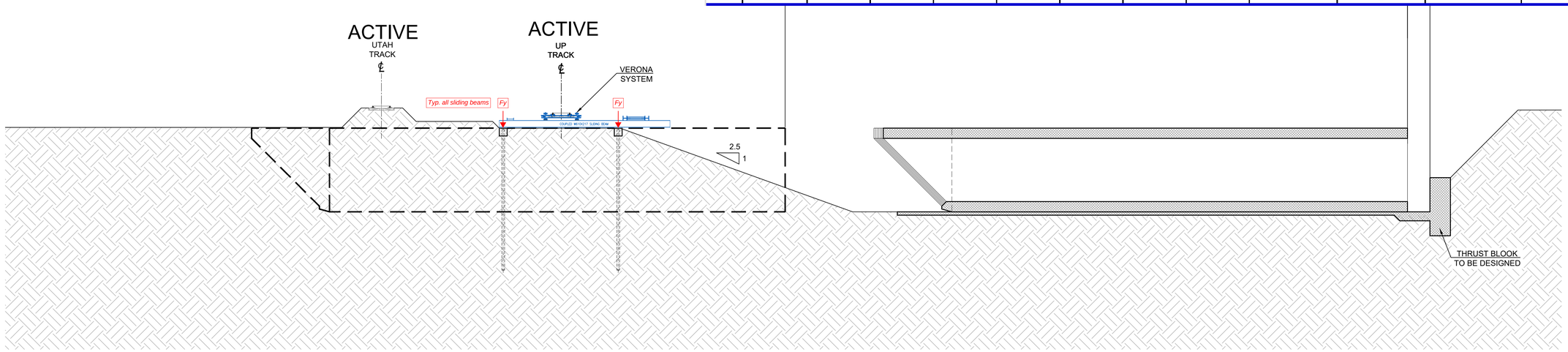
Email attachments received 5/15/24

Plan – Phase 0
Scale 1:200



		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Y	Vert	194	152	9	128	118	9	128	4	118	4	All individual piles / Gravity
X	Long	0	0	1	7	0	1	7	0	0	0	All ind. piles / Positive or negative

Section A–A – Phase 0
Scale 1:200



		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Z	Transv	0	0	46	46	0	46	46	0	0	0	ea 4 corners / Positive or negative

60% FOR DESIGN TEAM COMMENTS

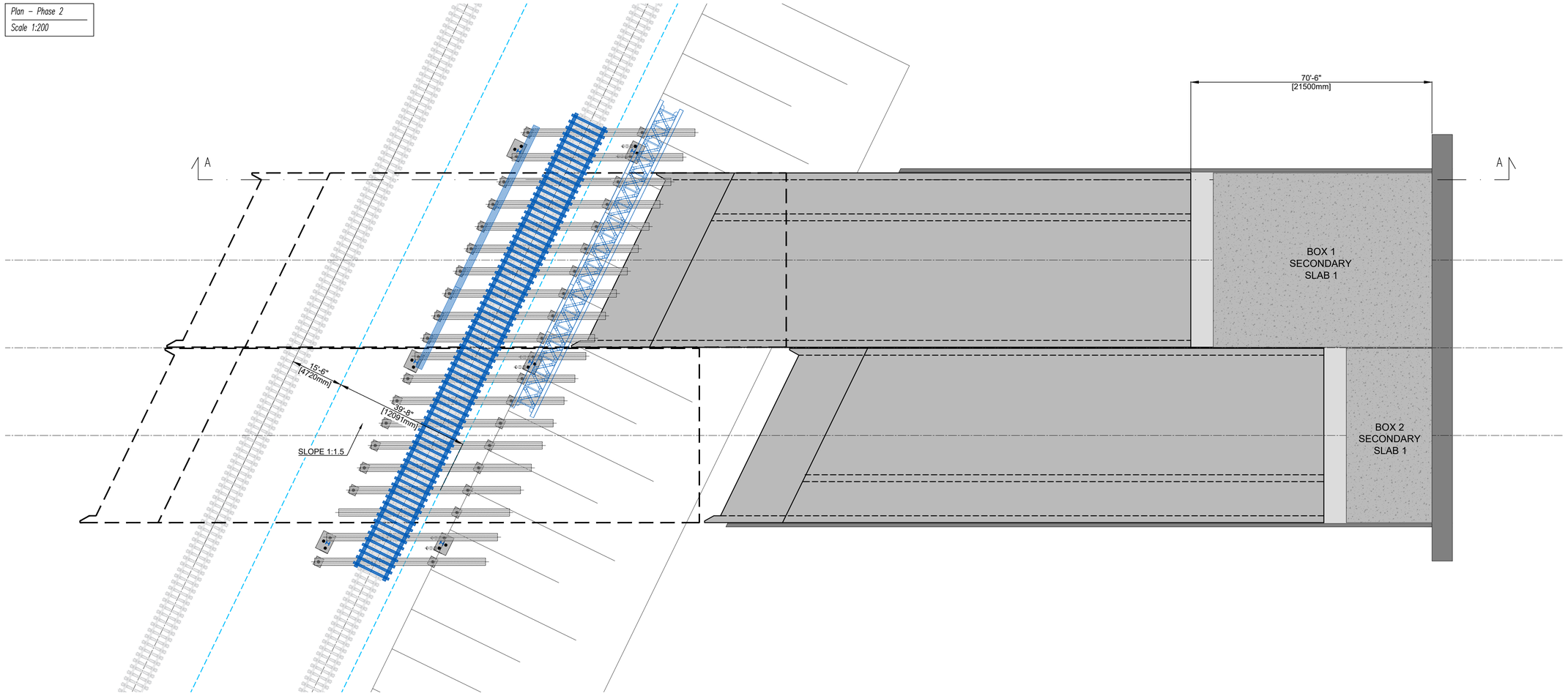
DRAWING N.	1	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	13th MAY 2024	ROAD UNDERPASS OPTION 2C	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	
APPROVED:	op				

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

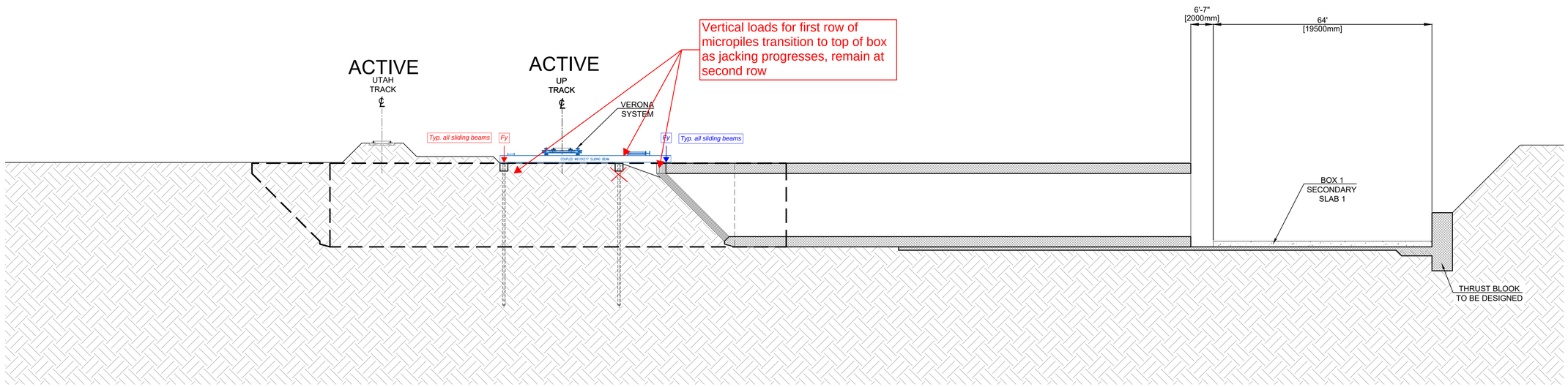
Plan – Phase 2

Scale 1:200



Section A–A – Phase 2

Scale 1:200



60% FOR DESIGN TEAM COMMENTS

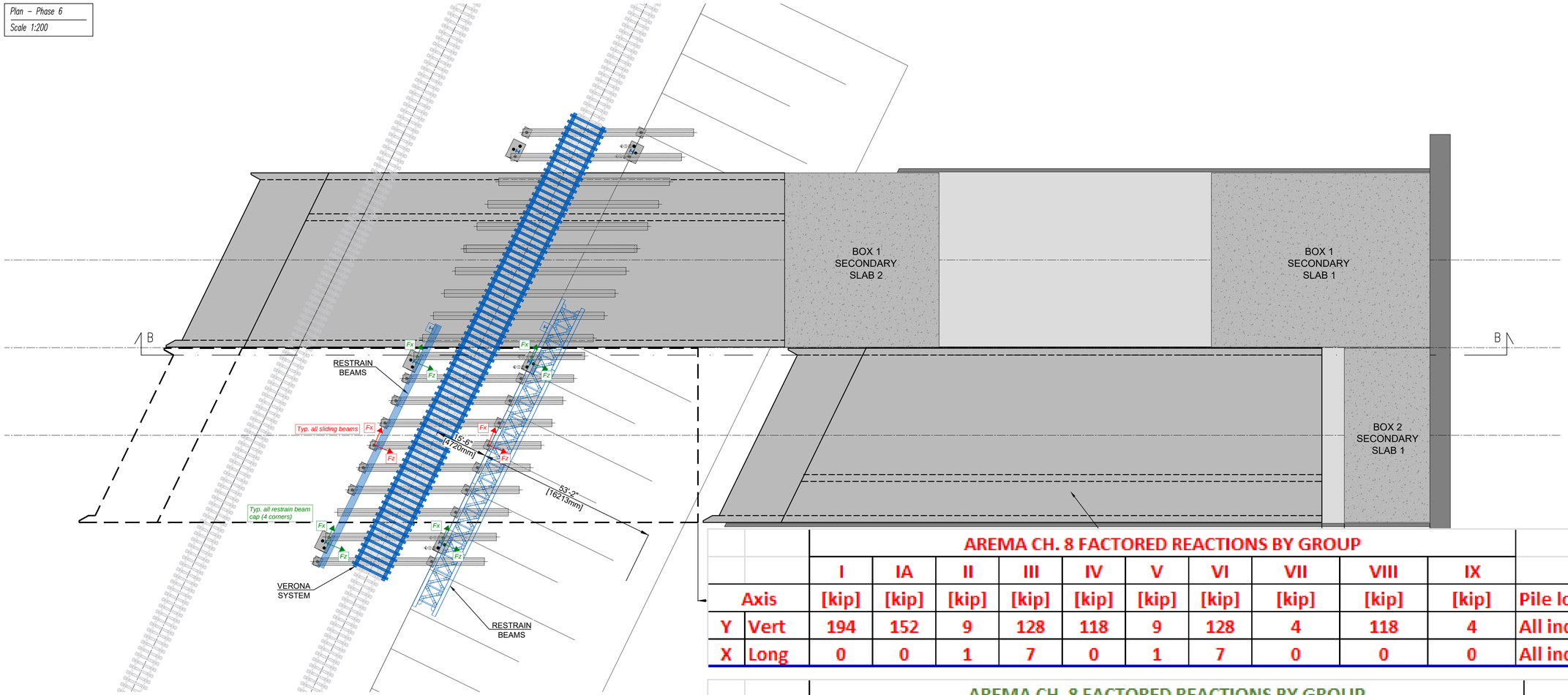
DRAWING N.	3	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	13th MAY 2024	
DRAWN:	drf	REVISION:	ROAD UNDERPASS OPTION 2C	
CHECKED:	vpo			
APPROVED:	op		TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

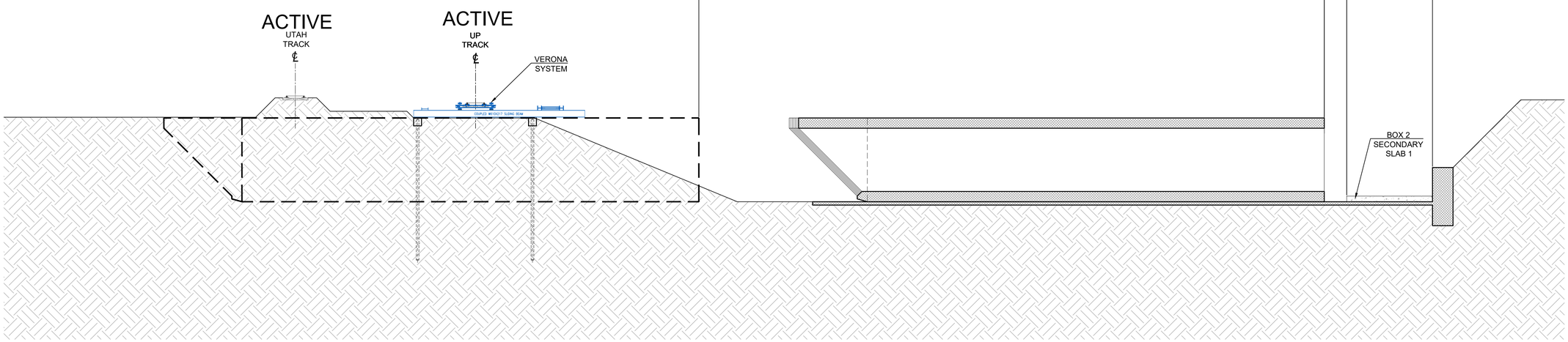
Plan – Phase 6
Scale 1:200



		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Y	Vert	194	152	9	128	118	9	128	4	118	4	All individual piles / Gravity
X	Long	0	0	1	7	0	1	7	0	0	0	All ind. piles / Positive or negative

		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Z	Transv	0	0	46	46	0	46	46	0	0	0	ea 4 corners / Positive or negative

Section A-A – Phase 6
Scale 1:200



60% FOR DESIGN TEAM COMMENTS

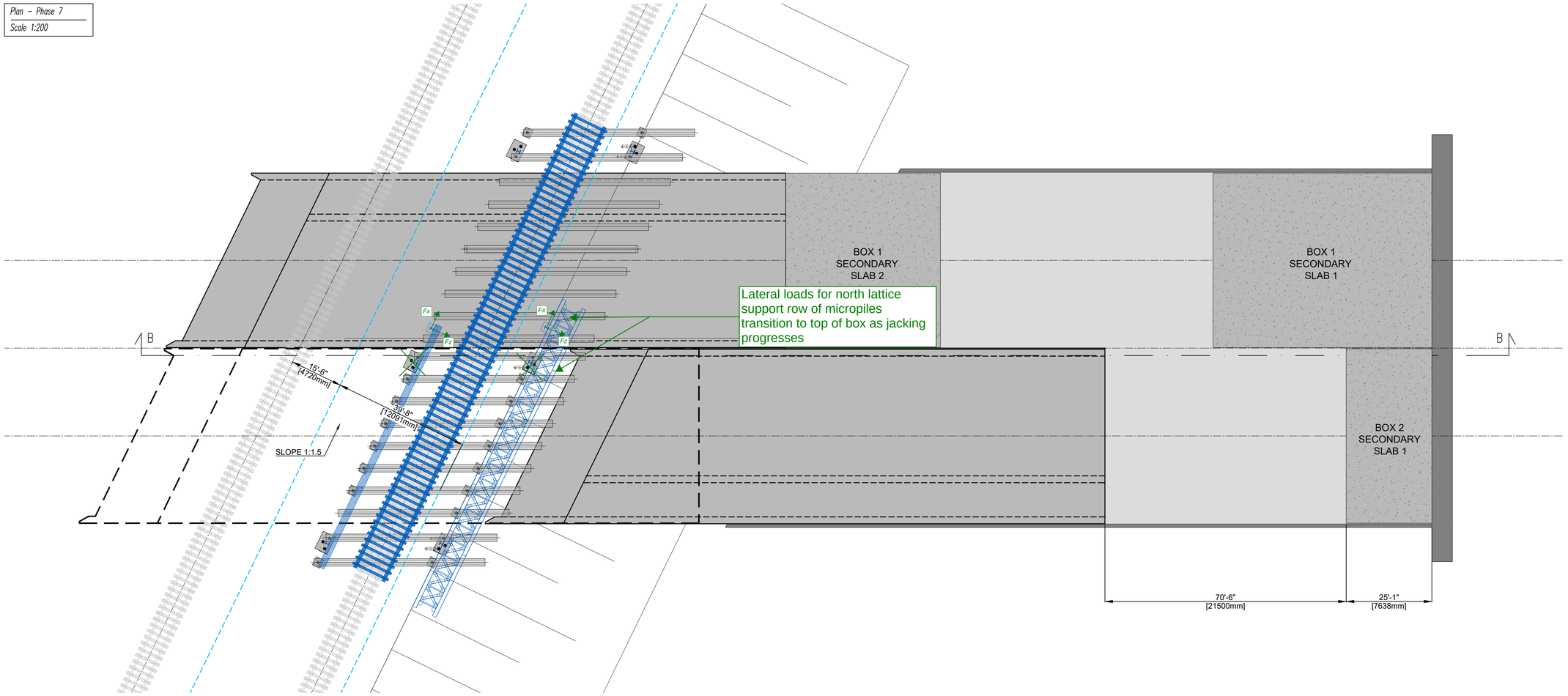
DRAWING N.	7	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	13th MAY 2024	ROAD UNDERPASS OPTION 2C	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	
APPROVED:	op				

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

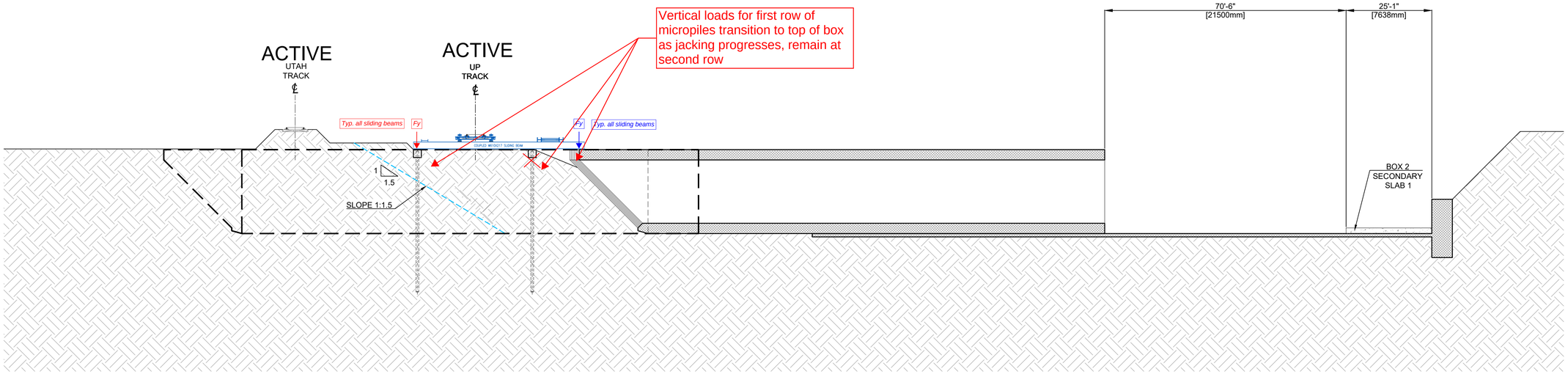
Plan – Phase 7

Scale 1:200



Section A–A – Phase 7

Scale 1:200



60% FOR DESIGN TEAM COMMENTS

DRAWING N.	8	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	13th MAY 2024	ROAD UNDERPASS OPTION 2C	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	
APPROVED:	op				
60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY					

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Email attachments received 5/13/24

PILE LOADS @ 7'-5" - 60 mph SPEED, R0m CURVE - Alternate LL - Traction

Loads per AREMA Chapter 15 - Steel Structures *Section 1.3 Loads, forces and stresses*

Axis		DL [kip]	LL + I [kip]	CF [kip]	WL [kip]	LF-Tr [kip]	All [kip]	(linear combination, unfactored) Pile location
Y	Vert	3.5	81	0	3	4	92	All piles
Z	Transv	0	0	0	3	0	3	All piles
X	Long	0	0	0	0.5	12	13	All piles

Load description per Table 15-1-10 shown below:

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Loads per AREMA Ch. 8 - Concrete Structures *Section 2.2.4c Load Factor Design Combinations*

Load class correspondence between AREMA Ch. 15 to AREMA Ch. 8 Section 2.2.3 Design loads

Ch.15	DL	LL	I	CF	WL	LF
Ch.8	D	L	I	CF	W+WL	LF

The load classes for AREMA Ch. 8 are per the description below:

2.2.3 DESIGN LOADS (2012)

a. *General.*

(1) The following loads and forces shall be considered in the design of railway concrete structures supporting tracks:

D = Dead Load
L = Live Load
I = Impact
CF = Centrifugal Force
E = Earth Pressure
B = Buoyancy
W = Wind Load on Structure
WL = Wind Load on Live Load
LF = Longitudinal Force from Live Load
F = Longitudinal Force due to Friction or Shear Resistance at Expansion Bearings
EQ = Earthquake (Seismic)
SF = Stream Flow Pressure
ICE = Ice Pressure
OF = Other Forces (Rib Shortening, Shrinkage, Temperature and/or Settlement of Supports)

The pile reactions per load class according to AREMA Chapter 8 is shown below:

Load Class		D	L + I	CF	W+WL	LF	All	(linear combination, unfactored)
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location
Y	Vert	3.5	81.0	0	3.0	4.0	91.5	All piles
Z	Transv	0	0	0	3	0	3	Outside of curve, inside reduced 15%
X	Long	0	0	0	1	12.0	12.5	All

The loads for the group loading combinations per Table 8-2-5 from AREMA Ch. 8 Section 2.2.4c are shown below:

Table 8-2-5. Group Loading Combinations – Load Factor Design

Group	Item
I	1.4 (D + 5/3 (L + I) + CF + E + B + SF)
IA	1.8 (D + L + I + CF + E + B + SF)
II	1.4 (D + E + B + SF + W)
III	1.4 (D + L + I + CF + E + B + SF + 0.5W + WL + LF + F)
IV	1.4 (D + L + I + CF + E + B + SF + OF)
V	Group II + 1.4 (OF)
VI	Group III + 1.4 (OF)
VII	1.0 (D + E + B + EQ)
VIII	1.4 (D + L + I + E + B + SF + ICE)
IX	1.2 (D + E + B + SF + W + ICE)

		Group									
		I	IA	II	III	IV	V	VI	VII	VIII	IX
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]
Y	Vert	**194**	152	9	128	118	9	128	4	118	4
Z	Transv	0	0	**4**	**4**	0	**4**	**4**	0	0	0
X	Long	0	0	1	**18**	0	1	**18**	0	0	0

PILE LOADS @ 7'-5" - 60 mph SPEED, R0m CURVE - Alternate LL - Traction - CWR

Loads per AREMA Chapter 15 - Steel Structures *Section 1.3 Loads, forces and stresses*

Axis		DL [kip]	LL + I [kip]	CF [kip]	WL [kip]	LF-Tr [kip]	All [kip]	(linear combination, unfactored) Pile location
Y	Vert	3.5	81	0	3	4	92	All piles
Z	Transv	0	0	0	3	0	3	All piles
X	Long	0	0	0	0.5	6	7	All piles

Load description per Table 15-1-10 shown below:

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Loads per AREMA Ch. 8 - Concrete Structures *Section 2.2.4c Load Factor Design Combinations*

Load class correspondence between AREMA Ch. 15 to AREMA Ch. 8 Section 2.2.3 Design loads

Ch.15	DL	LL	I	CF	WL	LF
Ch.8	D	L	I	CF	W+WL	LF

The load classes for AREMA Ch. 8 are per the description below:

2.2.3 DESIGN LOADS (2012)

a. *General.*

(1) The following loads and forces shall be considered in the design of railway concrete structures supporting tracks:

D = Dead Load
L = Live Load
I = Impact
CF = Centrifugal Force
E = Earth Pressure
B = Buoyancy
W = Wind Load on Structure
WL = Wind Load on Live Load
LF = Longitudinal Force from Live Load
F = Longitudinal Force due to Friction or Shear Resistance at Expansion Bearings
EQ = Earthquake (Seismic)
SF = Stream Flow Pressure
ICE = Ice Pressure
OF = Other Forces (Rib Shortening, Shrinkage, Temperature and/or Settlement of Supports)

The pile reactions per load class according to AREMA Chapter 8 is shown below:

Load Class		D	L + I	CF	W+WL	LF	All	(linear combination, unfactored)
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location
Y	Vert	3.5	81.0	0	3.0	4.0	91.5	All piles
Z	Transv	0	0	0	3	0	3	Outside of curve, inside reduced 15%
X	Long	0	0	0	1	6.0	6.5	All

The loads for the group loading combinations per Table 8-2-5 from AREMA Ch. 8 Section 2.2.4c are shown below:

Table 8-2-5. Group Loading Combinations – Load Factor Design

Group	Item
I	1.4 (D + 5/3 (L + I) + CF + E + B + SF)
IA	1.8 (D + L + I + CF + E + B + SF)
II	1.4 (D + E + B + SF + W)
III	1.4 (D + L + I + CF + E + B + SF + 0.5W + WL + LF + F)
IV	1.4 (D + L + I + CF + E + B + SF + OF)
V	Group II + 1.4 (OF)
VI	Group III + 1.4 (OF)
VII	1.0 (D + E + B + EQ)
VIII	1.4 (D + L + I + E + B + SF + ICE)
IX	1.2 (D + E + B + SF + W + ICE)

		Group									
		I	IA	II	III	IV	V	VI	VII	VIII	IX
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]
Y	Vert	**194**	152	9	128	118	9	128	4	118	4
Z	Transv	0	0	**4**	**4**	0	**4**	**4**	0	0	0
X	Long	0	0	1	**9**	0	1	**9**	0	0	0

Andrew LeCheminant

From: Alex Belenguer <abelenguer@mcnarybergeron.com>
Sent: Thursday, May 29, 2025 6:22 PM
To: Andrew LeCheminant
Cc: Richard Buhler; McCune, David; Brian Garrett; Diego Rodríguez; Vincenzo Perrotta Orgnani; Jeff Mehle
Subject: Re: Bluffdale Comments

Andrew,

Thanks for your time this morning. I agree with all your points.

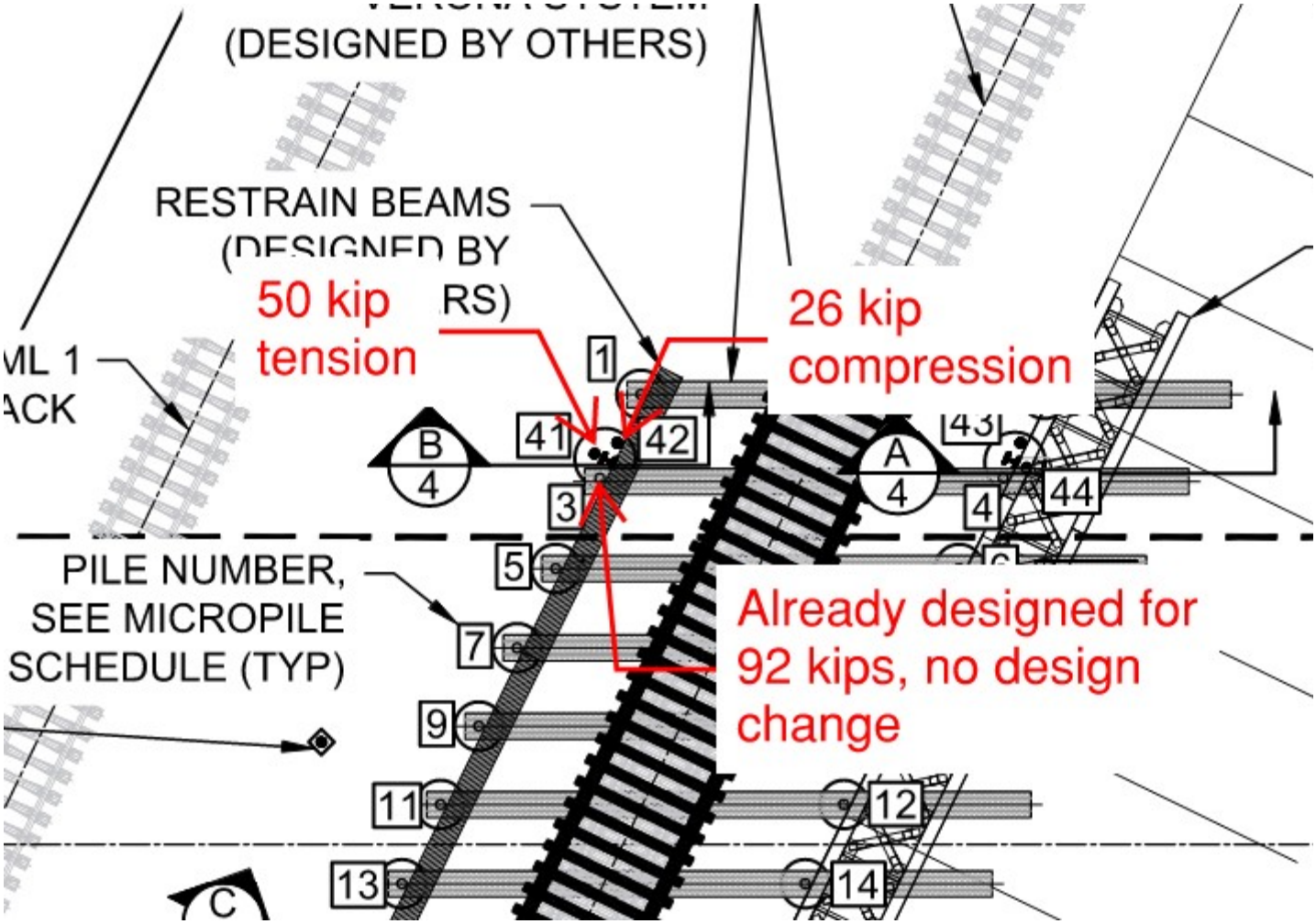
Thanks,

Alex Belenguer, PE
Bridge Engineer
Office: 303.450.6900
Direct: 720.614.5357



On Thu, May 29, 2025 at 4:03 PM Andrew LeCheminant <andrewle@gerhartcole.com> wrote:

> Alex,
>
> Thanks for taking our call to discuss the revised micropile loads. To follow-up, this is our understanding of our discussion and of the diagrams/loads provided earlier today.
>
> - Of the three micropiles within the restrain beam micropile caps, the two micropiles that are in aligned with the vertical HP12x84 beam both have an added 26 kip load in compression
>   - One of these two micropiles is already designed for a 92 kip compression load from the sliding beam load case and no design change is needed
> - The third micropile in each restrain beam micropile cap that is offset from the vertical HP12x84 beam has an added 50 kip load in tension
> - See snippet below for our understanding of loads
> - The spacing of the micropile layout has changed but still fits within the same pile cap dimensions
> - The typical section views in our working drawings will revert back to what was previously shown and include the micropile tendon stick-up 1'-8" above the top of the micropile casing



Please let us know if we have missed anything or misunderstood any of the points covered.

Thanks,

Andrew LeCheminant, PE
Project Consultant
O: 801.849.0055

M: 907.982.6012
gerhartcole.com
andrewle@gerhartcole.com

GERHART COLE

From: Alex Belenguer <abelenguer@mcnarybergeron.com>
Sent: Thursday, May 29, 2025 11:25 AM
To: Richard Buhler <richardb@gerhartcole.com>; McCune, David <david.mccune@hdrinc.com>
Cc: Brian Garrett <brian@gerhartcole.com>; Andrew LeCheminant <andrewle@gerhartcole.com>; Diego Rodríguez <diego@petrucco.com>; Vincenzo Perrotta Orgnani <vincenzo@petruccosrl.it>; Jeff Mehle <jmehle@mcnarybergeron.com>
Subject: Re: Bluffdale Comments

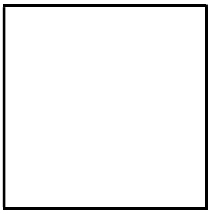
Richard and David,

See additional calculations attached. I incorporated those into appendix D and updated the comment response. Let me know what you think.

Thanks,

Alex Belenguer, PE
Bridge Engineer
Office: 303.450.6900

Direct: 720.614.5357



On Thu, May 29, 2025 at 8:47 AM Richard Buhler <richardb@gerhartcole.com> wrote:

> Alex,
>
> Brian has limited availability for the next couple of days. Andy and I are happy to have a discussion whenever you available to discuss this and we can try to loop Brian is as needed.

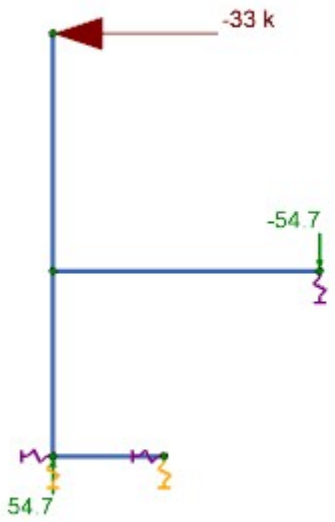
Richard

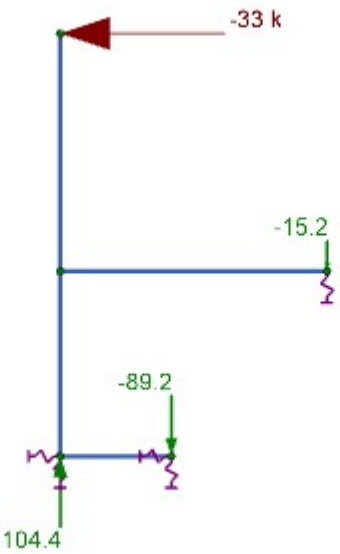
From: Alex Belenguer <abelenguer@mcnarybergeron.com>
Sent: Thursday, May 29, 2025 8:00 AM
To: Brian Garrett <brian@gerhartcole.com>
Cc: Andrew LeCheminant <andrewle@gerhartcole.com>; Diego Rodríguez <diego@petrucco.com>; Richard Buhler <richardb@gerhartcole.com>; Vincenzo Perrotta Orgnani <vincenzo@petruccosrl.it>; McCune, David <david.mccune@hdrinc.com>; Jeff Mehle <jmehle@mcnarybergeron.com>
Subject: Re: Bluffdale Comments

Brian,

We might have to scratch our heads a bit more with the new pinned connection on the combined caps.

I couldn't get them without a significant tension, so I had no choice but leaving the rod and nut protruding to the top. When is a good moment let's discuss.

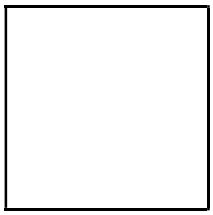




Thanks,

Alex Belenguer, PE
Bridge Engineer
Office: 303.450.6900

Direct: 720.614.5357



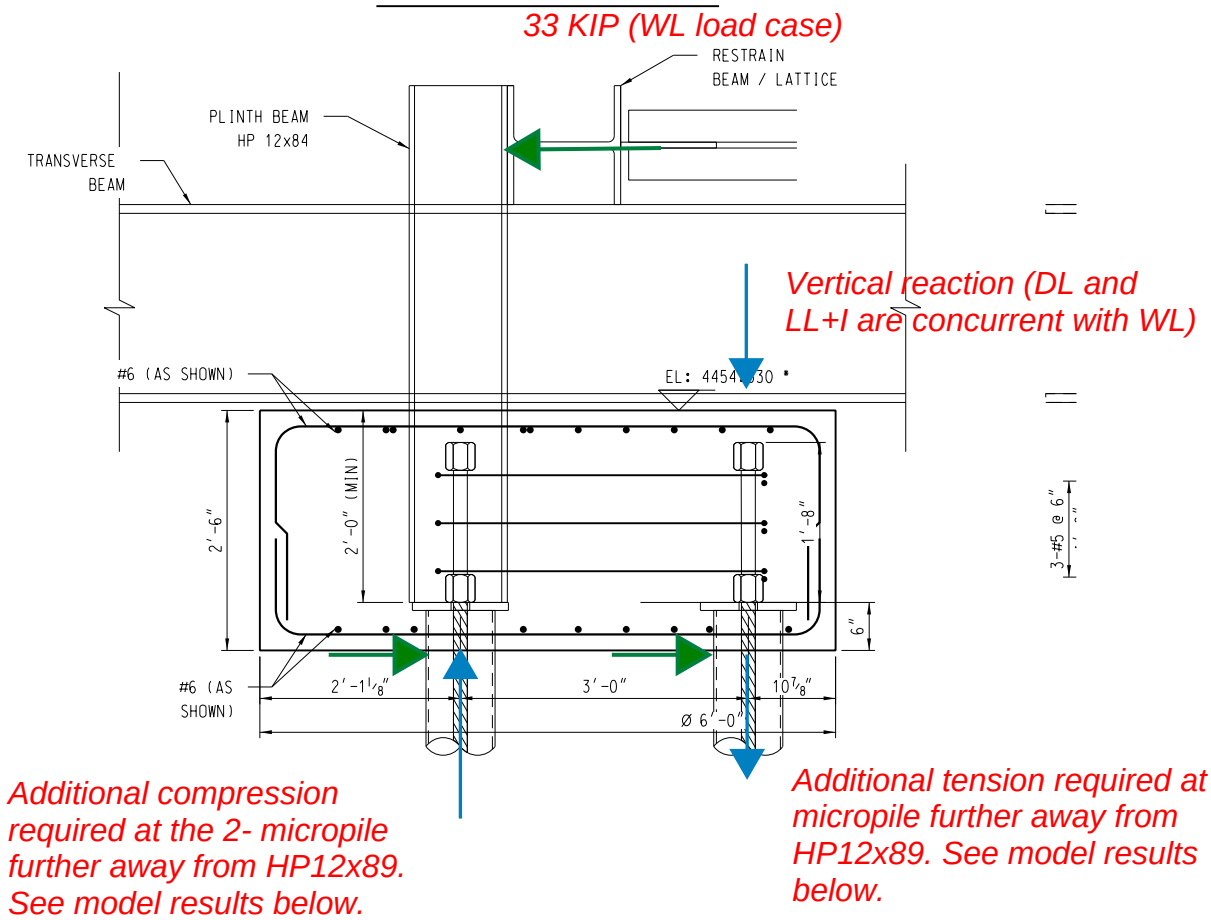
Email received from McNary, Bergeron, and Johannesen on 5/29/25

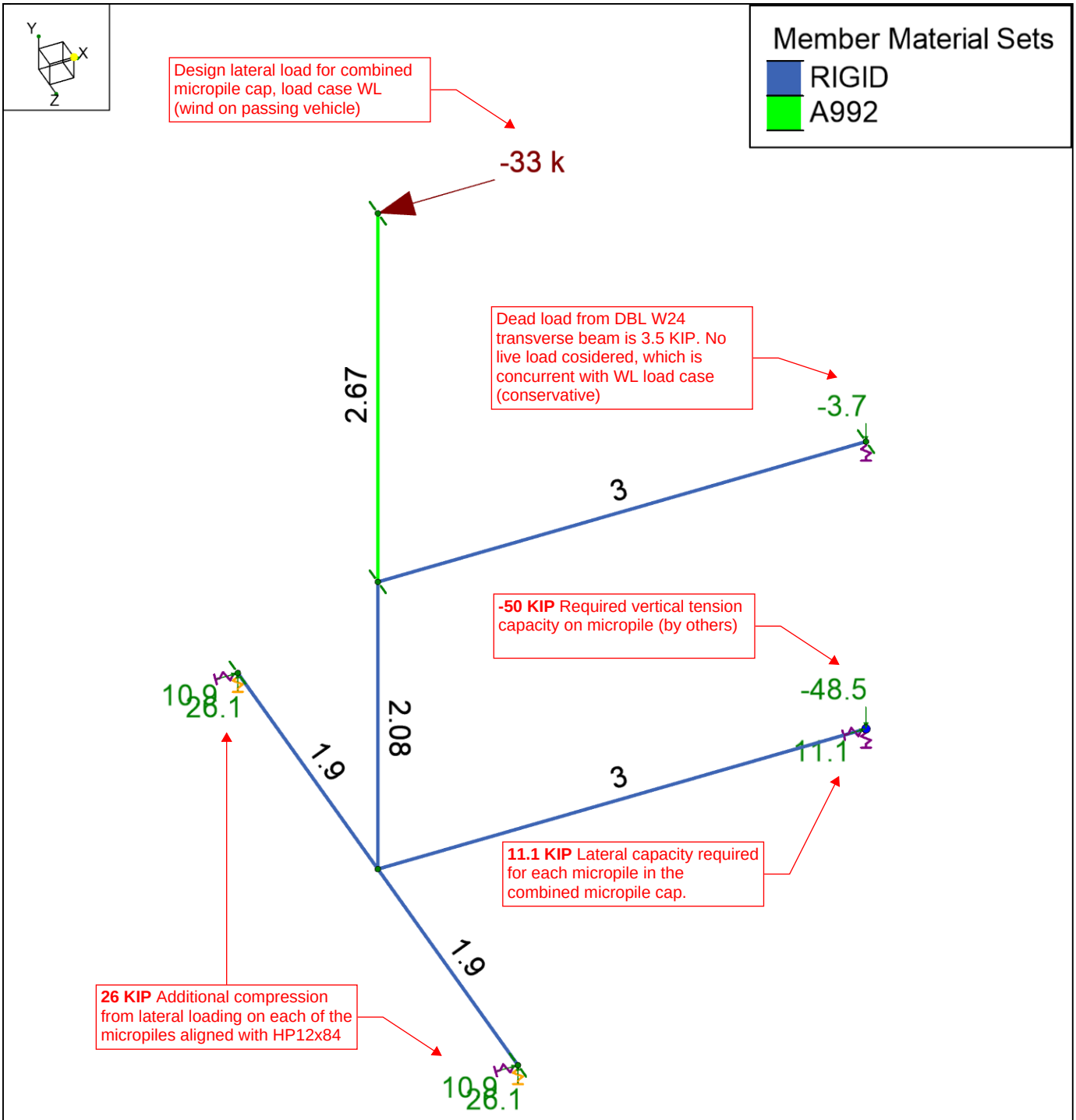
7. MICROPILE DEMANDS AT THE COMBINED MICROPILE CAP

A pinned connection is provided at the bottom of the combined micropile cap.

Equilibrium for the design lateral forces provided by additional tension and compression in the vertical micropiles, together with the vertical dead and live loads concurrent with the lateral loading load case.

A Risa model has been used to calculate the additional vertical forces on the micropiles and found to be within bounds of the design micropile capacities.





Member Length (ft) Displayed
Loads: LC 1,
Results for LC 1,
Reaction and Moment Units are kips and kip-ft

McNary Bergeron & Johannesen Engineered Construction	MBJ		SK-6
	ABG		May 29, 2025 at 10:58 AM
			Combined micropile.r3d

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION®

CONNECTICUT
44 Pond Road
Old Saybrook, CT 06475
tel 860 388 2267

COLORADO
565 Burbank Street, Suite A
Broomfield, CO 80020
tel 303 450 6900

FLORIDA
10014 N. Dale Mabry Hwy,
Suite 222
Tampa, FL 33618
tel 813 609 4616

www.mcnarybergeron.com

TEMPORARY BRIDGE "VERONA SHORING SYSTEM" REVIEW

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

PREPARED FOR: City of Bluffdale
In conjunction with Petrucco USA, LLC

SUBMITTED R1: 9/20/2024
Revision 2: 5/28/2025
Revision 3: 7/11/2025



TEMPORARY BRIDGE "VERONA SHORING SYSTEM" REVIEW

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

PREPARED FOR: City of Bluffdale
In conjunction with Petrucco USA, LLC

SUBMITTED: 9/20/2024
Revision 2: 5/28/2025
Revision 3: 7/11/2025

Contents

1. INTRODUCTION AND FINDINGS 4
   1.1 INTRODUCTION 4
   1.2 FINDINGS AND RECOMMENDATIONS 4
2. DESCRIPTION OF THE SHORING SYSTEM 8
   2.1 GENERAL DESCRIPTION 8
   2.2 DESIGN CODES 8
   2.3 MATERIALS 8
   2.4 MODELING NOTES 8
3. LOADS AND LOAD COMBINATIONS 18
   3.1 DEAD LOADS 18
   3.2 LIVE LOADS 18
4. ALLOWABLE STRESSES 26
5. PLINTH SUPPORT AT BOX ROOF 28
6. ANALYSIS RESULTS 49
APPENDIX A – RISA 3D MODEL INPUT AND OUTPUT PRINTOUTS 58
APPENDIX B – RISA 3D MODEL REACTIONS FOR SUBSTRUCTURE DESIGN 164

TEMPORARY BRIDGE "VERONA SHORING SYSTEM" REVIEW

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

***Revision* log**

Rev 0: 9/20/2024
Original submittal

Rev 1: 2/20/2025
Addressed review comments

Rev 2: 5/28/2025
Addressed additional review comments

Rev 3: 7/11/2025
Addressed unresolved review comments

1. INTRODUCTION AND FINDINGS

1.1 INTRODUCTION

This report contains an independent review of the Verona Self-Supporting Shoring System, prepared by McNary Bergeron & Johannesen (MBJ) for Petrucco USA, LLC, to be used to support railroad tracks during the box jacking under the railroad crossing in Bluffdale, Utah. The purpose of this review is to verify that the design of the shoring system conforms to the relevant design codes as described in Section 2 of this report.

The scope of this report is based on the design information provided by Petrucco USA, LLC, the supplier of the shoring system. It is limited to a review of the structural capacity of the main members of the system including the following:

- Longitudinal Beams / Blue Beams: Euro shape HEB-550
- Transverse Beams: Euro shape HEM-180
- Maneuvering beams: Double W24x146

Items not critical to the overall structural capacity of the Shoring System have not been reviewed and are excluded from this report. These items include the following:

- Mechanical, hydraulic, and electrical components, and specific operational sequences and instructions thereof.
- Platforms and walkways.
- Verification for compliance with jobsite safety requirements. The contractor is solely responsible for jobsite safety and safe operation of the equipment and procedures associated with the work. MBJ does not have control over, charge of, or responsibility for the safety precautions and programs in connection with the work.
- Roller Assemblies.

Furthermore, the scope of MBJ's review does not include:

- A review of the piling foundations.
- A review of the retention beam.
- Verification that the materials specified in the design were utilized in fabrication, and quality assurance or quality control inspections or certifications during the fabrication process.

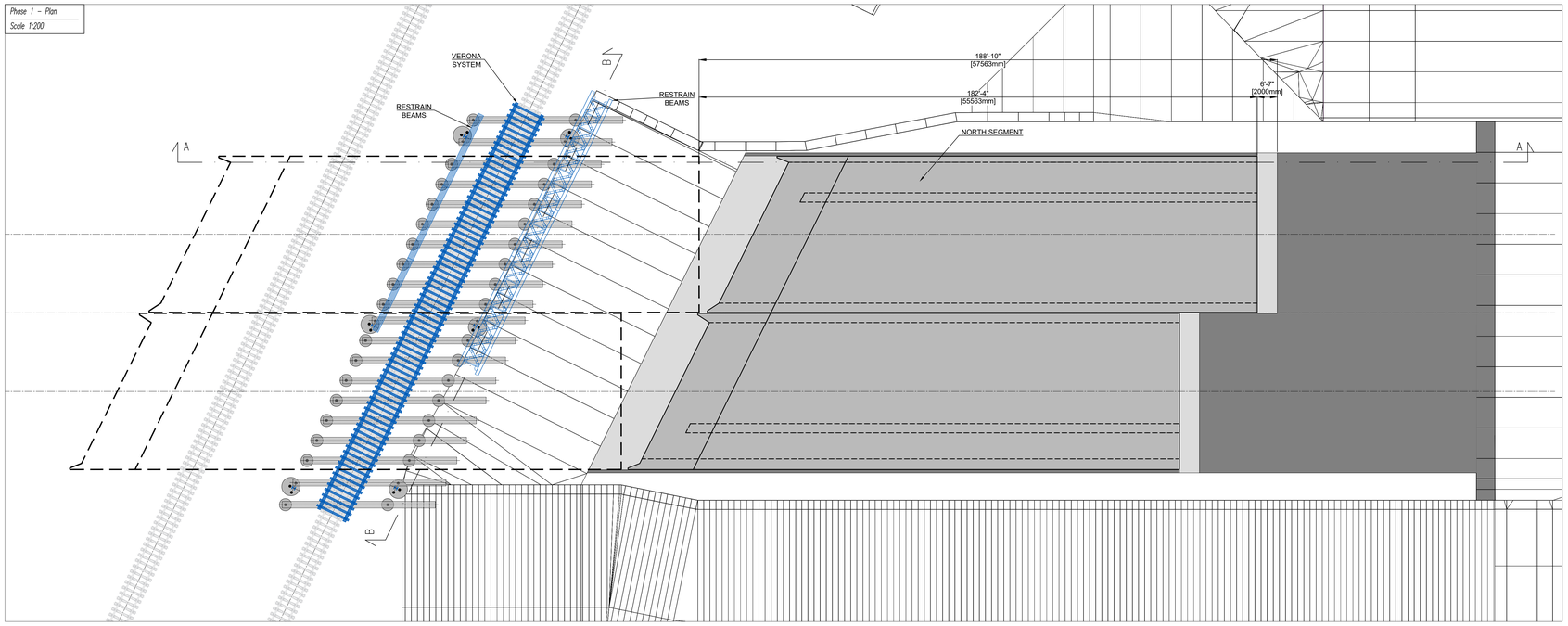
1.2 FINDINGS AND RECOMMENDATIONS

a) We have found that the Verona Self-Supporting Shoring System is of adequate capacity for the load conditions which govern the system design.

b) The Box Jacking Method Statement submitted under separate cover by Petrucco is consistent with this review and the Verona system requirements. The sequence of activities (including installation of beams, box jacking and removal of beams) is consistent with that required for the Verona System.

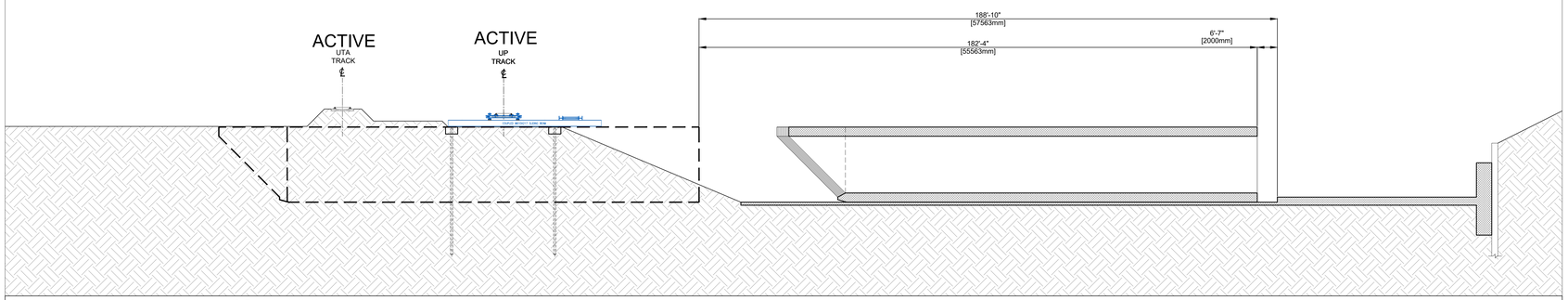
Phase 1 – Plan

Scale 1:200



Section A–A

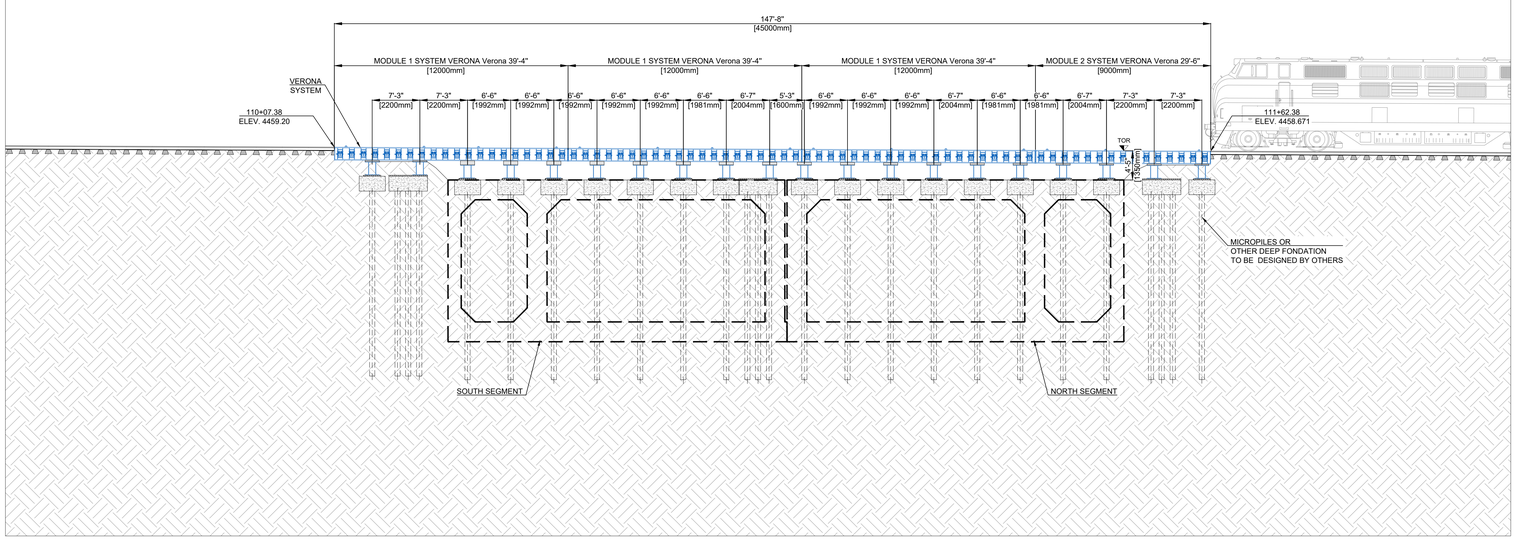
Scale 1:200



Box 1 – Phase 1: Verona System installation on UP Track for both North and South segments.

Section B–B

Scale 1:100



DRAWING N.		TITLE:	100% DESIGN – JACKING WORKS	CLIENT: CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	
DRAWN:	drf	REVISION:	14600 CROSSING – ROAD UNDERPASS BOX 1	
CHECKED:	vpo		PHASE 1 – VERONA SYSTEM INSTALLATION	
APPROVED:	op			

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

VERONA SYSTEM NORTH SEGMENT PLAN
Scale 1:50

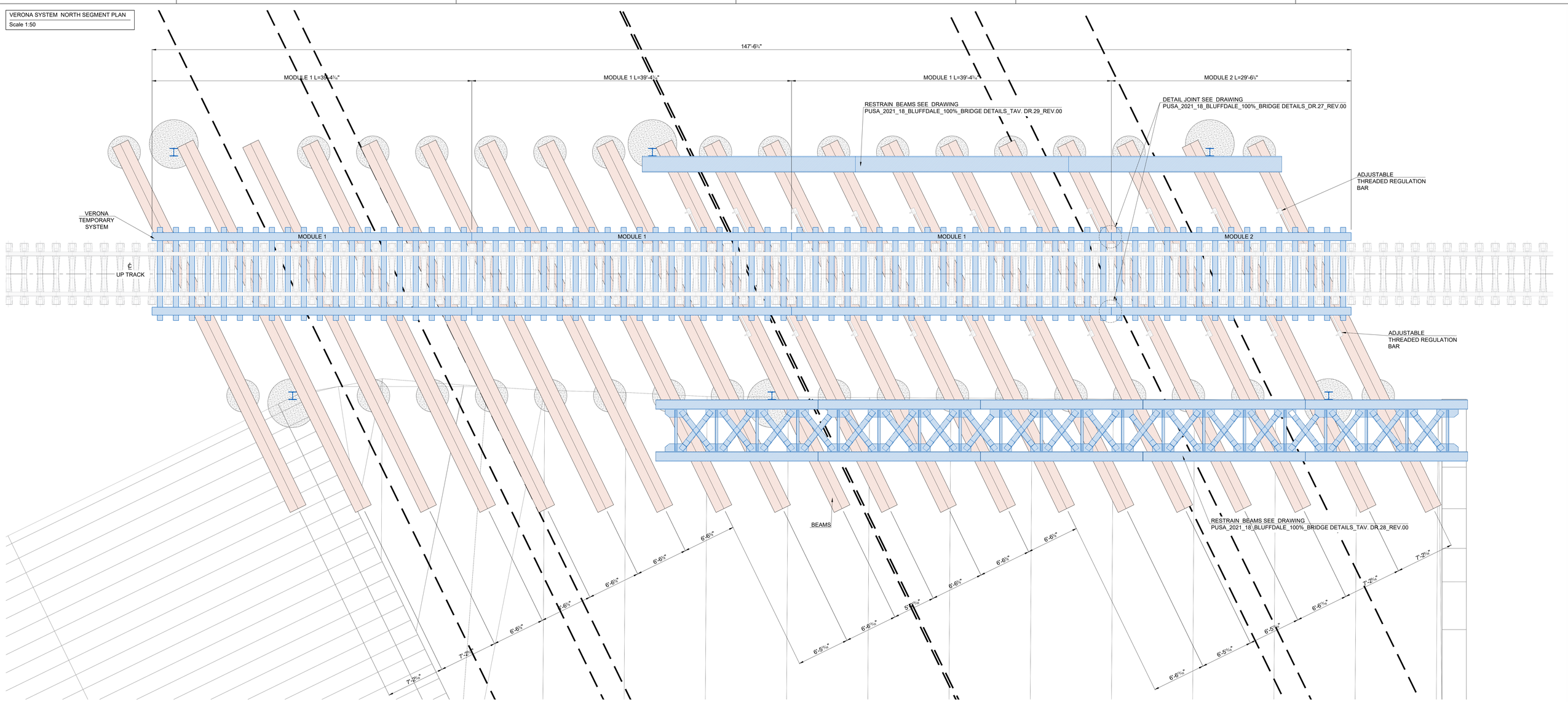


PHOTO 1: VERONA SYSTEM



PHOTO 2: VERONA SYSTEM

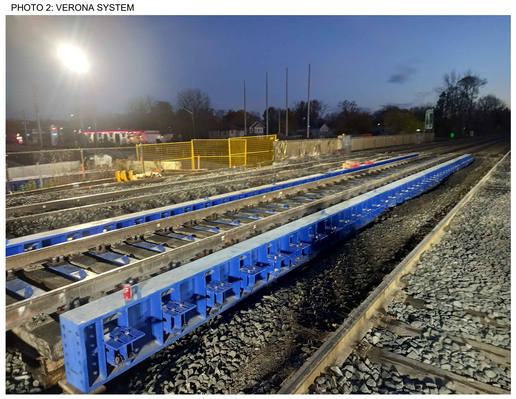


PHOTO 3: VERONA SYSTEM



DRAWING N.	23	TITLE:	100% DESIGN – VERONA SYSTEM	CLIENT: CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	20th SETT. 2024	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:	17th OCT. 2024		
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	rp				

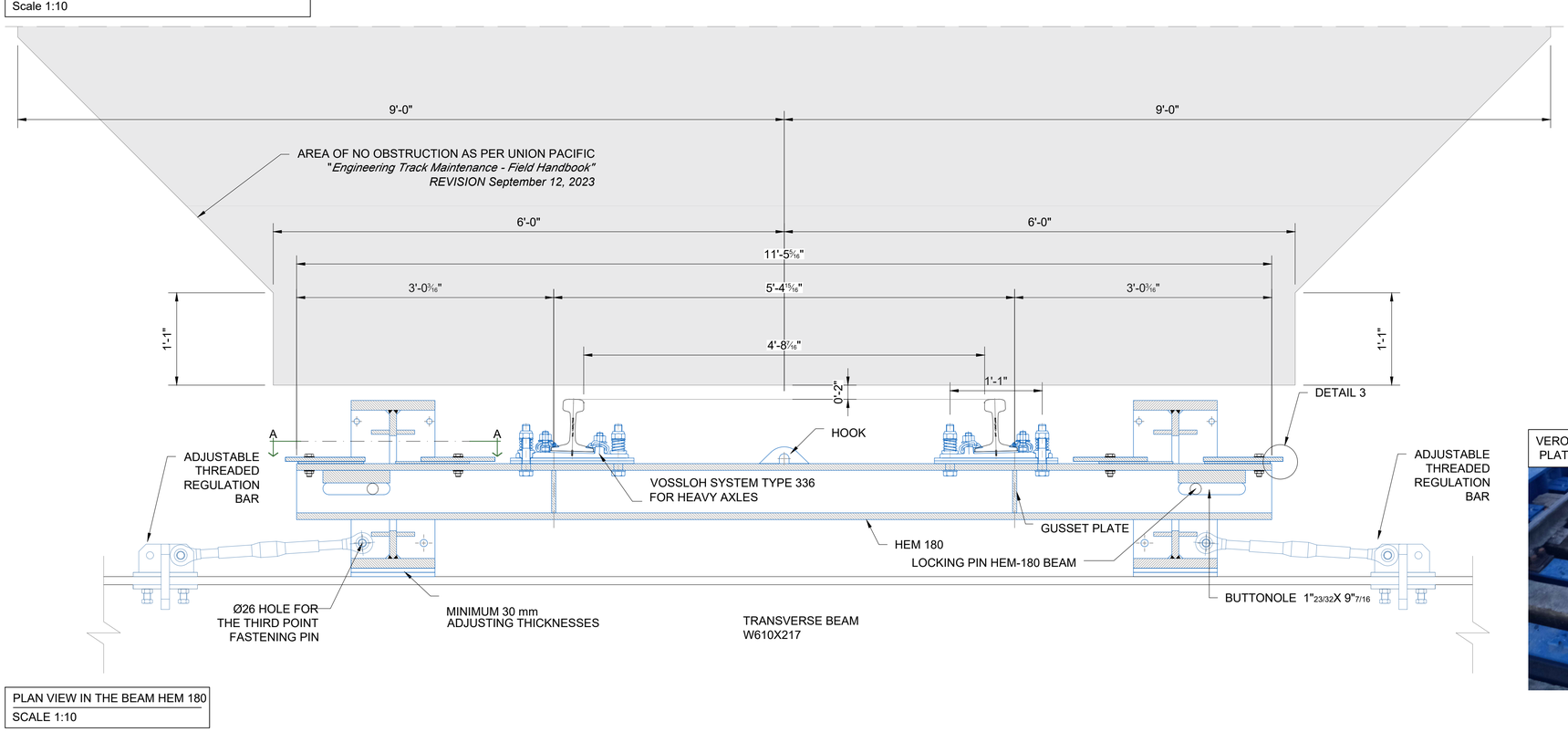
100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

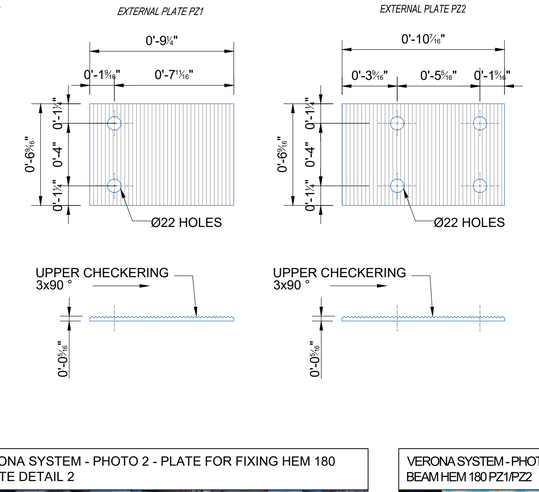
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, Fl 33141
www.petrucco.com

ALL DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA - ALCALA DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N.C.J.YES 20/03/0674
20/03/0674 ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT

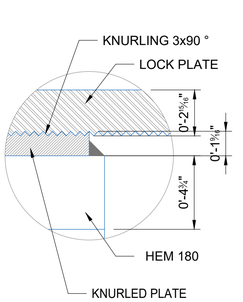
CROSS SECTION OF HEM-180 AT THE CENTERLINE
Scale 1:10



DETAIL 2
Scale 1:5



DETAIL 3
Scale 1:2



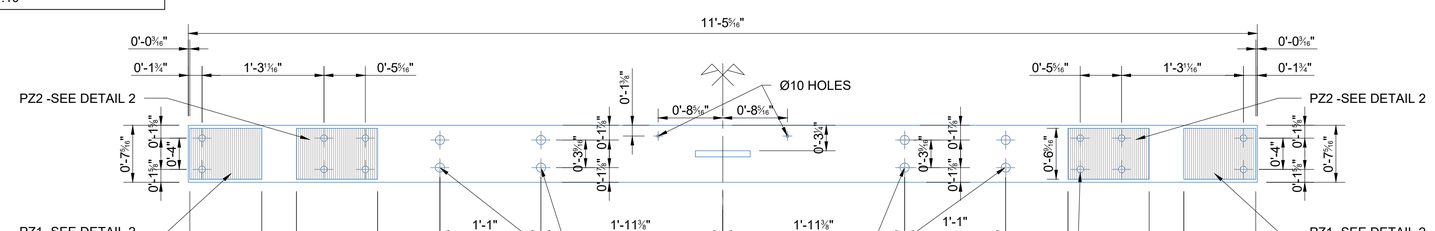
VERONA SYSTEM - PHOTO 2 - PLATE FOR FIXING HEM 180 PLATE DETAIL 2



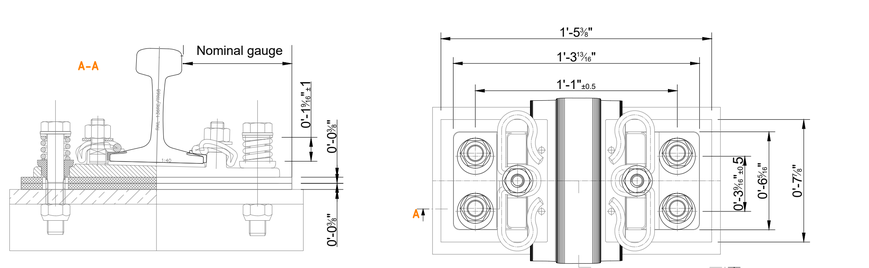
VERONA SYSTEM - PHOTO 1 - KNURLED PLATES WELDED ON THE BEAM HEM 180 PZ1/PZ2



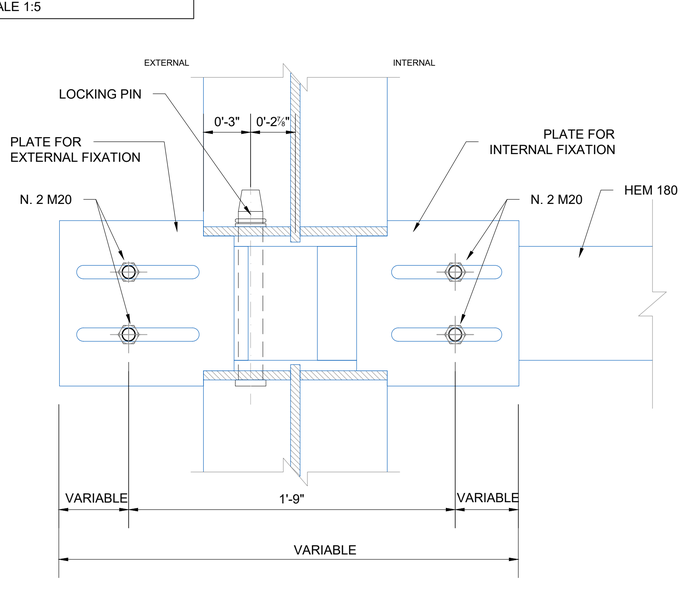
PLAN VIEW IN THE BEAM HEM 180
SCALE 1:10



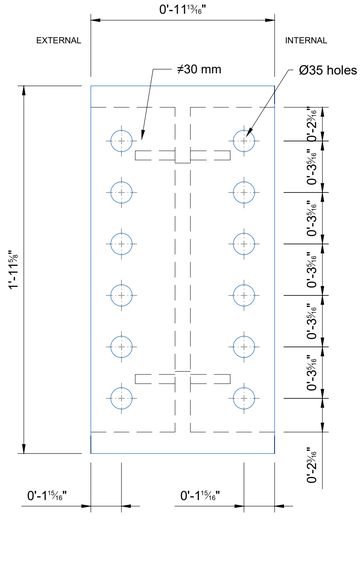
VOSSLOH RAIL FASTENING SYSTEM 336 FOR HEAVY AXLES
SCALE 1:5



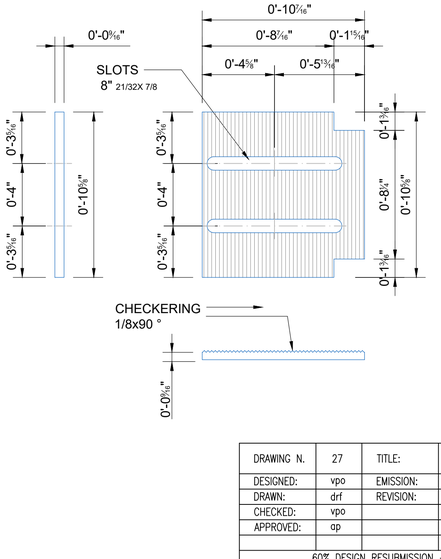
SECTION A-A
SCALE 1:5



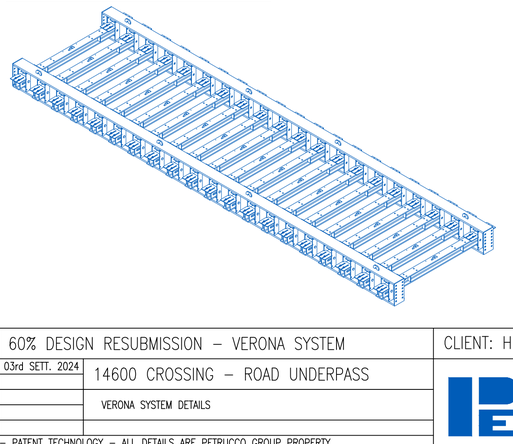
JOINT DETAIL
Scale 1:5



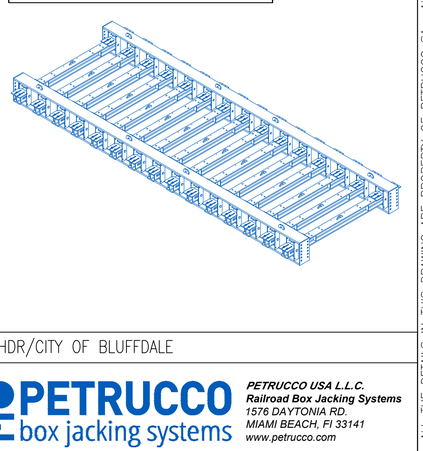
DETAIL 1
SCALE 1:5



VERONA SYSTEM MODUL 1 3D TYPICAL VIEW
NO SCALE



VERONA SYSTEM MODUL 2 3D TYPICAL VIEW
NO SCALE



DRAWING N.	27	TITLE:	60% DESIGN RESUBMISSION – VERONA SYSTEM		CLIENT: HDR/CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	03rd SETT. 2024	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	op				

60% DESIGN RESUBMISSION – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA , ALCALA' DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N. P.C.T/ES 2010/070674 ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT

2. DESCRIPTION OF THE SHORING SYSTEM

The Shoring System was designed and manufactured by Petrucco USA, LLC to install segments on the 14600 South-Railroad Crossing project. The Shoring System consists of the following components:

- Maneuvering Beams
- HEB-550 Longitudinal Beams
- HEM-180 Transverse Beams
- Type 60 UNI Rails
- Piling Foundations
- Retention Beam

2.1 GENERAL DESCRIPTION

This section contains the parameters used to review the structural capacity of the main members of the Shoring System. The detailed independent analysis is included in Section 4 while supporting calculations are included in Appendices A and B.

2.2 DESIGN CODES

The Shoring System was designed by Petrucco in accordance with

1. Italian Regulation NTC 2008
2. Eurocode
3. AREMA Manual of Railway Engineering (AREMA)
4. AISC

The check of the system is done to prove compliance with AREMA MRE requirements.

The appropriate conversions to English units have been made in the review of Euro shape section properties and calculations.

2.3 MATERIALS

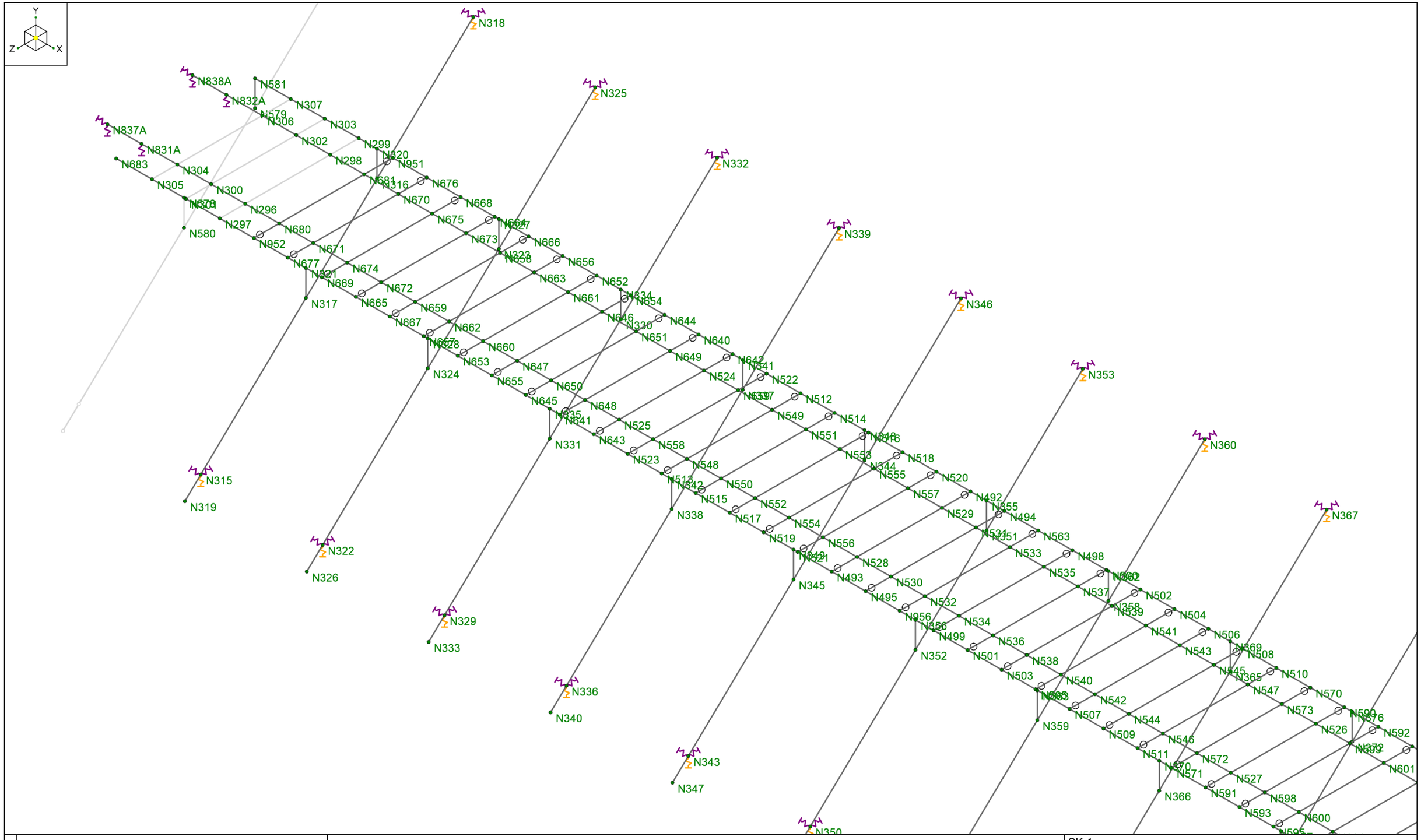
All hot-rolled shapes are specified to meet the following material specifications::

Material Designation	Yield Str. (ksi)	Tensile Str. (ksi)
A709	50	65

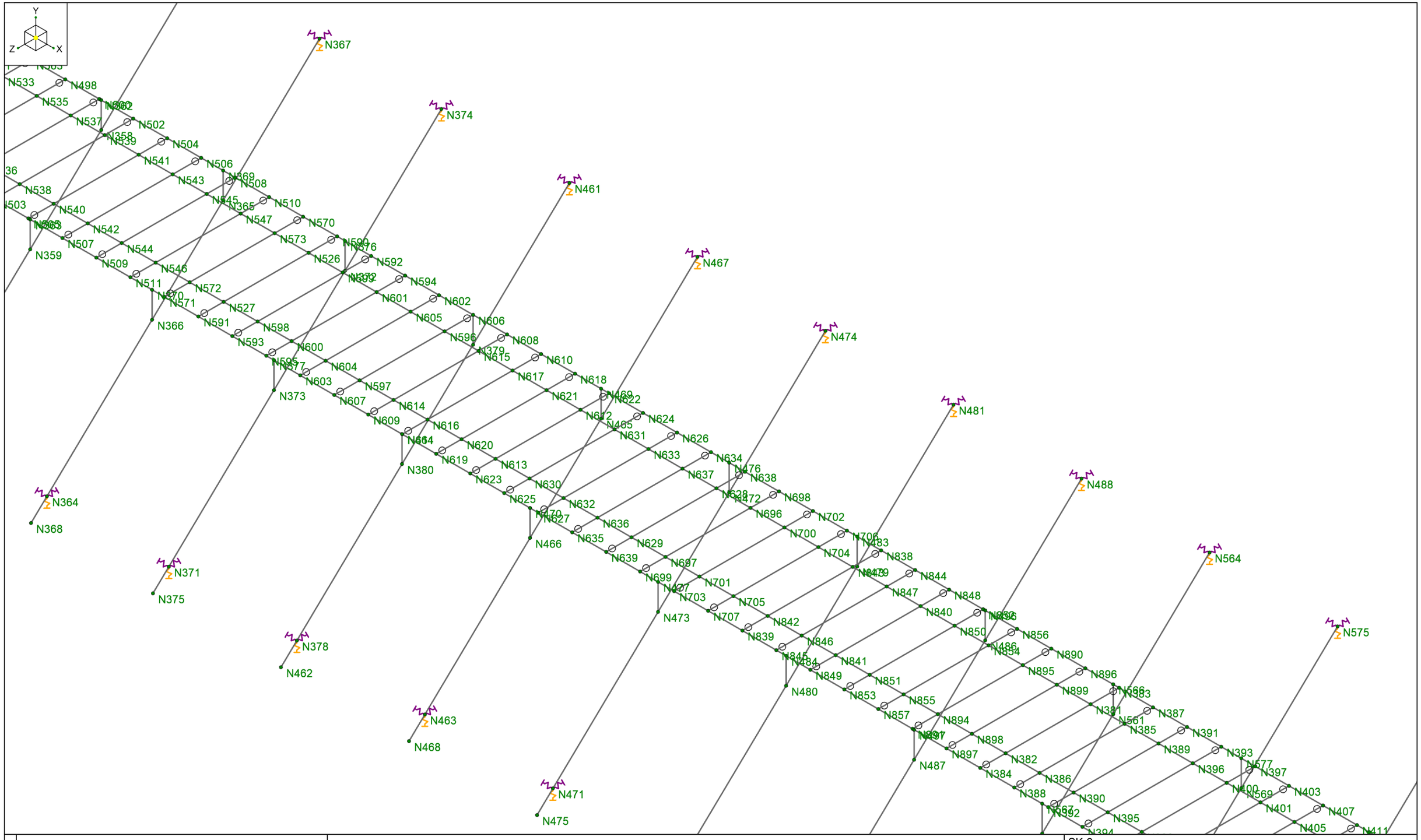
2.4 MODELING NOTES

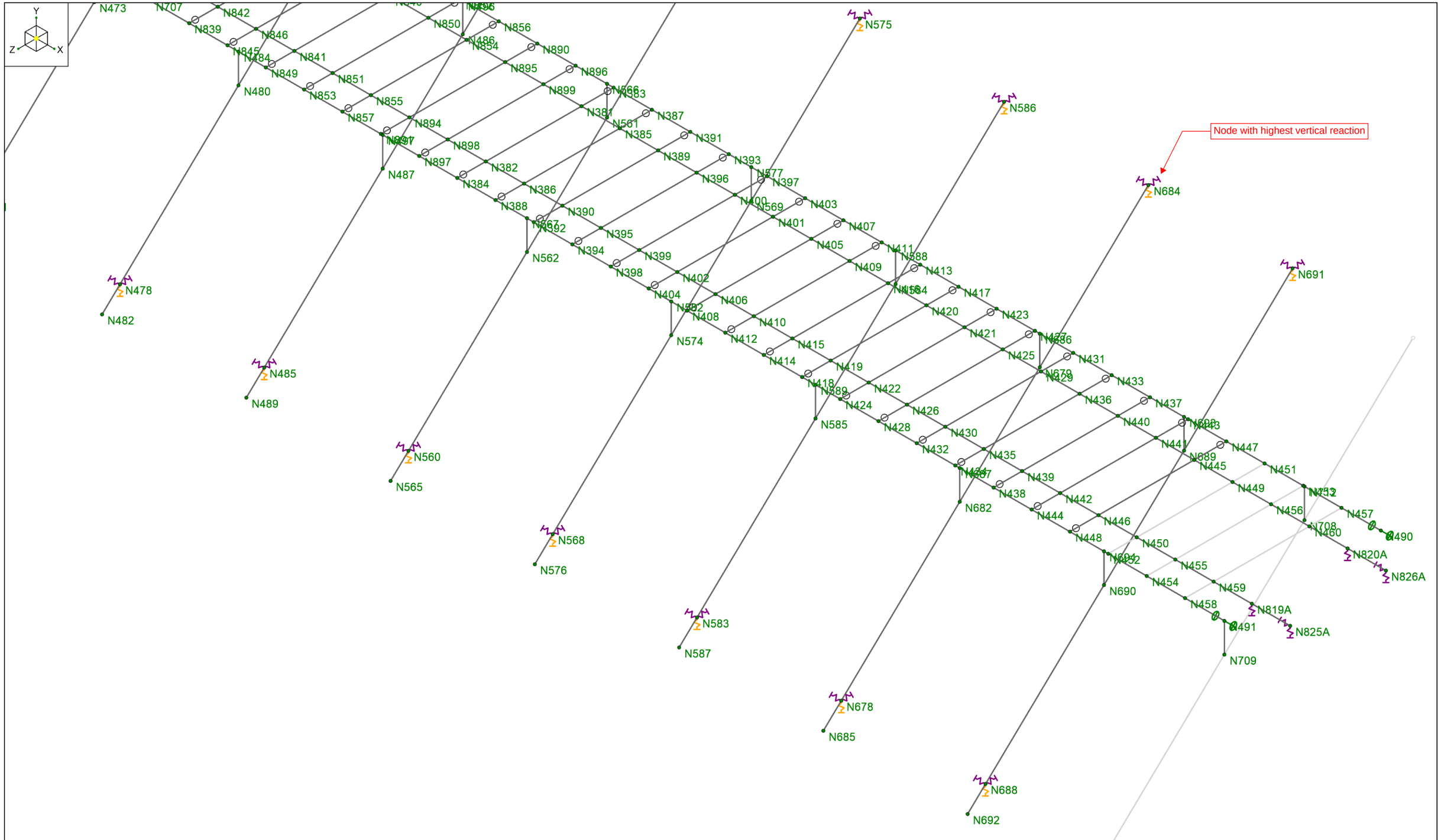
A detailed model of the Shoring Systems has been developed using Risa3D software. Appendix A shows the model input data and section properties of the shapes used in the model. Built up sections were modeled as custom sections to determine the cross-sectional properties. Those properties were then used in the Risa3D model.

Reactions used for the support of the temp. bridge “Verona System” are provided in Appendix B.

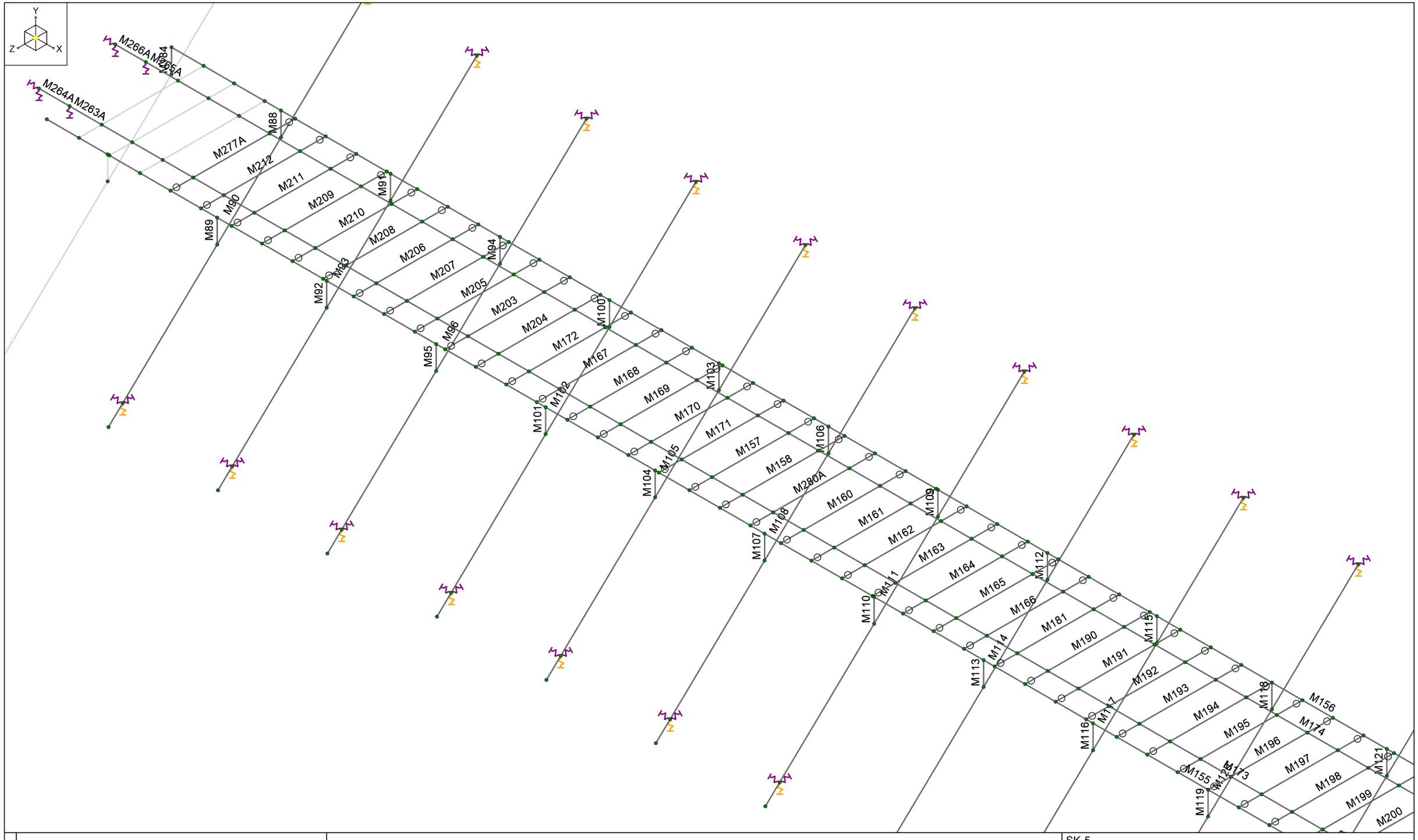


		SK-1
		May 29, 2025 at 01:02 AM
		Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d

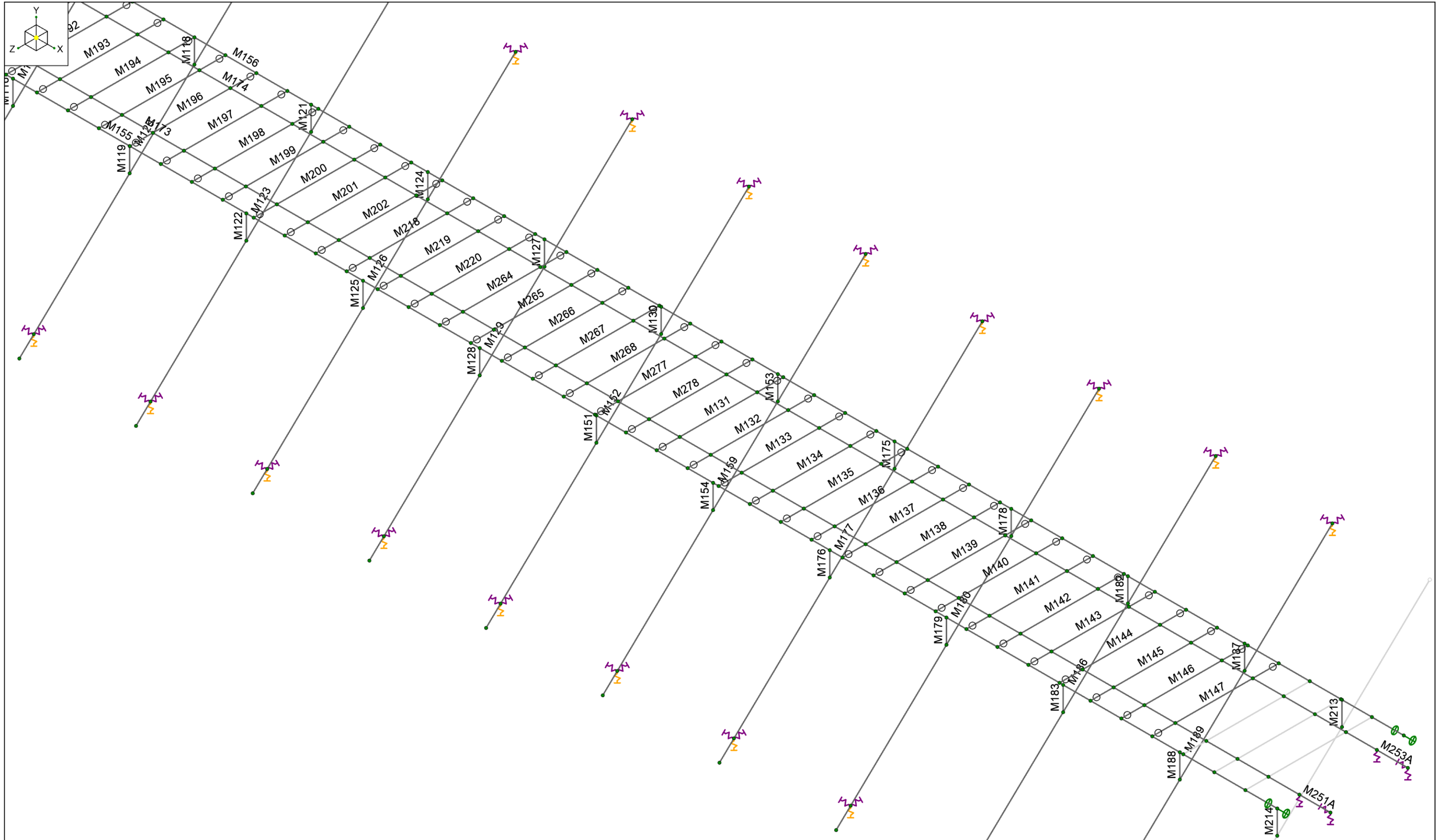

Y
Z
X
N367
N374
N461
N467
N474
N481
N488
N564
N575
N364
N368
N371
N375
N378
N462
N463
N468
N471
N475
N533
N498
N535
N537
N502
N358
N539
N504
N541
N506
N543
N508
N538
N540
N542
N507
N544
N359
N509
N546
N511
N572
N527
N591
N598
N593
N600
N595
N604
N603
N597
N373
N607
N614
N609
N616
N380
N620
N619
N613
N623
N630
N625
N632
N627
N636
N635
N629
N639
N699
N701
N703
N705
N707
N473
N842
N839
N846
N841
N849
N851
N853
N855
N857
N480
N894
N898
N897
N382
N384
N386
N388
N390
N487
N395
N394
N397
N403
N401
N407
N405
N411
N569
N577
N393
N396
N400
N389
N391
N385
N387
N561
N383
N381
N899
N895
N896
N890
N856
N854
N850
N848
N847
N844
N838
N483
N704
N700
N702
N696
N698
N472
N638
N476
N637
N633
N634
N631
N626
N624
N622
N469
N621
N617
N618
N610
N606
N608
N596
N379
N605
N602
N601
N594
N592
N526
N576
N599
N570
N547
N510
N545
N365
N369
N503
N363
N536
N534
N532
N500
N501
N359
N366
N370
N571



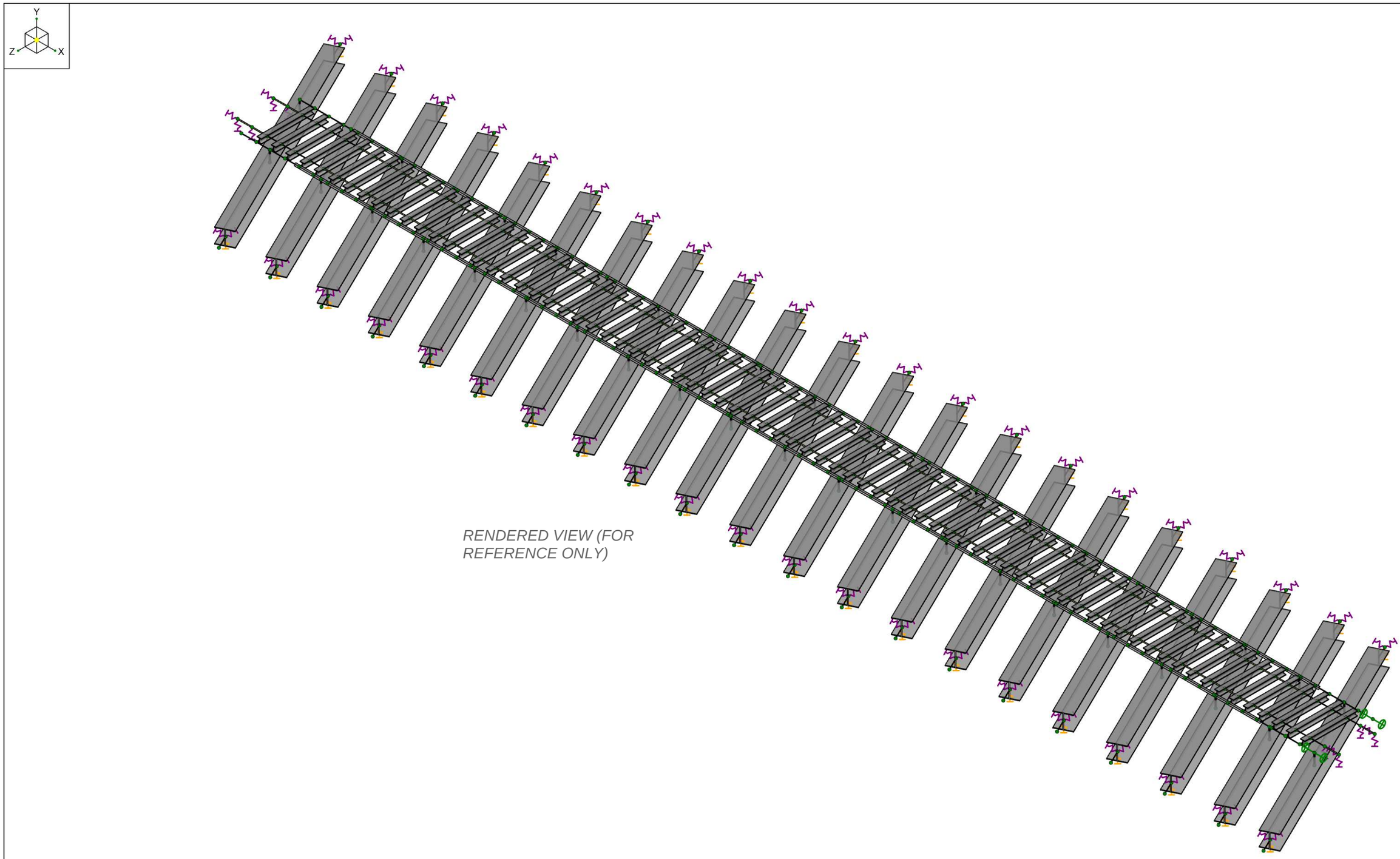
		SK-3
		May 29, 2025 at 01:03 AM
		Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d



		SK-5
		May 29, 2025 at 01:06 AM
		Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d

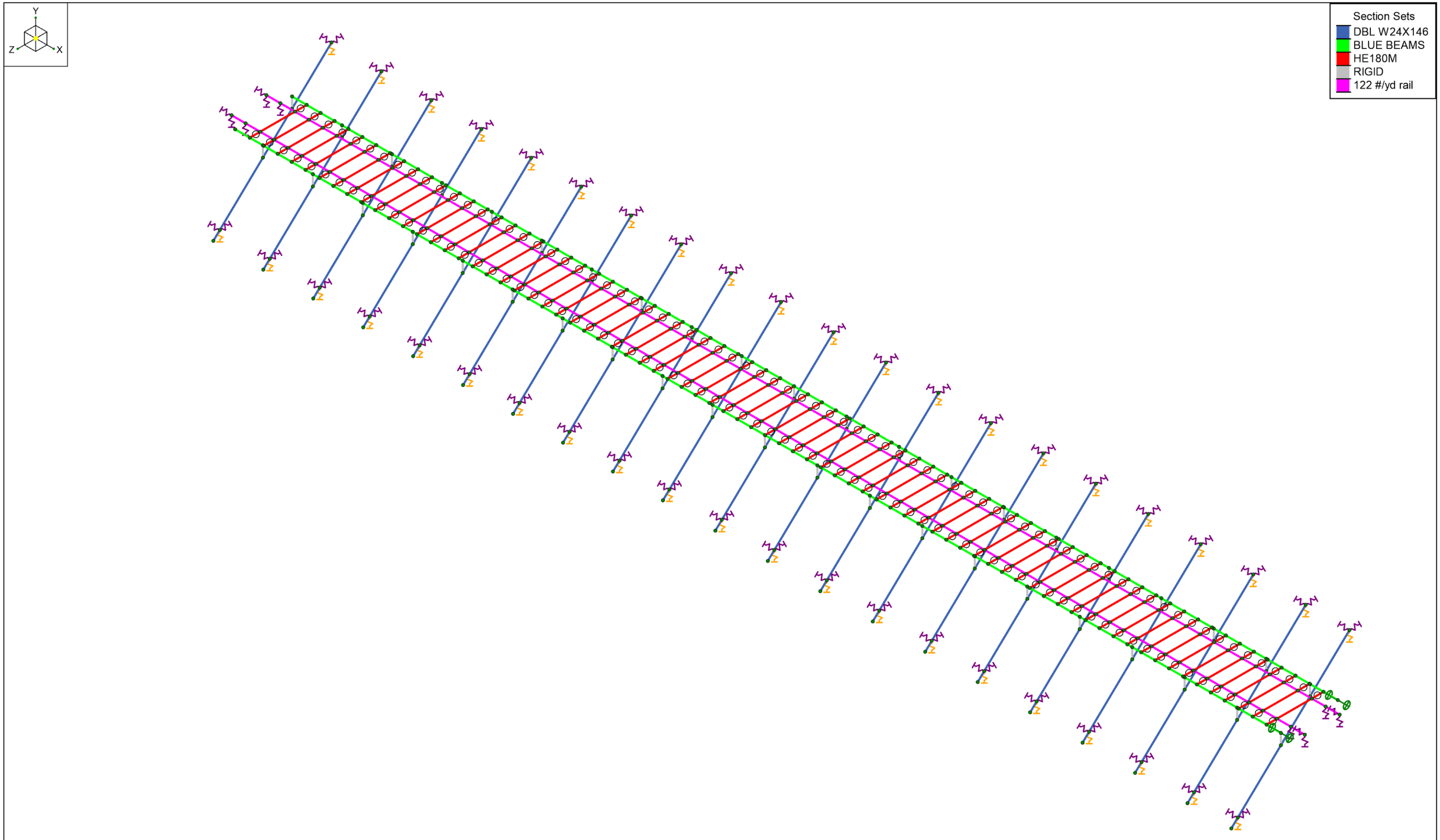


			SK-4
			May 29, 2025 at 01:06 AM
			Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d



RENDERED VIEW (FOR REFERENCE ONLY)

IRISA A NEMETSCHEK COMPANY			SK-2
			Sep 19, 2024 at 10:41 AM
			Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d



RISA A NEMETSCHEK COMPANY			SK-3
			Sep 19, 2024 at 10:41 AM
			Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d

3. LOADS AND LOAD COMBINATIONS

Design forces are deduced from AREMA MRE Chapter 15 Section 1.3.

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Loads are combined to investigate that stresses are below allowable as per AREMA MRE Chapter 15 Section 1.3.14.

3.1 DEAD LOADS

The dead loads include the self-weight of the Shoring System members per material takeoff used in the model, rails, and ties kept in place.

3.2 LIVE LOADS

The live loads include the greatest of Cooper E80 and Alternate Live Load Series Loading, braking / traction force, and lateral load. Traffic speed of 60 mph has been used to obtain a live load impact factor of 40%, including rocking effect. Factored wheel forces have been applied to the rails to maximize the load effect.

Live loads are modeled as moving loads along the bridge, and the design is based on the envelope effect.

LOADS AND LOAD COMBINATIONS

The summary of load and applicable sections of the Manual are reproduced below:

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Section 1.3.2 - Dead Load (DL)

The Dead load (DL) considered for the rails, fastening equipment, and ties left in place is 0.32 kip/ft.

Additionally, the self-weight of the shoring system self weight is per breakdown below:

Material Takeoff

	Material	Size	Pieces	Length[ft]	Weight[K]
6	Hot Rolled Steel				
7	A572 Gr.50	Blue Beams	2	295.3	45.869
8	A572 Gr.50	DBL W24x146	21	762	223.003
9	A572 Gr.50	HE180M	74	594.4	35.424
10	Total HR Steel		97	1651.7	304.295

Section 1.3.3 - Live Load (LL)

Per Section 1.3.3a the Cooper E 80 and Alternate Live Load is considered here.

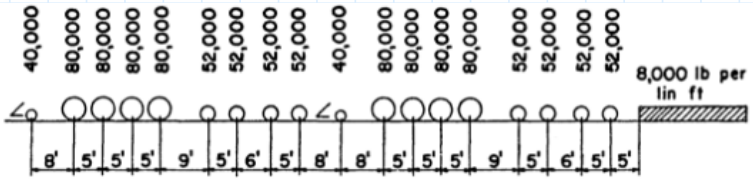


Figure 15-1-2. Cooper E 80 Load

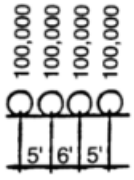


Figure 15-1-3. Alternate Live Load on 4 Axles

Section 1.3.4 - Distribution of Live Load

This design is an open deck bridge. Per Section 1.3.4.1a no distribution of live load is considered.

Section 1.3.5 - Impact load (I)

$L_{span} := 6\ ft$ Spacing between transverse beams

Per Section 1.3.5c (b) the impact load due to vertical effects (% of the live load, vertical direction) is

$$I_1 := 40 - \frac{3 \cdot \left(L_{span} \div ft\right)^2}{1600} = 39.933 \qquad I_2 := 60 - \frac{\left(L_{span} \div ft\right)^2}{500} = 59.9$$

No hammer blow equipment is considered $I := I_1$

Per Section 1.3.5d the impact load due to rocking effect (RE) shall be a vertical force couple, magnitude of 20% of wheel load (1 wheel applied vertical updward, 1 wheel applied vertical downward) to maximize force.

This design limits the speed to 25 mph during operation. Per Section 7.3.2.3a (1), for load rating, the vertical effects component can be multiplied by a reduction factor for train speeds below 60 mph per the following:

$$S := 60\ mph \qquad RF_I := 1 - \frac{0.8}{2500} \cdot \left(60 - \frac{S}{mph}\right)^2 = 1 \qquad RF_I \cdot I_1 = 39.9$$

Distribution of Live Load & Impact Load to each rail

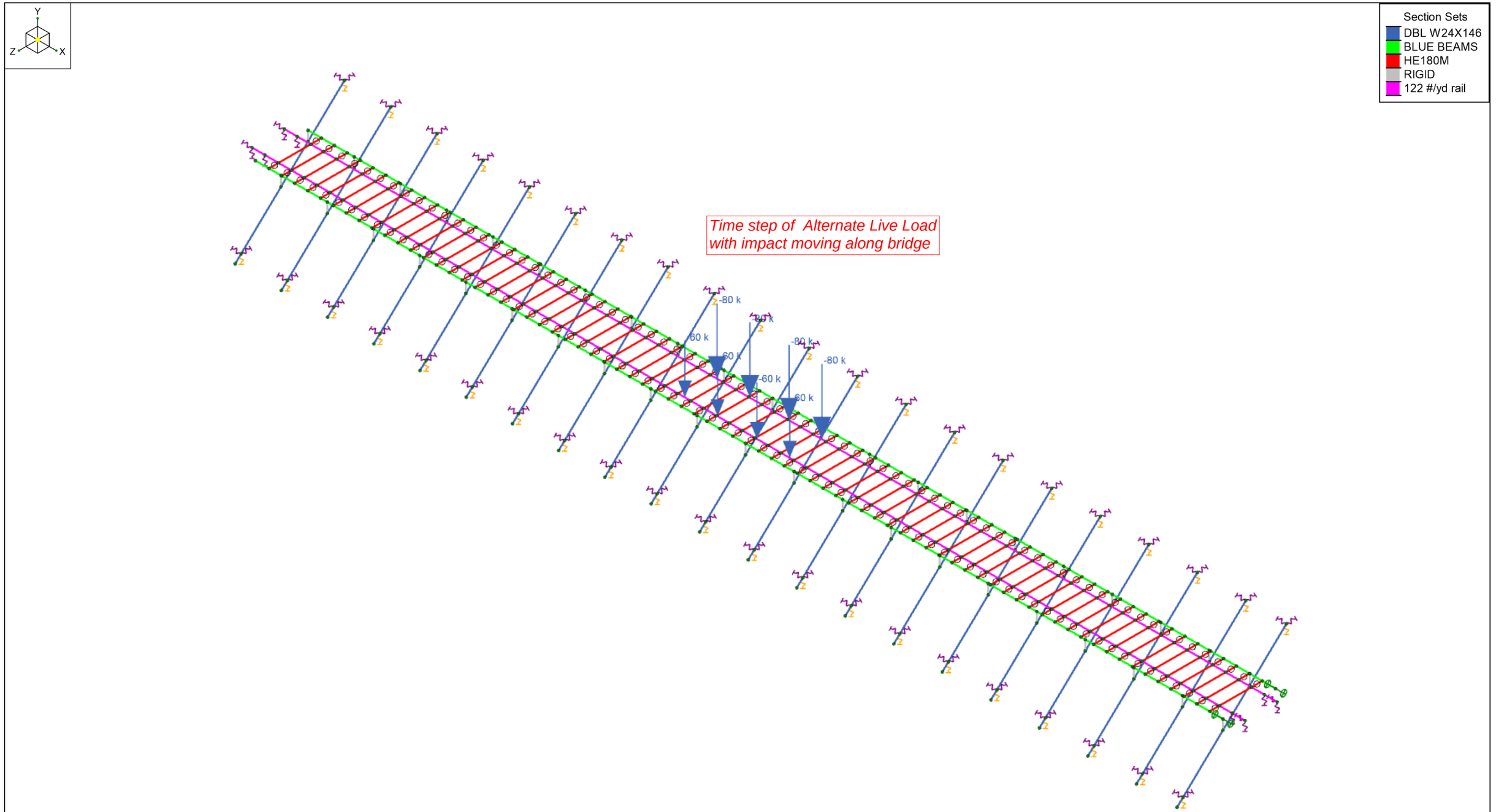
Live load, impact load, and rocking effect loads are distributed to each rail differently to maximize loads on the girder towards the outside of curve per table attached.

	$Interior_Rail$	$Exterior_rail$
LL	0.5	0.5
I	0.2	0.2
RE	−0.1	0.1
$Total$	0.6	0.8
	*	*

* Each columns represents the fraction of the axle weight applied to each rail

Section 1.3.6 - Centrifugal force (CF)

No centrifugal loads have been applied to the model.



IRISA A NEMETSCHEK COMPANY			SK-3
			Sep 19, 2024 at 10:41 AM
			Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d

Section 1.3.7 - Wind forces on loaded bridge (WL)

Per Section 1.3.7a the lateral wind forces on the train shall be $0.3\ klf$ applied 8 ft of top rail
Per Section 1.3.7b and 1.3.7c the lateral wind forces on the girders shall be $0.03\ ksf$ on 1.5 x vertical projection of span with a $0.2\ klf$ min.
Per Section 1.3.7d the longitudinal wind force on the girders shall be 25% of transverse wind.

$WL_{Train_hor} := 0.3\ klf$ Lateral wind applied on train

$lat_off_{rail} := \frac{1435\ mm}{2} = 28.248\ in$ Lateral offset from W on train to rail

$h_{CF} := 8\ ft + \frac{885\ mm}{2} = 113.421\ in$ Height btw W on train and girder CL

$lat_off_{girder} := 2965\ mm \div 2 = 58.4\ in$ Lateral offset from CL to center of girder

$WL_{Train_vert} := WL_{Train_hor} \cdot \frac{h_{CF}}{lat_off_{girder}} = 0.6\ klf$ Vertical wind applied on rail (DOWN)

$WL_{girder} := 0.03\ ksf \cdot 885\ mm = 0.087\ klf$ Lateral wind applied on girder

$WL_{Long} := 0.25 \cdot \left(WL_{girder} + WL_{Train_hor}\right) = 0.097\ klf$ Longitudinal wind applied on rail

Section 1.3.8 - Wind forces on unloaded bridge (WU)

Per Section 1.3.8a the lateral wind forces on the girders shall be $0.05\ ksf$ on 1.5 x vertical projection of span.
Per Section 1.3. the longitudinal wind force on the girders shall be 25% of transverse wind.

$WU_{girder} := 0.05\ ksf \cdot 885\ mm = 0.145\ klf$ Lateral wind applied on girder

$WU_{Long} := 0.25 \cdot WU_{girder} = 0.036\ klf$ Longitudinal wind applied on rail

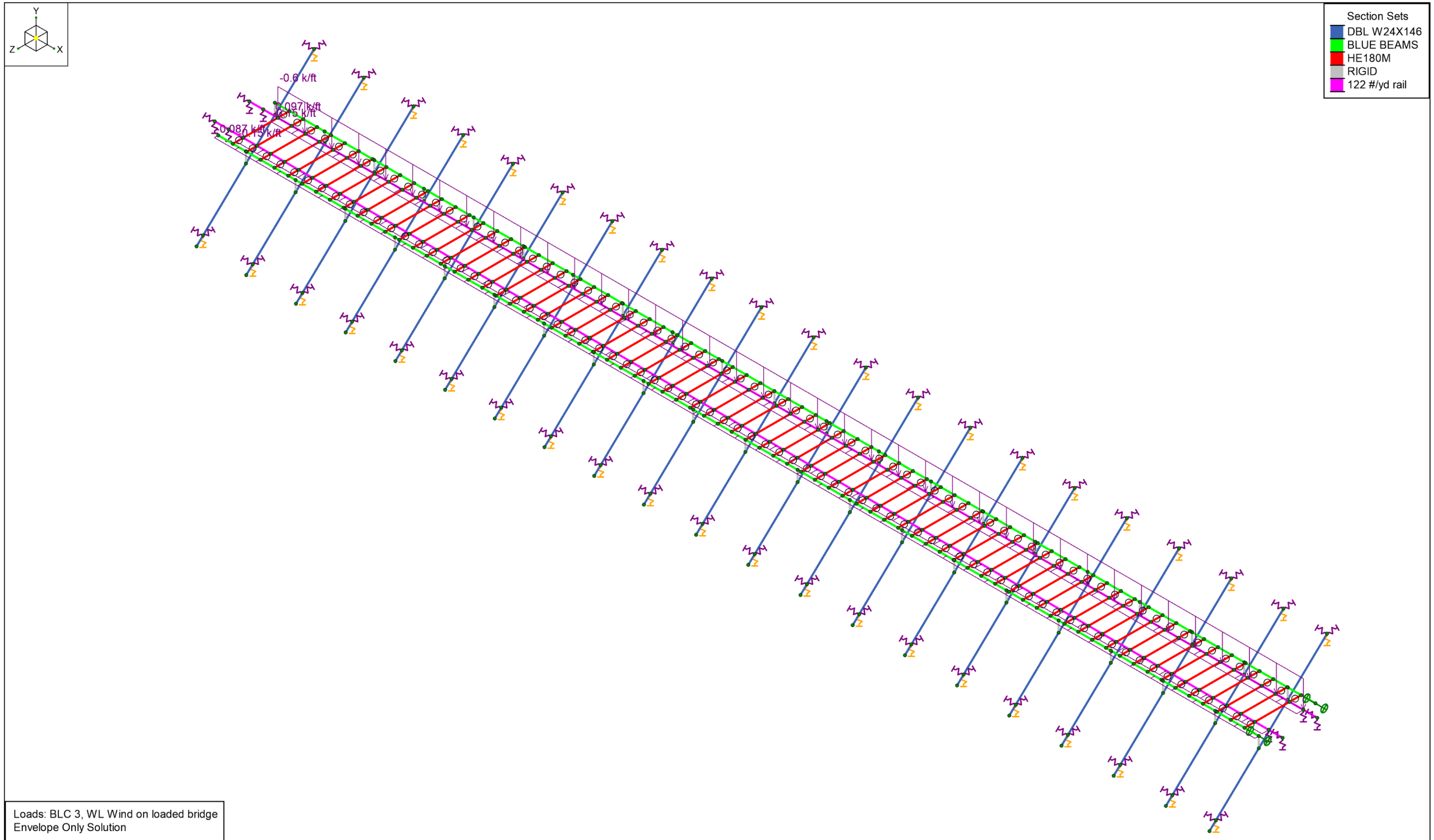
Section 1.3.9 - Lateral forces from equipment (N)

Per Section 1.3.9a the lateral force from equipment: 25% of heaviest axle applied at any point ($20\ kip$).
Per Section 1.3.9b the only stresses to be considered are axial stress design of bracing elements of the girders and stresses from lateral bending of flanges of longitudinal members without bracing.

A single load of 20 kips will be used to check the design of the bracing system.

Section 1.3.10 - Stability check - Derailment (DF)

Per Section 1.3.10b a single line of wheel load Q with impact and an eccentricity of 5' from CL shall be applied to verify stability of the spans against derailment.



Loads: BLC 3, WL Wind on loaded bridge
Envelope Only Solution

IRISA A NEMETSCHEK COMPANY		SK-5
		Sep 19, 2024 at 11:06 AM
		Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d

Section 1.3.11 - Bracing between compression members (Br)

The lateral bracing shall be proportioned for a transverse shear force in any panel equal to 2.5% of the total axial force in both members, in addition to the shear force from the specified lateral loads.

Section 1.3.12 - Longitudinal forces (LF)

Per Section 1.3.12a Longitudinal force to be the max btw:

1. Braking force $45\ kip + 1.2\ L$ acting 8 ft above top of rail
2. Traction force $25\ \sqrt{L}\ kip$ acting 3 ft above top of rail

$L_{bridge} := 108.3\ ft$ This is the length of the total installation of Verona system

For the braking load case

$LF_b := 45\ kip + 1.2 \cdot \frac{L_{bridge}}{ft}\ kip = 175\ kip$ Longitudinal force applied at rails

$LM_b := LF_b \cdot \frac{8\ ft}{L_{bridge}} = 12.92\ \frac{kip \cdot ft}{ft}$ Vertical reaction effect +/- per line of support

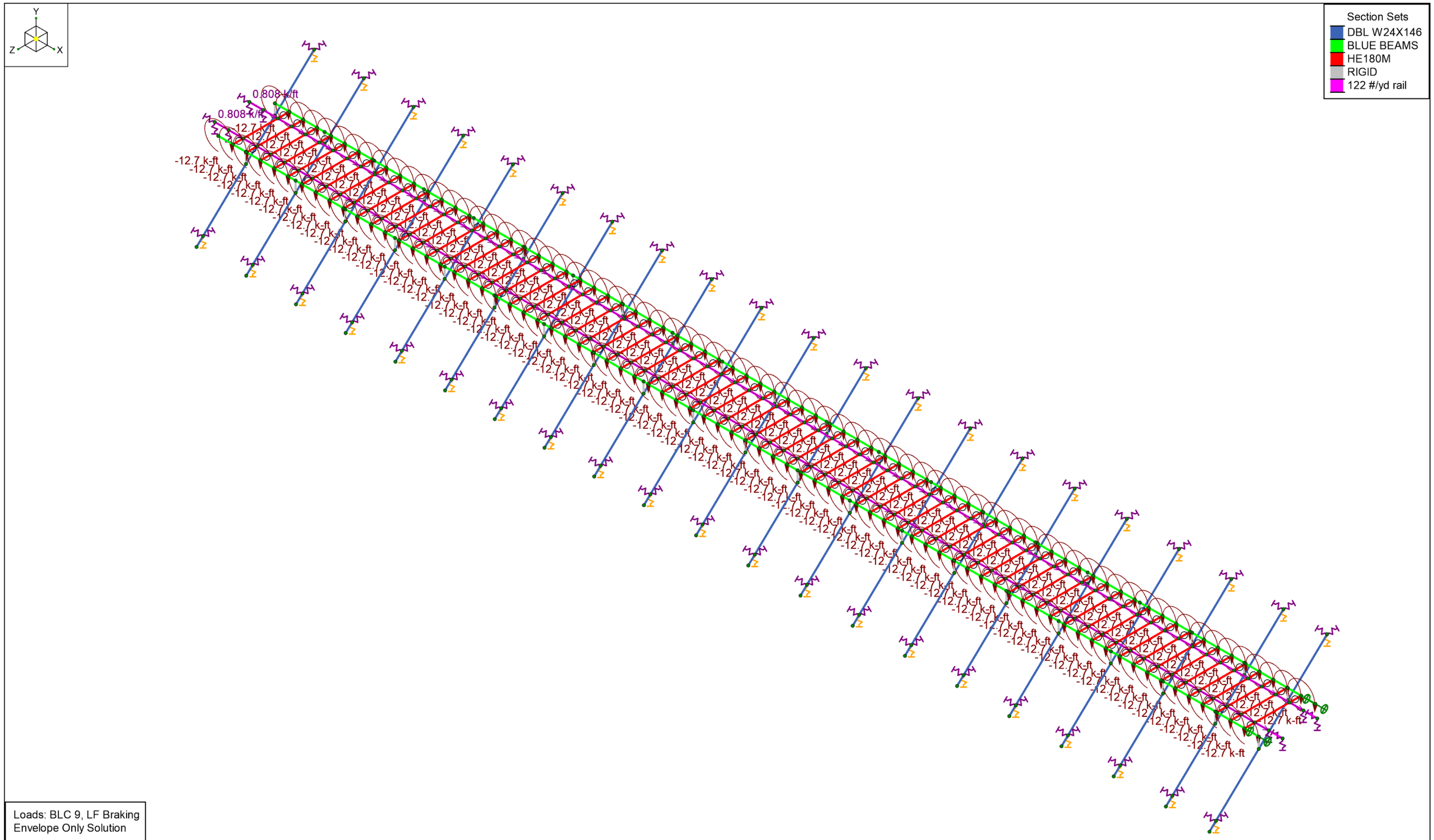
$LM_{bi} := LM_b \cdot 600\ mm = 25.4\ kip \cdot ft$ Longitudinal moment applied at each rail-transverse beam connection

For the traction load case

$LF_t := 25 \cdot \sqrt{\frac{L_{bridge}}{ft}}\ kip = 260\ kip$ Longitudinal force applied at rails

$LM_t := LF_t \cdot \frac{3\ ft}{L_{bridge}} = 7.2\ \frac{kip \cdot ft}{ft}$ Vertical reaction effect +/- per line of support

$LM_{ti} := LM_t \cdot 600\ mm = 14.2\ kip \cdot ft$ Longitudinal moment applied at each rail-transverse beam connection



Loads: BLC 9, LF Braking Envelope Only Solution

IRISA A NEMETSCHEK COMPANY		SK-4
		Sep 19, 2024 at 11:06 AM
		Bluffdale 60p REV1 MBJ MP REMOVED 2024-09-19 .r3d

4. ALLOWABLE STRESSES

Load combinations below have been investigated to check that the stresses do not exceed the allowable stresses for each case.

Member	Allowable Stress Factor	Load Combination	Reference Article
All members	100%	DL + LL + I + CF	1.3.14.3a
Truss web member		See Article 1.3.16	
All members except Floorbeam hangers	125%	DL + LL + I + CF + W_L + LF + N + CWR + OF	1.3.14.3c
Floorbeam hangers	100%	DL + LL + I + CF + W_L + LF + N + CWR + OF	1.3.14.3c
Bracing between Compression members	125%	CF + B_r + N + W_L + CWR_L	1.3.14.3c
Members loaded by wind only	100%	W_U	1.3.14.3b
Cross Frames, Diaphragms, Anchor bolts of beam and deck girder spans requiring lateral bracing	150%	DF	1.3.10b

STRESS LIMITS (AREMA)

Section 1.3.14 - Combined stresses (axial / bending)

Per Section 1.3.14.1, the combined axial compression and bending stress interaction shall satisfy, when axial stress is less than 15% of allowable:

$$\frac{f_a}{F_a}+\frac{f_{b1}}{F_{b1}}+\frac{f_{b2}}{F_{b2}}\le 1.0$$

f_a, f_{b1}, f_{b2} axial and bending stresses for each load combination

F_a, F_{b1}, F_{b2} axial and bending limits per 1.4.1 without considering axial/bending interaction

For the main built-up section girders

$F_{aG} := 0.55 \cdot F_{y1} = 27.5\ ksi$ Allowable axial compression stress per Section 1.4.1

$F_{b1G} := 26.7\ ksi$ Allowable extreme fiber compression stress for strong axis per Section 1.4.1

$F_{b2G} := 26.7\ ksi$ Allowable extreme fiber compression stress for weak axis per Section 1.4.1

For the HEM 180 transverse beams

$F_{aH} := 0.55 \cdot F_{y2} = 27.5\ ksi$ Allowable axial compression stress per Section 1.4.1

$F_{b1H} := 27.5\ ksi$ Allowable extreme fiber compression stress for strong axis per Section 1.4.1

$F_{b2H} := 27.5\ ksi$ Allowable extreme fiber compression stress for weak axis per Section 1.4.1

The allowable shear stress for web and welds per Section 1.4.1 and 1.4.3 is $F_v := 17.5\ ksi$

$F_{yWeld} := 17\ ksi$

The load combinations and allowable stress factors for each member are checked per table 15-1-10 of Section 1.3.14.3:

Member	Allowable Stress Factor	Load Combination	Reference Article
All members	100%	DL + LL + I + CF	1.3.14.3a
Truss web member		See Article 1.3.16	
All members except Floorbeam hangers	125%	DL + LL + I + CF + W_L + LF + N + CWR + OF	1.3.14.3c
Floorbeam hangers	100%	DL + LL + I + CF + W_L + LF + N + CWR + OF	1.3.14.3c
Bracing between Compression members	125%	CF + B_r + N + W_L + CWR_L	1.3.14.3c
Members loaded by wind only	100%	W_U	1.3.14.3b
Cross Frames, Diaphragms, Anchor bolts of beam and deck girder spans requiring lateral bracing	150%	DF	1.3.10b

5. PLINTH SUPPORT AT BOX ROOF AND WALKWAY WITH GUARDRAIL

The following elements of the Verona System have been checked :

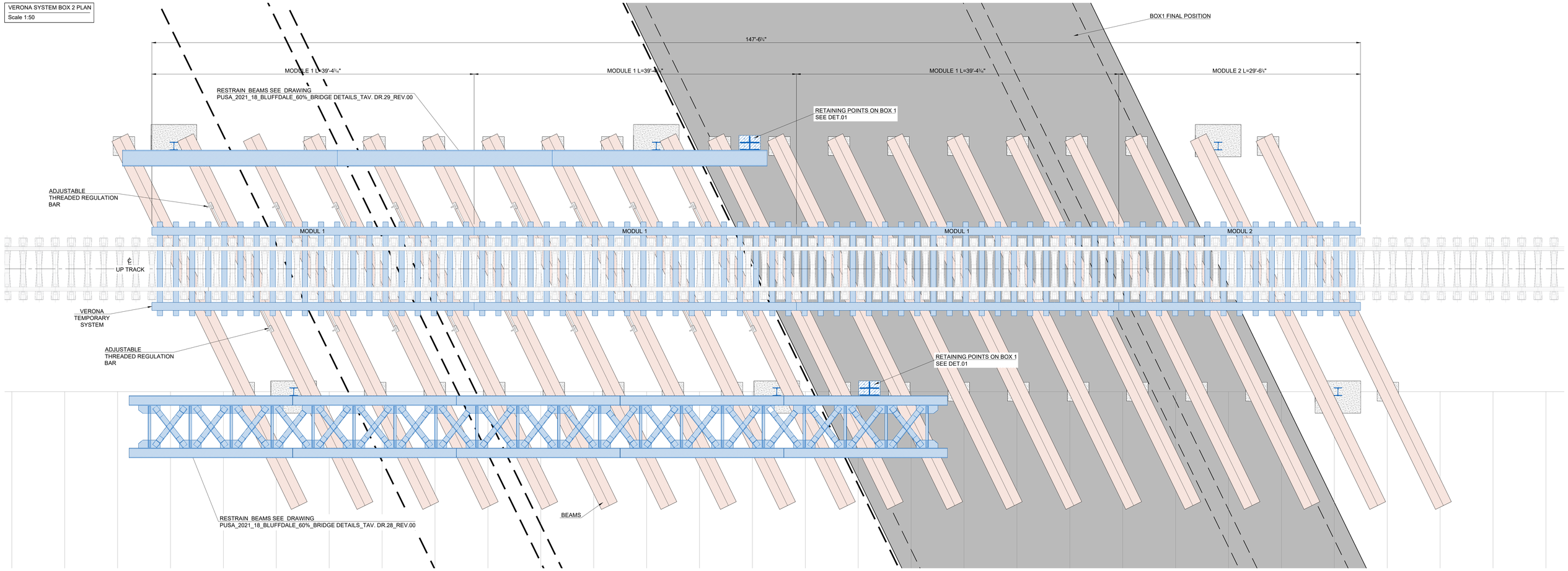
1. Plinth anchors on top of box roof.

During the jacking of the second box, the lateral restraint of the lattice beam needs to be fixed to the box roof once the first row of micropiles is removed. The strength check of the anchors is provided below.

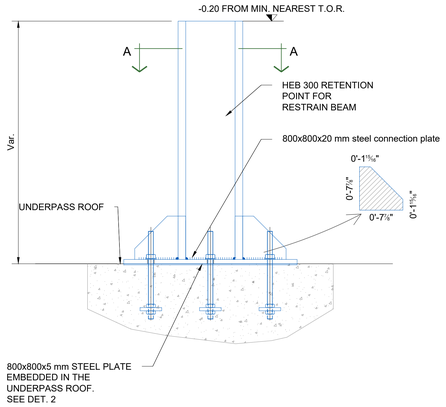
2. Walkway with guardrail for crossing along bridge installation

During the presence of the shoring system in the tracks, a temporary walkway meeting OSHA requirements is installed. Checks for strength and deflection requirements are provided below.

VERONA SYSTEM BOX 2 PLAN
Scale 1:50



DETAIL 1
Scale 1:10



DETAIL 2
Scale 1:10

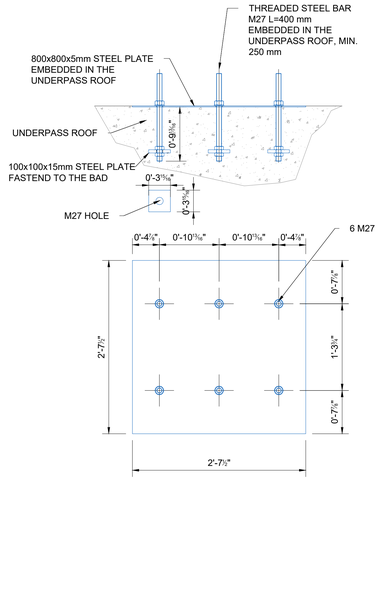
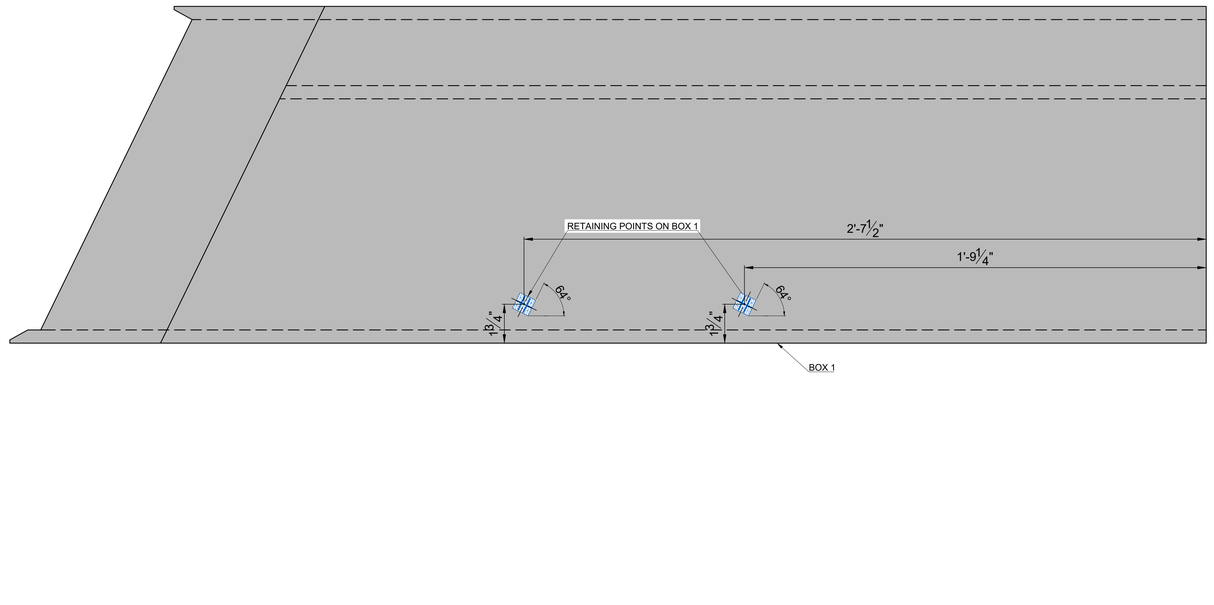


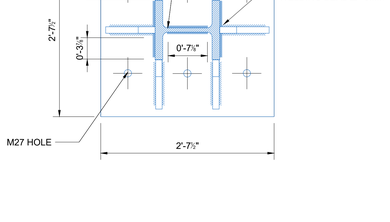
PHOTO: EXAMPLE RETAINING POINTS ON BOX 1



RETAINING POINTS POSITION ON BOX 1
Scale 1:100



DETAIL 1 - SECTION A-A
Scale 1:10



DRAWING N.	24	TITLE:	60% DESIGN RESUBMISSION – VERONA SYSTEM	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	03rd SETT. 2024		
DRAWN:	drf	REVISION:	14600 CROSSING – ROAD UNDERPASS		
CHECKED:	vpo				
APPROVED:	op		VERONA SYSTEM DETAILS		

60% DESIGN RESUBMISSION – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA - ALCALA' DE HENARES, MADRID - SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL PATENT N. PCT/ES 2010/070674. ALL DETAIL FOR INFORMATION. NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT.

Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

Specifier's comments:

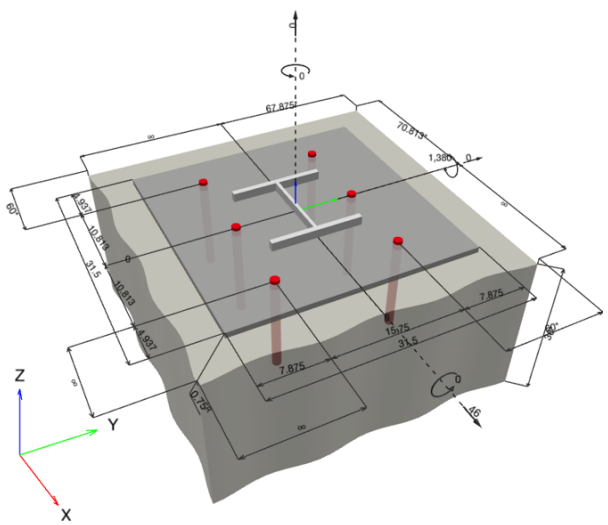
1 Input data



Anchor type and diameter:	**Hex Head ASTM F 1554 GR. 36 1 1/8**
Item number:	not available
Additional plate or washer (17.6.2.1.3):	d_{plate} = 3.875 in., t_{plate} = 0.625 in.
Specification text:	Hilti Hex Head headed stud anchor with 12 in embedment, 1 1/8, Steel galvanized, installation per instruction for use
Effective embedment depth:	h_{ef} = 12.000 in., $h_{ef,17.6.2.1.3}$ = 13.007 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-19 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.750 in.
Anchor plate[R]:	l_x x l_y x t = 31.500 in. x 31.500 in. x 0.750 in.; (Recommended plate thickness: not calculated)
Profile:	IPB/HEB, IPB 300 / HE 300 B; (L x W x T x FT) = 11.811 in. x 11.811 in. x 0.433 in. x 0.748 in.
Base material:	cracked concrete, 6000, f_c' = 6,000 psi; h = 36.000 in.
Reinforcement:	tension: not present, shear: not present; edge reinforcement: none or < No. 4 bar

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [kip, in.kip]



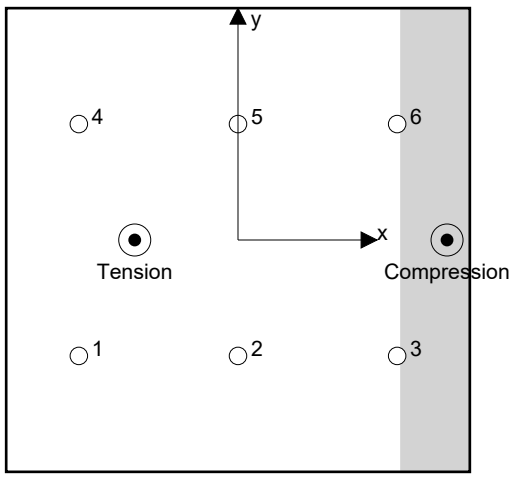
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

1.1 Design results

Case	Description	Forces [kip] / Moments [in.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0.000; V_x = 46.000; V_y = 0.000; M_x = 0.000000; M_y = 1,380.000000; M_z = 0.000000;	no	75

2 Load case/Resulting anchor forces



Anchor reactions [kip]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	21.389	7.667	7.667	0.000
2	10.839	7.667	7.667	0.000
3	0.290	7.667	7.667	0.000
4	21.389	7.667	7.667	0.000
5	10.839	7.667	7.667	0.000
6	0.290	7.667	7.667	0.000

Max. concrete compressive strain:	0.20 [‰]
Max. concrete compressive stress:	890 [psi]
Resulting tension force in (x/y)=(-7.016/0.000):	65.035 [kip]
Resulting compression force in (x/y)=(14.203/0.000):	65.035 [kip]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load

	Load N_{ua} [kip]	Capacity ϕ N_n [kip]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	21.389	33.190	65	OK
Pullout Strength*	21.389	49.459	44	OK
Concrete Breakout Failure**	65.035	100.143	65	OK
Concrete Side-Face Blowout, direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

3.1 Steel Strength

$N_{sa} = A_{se,N} f_{uta}$ ACI 318-19 Eq. (17.6.1.2)
$\phi N_{sa} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.76	58,000

Calculations

N_{sa} [kip]
44.254

Results

N_{sa} [kip]	ϕ_{steel}	ϕN_{sa} [kip]	N_{ua} [kip]
44.254	0.750	33.190	21.389

3.2 Pullout Strength

$N_{pN} = \psi_{c,p} N_p$ ACI 318-19 Eq. (17.6.3.1)
$N_p = 8 A_{brg} f'_c$ ACI 318-19 Eq. (17.6.3.2.2a)
$\phi N_{pN} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$\psi_{c,p}$	A_{brg} [in.^{2}]	λ_a	f'_c [psi]
1.000	1.47	1.000	6,000

Calculations

N_p [kip]
70.656

Results

N_{pn} [kip]	$\phi_{concrete}$	ϕN_{pn} [kip]	N_{ua} [kip]
70.656	0.700	49.459	21.389

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

3.3 Concrete Breakout Failure

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ — ACI 318-19 Eq. (17.6.2.1b)

$\phi N_{cbg} \geq N_{ua}$ — ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ — ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = 16 \lambda_a \sqrt{f'_c} h_{ef}^{5/3}$ — ACI 318-19 Eq. (17.6.2.2.3)

Variables

$h_{ef,17.6.2.1.3}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
13.007	7.016	0.000	60.000	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
-	16	1.000	6,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [kip]
3,321.81	1,522.71	0.736	1.000	1.000	1.000	89.161

Results

N_{cbg} [kip]	$\phi_{concrete}$	ϕN_{cbg} [kip]	N_{ua} [kip]
143.062	0.700	100.143	65.035

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	5
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

4 Shear load

	Load V_{ua} [kip]	Capacity ϕ V_n [kip]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	7.667	17.259	45	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	46.000	272.308	17	OK
Concrete edge failure in direction y+**	46.000	273.535	17	OK

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel Strength

$V_{sa} = 0.6\ A_{se,V}\ f_{uta}$ ACI 318-19 Eq. (17.7.1.2b)
$\phi\ V_{steel} \geq V_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.76	58,000

Calculations

V_{sa} [kip]
26.552

Results

V_{sa} [kip]	ϕ_{steel}	$\phi\ V_{sa}$ [kip]	V_{ua} [kip]
26.552	0.650	17.259	7.667

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	6
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

4.2 Pryout Strength

$V_{cpg} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right]$ ACI 318-19 Eq. (17.7.3.1b)

$\phi V_{cpg} \geq V_{ua}$ ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = 16 \lambda_a \sqrt{f'_c} h_{ef}^{5/3}$ ACI 318-19 Eq. (17.6.2.2.3)

Variables

k_{cp}	$h_{ef,17.6.2.1.3}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	13.007	0.000	0.000	60.000

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	∞	16	1.000	6,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [kip]
3,321.81	1,522.71	1.000	1.000	1.000	1.000	89.161

Results

V_{cpg} [kip]	$\phi_{concrete}$	ϕV_{cpg} [kip]	V_{ua} [kip]
389.011	0.700	272.308	46.000

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	7
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

4.3 Concrete edge failure in direction y+

$V_{cbg} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ec,V}\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ \psi_{parallel,V}\ V_b$ — ACI 318-19 Eq. (17.7.2.1b)

$\phi\ V_{cbg} \geq V_{ua}$ — ACI 318-19 Table 17.5.2

A_{Vc} see ACI 318-19, Section 17.7.2.1, Fig. R 17.7.2.1(b)

$A_{Vc0} = 4.5\ c_{a1}^2$ — ACI 318-19 Eq. (17.7.2.1.3)

$\psi_{ec,V} = \left(\frac{1}{1 + \frac{e_v'}{1.5c_{a1}}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.7.2.3.1)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.7.2.4.1b)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ — ACI 318-19 Eq. (17.7.2.6.1)

$V_b = 9\ \lambda_a\ \sqrt{f_c'}\ c_{a1}^{1.5}$ — ACI 318-19 Eq. (17.7.2.2.1b)

Variables

c_{a1} [in.]	c_{a2} [in.]	e_{cV} [in.]	$\psi_{c,V}$	h_a [in.]
60.000	60.000	0.000	1.000	36.000

l_e [in.]	λ_a	d_a [in.]	f_c' [psi]	$\psi_{parallel,V}$
9.000	1.000	1.125	6,000	2.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [kip]
6,178.54	16,200.00	1.000	1.000	1.581	324.000

Results

V_{cbg} [kip]	$\phi_{concrete}$	$\phi\ V_{cbg}$ [kip]	V_{ua} [kip]
390.765	0.700	273.535	46.000

5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.649	0.444	5/3	75	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	8
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/

Fastening meets the design criteria!

PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

Company:		Page:	9
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Box Roof anchor	Date:	10/16/2024
Fastening point:			

7 Installation data

Profile: IPB/HEB, IPB 300 / HE 300 B; (L x W x T x FT) = 11.811 in. x 11.811 in. x 0.433 in. x 0.748 in.

Hole diameter in the fixture: d_f = 1.188 in.

Plate thickness (input): 0.750 in.

Recommended plate thickness: not calculated

Anchor type and diameter: Hex Head ASTM F 1554 GR. 36 1 1/8

Item number: not available

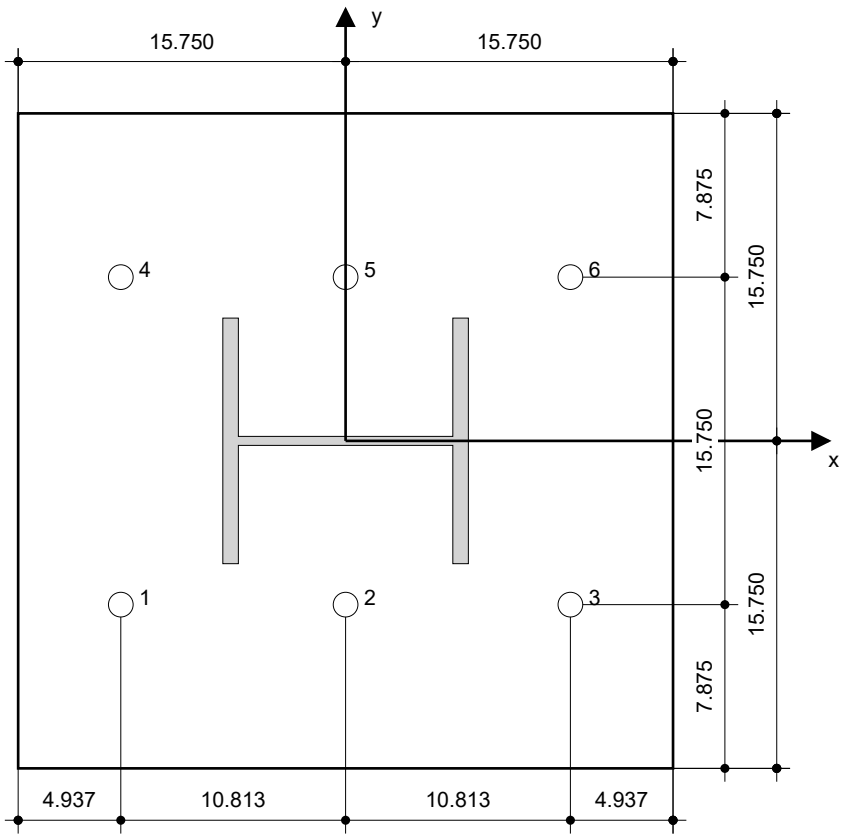
Maximum installation torque: -

Hole diameter in the base material: - in.

Hole depth in the base material: 12.000 in.

Minimum thickness of the base material: 13.250 in.

Hilti Hex Head headed stud anchor with 12 in embedment, 1 1/8, Steel galvanized, installation per instruction for use



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-10.813	-7.875	60.000	-	-	75.750
2	0.000	-7.875	70.813	-	-	75.750
3	10.813	-7.875	81.626	-	-	75.750

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
4	-10.813	7.875	60.000	-	-	60.000
5	0.000	7.875	70.813	-	-	60.000
6	10.813	7.875	81.626	-	-	60.000

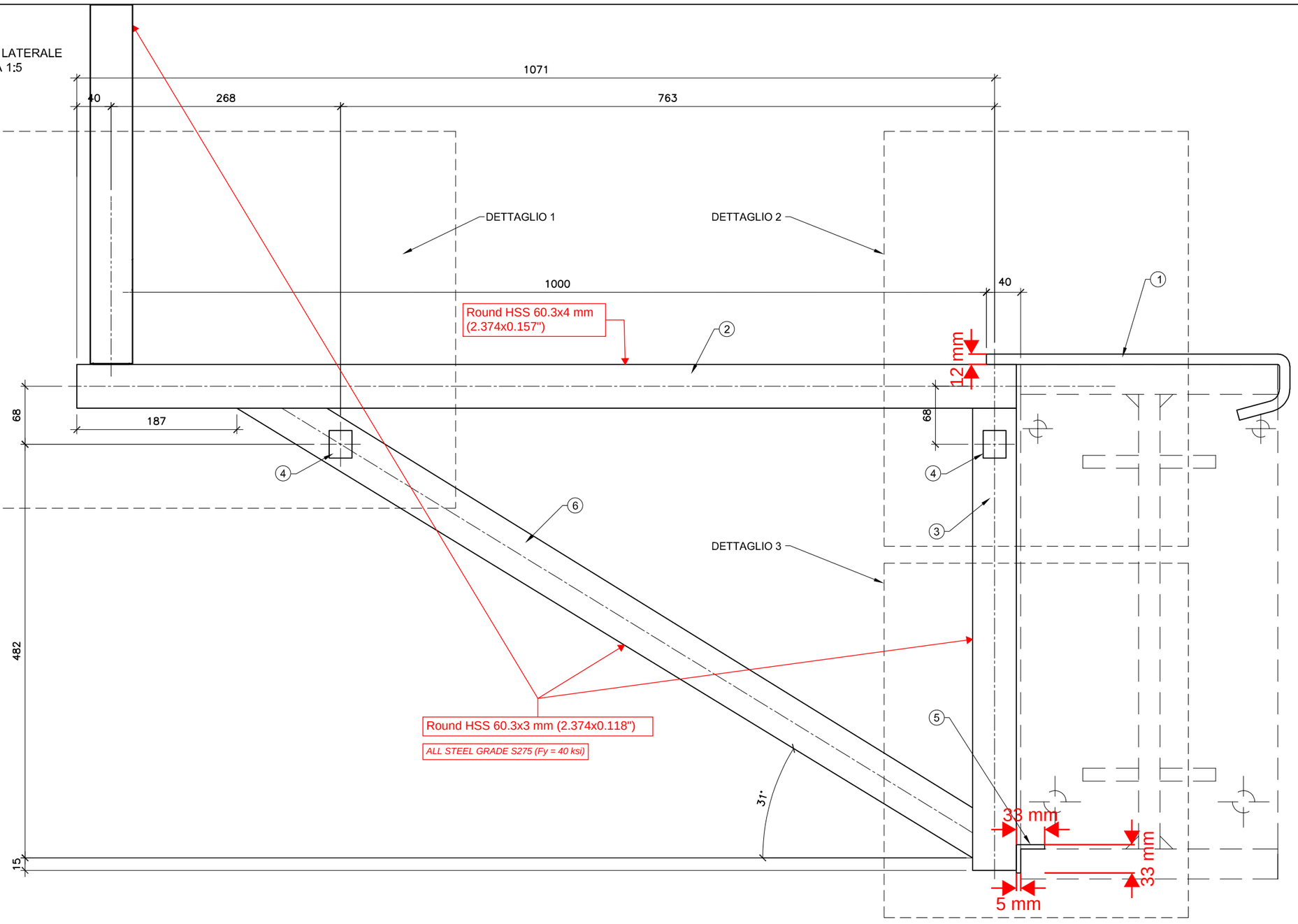
Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

8 Remarks; Your Cooperation Duties

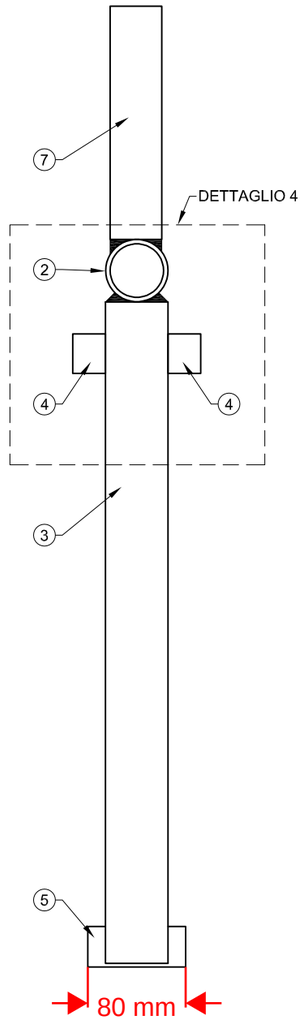
- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

Input data and results must be checked for conformity with the existing conditions and for plausibility!
PROFIS Engineering (c) 2003-2024 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan

VISTA LATERALE
SCALA 1:5



VISTA FRONTALE
SCALA 1:5



ASSIEME TELAIO PASSERELLA

N° 36 PEZZI COMPLETI
FINITURA: RAL 5005

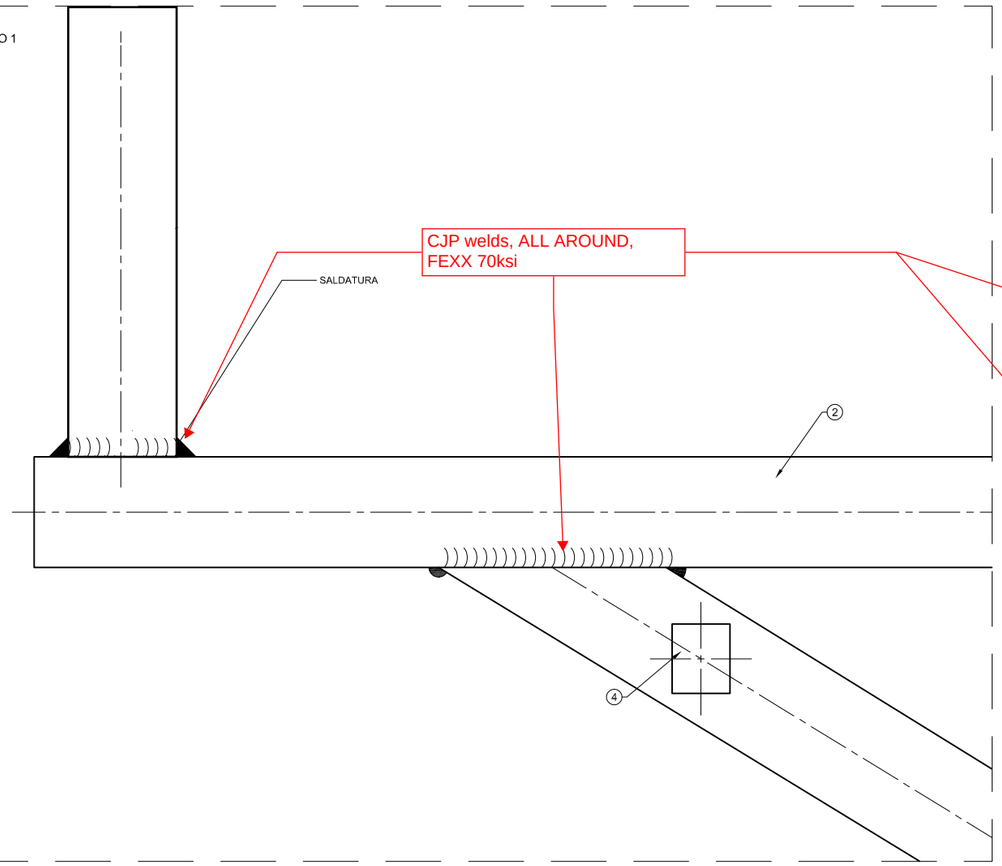
DRAWING N.	1	TITLE:	100% DESIGN – JACKING WORKS	
DESIGNED:	vpo	EMISSION:	02th JUL 2021	HURONTARIO LRT–PORT CREDIT
DRAWN:	p_ita	REVISION:		
CHECKED:	vpo			VERONA SYSTEM SAFETY PLAN – ASSIEME
APPROVED:	ap			

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

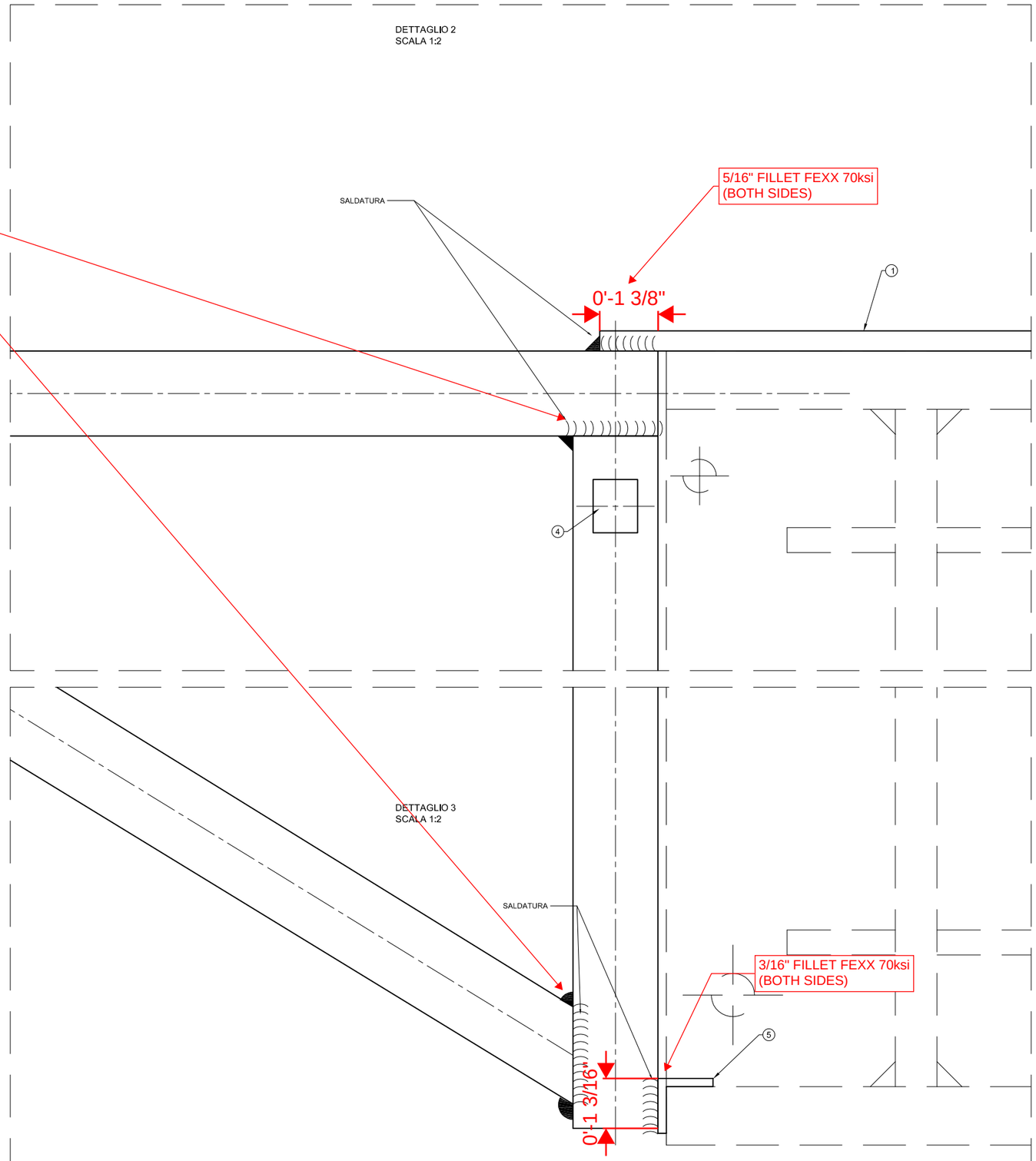
PETRUCCO box jacking systems

PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

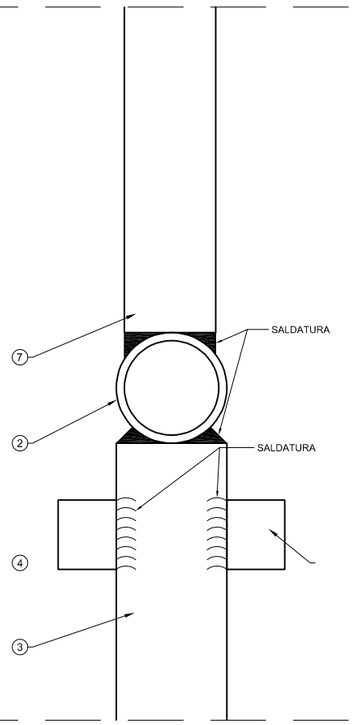
DETTAGLIO 1
SCALA 1:2



DETTAGLIO 2
SCALA 1:2



DETTAGLIO 4
SCALA 1:2

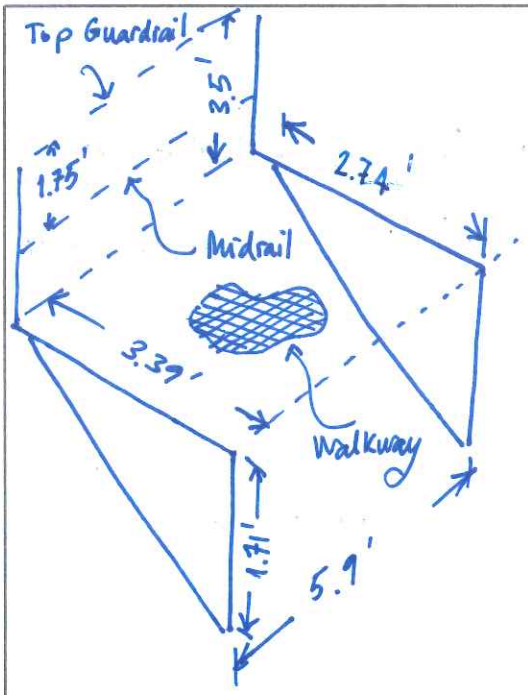


DRAWING N.	3	TITLE:	100% DESIGN – JACKING WORKS	
DESIGNED:	vpo	EMISSION:	02th JUL 2021	HURONTARIO LRT–PORT CREDIT
DRAWN:	p_ita	REVISION:		
CHECKED:	vpo			VERONA SYSTEM SAFETY PLAN – SALDATURE
APPROVED:	ap			

100% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

SUBJECT: Petrucco Walkway - Safety Guardrail
JOB: Bluffdale SHEET: ____ OF ____
MADE BY: ABG DATE: ____
CHECKED: JJM DATE: ____



1. GUARDRAIL REQUIREMENTS

Per OSHA 1926.502(b)(1)

Top guardrail height ≥ 42" ± 3"

Check ok

Per OSHA 1926.502(b)(2)

Midrail is present @ 21" spa

Check ok

Per OSHA 1926.502(b)(3)

200 lb-f resistance → Proven below

1926.502(b)(4)

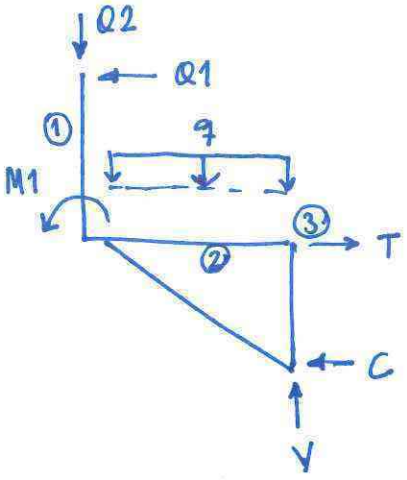
H top guardrail ≥ 39" from walkway when 200 lb-f is applied

→ Proven below

2. WALKWAY REQ.

- loading per AREMA 15 8.5.3 q = 85 psf
- Width (including top flange of main girder): 3.4' + 0.98' = 4.38' > 4' ✓

structural check per AREMA Ch. 15



$Q_1 = Q_2 = 0.2$ kip

$q = 85$ psf $\quad 5.9' = 0.502$ klf

① Post: Ø60 x 3 mm $\quad F_y \cong 40$ ksi
(2.37" x 0.118")

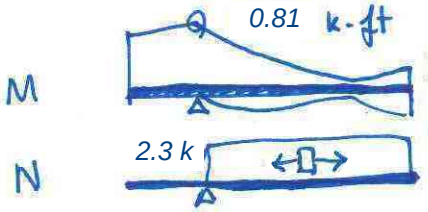
Per AREMA - 15.-1-11 Allowable stress $= 0.55 F_y$

$M_1 = Q_1 \cdot 3.5' = 0.7$ k-ft

$\frac{F_y}{\Omega} = 0.55 \cdot (40 \text{ ksi}) = 22$ ksi

$S = 0.533 \text{ in}^4 / (2.37"/2) = 0.45 \text{ in}^3 \quad f = \frac{M_1}{S} = 18.7 \text{ ksi}$ ok

② Base → Use Ø60x4mm (2.37"x0.157") S = 0.678 in4 / r = 0.571 in3



$f_M = \frac{0.81 \text{ k-ft}}{0.571 \text{ in}^3} = 17.2$ ksi

$f_A = \frac{2.3 \text{ k}}{1.1 \text{ in}^2} = 2.1$ ksi → ok

$f_A + f_M = 19.2$ ksi

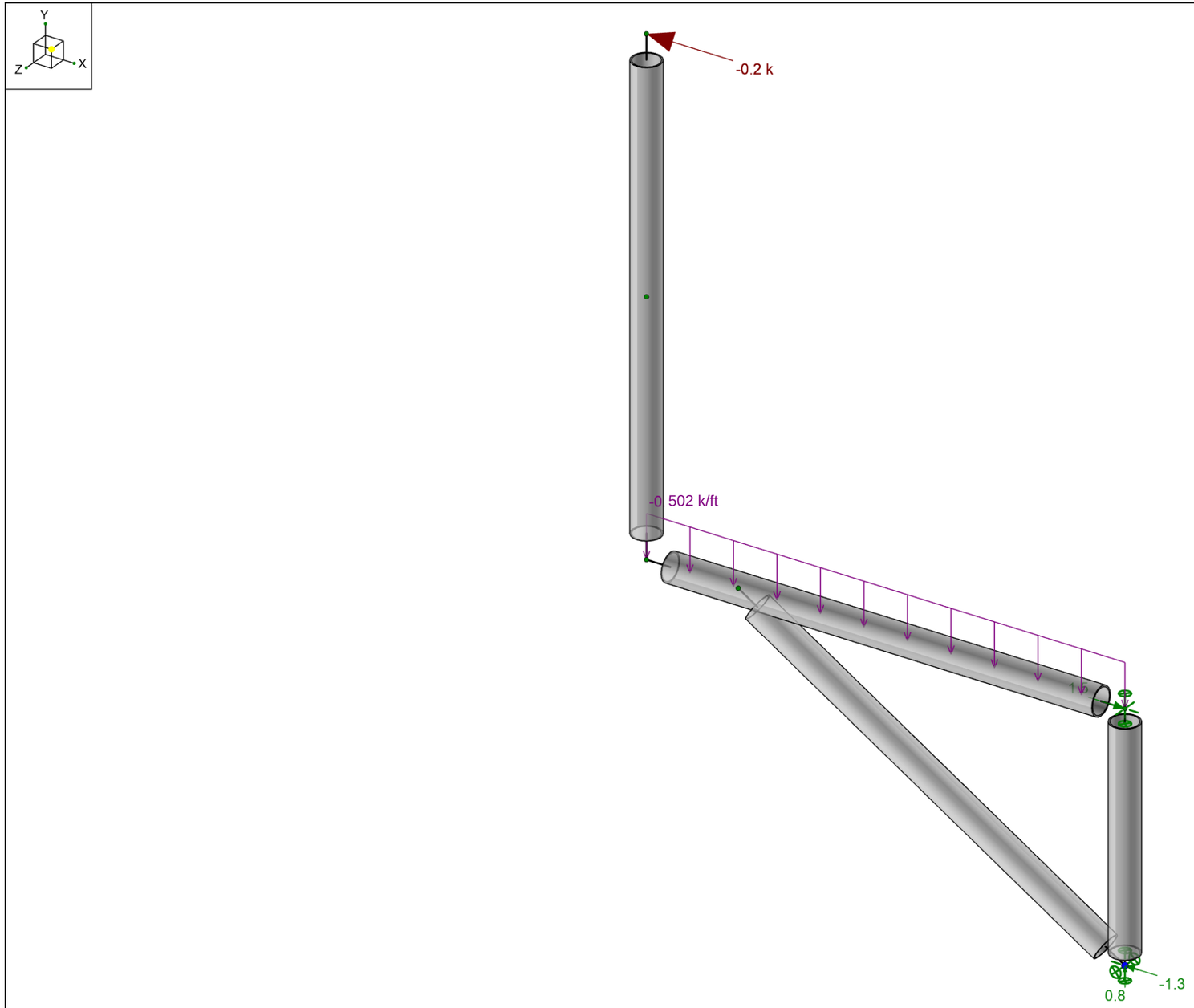
③ Weld $L = 2 \cdot 1.375" = 2.75"$, $a = 5/16"$ → $R_n = 0.35 F_y \cdot 0.707 \cdot 5/16" \cdot L = 14.8$ kip

(1.4.2) $F_{EXX} = 70$ksi Allowable stress $= 0.35 F_y = 24.5$ ksi

$T = 1.5$ kip for $(Q_1 + q)$ LC $R_n \gg T$ check ok

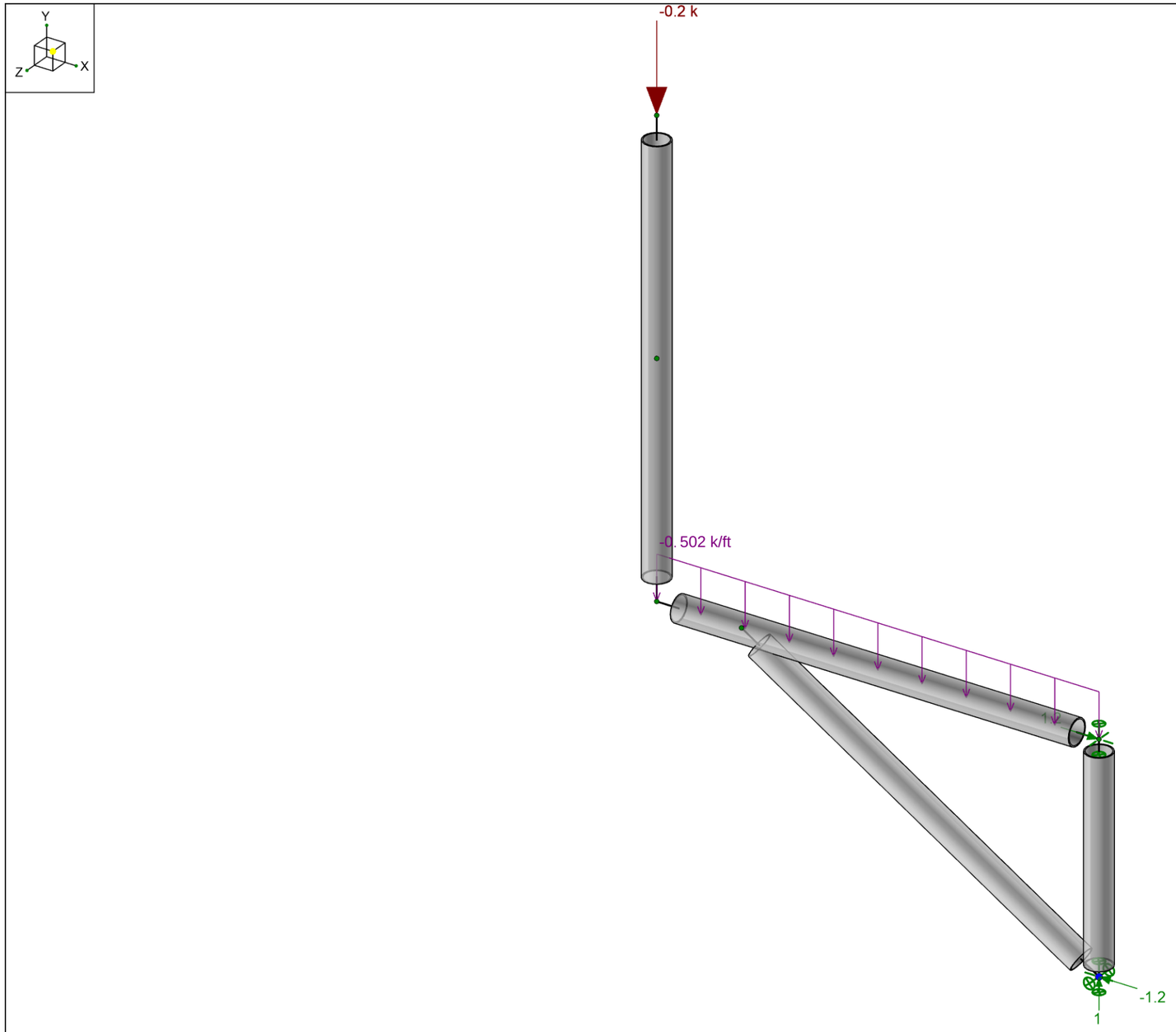
④ Weld $L = 2 \cdot 1.1875" = 2.375"$, $a = 3/16"$ → $R_n = 0.35 F_y \cdot 0.707 \cdot 3/16" \cdot L = 4.4$ kip

$V = 1.034$ kip for LC $(Q_2 + q)$ $\quad R_n \gg V$ ok



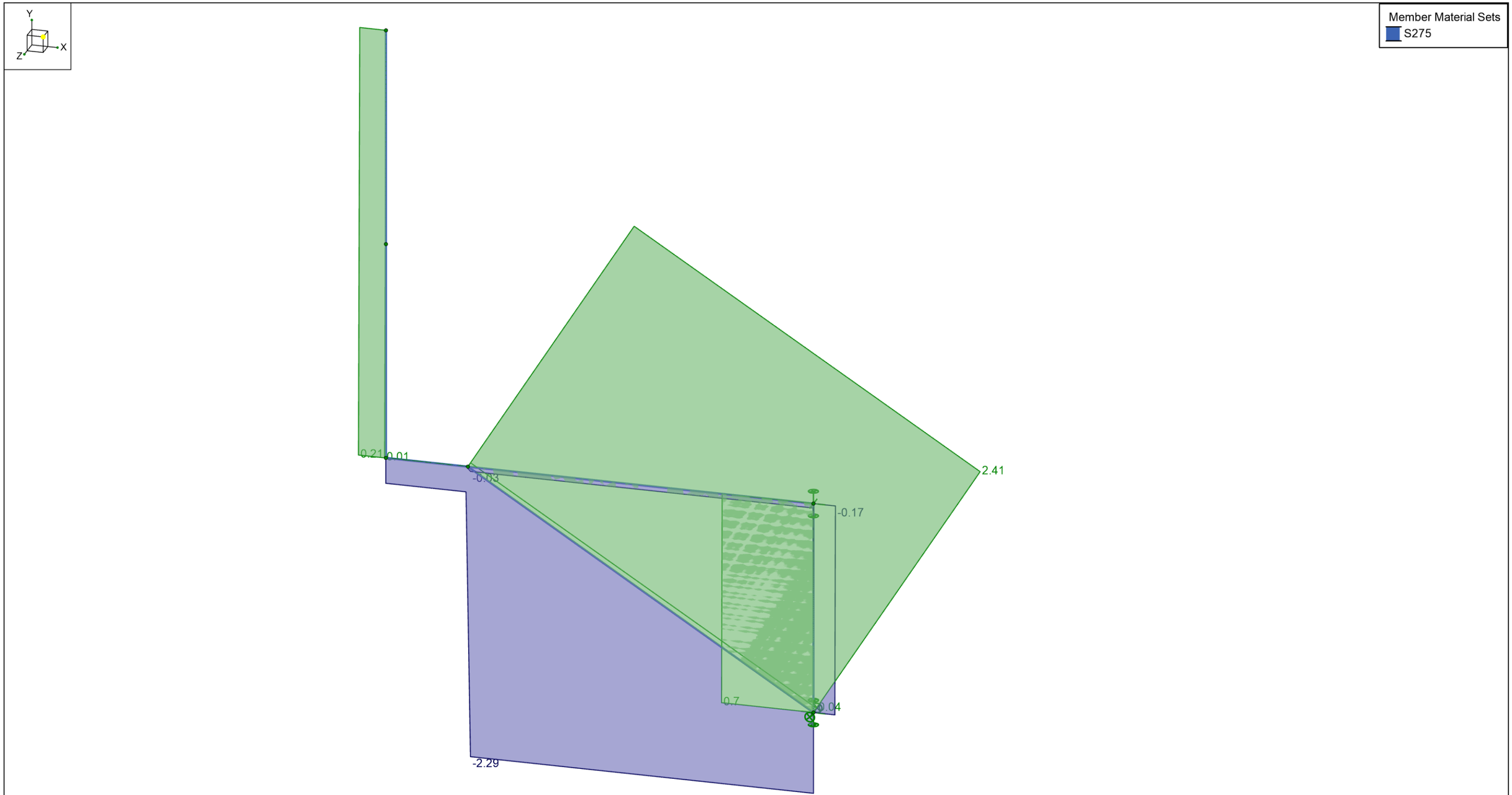
Loads: LC 6, LC6 GR1+SURCH
Results for LC 6, LC6 GR1+SURCH
Reaction and Moment Units are kips and kip-ft

MBJ		SK-1
ABG		Feb 04, 2025 at 11:36 AM
		guardrail_02.r3d



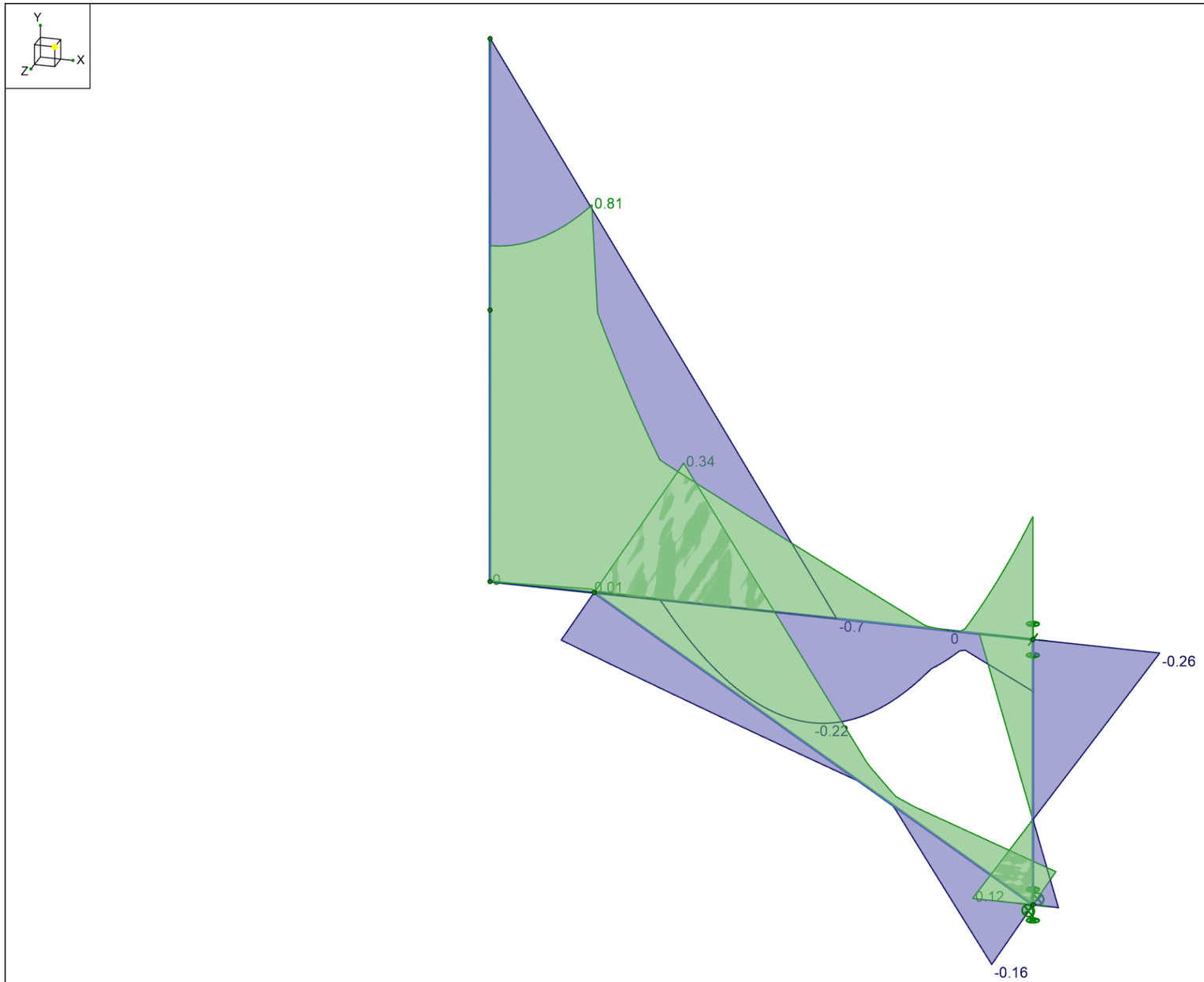
Loads: LC 7, LC7 GR2+SURCH
Results for LC 7, LC7 GR2+SURCH
Reaction and Moment Units are kips and kip-ft

MBJ		SK-2
ABG		Feb 04, 2025 at 11:36 AM
		guardrail_02.r3d



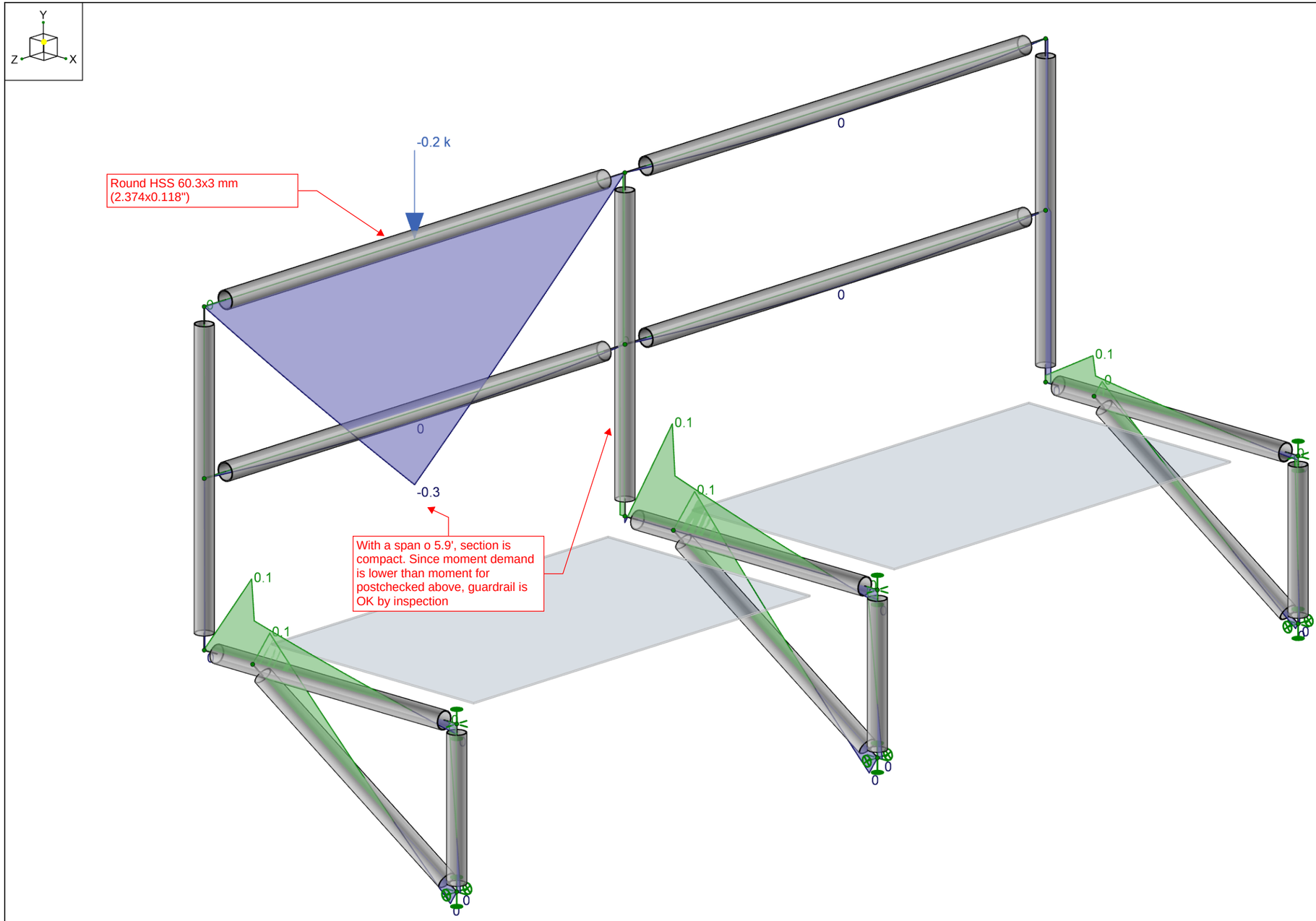
Member Axial Forces (kips) (Enveloped)

MBJ		SK-2
ABG		Feb 04, 2025 at 02:23 PM
		guardrail_02.r3d



Member z Bending Moments (kip-ft) (Enveloped)

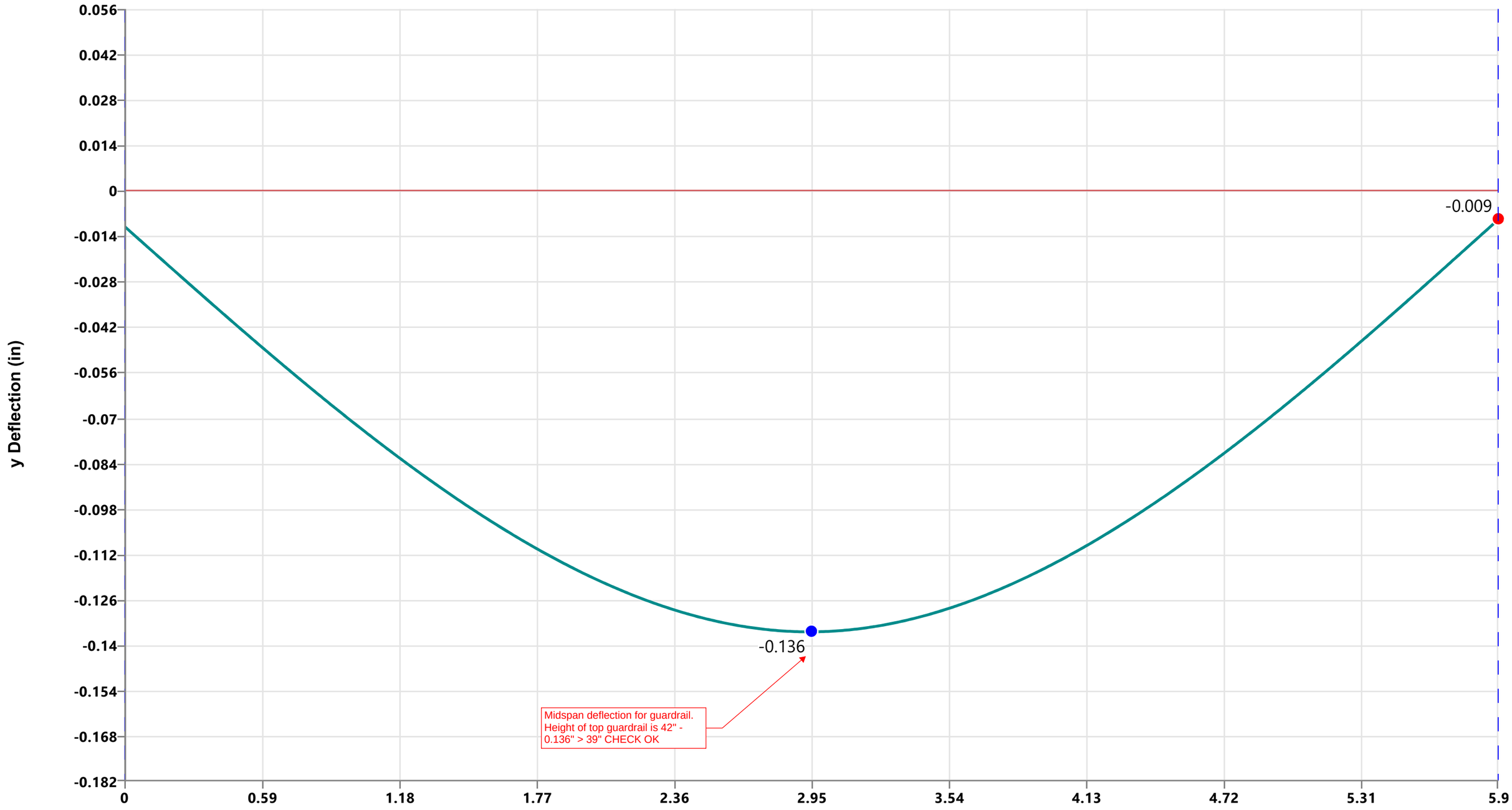
MBJ		SK-1
ABG		Feb 04, 2025 at 02:23 PM
		guardrail_02.r3d



Loads: LC 4, LC4 GR3
Results for LC 4, LC4 GR3
Member z Bending Moments (kip-ft)

MBJ		SK-5
ABG		Feb 04, 2025 at 11:43 AM
		guardrail_handrail only.r3d

Member M9, LC 4: LC4 GR3



6. ANALYSIS RESULTS

DEFLECTION LIMITS

Section 1.2.5 - Deflection limits

Per Section 1.2.5a the vertical deflection is referred as LL+I @ midspan using Igross girder properties.
Per Section 1.2.5b the vertical deflection shall be $L_{bridge} \div 640$ between end supports max.
All loads in section 1.3 must be used except Wind on unloaded bridges and EQ for lateral deflection.

The jacking process consists of tunnel excavation at the front of the box. This allows for support of the transverse beams near the excavation front and minimize the span deflecting between supports (soil and box roof). However, the check below is provided assuming a transverse beam simply supported on pile caps on one end, and the box roof on the other, which is more conservative than the actual field conditions. This is to ensure serviceability requirements in case of overexcavation.

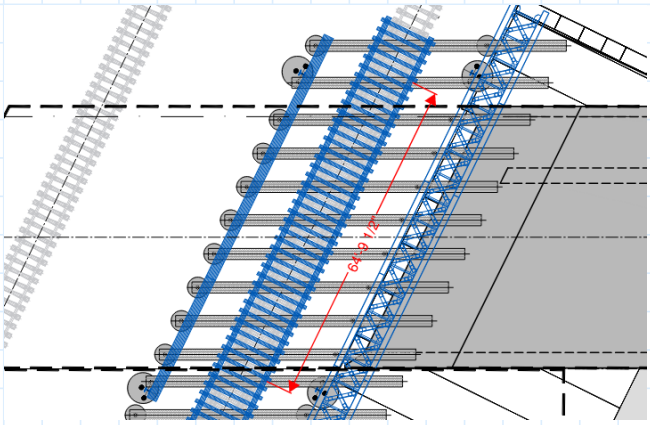
Per RISA analysis provided below, vertical deflection for the LL+I load combination is:

For the Cooper E 80 load: $L_{bridge} := 65\ ft$ Span between limits of excavation front

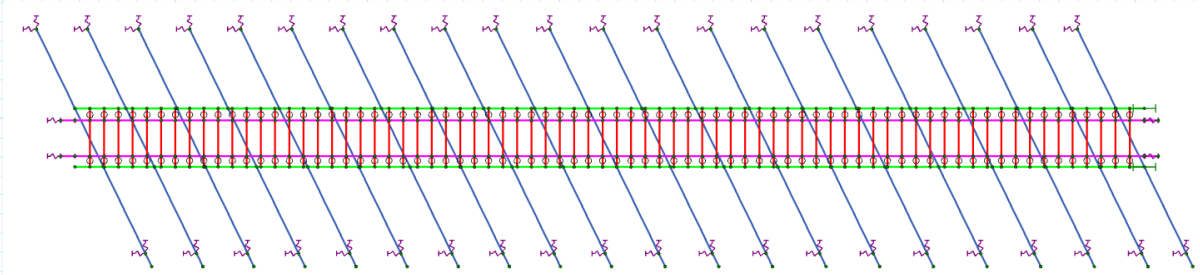
$$\delta_{vert_max} := \frac{L_{bridge}}{640} = 1.219\ in$$

$\delta_{vertLL} := 0.916\ in - 0.082\ in = 0.834\ in$ (LL+I) $\frac{L_{bridge}}{\delta_{vertLL}} = 935$

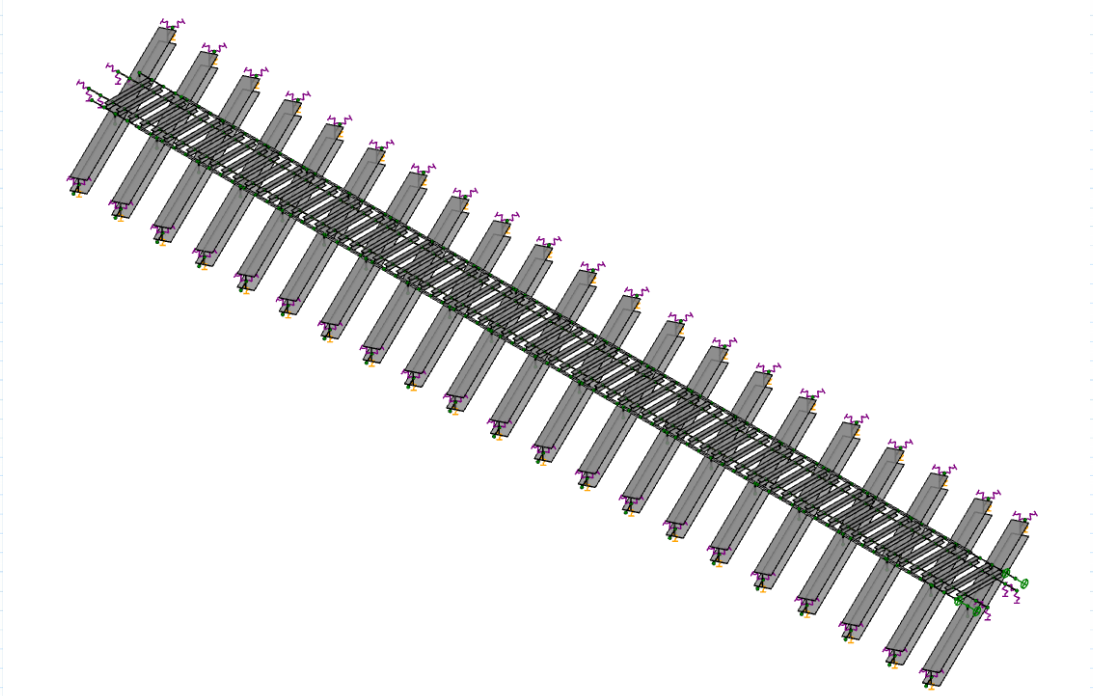
$\text{if}\left(\delta_{vertLL} < \delta_{vert_max}, \text{“Ok”}, \text{“NG”}\right) = \text{“Ok”}$



RISA 3D ANALYSIS MODEL



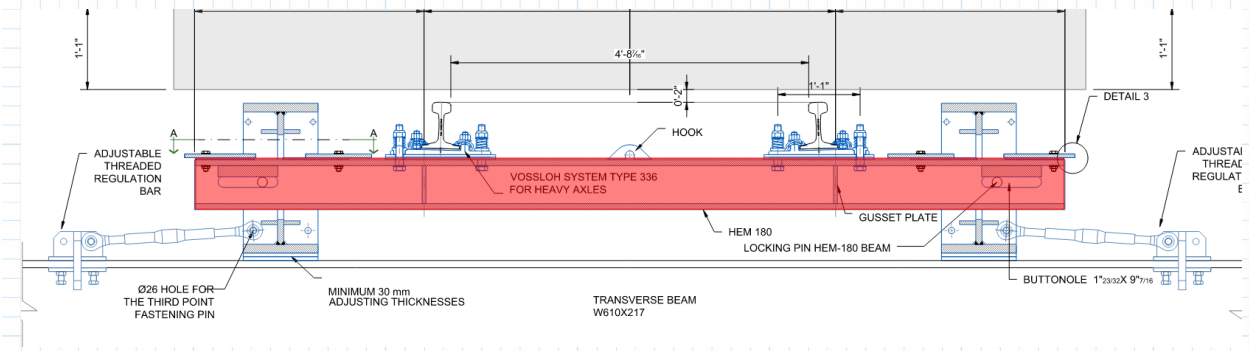
Plan View



Isometric View

Created with PTC Mathcad Express. See www.mathcad.com for more information.

HEM 180 BLUE TIES



$Area := 113.3\ cm^2 = 17.6\ in^2$

$Ixx := 7483\ cm^4 = 179.8\ in^4$

$Iyy := 2580\ cm^4 = 62\ in^4$

$h := 200\ mm = 7.9\ in$

$tw := 15\ mm = 0.6\ in$

$fb := 186\ mm = 7.3\ in$

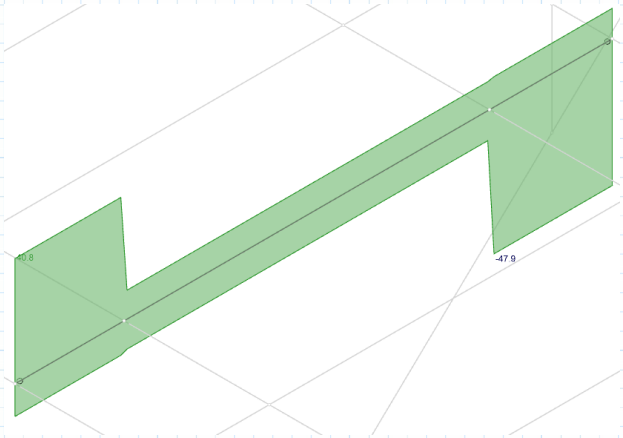
$Fy := 50\ ksi$

$Fa := 0.55 \cdot Fy = 27.5\ ksi$

$Fv := 0.35 \cdot Fy = 17.5\ ksi$

$Fb := 0.55 \cdot Fy = 27.5\ ksi$

$Impact := 1.40$



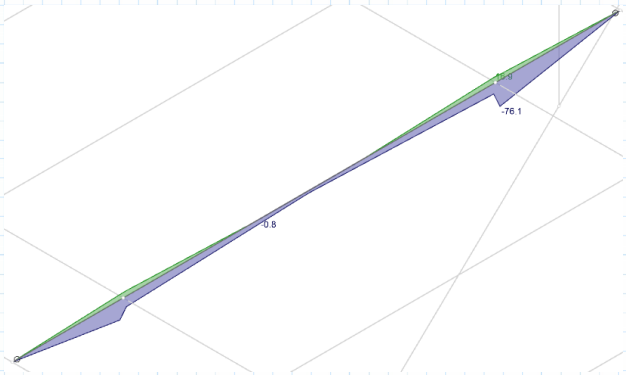
RISA 3D MODEL RESULTS

$V := 48\ kip$

$Mx := 77\ kip \cdot ft = 924\ kip \cdot in$

$My := 8\ kip \cdot ft = 96\ kip \cdot in$

$P := 27\ kip$



Created with PTC Mathcad Express. See www.mathcad.com for more information.

HEM 180 BLUE TIES

$fv := \frac{V}{h \cdot tw} = 10.3$ ***ksi*** $\quad$ **if**$(fv < Fv, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fv}{Fv} = 0.59$

$fa := \frac{P}{Area} = 1.5$ ***ksi*** $\quad$ **if**$(fa < Fa, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fa}{Fa} = 0.06 \quad < 0.15$

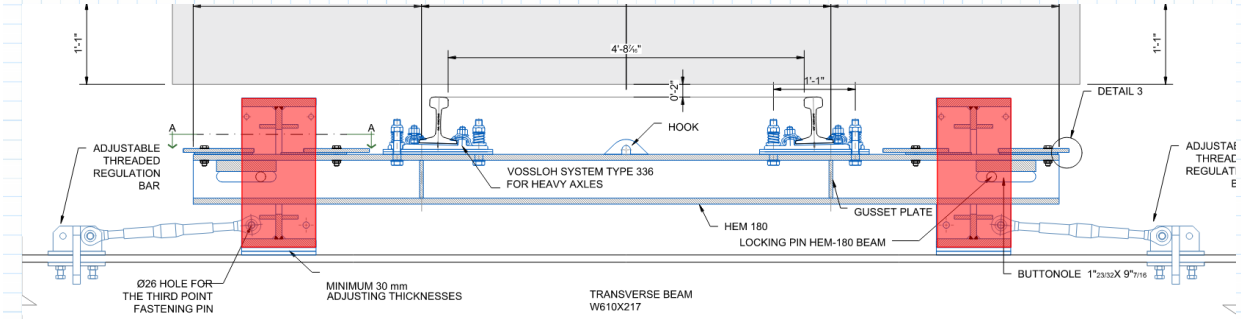
$fbx := \frac{Mx \cdot h}{Ixx \cdot 2} = 20.2$ ***ksi*** $\quad$ **if**$(fbx < Fb, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fbx}{Fb} = 0.74$

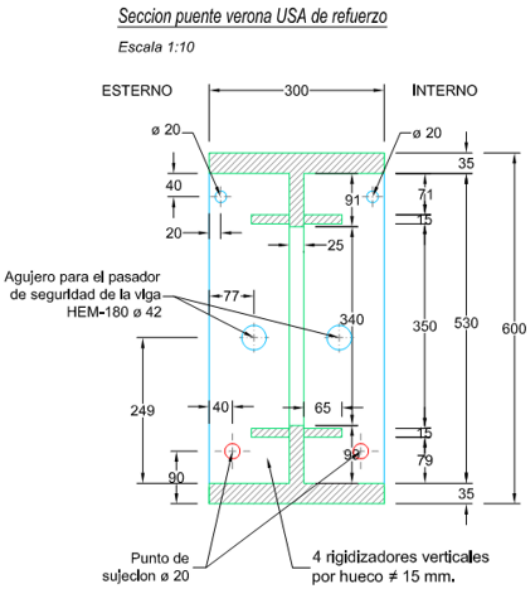
$fby := \frac{My \cdot fb}{Iyy \cdot 2} = 5.7$ ***ksi*** $\quad$ **if**$(fbx < Fb, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fby}{Fb} = 0.21$

$Combined := \frac{fa}{Fa} + \frac{fbx}{Fb} + \frac{fby}{Fb} = 0.998$ $\quad$ **if**$(Combined < 1.00, \text{“OK”}, \text{“NG”}) = \text{“OK”}$

Created with PTC Mathcad Express. See www.mathcad.com for more information.

LONGITUDINAL BLUE BEAMS





Flange	mm	inch
Width	300	11.8
Thick	35	1.4
Web		
Height	91	3.6
Thick	25	1.0

Cross-Section w/o stiffners

	Area	Ix	y	Ay^2	Iy
Flange	16.3	2.6	11.1	2,005.2	189.2
Web	3.5	3.8	8.6	260.8	0.3
Web	3.5	3.8	8.6	260.8	0.3
Flange	16.3	2.6	11.1	2,005.2	189.2
	39.6	12.7		4,532.1	379.0

Area =	39.6 in^2
Ixx =	4,544.8 in^4
Iyy =	379.0 in^4

$Area := 39.6\ in^2$

$Ixx := 4544.8\ in^4$

$Iyy := 379.0\ in^4$

$h := 600\ mm = 23.6\ in$

$tw := 25\ mm = 1\ in$

$hw := 252\ mm = 9.9\ in$

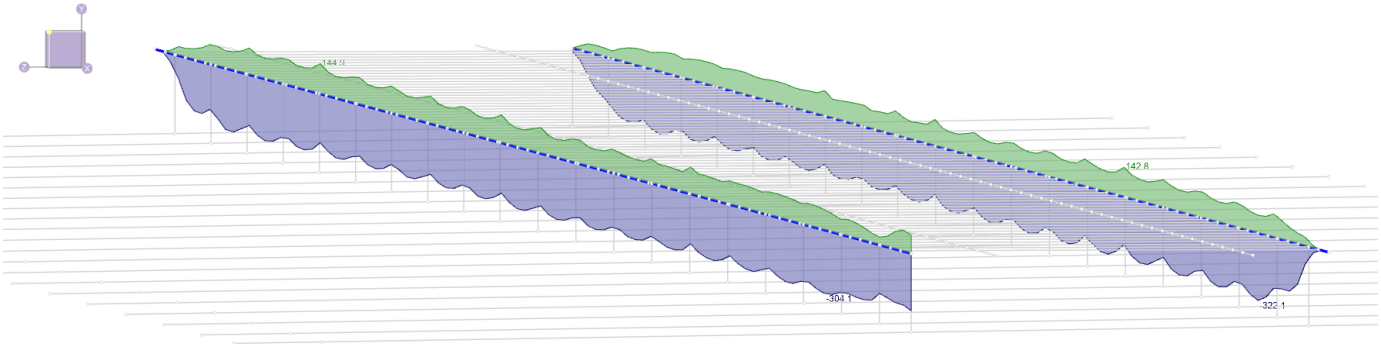
$fb := 186\ mm = 7.3\ in$

$Fy := 50\ ksi$

$Fa := 0.55 \cdot Fy = 27.5\ ksi$

$Fv := 0.35 \cdot Fy = 17.5\ ksi$

$Fb := 0.55 \cdot Fy = 27.5\ ksi$



Blue Beam Moment Envelope

Created with PTC Mathcad Express. See www.mathcad.com for more information.

RISA 3D MODEL RESULTS

$V := 101\ kip$

$Mx := 323\ kip \cdot ft = 3876\ kip \cdot in$

$My := 34.4\ kip \cdot ft = 412.8\ kip \cdot in$

$P := 46\ kip$

$fv := \frac{V}{hw \cdot tw} = 10.3\ ksi$ $\quad \mathbf{if}(fv < Fv, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fv}{Fv} = 0.59$

$fa := \frac{P}{Area} = 1.2\ ksi$ $\quad \mathbf{if}(fa < Fa, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fa}{Fa} = 0.04 < 0.15$

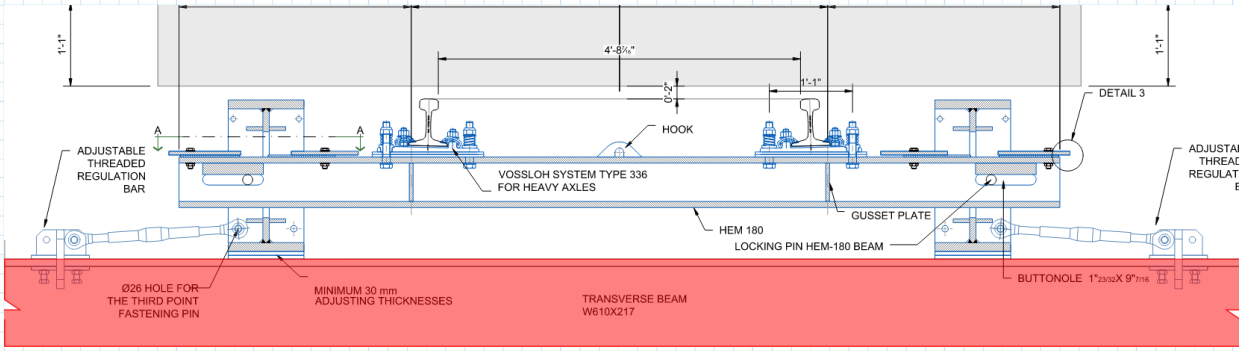
$fbx := \frac{Mx \cdot h}{Ixx \cdot 2} = 10.1\ ksi$ $\quad \mathbf{if}(fbx < Fb, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fbx}{Fb} = 0.37$

$fby := \frac{My \cdot fb}{Iyy \cdot 2} = 4\ ksi$ $\quad \mathbf{if}(fbx < Fb, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\quad \frac{fby}{Fb} = 0.15$

$Combined := \frac{fa}{Fa} + \frac{fbx}{Fb} + \frac{fby}{Fb} = 0.554$ $\quad \mathbf{if}(Combined < 1.00, \text{“OK”}, \text{“NG”}) = \text{“OK”}$

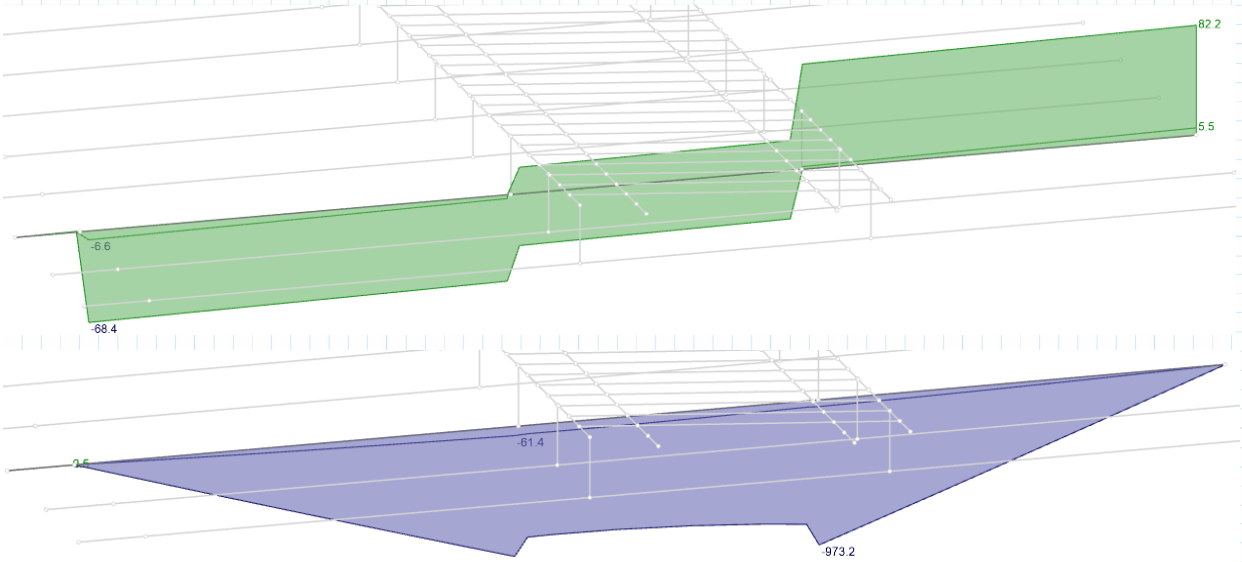
Created with PTC Mathcad Express. See www.mathcad.com for more information.

TRANSVERSE GRAY BEAMS



SHEAR / MOMENT DIAGRAMS

At Phase 2.1



Created with PTC Mathcad Express. See www.mathcad.com for more information.

Double W24x146 (W610x217)

$Area := 2 \cdot 43.0\ in^2 = 86\ in^2$

$Ixx := 2 \cdot 4580\ in^4 = 9160\ in^4$

$hw := 24.74\ in$

$tw := 0.65\ in$

$fb := 12.90\ in$

$Iyy := 2 \cdot 391\ in^4 + Area \cdot \left(\frac{fb}{2}\right)^2$

$Iyy = 4359.8\ in^4$

RISA 3D MODEL RESULTS

$V := 191.2\ kip$ check with box under

$Mx := 973.2\ kip \cdot ft = 11678.4\ kip \cdot in$

$My := 30.9\ kip \cdot ft = 370.8\ kip \cdot in$

$P := 87\ kip$

$Rea := 308\ kip$

$\Delta_g := 0.916\ in$ -global max deflection

$\Delta := \Delta_g - 0.082\ in = 0.834\ in$

-local deflection between supports

$fv := \frac{V}{2 \cdot hw \cdot tw} = 5.9\ ksi$ **if** $(fv < Fv, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\frac{fv}{Fv} = 0.34$

$fa := \frac{P}{Area} = 1\ ksi$ **if** $(fa < Fa, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\frac{fa}{Fa} = 0.04$ < 0.15

$fbx := \frac{Mx \cdot h}{Ixx \cdot 2} = 15.1\ ksi$ **if** $(fbx < Fb, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\frac{fbx}{Fb} = 0.55$

$fby := \frac{My \cdot fb}{Iyy} = 1.1\ ksi$ **if** $(fbx < Fb, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $\frac{fby}{Fb} = 0.04$

$Combined := \frac{fa}{Fa} + \frac{fbx}{Fb} + \frac{fby}{Fb} = 0.624$ **if** $(Combined < 1.00, \text{“OK”}, \text{“NG”}) = \text{“OK”}$

The structure shall be so designed that the computed deflection shall not exceed 1/640 of the span length center to center of bearings for simple spans.

$Verona_North_Span := 64.833\ ft$ Bridge Span when excavation under north box (Phase 2.1)

$Allowable_Deflect := \frac{Verona_North_Span}{640} = 1.216\ in$ **if** $(\Delta < Allowable_Deflect, \text{“OK”}, \text{“NG”}) = \text{“OK”}$

$\Delta = 0.8\ in$ $\Delta \div Allowable_Deflect = 0.7$

b. The structure shall be proportioned and designed so that the computed downward deflection within any span which has moment-carrying capacity throughout its length shall not exceed 1/640 of that span length. In the case of cantilever structures, the computed downward deflection at the end of the cantilever arm shall not exceed 1/250 of the length of that arm and the downward deflection of a suspended simple span shall not exceed 1/640 of the length of that span.

Created with PTC Mathcad Express. See www.mathcad.com for more information.

Check of HE180M Pin Connection AISC Chapter J.4

$V := 48\ kip$ $V' := \frac{V}{2} = 24\ kip$ -shear per plane

$F_y := 640\ MPa = 93\ ksi$

$d_{pin} := 40\ mm = 1.575\ in$ $A_{pin} := \frac{\pi \cdot d_{pin}^2}{4} = 2\ in^2$

$R_n := 0.60 \cdot F_y \cdot A_{pin} = 108\ kip$ -nominal pin capacity per shear plane

$\Omega := 1.50$ $R_c := \frac{R_n}{\Omega} = 72\ kip$

$\text{if}\left(V' \le \frac{2 \cdot R_n}{\Omega}, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $\frac{V'}{R_c} = 0.332$

Check of Steel Plate - Bearing Check
(J3-6e, long slotted holes perpendicular to the direction of the load)

$t_{pl} := 15\ mm = 0.591\ in$ $F_y := 355\ MPa = 51\ ksi$ $F_u := 490\ MPa = 71\ ksi$

$R_n := 2.0 \cdot d_{pin} \cdot t_{pl} \cdot F_u = 132.188\ kip$ $\Omega := 2.00$

$R_c := \frac{R_n}{\Omega} = 66.094\ kip$ $\text{if}\left(V' \le R_c, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $\frac{V'}{R_c} = 0.363$

Created with PTC Mathcad Express. See www.mathcad.com for more information.

APPENDIX A – RISA 3D MODEL INPUT AND OUTPUT PRINTOUTS

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
3	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	0.3	0.65	0.49	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	0.3	0.65	0.49	46	1.4	58	1.3
6	A992_WTLESS	29000	11154	0.3	0.65	0	50	1.1	65	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	HR1A	W8X10	Beam	Wide Flange	A36 Gr.36	Typical	2.96	2.09	30.8	0.043
2	DBL W24X146	DBL W24x146	Beam	Wide Flange	A572 Gr.50	Typical	86	4359.81	9160	26.8
3	BLUE BEAMS	Blue Beams	Beam	Wide Flange	A572 Gr.50	Typical	45.652	401.255	4893.48	23.214
4	HE180M	HE180M	Beam	Wide Flange	A572 Gr.50	Typical	17.515	61.984	179.778	4.829

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N490	102.315417	1.5	-4.016	
2	N491	102.315417	1.5	4.016	
3	N492	-3.932	1.5	-4.016	
4	N493	-3.932	1.5	4.016	
5	N494	-1.966	1.5	-4.016	
6	N495	-1.966	1.5	4.016	
7	N498	1.966	1.5	-4.016	
8	N499	1.966	1.5	4.016	
9	N500	3.932	1.5	-4.016	
10	N501	3.932	1.5	4.016	
11	N502	5.898	1.5	-4.016	
12	N503	5.898	1.5	4.016	
13	N504	7.864	1.5	-4.016	
14	N505	7.864	1.5	4.016	
15	N506	9.83	1.5	-4.016	
16	N507	9.83	1.5	4.016	
17	N508	11.796	1.5	-4.016	
18	N509	11.796	1.5	4.016	
19	N510	13.762	1.5	-4.016	
20	N511	13.762	1.5	4.016	
21	N512	-13.762	1.5	-4.016	
22	N513	-13.762	1.5	4.016	
23	N514	-11.796	1.5	-4.016	
24	N515	-11.796	1.5	4.016	
25	N516	-9.83	1.5	-4.016	
26	N517	-9.83	1.5	4.016	
27	N518	-7.864	1.5	-4.016	
28	N519	-7.864	1.5	4.016	
29	N520	-5.898	1.5	-4.016	
30	N521	-5.898	1.5	4.016	
31	N522	-15.728	1.5	-4.016	
32	N523	-15.728	1.5	4.016	
33	N524	-17.694	1.5	-2.365	
34	N525	-17.694	1.5	2.55	
35	N526	17.694	1.5	-2.365	
36	N527	17.694	1.5	2.55	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
37	N528	-3.932	1.5	2.55	
38	N529	-3.932	1.5	-2.365	
39	N530	-1.966	1.5	2.55	
40	N531	-1.966	1.5	-2.365	
41	N532	0	1.5	2.55	
42	N533	0	1.5	-2.365	
43	N534	1.966	1.5	2.55	
44	N535	1.966	1.5	-2.365	
45	N536	3.932	1.5	2.55	
46	N537	3.932	1.5	-2.365	
47	N538	5.898	1.5	2.55	
48	N539	5.898	1.5	-2.365	
49	N540	7.864	1.5	2.55	
50	N541	7.864	1.5	-2.365	
51	N542	9.83	1.5	2.55	
52	N543	9.83	1.5	-2.365	
53	N544	11.796	1.5	2.55	
54	N545	11.796	1.5	-2.365	
55	N546	13.762	1.5	2.55	
56	N547	13.762	1.5	-2.365	
57	N548	-13.762	1.5	2.55	
58	N549	-13.762	1.5	-2.365	
59	N550	-11.796	1.5	2.55	
60	N551	-11.796	1.5	-2.365	
61	N552	-9.83	1.5	2.55	
62	N553	-9.83	1.5	-2.365	
63	N554	-7.864	1.5	2.55	
64	N555	-7.864	1.5	-2.365	
65	N556	-5.898	1.5	2.55	
66	N557	-5.898	1.5	-2.365	
67	N558	-15.728	1.5	2.55	
68	N559	-15.728	1.5	-2.365	
69	N563	-0.01	1.5	-4.016	
70	N570	15.728	1.5	-4.016	
71	N571	15.728	1.5	4.016	
72	N572	15.728	1.5	2.55	
73	N573	15.728	1.5	-2.365	
74	N578	-41.398	1.5	4.016	
75	N579	-45.3195	0	-4.016	
76	N580	-41.398	0	4.016	
77	N581	-45.3195	1.5	-4.016	
78	N590	17.694	1.5	-4.016	
79	N591	17.694	1.5	4.016	
80	N592	19.66	1.5	-4.016	
81	N593	19.66	1.5	4.016	
82	N594	21.626	1.5	-4.016	
83	N595	21.626	1.5	4.016	
84	N596	25.558	1.5	-2.365	
85	N597	25.558	1.5	2.55	
86	N598	19.66	1.5	2.55	
87	N599	19.66	1.5	-2.365	
88	N600	21.626	1.5	2.55	
89	N601	21.626	1.5	-2.365	
90	N602	23.592	1.5	-4.016	
91	N603	23.592	1.5	4.016	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
92	N604	23.592	1.5	2.55	
93	N605	23.592	1.5	-2.365	
94	N606	25.558	1.5	-4.016	
95	N607	25.558	1.5	4.016	
96	N608	27.524	1.5	-4.016	
97	N609	27.524	1.5	4.016	
98	N610	29.49	1.5	-4.016	
99	N611	29.49	1.5	4.016	
100	N612	33.422	1.5	-2.365	
101	N613	33.422	1.5	2.55	
102	N614	27.524	1.5	2.55	
103	N615	27.524	1.5	-2.365	
104	N616	29.49	1.5	2.55	
105	N617	29.49	1.5	-2.365	
106	N618	31.456	1.5	-4.016	
107	N619	31.456	1.5	4.016	
108	N620	31.456	1.5	2.55	
109	N621	31.456	1.5	-2.365	
110	N622	33.422	1.5	-4.016	
111	N623	33.422	1.5	4.016	
112	N624	35.388	1.5	-4.016	
113	N625	35.388	1.5	4.016	
114	N626	37.354	1.5	-4.016	
115	N627	37.354	1.5	4.016	
116	N628	41.286	1.5	-2.365	
117	N629	41.286	1.5	2.55	
118	N630	35.388	1.5	2.55	
119	N631	35.388	1.5	-2.365	
120	N632	37.354	1.5	2.55	
121	N633	37.354	1.5	-2.365	
122	N634	39.32	1.5	-4.016	
123	N635	39.32	1.5	4.016	
124	N636	39.32	1.5	2.55	
125	N637	39.32	1.5	-2.365	
126	N638	41.286	1.5	-4.016	
127	N639	41.286	1.5	4.016	
128	N640	-19.66	1.5	-4.016	
129	N641	-19.66	1.5	4.016	
130	N642	-17.694	1.5	-4.016	
131	N643	-17.694	1.5	4.016	
132	N644	-21.626	1.5	-4.016	
133	N645	-21.626	1.5	4.016	
134	N646	-23.592	1.5	-2.365	
135	N647	-23.592	1.5	2.55	
136	N648	-19.66	1.5	2.55	
137	N649	-19.66	1.5	-2.365	
138	N650	-21.626	1.5	2.55	
139	N651	-21.626	1.5	-2.365	
140	N652	-25.558	1.5	-4.016	
141	N653	-25.558	1.5	4.016	
142	N654	-23.592	1.5	-4.016	
143	N655	-23.592	1.5	4.016	
144	N660	-25.558	1.5	2.55	
145	N661	-25.558	1.5	-2.365	
146	N656	-27.524	1.5	-4.016	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
147	N696	43.252	1.5	-2.365	
148	N657	-27.524	1.5	4.016	
149	N658	-29.49	1.5	-2.365	
150	N697	43.252	1.5	2.55	
151	N659	-29.49	1.5	2.55	
152	N698	43.252	1.5	-4.016	
153	N699	43.252	1.5	4.016	
154	N700	45.218	1.5	-2.365	
155	N701	45.218	1.5	2.55	
156	N662	-27.524	1.5	2.55	
157	N702	45.218	1.5	-4.016	
158	N663	-27.524	1.5	-2.365	
159	N664	-31.456	1.5	-4.016	
160	N703	45.218	1.5	4.016	
161	N665	-31.456	1.5	4.016	
162	N704	47.184	1.5	-2.365	
163	N666	-29.49	1.5	-4.016	
164	N705	47.184	1.5	2.55	
165	N667	-29.49	1.5	4.016	
166	N706	47.184	1.5	-4.016	
167	N668	-33.422	1.5	-4.016	
168	N707	47.184	1.5	4.016	
169	N669	-33.422	1.5	4.016	
170	N670	-35.388	1.5	-2.365	
171	N671	-35.388	1.5	2.55	
172	N672	-31.456	1.5	2.55	
173	N673	-31.456	1.5	-2.365	
174	N674	-33.422	1.5	2.55	
175	N675	-33.422	1.5	-2.365	
176	N676	-35.388	1.5	-4.016	
177	N677	-35.388	1.5	4.016	
178	N680	-37.354	1.5	2.55	
179	N681	-37.354	1.5	-2.365	
180	N838	49.166	1.5	-4.016	
181	N839	49.166	1.5	4.016	
182	N683	-45.32	1.5	4.016	
183	N840	53.098	1.5	-2.365	
184	N841	53.098	1.5	2.55	
185	N842	49.166	1.5	2.55	
186	N843	49.166	1.5	-2.365	
187	N844	51.132	1.5	-4.016	
188	N845	51.132	1.5	4.016	
189	N846	51.132	1.5	2.55	
190	N847	51.132	1.5	-2.365	
191	N848	53.098	1.5	-4.016	
192	N849	53.098	1.5	4.016	
193	N850	55.064	1.5	-2.365	
194	N851	55.064	1.5	2.55	
195	N852	55.064	1.5	-4.016	
196	N853	55.064	1.5	4.016	
197	N854	57.03	1.5	-2.365	
198	N855	57.03	1.5	2.55	
199	N856	57.03	1.5	-4.016	
200	N857	57.03	1.5	4.016	
201	N890	59.009	1.5	-4.016	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
202	N891	59.009	1.5	4.016	
203	N894	59.009	1.5	2.55	
204	N895	59.009	1.5	-2.365	
205	N896	60.975	1.5	-4.016	
206	N897	60.975	1.5	4.016	
207	N898	60.975	1.5	2.55	
208	N899	60.975	1.5	-2.365	
209	N956	0	1.5	4.016	
210	N819A	102.258417	1.5	2.55	
211	N820A	102.258417	1.5	-2.365	
212	N825A	104.226417	1.5	2.55	
213	N826A	104.226417	1.5	-2.365	
214	N951	-37.354	1.5	-4.016	
215	N952	-37.354	1.5	4.016	
216	N831A	-45.322	1.5	2.55	
217	N832A	-45.322	1.5	-2.365	
218	N837A	-47.29	1.5	2.55	
219	N838A	-47.29	1.5	-2.365	
220	N296	-39.32	1.5	2.55	
221	N297	-39.32	1.5	4.016	
222	N298	-39.32	1.5	-2.365	
223	N299	-39.32	1.5	-4.016	
224	N300	-41.286	1.5	2.55	
225	N301	-41.286	1.5	4.016	
226	N302	-41.286	1.5	-2.365	
227	N303	-41.286	1.5	-4.016	
228	N304	-43.252	1.5	2.55	
229	N305	-43.252	1.5	4.016	
230	N306	-43.252	1.5	-2.365	
231	N307	-43.252	1.5	-4.016	
232	N381	62.928	1.5	-2.365	
233	N382	62.928	1.5	2.55	
234	N383	62.928	1.5	-4.016	
235	N384	62.928	1.5	4.016	
236	N385	64.894	1.5	-2.365	
237	N386	64.894	1.5	2.55	
238	N387	64.894	1.5	-4.016	
239	N388	64.894	1.5	4.016	
240	N389	66.86	1.5	-2.365	
241	N390	66.86	1.5	2.55	
242	N391	66.86	1.5	-4.016	
243	N392	66.86	1.5	4.016	
244	N393	68.839	1.5	-4.016	
245	N394	68.839	1.5	4.016	
246	N395	68.839	1.5	2.55	
247	N396	68.839	1.5	-2.365	
248	N397	70.805	1.5	-4.016	
249	N398	70.805	1.5	4.016	
250	N399	70.805	1.5	2.55	
251	N400	70.805	1.5	-2.365	
252	N401	72.758	1.5	-2.365	
253	N402	72.758	1.5	2.55	
254	N403	72.758	1.5	-4.016	
255	N404	72.758	1.5	4.016	
256	N405	74.724	1.5	-2.365	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
257	N406	74.724	1.5	2.55	
258	N407	74.724	1.5	-4.016	
259	N408	74.724	1.5	4.016	
260	N409	76.69	1.5	-2.365	
261	N410	76.69	1.5	2.55	
262	N411	76.69	1.5	-4.016	
263	N412	76.69	1.5	4.016	
264	N413	78.669	1.5	-4.016	
265	N414	78.669	1.5	4.016	
266	N415	78.669	1.5	2.55	
267	N416	78.669	1.5	-2.365	
268	N417	80.635	1.5	-4.016	
269	N418	80.635	1.5	4.016	
270	N419	80.635	1.5	2.55	
271	N420	80.635	1.5	-2.365	
272	N421	82.588	1.5	-2.365	
273	N422	82.588	1.5	2.55	
274	N423	82.588	1.5	-4.016	
275	N424	82.588	1.5	4.016	
276	N425	84.554	1.5	-2.365	
277	N426	84.554	1.5	2.55	
278	N427	84.554	1.5	-4.016	
279	N428	84.554	1.5	4.016	
280	N429	86.52	1.5	-2.365	
281	N430	86.52	1.5	2.55	
282	N431	86.52	1.5	-4.016	
283	N432	86.52	1.5	4.016	
284	N433	88.499	1.5	-4.016	
285	N434	88.499	1.5	4.016	
286	N435	88.499	1.5	2.55	
287	N436	88.499	1.5	-2.365	
288	N437	90.465	1.5	-4.016	
289	N438	90.465	1.5	4.016	
290	N439	90.465	1.5	2.55	
291	N440	90.465	1.5	-2.365	
292	N441	92.418	1.5	-2.365	
293	N442	92.418	1.5	2.55	
294	N443	92.418	1.5	-4.016	
295	N444	92.418	1.5	4.016	
296	N445	94.384	1.5	-2.365	
297	N446	94.384	1.5	2.55	
298	N447	94.384	1.5	-4.016	
299	N448	94.384	1.5	4.016	
300	N449	96.35	1.5	-2.365	
301	N450	96.35	1.5	2.55	
302	N451	96.35	1.5	-4.016	
303	N452	96.35	1.5	4.016	
304	N453	98.329	1.5	-4.016	
305	N454	98.329	1.5	4.016	
306	N455	98.329	1.5	2.55	
307	N456	98.329	1.5	-2.365	
308	N457	100.295	1.5	-4.016	
309	N458	100.295	1.5	4.016	
310	N459	100.295	1.5	2.55	
311	N460	100.295	1.5	-2.365	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
312	N315	-28.542	0	15.904	
313	N316	-38.2675	0	-4.016	
314	N317	-34.346	0	4.016	
315	N318	-43.586	0	-14.908	
316	N319	-27.664	0	17.7	
317	N320	-38.2675	1.5	-4.016	
318	N321	-34.346	1.5	4.016	
319	N322	-21.49	0	15.904	
320	N323	-31.2155	0	-4.016	
321	N324	-27.294	0	4.016	
322	N325	-36.534	0	-14.908	
323	N326	-20.612	0	17.7	
324	N327	-31.2155	1.5	-4.016	
325	N328	-27.294	1.5	4.016	
326	N329	-14.438	0	15.904	
327	N330	-24.1635	0	-4.016	
328	N331	-20.242	0	4.016	
329	N332	-29.482	0	-14.908	
330	N333	-13.56	0	17.7	
331	N334	-24.1635	1.5	-4.016	
332	N335	-20.242	1.5	4.016	
333	N336	-7.386	0	15.904	
334	N337	-17.1115	0	-4.016	
335	N338	-13.19	0	4.016	
336	N339	-22.43	0	-14.908	
337	N340	-6.508	0	17.7	
338	N341	-17.1115	1.5	-4.016	
339	N342	-13.19	1.5	4.016	
340	N343	-0.334	0	15.904	
341	N344	-10.0595	0	-4.016	
342	N345	-6.138	0	4.016	
343	N346	-15.378	0	-14.908	
344	N347	0.544	0	17.7	
345	N348	-10.0595	1.5	-4.016	
346	N349	-6.138	1.5	4.016	
347	N350	6.719	0	15.904	
348	N351	-3.0065	0	-4.016	
349	N352	0.915	0	4.016	
350	N353	-8.325	0	-14.908	
351	N354	7.597	0	17.7	
352	N355	-3.0065	1.5	-4.016	
353	N356	0.915	1.5	4.016	
354	N357	13.771	0	15.904	
355	N358	4.0455	0	-4.016	
356	N359	7.967	0	4.016	
357	N360	-1.273	0	-14.908	
358	N361	14.649	0	17.7	
359	N362	4.0455	1.5	-4.016	
360	N363	7.967	1.5	4.016	
361	N364	20.823	0	15.904	
362	N365	11.0975	0	-4.016	
363	N366	15.019	0	4.016	
364	N367	5.779	0	-14.908	
365	N368	21.701	0	17.7	
366	N369	11.0975	1.5	-4.016	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
367	N370	15.019	1.5	4.016	
368	N371	27.875	0	15.904	
369	N372	18.1495	0	-4.016	
370	N373	22.071	0	4.016	
371	N374	12.831	0	-14.908	
372	N375	28.753	0	17.7	
373	N376	18.1495	1.5	-4.016	
374	N377	22.071	1.5	4.016	
375	N378	35.281	0	15.904	
376	N379	25.5555	0	-4.016	
377	N380	29.477	0	4.016	
378	N461	20.237	0	-14.908	
379	N462	36.159	0	17.7	
380	N464	29.477	1.5	4.016	
381	N463	42.687	0	15.904	
382	N465	32.9615	0	-4.016	
383	N466	36.883	0	4.016	
384	N467	27.643	0	-14.908	
385	N468	43.565	0	17.7	
386	N469	32.9615	1.5	-4.016	
387	N470	36.883	1.5	4.016	
388	N471	50.094	0	15.904	
389	N472	40.3685	0	-4.016	
390	N473	44.29	0	4.016	
391	N474	35.05	0	-14.908	
392	N475	50.972	0	17.7	
393	N476	40.3685	1.5	-4.016	
394	N477	44.29	1.5	4.016	
395	N478	57.5	0	15.904	
396	N479	47.7745	0	-4.016	
397	N480	51.696	0	4.016	
398	N481	42.456	0	-14.908	
399	N482	58.378	0	17.7	
400	N483	47.7745	1.5	-4.016	
401	N484	51.696	1.5	4.016	
402	N485	64.906	0	15.904	
403	N486	55.1805	0	-4.016	
404	N487	59.102	0	4.016	
405	N488	49.862	0	-14.908	
406	N489	65.784	0	17.7	
407	N496	55.1805	1.5	-4.016	
408	N497	59.102	1.5	4.016	
409	N560	72.312	0	15.904	
410	N561	62.5865	0	-4.016	
411	N562	66.508	0	4.016	
412	N564	57.268	0	-14.908	
413	N565	73.19	0	17.7	
414	N566	62.5865	1.5	-4.016	
415	N567	66.508	1.5	4.016	
416	N568	79.719	0	15.904	
417	N569	69.9935	0	-4.016	
418	N574	73.915	0	4.016	
419	N575	64.675	0	-14.908	
420	N576	80.597	0	17.7	
421	N577	69.9935	1.5	-4.016	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
422	N582	73.915	1.5	4.016	
423	N583	87.125	0	15.904	
424	N584	77.3995	0	-4.016	
425	N585	81.321	0	4.016	
426	N586	72.081	0	-14.908	
427	N587	88.003	0	17.7	
428	N588	77.3995	1.5	-4.016	
429	N589	81.321	1.5	4.016	
430	N678	94.531	0	15.904	
431	N679	84.8055	0	-4.016	
432	N682	88.727	0	4.016	
433	N684	79.487	0	-14.908	
434	N685	95.409	0	17.7	
435	N686	84.8055	1.5	-4.016	
436	N687	88.727	1.5	4.016	
437	N688	101.937	0	15.904	
438	N689	92.2115	0	-4.016	
439	N690	96.133	0	4.016	
440	N691	86.893	0	-14.908	
441	N692	102.815	0	17.7	
442	N693	92.2115	1.5	-4.016	
443	N694	96.133	1.5	4.016	
444	N708	98.393917	0	-4.016	
445	N709	102.315417	0	4.016	
446	N712	98.393917	1.5	-4.016	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]
1	N490				Reaction
2	N491				Reaction
3	N524				
4	N525				
5	N526				
6	N527				
7	N596				
8	N597				
9	N612				
10	N613				
11	N628				
12	N629				
13	N646				
14	N647				
15	N696				
16	N697				
17	N658				
18	N700				
19	N659				
20	N701				
21	N670				
22	N704				
23	N671				
24	N705				
25	N819A		S100		
26	N820A		S100		
27	N825A	S300	S100		

Node Boundary Conditions (Continued)

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]
28	N826A	S300	S100		
29	N831A		S100		
30	N832A		S100		
31	N837A	S300	S100		
32	N838A	S300	S100		
33	N315	S50	CS1000	S50	
34	N318	S50	CS1000	S50	
35	N322	S50	CS1000	S50	
36	N325	S50	CS1000	S50	
37	N329	S50	CS1000	S50	
38	N332	S50	CS1000	S50	
39	N336	S50	CS1000	S50	
40	N339	S50	CS1000	S50	
41	N343	S50	CS1000	S50	
42	N346	S50	CS1000	S50	
43	N350	S50	CS1000	S50	
44	N353	S50	CS1000	S50	
45	N357	S50	CS1000	S50	
46	N360	S50	CS1000	S50	
47	N364	S50	CS1000	S50	
48	N367	S50	CS1000	S50	
49	N371	S50	CS1000	S50	
50	N374	S50	CS1000	S50	
51	N378	S50	CS1000	S50	
52	N461	S50	CS1000	S50	
53	N463	S50	CS1000	S50	
54	N467	S50	CS1000	S50	
55	N471	S50	CS1000	S50	
56	N474	S50	CS1000	S50	
57	N478	S50	CS1000	S50	
58	N481	S50	CS1000	S50	
59	N485	S50	CS1000	S50	
60	N488	S50	CS1000	S50	
61	N560	S50	CS1000	S50	
62	N564	S50	CS1000	S50	
63	N568	S50	CS1000	S50	
64	N575	S50	CS1000	S50	
65	N583	S50	CS1000	S50	
66	N586	S50	CS1000	S50	
67	N678	S50	CS1000	S50	
68	N684	S50	CS1000	S50	
69	N688	S50	CS1000	S50	
70	N691	S50	CS1000	S50	

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	M155	N683	N491		BLUE BEAMS	Beam	Wide Flange	A572 Gr.50	Typical
2	M156	N581	N490		BLUE BEAMS	Beam	Wide Flange	A572 Gr.50	Typical
3	M157	N493	N492		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
4	M158	N495	N494		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
5	M160	N499	N498		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
6	M161	N501	N500		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
7	M162	N503	N502		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
8	M163	N505	N504		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
9	M164	N507	N506		HE180M	Beam	Wide Flange	A572 Gr.50	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
10	M165	N509	N508		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
11	M166	N511	N510		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
12	M167	N513	N512		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
13	M168	N515	N514		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
14	M169	N517	N516		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
15	M170	N519	N518		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
16	M171	N521	N520		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
17	M172	N523	N522		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
18	M173	N304	N819A		122 #/yd rail	Beam	None	wtls steel	DR1
19	M174	N306	N820A		122 #/yd rail	Beam	None	wtls steel	DR1
20	M181	N571	N570		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
21	M184	N579	N581	209	RIGID	None	None	RIGID	Typical
22	M190	N591	N590		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
23	M191	N593	N592		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
24	M192	N595	N594		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
25	M193	N603	N602		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
26	M194	N607	N606		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
27	M195	N609	N608		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
28	M196	N611	N610		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
29	M197	N619	N618		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
30	M198	N623	N622		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
31	M199	N625	N624		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
32	M200	N627	N626		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
33	M201	N635	N634		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
34	M202	N639	N638		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
35	M203	N641	N640		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
36	M204	N643	N642		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
37	M205	N645	N644		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
38	M206	N653	N652		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
39	M207	N655	N654		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
40	M218	N699	N698		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
41	M208	N657	N656		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
42	M219	N703	N702		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
43	M209	N665	N664		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
44	M210	N667	N666		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
45	M220	N707	N706		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
46	M211	N669	N668		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
47	M212	N677	N676		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
48	M264	N839	N838		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
49	M265	N845	N844		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
50	M266	N849	N848		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
51	M267	N853	N852		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
52	M268	N857	N856		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
53	M277	N891	N890		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
54	M278	N897	N896		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
55	M280A	N956	N563		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
56	M251A	N825A	N819A		122 #/yd rail	Beam	None	wtls steel	DR1
57	M253A	N826A	N820A		122 #/yd rail	Beam	None	wtls steel	DR1
58	M277A	N952	N951		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
59	M263A	N304	N831A		122 #/yd rail	Beam	None	wtls steel	DR1
60	M264A	N831A	N837A		122 #/yd rail	Beam	None	wtls steel	DR1
61	M265A	N306	N832A		122 #/yd rail	Beam	None	wtls steel	DR1
62	M266A	N832A	N838A		122 #/yd rail	Beam	None	wtls steel	DR1
63	M131	N384	N383		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
64	M132	N388	N387		HE180M	Beam	Wide Flange	A572 Gr.50	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
65	M133	N392	N391		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
66	M134	N394	N393		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
67	M135	N398	N397		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
68	M136	N404	N403		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
69	M137	N408	N407		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
70	M138	N412	N411		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
71	M139	N414	N413		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
72	M140	N418	N417		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
73	M141	N424	N423		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
74	M142	N428	N427		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
75	M143	N432	N431		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
76	M144	N434	N433		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
77	M145	N438	N437		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
78	M146	N444	N443		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
79	M147	N448	N447		HE180M	Beam	Wide Flange	A572 Gr.50	Typical
80	M88	N316	N320	209	RIGID	None	None	RIGID	Typical
81	M89	N317	N321	209	RIGID	None	None	RIGID	Typical
82	M90	N318	N319		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
83	M91	N323	N327	209	RIGID	None	None	RIGID	Typical
84	M92	N324	N328	209	RIGID	None	None	RIGID	Typical
85	M93	N325	N326		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
86	M94	N330	N334	209	RIGID	None	None	RIGID	Typical
87	M95	N331	N335	209	RIGID	None	None	RIGID	Typical
88	M96	N332	N333		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
89	M100	N337	N341	209	RIGID	None	None	RIGID	Typical
90	M101	N338	N342	209	RIGID	None	None	RIGID	Typical
91	M102	N339	N340		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
92	M103	N344	N348	209	RIGID	None	None	RIGID	Typical
93	M104	N345	N349	209	RIGID	None	None	RIGID	Typical
94	M105	N346	N347		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
95	M106	N351	N355	209	RIGID	None	None	RIGID	Typical
96	M107	N352	N356	209	RIGID	None	None	RIGID	Typical
97	M108	N353	N354		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
98	M109	N358	N362	209	RIGID	None	None	RIGID	Typical
99	M110	N359	N363	209	RIGID	None	None	RIGID	Typical
100	M111	N360	N361		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
101	M112	N365	N369	209	RIGID	None	None	RIGID	Typical
102	M113	N366	N370	209	RIGID	None	None	RIGID	Typical
103	M114	N367	N368		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
104	M115	N372	N376	209	RIGID	None	None	RIGID	Typical
105	M116	N373	N377	209	RIGID	None	None	RIGID	Typical
106	M117	N374	N375		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
107	M118	N379	N606	209	RIGID	None	None	RIGID	Typical
108	M119	N380	N464	209	RIGID	None	None	RIGID	Typical
109	M120	N461	N462		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
110	M121	N465	N469	209	RIGID	None	None	RIGID	Typical
111	M122	N466	N470	209	RIGID	None	None	RIGID	Typical
112	M123	N467	N468		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
113	M124	N472	N476	209	RIGID	None	None	RIGID	Typical
114	M125	N473	N477	209	RIGID	None	None	RIGID	Typical
115	M126	N474	N475		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
116	M127	N479	N483	209	RIGID	None	None	RIGID	Typical
117	M128	N480	N484	209	RIGID	None	None	RIGID	Typical
118	M129	N481	N482		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
119	M130	N486	N496	209	RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
120	M151	N487	N497	209	RIGID	None	None	RIGID	Typical
121	M152	N488	N489		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
122	M153	N561	N566	209	RIGID	None	None	RIGID	Typical
123	M154	N562	N567	209	RIGID	None	None	RIGID	Typical
124	M159	N564	N565		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
125	M175	N569	N577	209	RIGID	None	None	RIGID	Typical
126	M176	N574	N582	209	RIGID	None	None	RIGID	Typical
127	M177	N575	N576		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
128	M178	N584	N588	209	RIGID	None	None	RIGID	Typical
129	M179	N585	N589	209	RIGID	None	None	RIGID	Typical
130	M180	N586	N587		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
131	M182	N679	N686	209	RIGID	None	None	RIGID	Typical
132	M183	N682	N687	209	RIGID	None	None	RIGID	Typical
133	M186	N684	N685		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
134	M187	N689	N693	209	RIGID	None	None	RIGID	Typical
135	M188	N690	N694	209	RIGID	None	None	RIGID	Typical
136	M189	N691	N692		DBL W24X146	Beam	Wide Flange	A572 Gr.50	Typical
137	M213	N708	N712	209	RIGID	None	None	RIGID	Typical
138	M214	N709	N491	209	RIGID	None	None	RIGID	Typical

Basic Load Cases

	BLC Description	Category	Y Gravity	Nodal	Point	Distributed
1	DL Self weight	DL	-1			
2	DL Rail Ties	DL				2
3	WL Wind on loaded bridge	WL				5
4	WU Wind on unloaded bridge	WL				2
5	N lateral force from equipment	None		1		
6	DF Derailment load Q	None			6	
7	Br Bracing force	None				
8	LF Traction	LL		150		2
9	LF Braking	LL		150		2
10	DF Derailment CSX	IL			6	
12	Train on Track	None			36	

Node Loads and Enforced Displacements (BLC 5 : N lateral force from equipment)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N503	L	Z	20

Node Loads and Enforced Displacements (BLC 8 : LF Traction)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N297	L	MZ	7.1
2	N299	L	MZ	7.1
3	N301	L	MZ	7.1
4	N303	L	MZ	7.1
5	N305	L	MZ	7.1
6	N307	L	MZ	7.1
7	N383	L	MZ	7.1
8	N384	L	MZ	7.1
9	N387	L	MZ	7.1
10	N388	L	MZ	7.1
11	N391	L	MZ	7.1
12	N392	L	MZ	7.1

Node Loads and Enforced Displacements (BLC 8 : LF Traction) (Continued)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
13	N393	L	MZ	7.1
14	N394	L	MZ	7.1
15	N397	L	MZ	7.1
16	N398	L	MZ	7.1
17	N403	L	MZ	7.1
18	N404	L	MZ	7.1
19	N407	L	MZ	7.1
20	N408	L	MZ	7.1
21	N411	L	MZ	7.1
22	N412	L	MZ	7.1
23	N413	L	MZ	7.1
24	N414	L	MZ	7.1
25	N417	L	MZ	7.1
26	N418	L	MZ	7.1
27	N423	L	MZ	7.1
28	N424	L	MZ	7.1
29	N427	L	MZ	7.1
30	N428	L	MZ	7.1
31	N431	L	MZ	7.1
32	N432	L	MZ	7.1
33	N433	L	MZ	7.1
34	N434	L	MZ	7.1
35	N437	L	MZ	7.1
36	N438	L	MZ	7.1
37	N443	L	MZ	7.1
38	N444	L	MZ	7.1
39	N447	L	MZ	7.1
40	N448	L	MZ	7.1
41	N451	L	MZ	7.1
42	N452	L	MZ	7.1
43	N453	L	MZ	7.1
44	N454	L	MZ	7.1
45	N458	L	MZ	7.1
46	N492	L	MZ	7.1
47	N493	L	MZ	7.1
48	N494	L	MZ	7.1
49	N495	L	MZ	7.1
50	N498	L	MZ	7.1
51	N499	L	MZ	7.1
52	N500	L	MZ	7.1
53	N501	L	MZ	7.1
54	N502	L	MZ	7.1
55	N503	L	MZ	7.1
56	N504	L	MZ	7.1
57	N505	L	MZ	7.1
58	N506	L	MZ	7.1
59	N507	L	MZ	7.1
60	N508	L	MZ	7.1
61	N509	L	MZ	7.1
62	N510	L	MZ	7.1
63	N511	L	MZ	7.1
64	N512	L	MZ	7.1
65	N513	L	MZ	7.1
66	N514	L	MZ	7.1
67	N515	L	MZ	7.1

Node Loads and Enforced Displacements (BLC 8 : LF Traction) (Continued)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
68	N516	L	MZ	7.1
69	N517	L	MZ	7.1
70	N518	L	MZ	7.1
71	N519	L	MZ	7.1
72	N520	L	MZ	7.1
73	N521	L	MZ	7.1
74	N522	L	MZ	7.1
75	N523	L	MZ	7.1
76	N563	L	MZ	7.1
77	N570	L	MZ	7.1
78	N571	L	MZ	7.1
79	N581	L	MZ	7.1
80	N590	L	MZ	7.1
81	N591	L	MZ	7.1
82	N592	L	MZ	7.1
83	N593	L	MZ	7.1
84	N594	L	MZ	7.1
85	N595	L	MZ	7.1
86	N602	L	MZ	7.1
87	N603	L	MZ	7.1
88	N606	L	MZ	7.1
89	N607	L	MZ	7.1
90	N608	L	MZ	7.1
91	N609	L	MZ	7.1
92	N610	L	MZ	7.1
93	N611	L	MZ	7.1
94	N618	L	MZ	7.1
95	N619	L	MZ	7.1
96	N622	L	MZ	7.1
97	N623	L	MZ	7.1
98	N624	L	MZ	7.1
99	N625	L	MZ	7.1
100	N626	L	MZ	7.1
101	N627	L	MZ	7.1
102	N634	L	MZ	7.1
103	N635	L	MZ	7.1
104	N638	L	MZ	7.1
105	N639	L	MZ	7.1
106	N640	L	MZ	7.1
107	N641	L	MZ	7.1
108	N642	L	MZ	7.1
109	N643	L	MZ	7.1
110	N644	L	MZ	7.1
111	N645	L	MZ	7.1
112	N652	L	MZ	7.1
113	N653	L	MZ	7.1
114	N654	L	MZ	7.1
115	N655	L	MZ	7.1
116	N656	L	MZ	7.1
117	N657	L	MZ	7.1
118	N664	L	MZ	7.1
119	N665	L	MZ	7.1
120	N666	L	MZ	7.1
121	N667	L	MZ	7.1
122	N668	L	MZ	7.1

Node Loads and Enforced Displacements (BLC 8 : LF Traction) (Continued)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
123	N669	L	MZ	7.1
124	N676	L	MZ	7.1
125	N677	L	MZ	7.1
126	N683	L	MZ	7.1
127	N698	L	MZ	7.1
128	N699	L	MZ	7.1
129	N702	L	MZ	7.1
130	N703	L	MZ	7.1
131	N706	L	MZ	7.1
132	N707	L	MZ	7.1
133	N838	L	MZ	7.1
134	N839	L	MZ	7.1
135	N844	L	MZ	7.1
136	N845	L	MZ	7.1
137	N848	L	MZ	7.1
138	N849	L	MZ	7.1
139	N852	L	MZ	7.1
140	N853	L	MZ	7.1
141	N856	L	MZ	7.1
142	N857	L	MZ	7.1
143	N890	L	MZ	7.1
144	N891	L	MZ	7.1
145	N896	L	MZ	7.1
146	N897	L	MZ	7.1
147	N951	L	MZ	7.1
148	N952	L	MZ	7.1
149	N956	L	MZ	7.1
150	N457	L	MZ	7.1

Node Loads and Enforced Displacements (BLC 9 : LF Braking)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N297	L	MZ	-12.7
2	N299	L	MZ	-12.7
3	N301	L	MZ	-12.7
4	N303	L	MZ	-12.7
5	N305	L	MZ	-12.7
6	N307	L	MZ	-12.7
7	N383	L	MZ	-12.7
8	N384	L	MZ	-12.7
9	N387	L	MZ	-12.7
10	N388	L	MZ	-12.7
11	N391	L	MZ	-12.7
12	N392	L	MZ	-12.7
13	N393	L	MZ	-12.7
14	N394	L	MZ	-12.7
15	N397	L	MZ	-12.7
16	N398	L	MZ	-12.7
17	N403	L	MZ	-12.7
18	N404	L	MZ	-12.7
19	N407	L	MZ	-12.7
20	N408	L	MZ	-12.7
21	N411	L	MZ	-12.7
22	N412	L	MZ	-12.7
23	N413	L	MZ	-12.7
24	N414	L	MZ	-12.7

Node Loads and Enforced Displacements (BLC 9 : LF Braking) (Continued)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
25	N417	L	MZ	-12.7
26	N418	L	MZ	-12.7
27	N423	L	MZ	-12.7
28	N424	L	MZ	-12.7
29	N427	L	MZ	-12.7
30	N428	L	MZ	-12.7
31	N431	L	MZ	-12.7
32	N432	L	MZ	-12.7
33	N433	L	MZ	-12.7
34	N434	L	MZ	-12.7
35	N437	L	MZ	-12.7
36	N438	L	MZ	-12.7
37	N443	L	MZ	-12.7
38	N444	L	MZ	-12.7
39	N447	L	MZ	-12.7
40	N448	L	MZ	-12.7
41	N451	L	MZ	-12.7
42	N452	L	MZ	-12.7
43	N453	L	MZ	-12.7
44	N454	L	MZ	-12.7
45	N458	L	MZ	-12.7
46	N492	L	MZ	-12.7
47	N493	L	MZ	-12.7
48	N494	L	MZ	-12.7
49	N495	L	MZ	-12.7
50	N498	L	MZ	-12.7
51	N499	L	MZ	-12.7
52	N500	L	MZ	-12.7
53	N501	L	MZ	-12.7
54	N502	L	MZ	-12.7
55	N503	L	MZ	-12.7
56	N504	L	MZ	-12.7
57	N505	L	MZ	-12.7
58	N506	L	MZ	-12.7
59	N507	L	MZ	-12.7
60	N508	L	MZ	-12.7
61	N509	L	MZ	-12.7
62	N510	L	MZ	-12.7
63	N511	L	MZ	-12.7
64	N512	L	MZ	-12.7
65	N513	L	MZ	-12.7
66	N514	L	MZ	-12.7
67	N515	L	MZ	-12.7
68	N516	L	MZ	-12.7
69	N517	L	MZ	-12.7
70	N518	L	MZ	-12.7
71	N519	L	MZ	-12.7
72	N520	L	MZ	-12.7
73	N521	L	MZ	-12.7
74	N522	L	MZ	-12.7
75	N523	L	MZ	-12.7
76	N563	L	MZ	-12.7
77	N570	L	MZ	-12.7
78	N571	L	MZ	-12.7
79	N581	L	MZ	-12.7

Node Loads and Enforced Displacements (BLC 9 : LF Braking) (Continued)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
80	N590	L	MZ	-12.7
81	N591	L	MZ	-12.7
82	N592	L	MZ	-12.7
83	N593	L	MZ	-12.7
84	N594	L	MZ	-12.7
85	N595	L	MZ	-12.7
86	N602	L	MZ	-12.7
87	N603	L	MZ	-12.7
88	N606	L	MZ	-12.7
89	N607	L	MZ	-12.7
90	N608	L	MZ	-12.7
91	N609	L	MZ	-12.7
92	N610	L	MZ	-12.7
93	N611	L	MZ	-12.7
94	N618	L	MZ	-12.7
95	N619	L	MZ	-12.7
96	N622	L	MZ	-12.7
97	N623	L	MZ	-12.7
98	N624	L	MZ	-12.7
99	N625	L	MZ	-12.7
100	N626	L	MZ	-12.7
101	N627	L	MZ	-12.7
102	N634	L	MZ	-12.7
103	N635	L	MZ	-12.7
104	N638	L	MZ	-12.7
105	N639	L	MZ	-12.7
106	N640	L	MZ	-12.7
107	N641	L	MZ	-12.7
108	N642	L	MZ	-12.7
109	N643	L	MZ	-12.7
110	N644	L	MZ	-12.7
111	N645	L	MZ	-12.7
112	N652	L	MZ	-12.7
113	N653	L	MZ	-12.7
114	N654	L	MZ	-12.7
115	N655	L	MZ	-12.7
116	N656	L	MZ	-12.7
117	N657	L	MZ	-12.7
118	N664	L	MZ	-12.7
119	N665	L	MZ	-12.7
120	N666	L	MZ	-12.7
121	N667	L	MZ	-12.7
122	N668	L	MZ	-12.7
123	N669	L	MZ	-12.7
124	N676	L	MZ	-12.7
125	N677	L	MZ	-12.7
126	N683	L	MZ	-12.7
127	N698	L	MZ	-12.7
128	N699	L	MZ	-12.7
129	N702	L	MZ	-12.7
130	N703	L	MZ	-12.7
131	N706	L	MZ	-12.7
132	N707	L	MZ	-12.7
133	N838	L	MZ	-12.7
134	N839	L	MZ	-12.7

Node Loads and Enforced Displacements (BLC 9 : LF Braking) (Continued)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
135	N844	L	MZ	-12.7
136	N845	L	MZ	-12.7
137	N848	L	MZ	-12.7
138	N849	L	MZ	-12.7
139	N852	L	MZ	-12.7
140	N853	L	MZ	-12.7
141	N856	L	MZ	-12.7
142	N857	L	MZ	-12.7
143	N890	L	MZ	-12.7
144	N891	L	MZ	-12.7
145	N896	L	MZ	-12.7
146	N897	L	MZ	-12.7
147	N951	L	MZ	-12.7
148	N952	L	MZ	-12.7
149	N956	L	MZ	-12.7
150	N457	L	MZ	-12.7

Member Point Loads (BLC 6 : DF Derailment load Q)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M156	Y	-40	2.5
2	M156	Y	-40	7.5
3	M156	Y	-26	16.5
4	M156	Y	-26	21.5
5	M156	Y	-26	27.5
6	M156	Y	-26	32.5

Member Point Loads (BLC 10 : DF Derailment CSX)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M156	Y	-20	2.7
2	M156	Y	-40	10.7
3	M156	Y	-40	15.7
4	M156	Y	-40	20.7
5	M156	Y	-40	25.7
6	M156	Y	-26	34.7

Member Point Loads (BLC 12 : Train on Track)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M173	Y	-32	1.966
2	M173	Y	-64	9.966
3	M173	Y	-64	14.966
4	M173	Y	-64	19.966
5	M173	Y	-64	24.966
6	M173	Y	-41.6	33.966
7	M173	Y	-41.6	38.966
8	M173	Y	-41.6	44.966
9	M173	Y	-41.6	49.966
10	M173	Y	-32	57.966
11	M173	Y	-64	65.966
12	M173	Y	-64	70.966
13	M173	Y	-64	75.966
14	M173	Y	-64	80.966
15	M173	Y	-41.6	89.966

Member Point Loads (BLC 12 : Train on Track) (Continued)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
16	M173	Y	-41.6	94.966
17	M173	Y	-41.6	100.966
18	M173	Y	-41.6	105.966
19	M174	Y	-24	1.966
20	M174	Y	-48	9.966
21	M174	Y	-48	14.966
22	M174	Y	-48	19.966
23	M174	Y	-48	24.966
24	M174	Y	-31.2	33.966
25	M174	Y	-31.2	38.966
26	M174	Y	-31.2	44.966
27	M174	Y	-31.2	49.966
28	M174	Y	-24	57.966
29	M174	Y	-48	65.966
30	M174	Y	-48	70.966
31	M174	Y	-48	75.966
32	M174	Y	-48	80.966
33	M174	Y	-31.2	89.966
34	M174	Y	-31.2	94.966
35	M174	Y	-31.2	100.966
36	M174	Y	-31.2	105.966

Member Distributed Loads (BLC 2 : DL Rail Ties)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M173	Y	-0.16	-0.16	0	%100
2	M174	Y	-0.16	-0.16	0	%100

Member Distributed Loads (BLC 3 : WL Wind on loaded bridge)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M174	Z	-0.15	-0.15	0	%100
2	M155	Z	-0.087	-0.087	0	%100
3	M174	Y	-0.6	-0.6	0	%100
4	M174	X	0.097	0.097	0	%100
5	M173	Z	-0.15	-0.15	0	%100

Member Distributed Loads (BLC 4 : WU Wind on unloaded bridge)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M155	Z	-0.145	-0.145	0	%100
2	M156	X	0.036	0.036	0	%100

Member Distributed Loads (BLC 8 : LF Traction)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M173	X	-1.2	-1.2	0	%100
2	M174	X	-1.2	-1.2	0	%100

Member Distributed Loads (BLC 9 : LF Braking)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M173	X	0.808	0.808	0	%100
2	M174	X	0.808	0.808	0	%100

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1													
2	DL	Yes	Y	1	1	2	1						
3	(LL + I + CF) Vert deflection	Yes	Y	M3	0.6	M4	0.8						
4	(LL+I+CF) + WL + N Lat deflection	Yes	Y	L2	1	L3	1	3	1	5	1		
5													
6	ASD LC (STEEL DESIGN)												
7	AS_100: DL + (LL+I+CF)	Yes	Y	L2	1	L3	1						
8	AS_125: DL + (LL+I+CF) + WL + LF + N Traction	Yes	Y	L2	1	L3	1	3	1	5	1	L15	1
9	AS_125: DL + (LL+I+CF) + WL + LF + N Braking	Yes	Y	L2	1	L3	1	3	1	5	1	L16	1
10	AS_125 Bracing: CF + Br + N + WL	Yes	Y					7	1	5	1	3	1
11	AS_100: WU	Yes	Y	L2	1	4	1						
12	AS_150: DF	Yes	Y	L2	1	10	1						
13	Fatigue: LL+ mean I + CF	Yes	Y	M1	0.675	M2	0.675						
14													
15	LF Traction		Y	8	1								
16	LF Braking		Y	9	1								
17	WL		Y	3	1								
18	N		Y	5	1								
19	LL+I		Y		0.019		0.01						

Envelope Node Reactions

Live load moving load only

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N684	max	0.509	3-9	75.069	3-68	5.626	3-62	0	3-1	0	3-1	0	3-1
2		min	-3.058	3-63	0	3-52	-0.457	3-78	0	3-80	0	3-80	0	3-80
3	N586	max	0.405	3-9	73.993	3-64	5.485	3-58	0	3-1	0	3-1	0	3-1
4		min	-3.017	3-59	0	3-48	-1.753	3-72	0	3-80	0	3-80	0	3-80
5	N575	max	0.341	3-9	73.374	3-61	5.451	3-54	0	3-1	0	3-1	0	3-1
6		min	-2.902	3-56	0	3-80	-2.682	3-71	0	3-80	0	3-80	0	3-80
7	N564	max	0.278	3-4	73.308	3-57	5.414	3-50	0	3-1	0	3-1	0	3-1
8		min	-2.805	3-52	0	3-80	-2.981	3-68	0	3-80	0	3-80	0	3-80
9	N488	max	0.225	3-4	73.254	3-53	5.363	3-47	0	3-1	0	3-1	0	3-1
10		min	-2.739	3-48	0	3-80	-3.059	3-65	0	3-80	0	3-80	0	3-80
11	N474	max	0.109	3-1	73.058	3-46	5.379	3-39	0	3-1	0	3-1	0	3-1
12		min	-2.665	3-41	0	3-80	-3.13	3-57	0	3-80	0	3-80	0	3-80
13	N481	max	0.158	3-1	73.014	3-49	5.36	3-43	0	3-1	0	3-1	0	3-1
14		min	-2.698	3-45	0	3-80	-3.122	3-61	0	3-80	0	3-80	0	3-80
15	N467	max	0.051	3-1	72.948	3-42	5.372	3-36	0	3-1	0	3-1	0	3-1
16		min	-2.631	3-37	0	3-80	-3.11	3-53	0	3-80	0	3-80	0	3-80
17	N461	max	-0.016	3-1	72.318	3-38	5.324	3-32	0	3-1	0	3-1	0	3-1
18		min	-2.609	3-34	0	3-80	-3.121	3-50	0	3-80	0	3-80	0	3-80
19	N691	max	0.64	3-9	72.193	3-71	6.117	3-67	0	3-1	0	3-1	0	3-1
20		min	-2.888	3-66	0	3-55	-0.276	3-31	0	3-80	0	3-80	0	3-80
21	N374	max	-0.093	3-1	71.203	3-35	5.304	3-28	0	3-1	0	3-1	0	3-1
22		min	-2.612	3-30	0	3-80	-3.112	3-46	0	3-80	0	3-80	0	3-80
23	N339	max	-0.161	3-79	71.103	3-17	4.52	3-11	0	3-1	0	3-1	0	3-1
24		min	-2.638	3-13	0	3-80	-2.978	3-28	0	3-80	0	3-80	0	3-80
25	N332	max	-0.16	3-79	70.712	3-14	3.545	3-9	0	3-1	0	3-1	0	3-1
26		min	-2.362	3-10	0	3-80	-2.916	3-24	0	3-80	0	3-80	0	3-80
27	N346	max	-0.157	3-79	70.581	3-21	4.989	3-14	0	3-1	0	3-1	0	3-1
28		min	-2.747	3-16	0	3-80	-3.033	3-32	0	3-80	0	3-80	0	3-80
29	N367	max	-0.135	3-79	70.242	3-31	5.257	3-25	0	3-1	0	3-1	0	3-1
30		min	-2.669	3-26	0	3-80	-3.124	3-42	0	3-80	0	3-80	0	3-80

Envelope Node Reactions (Continued)

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
31	N353	max	-0.152	3-79	70.232	3-24	5.165	3-18	0	3-1	0	3-1	0	3-1
32		min	-2.764	3-19	0	3-80	-3.101	3-35	0	3-80	0	3-80	0	3-80
33	N360	max	-0.144	3-79	70.059	3-28	5.203	3-21	0	3-1	0	3-1	0	3-1
34		min	-2.741	3-23	0	3-80	-3.122	3-39	0	3-80	0	3-80	0	3-80
35	N325	max	-0.144	3-79	68.155	3-11	1.436	3-4	0	3-1	0	3-1	0	3-1
36		min	-2.305	3-22	0	3-80	-3.07	3-20	0	3-80	0	3-80	0	3-80
37	N315	max	2.548	3-16	66.666	3-10	0.218	3-52	0	3-1	0	3-1	0	3-1
38		min	-0.734	3-4	0	3-80	-6.199	3-15	0	3-80	0	3-80	0	3-80
39	N212	max	2.626	3-15	65.655	3-9	0.553	3-41	0	3-1	0	3-1	0	3-1
40		min	-1.21	3-1	0	3-80	-8.347	3-10	0	3-80	0	3-80	0	3-80
41	N318	max	-0.1	3-79	64.967	3-9	0.841	3-39	0	3-1	0	3-1	0	3-1
42		min	-2.149	3-20	0	3-74	-4.054	3-14	0	3-80	0	3-80	0	3-80
43	N710	max	1.148	3-78	64.601	3-72	8.066	3-70	0	3-1	0	3-1	0	3-1
44		min	-3.03	3-67	0	3-57	-0.591	3-37	0	3-80	0	3-80	0	3-80
45	N560	max	2.522	3-65	64.435	3-61	3.067	3-50	0	3-1	0	3-1	0	3-1
46		min	0.189	3-3	0	3-80	-4.965	3-67	0	3-80	0	3-80	0	3-80
47	N568	max	2.395	3-69	64.421	3-65	2.988	3-53	0	3-1	0	3-1	0	3-1
48		min	0.198	3-3	0	3-80	-4.498	3-70	0	3-80	0	3-80	0	3-80
49	N322	max	2.654	3-19	64.176	3-14	0.641	3-4	0	3-1	0	3-1	0	3-1
50		min	-0.313	3-72	0	3-80	-5.533	3-20	0	3-80	0	3-80	0	3-80
51	N485	max	2.553	3-62	63.955	3-57	3.096	3-46	0	3-1	0	3-1	0	3-1
52		min	0.177	3-3	0	3-80	-5.103	3-63	0	3-80	0	3-80	0	3-80
53	N471	max	2.456	3-55	63.699	3-50	3.177	3-39	0	3-1	0	3-1	0	3-1
54		min	0.149	3-3	0	3-80	-5.173	3-56	0	3-80	0	3-80	0	3-80
55	N478	max	2.492	3-58	63.682	3-54	3.137	3-42	0	3-1	0	3-1	0	3-1
56		min	0.164	3-3	0	3-80	-5.187	3-60	0	3-80	0	3-80	0	3-80
57	N463	max	2.438	3-51	63.651	3-46	3.193	3-35	0	3-1	0	3-1	0	3-1
58		min	0.099	3-80	0	3-80	-5.129	3-53	0	3-80	0	3-80	0	3-80
59	N378	max	2.419	3-47	63.458	3-43	3.143	3-31	0	3-1	0	3-1	0	3-1
60		min	0.046	3-80	0	3-80	-5.149	3-49	0	3-80	0	3-80	0	3-80
61	N583	max	2.293	3-56	63.444	3-68	2.885	3-57	0	3-1	0	3-1	0	3-1
62		min	0.196	3-3	0	3-51	-3.333	3-72	0	3-80	0	3-80	0	3-80
63	N371	max	2.427	3-44	62.69	3-39	3.136	3-28	0	3-1	0	3-1	0	3-1
64		min	0.001	3-80	0	3-80	-5.14	3-45	0	3-80	0	3-80	0	3-80
65	N329	max	2.646	3-23	62.37	3-17	1.865	3-9	0	3-1	0	3-1	0	3-1
66		min	-0.271	3-72	0	3-80	-5.326	3-24	0	3-80	0	3-80	0	3-80
67	N364	max	2.415	3-40	61.856	3-35	3.073	3-24	0	3-1	0	3-1	0	3-1
68		min	-0.036	3-80	0	3-80	-5.169	3-42	0	3-80	0	3-80	0	3-80
69	N336	max	2.568	3-26	61.669	3-21	2.606	3-10	0	3-1	0	3-1	0	3-1
70		min	-0.225	3-72	0	3-80	-5.254	3-27	0	3-80	0	3-80	0	3-80
71	N357	max	2.398	3-36	61.493	3-32	2.995	3-20	0	3-1	0	3-1	0	3-1
72		min	-0.092	3-78	0	3-80	-5.188	3-38	0	3-80	0	3-80	0	3-80
73	N343	max	2.484	3-29	61.377	3-25	2.881	3-14	0	3-1	0	3-1	0	3-1
74		min	-0.179	3-75	0	3-80	-5.222	3-31	0	3-80	0	3-80	0	3-80
75	N350	max	2.428	3-33	61.289	3-28	2.986	3-17	0	3-1	0	3-1	0	3-1
76		min	-0.141	3-78	0	3-80	-5.21	3-35	0	3-80	0	3-80	0	3-80
77	N678	max	2.294	3-59	60.378	3-71	2.969	3-62	0	3-1	0	3-1	0	3-1
78		min	0.152	3-3	0	3-54	-1.302	3-78	0	3-80	0	3-80	0	3-80
79	N688	max	1.984	3-62	53.891	3-72	3.755	3-69	0	3-1	0	3-1	0	3-1
80		min	0.083	3-3	0	3-61	-0.823	3-43	0	3-80	0	3-80	0	3-80
81	N924	max	-0.036	3-80	51.298	3-9	1.419	3-34	0	3-1	0	3-1	0	3-1
82		min	-2.572	3-9	0	3-44	-6.688	3-9	0	3-80	0	3-80	0	3-80
83	N695	max	2.736	3-67	50.815	3-75	6.39	3-72	0	3-1	0	3-1	0	3-1
84		min	-0.175	3-80	0	3-67	-1.383	3-48	0	3-80	0	3-80	0	3-80
85	N832A	max	0	3-1	41.373	3-9	0	3-1	0	3-1	0	3-1	0	3-1

Envelope Node Reactions (Continued)

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
86		min	0	3-80	-4.172	3-24	0	3-80	0	3-80	0	3-80	0	3-80
87	N831A	max	0	3-1	40.989	3-9	0	3-1	0	3-1	0	3-1	0	3-1
88		min	0	3-80	-4.019	3-23	0	3-80	0	3-80	0	3-80	0	3-80
89	N819A	max	0	3-1	32.744	3-72	0	3-1	0	3-1	0	3-1	0	3-1
90		min	0	3-80	-4.496	3-58	0	3-80	0	3-80	0	3-80	0	3-80
91	N820A	max	0	3-1	30.63	3-75	0	3-1	0	3-1	0	3-1	0	3-1
92		min	0	3-80	-4.017	3-59	0	3-80	0	3-80	0	3-80	0	3-80
93	N838A	max	0.265	3-1	5.325	3-1	0	3-1	0	3-1	0	3-1	0	3-1
94		min	-3.834	3-18	-2.057	3-18	0	3-80	0	3-80	0	3-80	0	3-80
95	N837A	max	5.043	3-10	5.311	3-1	0	3-1	0	3-1	0	3-1	0	3-1
96		min	-0.292	3-78	-2.479	3-15	0	3-80	0	3-80	0	3-80	0	3-80
97	N825A	max	4.628	3-64	3.198	3-78	0	3-1	0	3-1	0	3-1	0	3-1
98		min	0.249	3-18	-2.366	3-64	0	3-80	0	3-80	0	3-80	0	3-80
99	N826A	max	0.54	3-9	3.129	3-78	0	3-1	0	3-1	0	3-1	0	3-1
100		min	-4.261	3-72	-2.361	3-65	0	3-80	0	3-80	0	3-80	0	3-80
101	N490	max	0	3-1	0	3-1	0	3-1	0.111	3-57	0	3-1	0	3-1
102		min	0	3-80	0	3-80	0	3-80	-3.383	3-71	0	3-80	0	3-80
103	N491	max	0	3-1	0	3-1	0	3-1	575.987	3-78	0	3-1	0	3-1
104		min	0	3-80	0	3-80	0	3-80	-218.848	3-67	0	3-80	0	3-80
105	Totals:	max	0	3-42	560	3-9	0	3-26						
106		min	0	3-12	140	3-79	0	3-57						

Node Reactions

Static load cases

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N490	0	0	0	-0.297	0	0
2	2	N491	0	0	0	14.478	0	0
3	2	N819A	0	2.735	0	0	0	0
4	2	N820A	0	2.333	0	0	0	0
5	2	N825A	0.928	0.163	0	0	0	0
6	2	N826A	-0.682	0.077	0	0	0	0
7	2	N831A	0	2.489	0	0	0	0
8	2	N832A	0	2.606	0	0	0	0
9	2	N837A	0.878	0.058	0	0	0	0
10	2	N838A	-0.723	0.063	0	0	0	0
11	2	N315	0.372	8.015	-0.648	0	0	0
12	2	N318	-0.466	6.417	-0.228	0	0	0
13	2	N322	0.39	8.487	-0.553	0	0	0
14	2	N325	-0.496	7.56	-0.105	0	0	0
15	2	N329	0.422	8.655	-0.457	0	0	0
16	2	N332	-0.519	8.121	0.02	0	0	0
17	2	N336	0.455	8.681	-0.385	0	0	0
18	2	N339	-0.534	8.316	0.117	0	0	0
19	2	N343	0.486	8.663	-0.331	0	0	0
20	2	N346	-0.542	8.34	0.19	0	0	0
21	2	N350	0.509	8.631	-0.3	0	0	0
22	2	N353	-0.547	8.288	0.236	0	0	0
23	2	N357	0.527	8.639	-0.281	0	0	0
24	2	N360	-0.551	8.259	0.266	0	0	0
25	2	N364	0.54	8.648	-0.267	0	0	0
26	2	N367	-0.552	8.228	0.286	0	0	0
27	2	N371	0.548	8.693	-0.26	0	0	0
28	2	N374	-0.553	8.252	0.298	0	0	0
29	2	N378	0.549	8.75	-0.266	0	0	0
30	2	N461	-0.556	8.292	0.294	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
31	2	N463	0.547	8.772	-0.266	0	0	0
32	2	N467	-0.556	8.304	0.293	0	0	0
33	2	N471	0.542	8.797	-0.27	0	0	0
34	2	N474	-0.553	8.315	0.285	0	0	0
35	2	N478	0.536	8.838	-0.267	0	0	0
36	2	N481	-0.546	8.331	0.282	0	0	0
37	2	N485	0.533	8.898	-0.241	0	0	0
38	2	N488	-0.53	8.365	0.298	0	0	0
39	2	N560	0.53	8.941	-0.191	0	0	0
40	2	N564	-0.505	8.401	0.334	0	0	0
41	2	N568	0.521	8.916	-0.123	0	0	0
42	2	N575	-0.476	8.435	0.383	0	0	0
43	2	N583	0.505	8.696	-0.028	0	0	0
44	2	N586	-0.445	8.404	0.453	0	0	0
45	2	N678	0.481	8.087	0.091	0	0	0
46	2	N684	-0.423	8.134	0.548	0	0	0
47	2	N688	0.446	6.903	0.204	0	0	0
48	2	N691	-0.418	7.308	0.637	0	0	0
49	2	COG (ft):	X: 28.888	Y: 0.547	Z: 0.9			
50	10	N490	0	0	0	-0.071	0	0
51	10	N491	0	0	0	9.008	0	0
52	10	N819A	0	0.812	0	0	0	0
53	10	N820A	0	0.916	0	0	0	0
54	10	N825A	-2.532	0.031	0	0	0	0
55	10	N826A	-3.164	0.148	0	0	0	0
56	10	N831A	0	0.494	0	0	0	0
57	10	N832A	0	0.615	0	0	0	0
58	10	N837A	-2.323	-0.029	0	0	0	0
59	10	N838A	-3.158	-0.049	0	0	0	0
60	10	N315	0.215	1.202	0.782	0	0	0
61	10	N318	-0.262	1.657	1.016	0	0	0
62	10	N322	0.206	1.453	0.724	0	0	0
63	10	N325	-0.314	2.254	0.984	0	0	0
64	10	N329	0.189	1.576	0.618	0	0	0
65	10	N332	-0.37	2.538	0.901	0	0	0
66	10	N336	0.156	1.667	0.44	0	0	0
67	10	N339	-0.431	2.662	0.741	0	0	0
68	10	N343	0.097	1.849	0.179	0	0	0
69	10	N346	-0.492	2.766	0.489	0	0	0
70	10	N350	-0.008	2.199	-0.178	0	0	0
71	10	N353	-0.547	2.986	0.118	0	0	0
72	10	N357	-0.2	1.816	-0.568	0	0	0
73	10	N360	-0.576	2.446	-0.379	0	0	0
74	10	N364	-0.144	1.366	-0.03	0	0	0
75	10	N367	-0.383	2.054	0.065	0	0	0
76	10	N371	-0.075	1.604	0.369	0	0	0
77	10	N374	-0.279	2.48	0.458	0	0	0
78	10	N378	0.001	1.694	0.691	0	0	0
79	10	N461	-0.21	2.71	0.79	0	0	0
80	10	N463	0.067	1.723	0.918	0	0	0
81	10	N467	-0.171	2.799	1.034	0	0	0
82	10	N471	0.122	1.724	1.072	0	0	0
83	10	N474	-0.149	2.81	1.208	0	0	0
84	10	N478	0.166	1.725	1.174	0	0	0
85	10	N481	-0.139	2.798	1.328	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
86	10	N485	0.2	1.735	1.243	0	0	0
87	10	N488	-0.134	2.791	1.412	0	0	0
88	10	N560	0.225	1.743	1.288	0	0	0
89	10	N564	-0.132	2.789	1.469	0	0	0
90	10	N568	0.24	1.728	1.317	0	0	0
91	10	N575	-0.133	2.791	1.506	0	0	0
92	10	N583	0.246	1.644	1.335	0	0	0
93	10	N586	-0.135	2.774	1.528	0	0	0
94	10	N678	0.244	1.441	1.344	0	0	0
95	10	N684	-0.143	2.668	1.54	0	0	0
96	10	N688	0.23	1.086	1.333	0	0	0
97	10	N691	-0.159	2.329	1.529	0	0	0
98	10	COG (ft):	X: 29.503	Y: 1.5	Z: -2.365			
99	11	N490	0	0	0	-0.293	0	0
100	11	N491	0	0	0	15.199	0	0
101	11	N819A	0	2.735	0	0	0	0
102	11	N820A	0	2.34	0	0	0	0
103	11	N825A	-0.322	0.162	0	0	0	0
104	11	N826A	-1.974	0.079	0	0	0	0
105	11	N831A	0	2.475	0	0	0	0
106	11	N832A	0	2.601	0	0	0	0
107	11	N837A	-0.394	0.055	0	0	0	0
108	11	N838A	-1.982	0.062	0	0	0	0
109	11	N315	0.377	7.958	-0.161	0	0	0
110	11	N318	-0.483	6.449	0.27	0	0	0
111	11	N322	0.395	8.436	-0.059	0	0	0
112	11	N325	-0.513	7.604	0.399	0	0	0
113	11	N329	0.428	8.606	0.041	0	0	0
114	11	N332	-0.537	8.171	0.53	0	0	0
115	11	N336	0.462	8.632	0.118	0	0	0
116	11	N339	-0.552	8.368	0.631	0	0	0
117	11	N343	0.494	8.614	0.174	0	0	0
118	11	N346	-0.561	8.392	0.708	0	0	0
119	11	N350	0.518	8.582	0.208	0	0	0
120	11	N353	-0.567	8.34	0.756	0	0	0
121	11	N357	0.536	8.59	0.23	0	0	0
122	11	N360	-0.571	8.31	0.79	0	0	0
123	11	N364	0.55	8.598	0.247	0	0	0
124	11	N367	-0.572	8.279	0.814	0	0	0
125	11	N371	0.56	8.641	0.257	0	0	0
126	11	N374	-0.574	8.302	0.83	0	0	0
127	11	N378	0.562	8.699	0.256	0	0	0
128	11	N461	-0.577	8.343	0.832	0	0	0
129	11	N463	0.563	8.721	0.258	0	0	0
130	11	N467	-0.577	8.356	0.834	0	0	0
131	11	N471	0.559	8.746	0.254	0	0	0
132	11	N474	-0.576	8.368	0.828	0	0	0
133	11	N478	0.555	8.786	0.256	0	0	0
134	11	N481	-0.57	8.383	0.825	0	0	0
135	11	N485	0.554	8.845	0.28	0	0	0
136	11	N488	-0.555	8.416	0.841	0	0	0
137	11	N560	0.552	8.888	0.324	0	0	0
138	11	N564	-0.533	8.451	0.874	0	0	0
139	11	N568	0.544	8.863	0.384	0	0	0
140	11	N575	-0.507	8.485	0.916	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
141	11	N583	0.529	8.645	0.465	0	0	0
142	11	N586	-0.48	8.454	0.976	0	0	0
143	11	N678	0.504	8.045	0.567	0	0	0
144	11	N684	-0.463	8.185	1.055	0	0	0
145	11	N688	0.465	6.878	0.655	0	0	0
146	11	N691	-0.464	7.362	1.12	0	0	0
147	11	COG (ft):	X: 28.888	Y: 0.547	Z: 0.9			
148	12	N490	0	0	0	-0.297	0	0
149	12	N491	0	0	0	15.871	0	0
150	12	N819A	0	2.747	0	0	0	0
151	12	N820A	0	2.347	0	0	0	0
152	12	N825A	1.099	0.165	0	0	0	0
153	12	N826A	-0.607	0.079	0	0	0	0
154	12	N831A	0	6.683	0	0	0	0
155	12	N832A	0	8.059	0	0	0	0
156	12	N837A	2.509	-0.383	0	0	0	0
157	12	N838A	-1.994	-0.27	0	0	0	0
158	12	N315	0.912	22.647	-2.6	0	0	0
159	12	N318	-1.05	23.054	-1.589	0	0	0
160	12	N322	0.893	23.999	-1.771	0	0	0
161	12	N325	-1.151	32.762	-0.699	0	0	0
162	12	N329	0.971	22.009	-0.806	0	0	0
163	12	N332	-1.375	35.856	0.419	0	0	0
164	12	N336	1.098	18.494	-0.019	0	0	0
165	12	N339	-1.522	31.249	1.331	0	0	0
166	12	N343	1.141	14.136	0.435	0	0	0
167	12	N346	-1.393	24.191	1.729	0	0	0
168	12	N350	1.171	11.024	0.52	0	0	0
169	12	N353	-1.222	16.503	1.728	0	0	0
170	12	N357	1.121	9.054	0.366	0	0	0
171	12	N360	-1.015	11.631	1.436	0	0	0
172	12	N364	1.039	8.204	0.133	0	0	0
173	12	N367	-0.88	9.144	1.09	0	0	0
174	12	N371	0.937	8.096	-0.077	0	0	0
175	12	N374	-0.799	8.189	0.786	0	0	0
176	12	N378	0.83	8.279	-0.24	0	0	0
177	12	N461	-0.747	8.009	0.545	0	0	0
178	12	N463	0.742	8.465	-0.329	0	0	0
179	12	N467	-0.709	8.121	0.395	0	0	0
180	12	N471	0.676	8.605	-0.371	0	0	0
181	12	N474	-0.677	8.281	0.304	0	0	0
182	12	N478	0.628	8.705	-0.376	0	0	0
183	12	N481	-0.645	8.399	0.261	0	0	0
184	12	N485	0.597	8.79	-0.345	0	0	0
185	12	N488	-0.607	8.481	0.259	0	0	0
186	12	N560	0.576	8.842	-0.285	0	0	0
187	12	N564	-0.565	8.53	0.289	0	0	0
188	12	N568	0.556	8.821	-0.204	0	0	0
189	12	N575	-0.521	8.561	0.339	0	0	0
190	12	N583	0.533	8.603	-0.1	0	0	0
191	12	N586	-0.481	8.523	0.411	0	0	0
192	12	N678	0.506	8.001	0.023	0	0	0
193	12	N684	-0.452	8.247	0.505	0	0	0
194	12	N688	0.469	6.845	0.135	0	0	0
195	12	N691	-0.446	7.409	0.592	0	0	0

Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	15	N212	3.747	1.684	0.123	0	0	0
2	15	N490	0	0	0	-0.059	0	0
3	15	N491	0	0	0	-18.991	0	0
4	15	N924	4.071	2.783	-0.032	0	0	0
5	15	N819A	0	-4.139	0	0	0	0
6	15	N820A	0	-4.124	0	0	0	0
7	15	N825A	43.887	-0.411	0	0	0	0
8	15	N826A	43.599	-0.333	0	0	0	0
9	15	N831A	0	1.961	0	0	0	0
10	15	N832A	0	1.29	0	0	0	0
11	15	N837A	43.492	0.527	0	0	0	0
12	15	N838A	43.123	0.384	0	0	0	0
13	15	N315	3.829	0	0.136	0	0	0
14	15	N318	4.081	0.379	0.013	0	0	0
15	15	N322	3.889	0	0.092	0	0	0
16	15	N325	4.089	0	-0.007	0	0	0
17	15	N329	3.936	0	0.073	0	0	0
18	15	N332	4.128	0	-0.022	0	0	0
19	15	N336	3.974	0	0.066	0	0	0
20	15	N339	4.179	0	-0.036	0	0	0
21	15	N343	4.008	0	0.063	0	0	0
22	15	N346	4.229	0	-0.047	0	0	0
23	15	N350	4.039	0	0.062	0	0	0
24	15	N353	4.276	0	-0.056	0	0	0
25	15	N357	4.065	0	0.062	0	0	0
26	15	N360	4.317	0	-0.062	0	0	0
27	15	N364	4.089	0	0.062	0	0	0
28	15	N367	4.353	0	-0.068	0	0	0
29	15	N371	4.108	0	0.064	0	0	0
30	15	N374	4.384	0	-0.072	0	0	0
31	15	N378	4.121	0	0.068	0	0	0
32	15	N461	4.411	0	-0.075	0	0	0
33	15	N463	4.129	0	0.07	0	0	0
34	15	N467	4.431	0	-0.078	0	0	0
35	15	N471	4.13	0	0.073	0	0	0
36	15	N474	4.444	0	-0.082	0	0	0
37	15	N478	4.124	0	0.074	0	0	0
38	15	N481	4.45	0	-0.085	0	0	0
39	15	N485	4.11	0	0.075	0	0	0
40	15	N488	4.448	0	-0.09	0	0	0
41	15	N560	4.092	0	0.075	0	0	0
42	15	N564	4.44	0	-0.096	0	0	0
43	15	N568	4.068	0	0.075	0	0	0
44	15	N575	4.427	0	-0.1	0	0	0
45	15	N583	4.039	0	0.076	0	0	0
46	15	N586	4.41	0	-0.105	0	0	0
47	15	N678	4	0	0.076	0	0	0
48	15	N684	4.397	0	-0.118	0	0	0
49	15	N688	3.955	0	0.059	0	0	0
50	15	N691	4.39	0	-0.153	0	0	0
51	15	N695	3.939	0	0.03	0	0	0
52	15	N710	4.379	0	-0.183	0	0	0
53	15	Totals:	349.225	0	0			
54	15	COG (ft):	NC	NC	NC			
55	16	N212	-2.616	0	-0.025	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
56	16	N490	0	0	0	0.015	0	0
57	16	N491	0	0	0	58.461	0	0
58	16	N924	-2.628	0	-0.019	0	0	0
59	16	N819A	0	1.526	0	0	0	0
60	16	N820A	0	1.677	0	0	0	0
61	16	N825A	-29.645	0.285	0	0	0	0
62	16	N826A	-29.584	0.329	0	0	0	0
63	16	N831A	0	-6.349	0	0	0	0
64	16	N832A	0	-6.169	0	0	0	0
65	16	N837A	-29.365	-0.892	0	0	0	0
66	16	N838A	-29.186	-0.805	0	0	0	0
67	16	N315	-2.604	0	-0.06	0	0	0
68	16	N318	-2.735	0	0.003	0	0	0
69	16	N322	-2.633	0	-0.058	0	0	0
70	16	N325	-2.774	0	0.011	0	0	0
71	16	N329	-2.665	0	-0.053	0	0	0
72	16	N332	-2.813	0	0.019	0	0	0
73	16	N336	-2.695	0	-0.051	0	0	0
74	16	N339	-2.849	0	0.026	0	0	0
75	16	N343	-2.719	0	-0.05	0	0	0
76	16	N346	-2.883	0	0.031	0	0	0
77	16	N350	-2.74	0	-0.049	0	0	0
78	16	N353	-2.915	0	0.037	0	0	0
79	16	N357	-2.755	0	-0.05	0	0	0
80	16	N360	-2.941	0	0.041	0	0	0
81	16	N364	-2.768	0	-0.05	0	0	0
82	16	N367	-2.964	0	0.046	0	0	0
83	16	N371	-2.775	0	-0.051	0	0	0
84	16	N374	-2.982	0	0.05	0	0	0
85	16	N378	-2.776	0	-0.054	0	0	0
86	16	N461	-2.994	0	0.053	0	0	0
87	16	N463	-2.773	0	-0.056	0	0	0
88	16	N467	-3.004	0	0.057	0	0	0
89	16	N471	-2.763	0	-0.06	0	0	0
90	16	N474	-3.007	0	0.06	0	0	0
91	16	N478	-2.746	0	-0.064	0	0	0
92	16	N481	-3.005	0	0.063	0	0	0
93	16	N485	-2.722	0	-0.069	0	0	0
94	16	N488	-2.996	0	0.065	0	0	0
95	16	N560	-2.694	0	-0.076	0	0	0
96	16	N564	-2.983	0	0.065	0	0	0
97	16	N568	-2.663	0	-0.087	0	0	0
98	16	N575	-2.965	0	0.061	0	0	0
99	16	N583	-2.628	0	-0.106	0	0	0
100	16	N586	-2.944	0	0.049	0	0	0
101	16	N678	-2.573	0.726	-0.117	0	0	0
102	16	N684	-2.926	0.242	0.056	0	0	0
103	16	N688	-2.526	2.046	-0.04	0	0	0
104	16	N691	-2.875	0.796	0.133	0	0	0
105	16	N695	-2.665	4.225	0.156	0	0	0
106	16	N710	-2.683	2.364	0.166	0	0	0
107	16	Totals:	-235.145	0	0			
108	16	COG (ft):	NC	NC	NC			
109	17	N212	0.091	0.791	0.957	0	0	0
110	17	N490	0	0	0	-0.072	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
111	17	N491	0	0	0	9.211	0	0
112	17	N924	-0.163	0.715	1.079	0	0	0
113	17	N819A	0	0.819	0	0	0	0
114	17	N820A	0	0.924	0	0	0	0
115	17	N825A	-3.017	0.032	0	0	0	0
116	17	N826A	-3.745	0.149	0	0	0	0
117	17	N831A	0	0.478	0	0	0	0
118	17	N832A	0	0.618	0	0	0	0
119	17	N837A	-3.117	-0.038	0	0	0	0
120	17	N838A	-3.612	-0.054	0	0	0	0
121	17	N315	0.095	1.225	1.01	0	0	0
122	17	N318	-0.167	1.674	1.138	0	0	0
123	17	N322	0.111	1.488	1.078	0	0	0
124	17	N325	-0.184	2.295	1.225	0	0	0
125	17	N329	0.129	1.6	1.142	0	0	0
126	17	N332	-0.196	2.598	1.305	0	0	0
127	17	N336	0.148	1.621	1.191	0	0	0
128	17	N339	-0.205	2.711	1.37	0	0	0
129	17	N343	0.166	1.612	1.229	0	0	0
130	17	N346	-0.211	2.731	1.419	0	0	0
131	17	N350	0.18	1.599	1.252	0	0	0
132	17	N353	-0.216	2.709	1.452	0	0	0
133	17	N357	0.192	1.604	1.27	0	0	0
134	17	N360	-0.22	2.694	1.478	0	0	0
135	17	N364	0.202	1.614	1.283	0	0	0
136	17	N367	-0.222	2.684	1.496	0	0	0
137	17	N371	0.21	1.634	1.297	0	0	0
138	17	N374	-0.223	2.705	1.515	0	0	0
139	17	N378	0.217	1.661	1.307	0	0	0
140	17	N461	-0.226	2.744	1.53	0	0	0
141	17	N463	0.223	1.676	1.312	0	0	0
142	17	N467	-0.229	2.76	1.539	0	0	0
143	17	N471	0.227	1.687	1.313	0	0	0
144	17	N474	-0.232	2.768	1.543	0	0	0
145	17	N478	0.23	1.701	1.312	0	0	0
146	17	N481	-0.233	2.775	1.545	0	0	0
147	17	N485	0.234	1.72	1.315	0	0	0
148	17	N488	-0.232	2.785	1.549	0	0	0
149	17	N560	0.237	1.732	1.319	0	0	0
150	17	N564	-0.23	2.795	1.553	0	0	0
151	17	N568	0.237	1.718	1.321	0	0	0
152	17	N575	-0.228	2.801	1.554	0	0	0
153	17	N583	0.232	1.634	1.322	0	0	0
154	17	N586	-0.228	2.785	1.553	0	0	0
155	17	N678	0.222	1.433	1.317	0	0	0
156	17	N684	-0.234	2.679	1.546	0	0	0
157	17	N688	0.203	1.084	1.293	0	0	0
158	17	N691	-0.25	2.338	1.519	0	0	0
159	17	N695	0.172	0.862	1.27	0	0	0
160	17	N710	-0.249	1.939	1.478	0	0	0
161	17	Totals:	-14.115	87.306	56.497			
162	17	COG (ft):	X: 29.503	Y: 1.5	Z: -2.365			

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
196	12	COG (ft):	X: 8.382	Y: 0.899	Z: -0.919			

Member Section Forces

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1	2	M155	1	0	0	0	0	0	0
2			2	2.564	-0.007	1.172	-0.003	-0.902	-1.687
3			3	0.909	-0.606	2.474	0	1.746	-0.996
4			4	-1.221	-0.746	2.96	0.001	1.34	-1.168
5			5	-1.446	2.559	0.682	-0.063	0.193	-9.791
6	2	M156	1	-1.476	-1.82	1.032	-0.035	-0.259	-3.112
7			2	-1.417	0.343	2.032	0.001	0.002	-1.34
8			3	0.226	-0.256	1.15	-0.001	1.778	-1.316
9			4	2.391	-0.124	0.715	-0.003	1.554	-1.872
10			5	0	0	0	0.297	0	0
11	2	M157	1	2.153	0.495	-0.16	0	0	0
12			2	2.497	0.064	-0.243	0	0.469	-0.847
13			3	2.497	-0.055	-0.243	0	-0.019	-0.856
14			4	2.497	-0.175	-0.243	0	-0.506	-0.625
15			5	2.831	-0.639	-0.197	0	0	0
16	2	M158	1	1.649	0.476	-0.422	0	0	0
17			2	2.038	0.068	-0.344	0	0.662	-0.841
18			3	2.038	-0.052	-0.344	0	-0.028	-0.857
19			4	2.038	-0.171	-0.344	0	-0.718	-0.633
20			5	2.402	-0.607	-0.41	-0.001	0	0
21	2	M160	1	2.712	0.55	-0.162	0	0	0
22			2	2.435	0.086	-0.235	0	0.459	-0.808
23			3	2.435	-0.034	-0.235	0	-0.013	-0.86
24			4	2.435	-0.154	-0.235	0	-0.485	-0.671
25			5	2.139	-0.587	-0.17	0	0	0
26	2	M161	1	2.467	0.502	-0.264	0	0	0
27			2	3.036	0.083	-0.282	0	0.543	-0.813
28			3	3.036	-0.036	-0.282	0	-0.023	-0.86
29			4	3.036	-0.156	-0.282	0	-0.59	-0.667
30			5	3.701	-0.628	-0.289	-0.001	0	0
31	2	M162	1	1.253	0.501	-0.515	0	0	0
32			2	1.379	0.096	-0.377	0	0.726	-0.789
33			3	1.379	-0.024	-0.377	0	-0.032	-0.862
34			4	1.379	-0.143	-0.377	0	-0.789	-0.694
35			5	1.358	-0.554	-0.483	0	0	0
36	2	M163	1	3.704	0.584	-0.32	-0.001	0	0
37			2	3.016	0.111	-0.294	0	0.571	-0.761
38			3	3.016	-0.009	-0.294	0	-0.02	-0.864
39			4	3.016	-0.129	-0.294	0	-0.611	-0.725
40			5	2.441	-0.547	-0.299	0	0	0
41	2	M164	1	2.179	0.549	-0.137	0	0	0
42			2	2.374	0.11	-0.229	0	0.443	-0.763
43			3	2.374	-0.01	-0.229	0	-0.017	-0.864
44			4	2.374	-0.129	-0.229	0	-0.476	-0.725
45			5	2.526	-0.585	-0.171	0	0	0
46	2	M165	1	1.96	0.522	-0.377	0	0	0
47			2	2.438	0.113	-0.323	0	0.622	-0.758
48			3	2.438	-0.007	-0.323	0	-0.027	-0.865
49			4	2.438	-0.127	-0.323	0	-0.675	-0.731
50			5	2.946	-0.572	-0.374	-0.001	0	0
51	2	M166	1	2.118	0.554	-0.453	-0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
52			2	1.845	0.127	-0.35	0	0.674	-0.731
53			3	1.845	0.007	-0.35	0	-0.028	-0.866
54			4	1.845	-0.112	-0.35	0	-0.731	-0.761
55			5	1.516	-0.522	-0.427	0	0	0
56	2	M167	1	3.022	0.527	-0.385	0	0	0
57			2	2.477	0.073	-0.331	0	0.64	-0.827
58			3	2.477	-0.047	-0.331	0	-0.024	-0.853
59			4	2.477	-0.166	-0.331	0	-0.689	-0.639
60			5	1.991	-0.579	-0.366	0	0	0
61	2	M168	1	2.358	0.518	-0.163	0	0	0
62			2	2.282	0.063	-0.244	0	0.474	-0.846
63			3	2.282	-0.057	-0.244	0	-0.015	-0.853
64			4	2.282	-0.176	-0.244	0	-0.504	-0.619
65			5	2.164	-0.619	-0.182	0	0	0
66	2	M169	1	2.277	0.469	-0.329	0	0	0
67			2	2.823	0.054	-0.313	0	0.603	-0.866
68			3	2.823	-0.066	-0.313	0	-0.026	-0.853
69			4	2.823	-0.186	-0.313	0	-0.654	-0.6
70			5	3.452	-0.652	-0.343	-0.001	0	0
71	2	M170	1	1.479	0.474	-0.51	0	0	0
72			2	1.432	0.061	-0.38	0	0.732	-0.851
73			3	1.432	-0.058	-0.38	0	-0.031	-0.854
74			4	1.432	-0.178	-0.38	0	-0.794	-0.617
75			5	1.257	-0.586	-0.479	0	0	0
76	2	M171	1	3.578	0.546	-0.271	-0.001	0	0
77			2	2.941	0.069	-0.279	0	0.543	-0.837
78			3	2.941	-0.05	-0.279	0	-0.018	-0.856
79			4	2.941	-0.17	-0.279	0	-0.578	-0.635
80			5	2.399	-0.591	-0.258	0	0	0
81	2	M172	1	1.351	0.481	-0.479	0	0	0
82			2	1.623	0.074	-0.372	0	0.717	-0.823
83			3	1.623	-0.045	-0.372	0	-0.03	-0.852
84			4	1.623	-0.165	-0.372	0	-0.778	-0.641
85			5	1.816	-0.59	-0.458	0	0	0
86	2	M173	1	0.901	-1.68	0.54	4.225	-0.55	-5.272
87			2	0.301	-0.028	0.863	-11.376	0.041	-0.022
88			3	-0.043	0.172	0.208	-12.428	-0.175	0.085
89			4	-0.374	-0.025	0.857	-17.346	0.038	-0.021
90			5	-0.928	-2.896	0	0	0	-0.317
91	2	M174	1	-0.734	-1.638	0.579	-9.911	-0.587	-5.519
92			2	-0.194	-0.007	0.819	-16.137	0.044	-0.043
93			3	0.102	0.138	0.289	-13.067	-0.253	0.03
94			4	0.408	-0.002	0.82	-14.412	0.041	-0.056
95			5	0.682	-2.411	0	0	0	-0.154
96	2	M181	1	3.114	0.608	-0.199	0	0	0
97			2	2.668	0.135	-0.245	0	0.479	-0.717
98			3	2.668	0.015	-0.245	0	-0.014	-0.867
99			4	2.668	-0.104	-0.245	0	-0.507	-0.778
100			5	2.248	-0.534	-0.197	0	0	0
101	2	M184	1	-1.82	-1.791	-0.187	-0.259	1.759	0.053
102			2	-1.82	-1.791	-0.187	-0.259	1.689	0.725
103			3	-1.82	-1.791	-0.187	-0.259	1.619	1.396
104			4	-1.82	-1.791	-0.187	-0.259	1.548	2.068
105			5	-1.82	-1.791	-0.187	-0.259	1.478	2.739
106	2	M190	1	2.37	0.554	-0.216	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
107			2	2.876	0.132	-0.26	0	0.501	-0.723
108			3	2.876	0.012	-0.26	0	-0.021	-0.867
109			4	2.876	-0.107	-0.26	0	-0.543	-0.772
110			5	3.438	-0.578	-0.246	0	0	0
111	2	M191	1	1.407	0.544	-0.487	0	0	0
112			2	1.657	0.14	-0.363	0	0.699	-0.707
113			3	1.657	0.02	-0.363	0	-0.03	-0.868
114			4	1.657	-0.099	-0.363	0	-0.76	-0.789
115			5	1.802	-0.519	-0.461	0	0	0
116	2	M192	1	3.327	0.611	-0.35	-0.001	0	0
117			2	2.69	0.151	-0.306	0	0.59	-0.686
118			3	2.69	0.032	-0.306	0	-0.024	-0.87
119			4	2.69	-0.088	-0.306	0	-0.638	-0.813
120			5	2.149	-0.501	-0.336	0	0	0
121	2	M193	1	2.008	0.598	-0.092	0	0	0
122			2	1.931	0.146	-0.204	0	0.398	-0.697
123			3	1.931	0.026	-0.204	0	-0.011	-0.869
124			4	1.931	-0.094	-0.204	0	-0.42	-0.802
125			5	1.76	-0.531	-0.117	0	0	0
126	2	M194	1	2.476	0.55	-0.285	0	0	0
127			2	3.092	0.136	-0.284	0	0.547	-0.715
128			3	3.092	0.017	-0.284	0	-0.022	-0.869
129			4	3.092	-0.103	-0.284	0	-0.591	-0.782
130			5	3.833	-0.574	-0.299	-0.001	0	0
131	2	M195	1	1.313	0.55	-0.538	0	0	0
132			2	1.394	0.146	-0.381	0	0.734	-0.698
133			3	1.394	0.026	-0.381	0	-0.032	-0.87
134			4	1.394	-0.094	-0.381	0	-0.798	-0.801
135			5	1.317	-0.503	-0.501	0	0	0
136	2	M196	1	3.824	0.637	-0.303	-0.001	0	0
137			2	3.079	0.155	-0.284	0	0.55	-0.679
138			3	3.079	0.036	-0.284	0	-0.021	-0.871
139			4	3.079	-0.084	-0.284	0	-0.592	-0.823
140			5	2.474	-0.502	-0.29	0	0	0
141	2	M197	1	1.769	0.582	-0.097	0	0	0
142			2	1.956	0.147	-0.208	0	0.403	-0.696
143			3	1.956	0.027	-0.208	0	-0.014	-0.87
144			4	1.956	-0.093	-0.208	0	-0.431	-0.804
145			5	2.048	-0.544	-0.133	0	0	0
146	2	M198	1	2.173	0.55	-0.359	0	0	0
147			2	2.718	0.141	-0.311	0	0.6	-0.706
148			3	2.718	0.022	-0.311	0	-0.025	-0.87
149			4	2.718	-0.098	-0.311	0	-0.649	-0.793
150			5	3.343	-0.552	-0.355	-0.001	0	0
151	2	M199	1	1.855	0.571	-0.496	0	0	0
152			2	1.685	0.152	-0.364	0	0.7	-0.685
153			3	1.685	0.032	-0.364	0	-0.031	-0.871
154			4	1.685	-0.087	-0.364	0	-0.761	-0.816
155			5	1.42	-0.496	-0.465	0	0	0
156	2	M200	1	3.364	0.638	-0.217	-0.001	0	0
157			2	2.753	0.159	-0.25	0	0.486	-0.672
158			3	2.753	0.039	-0.25	0	-0.016	-0.871
159			4	2.753	-0.08	-0.25	0	-0.519	-0.83
160			5	2.22	-0.504	-0.217	0	0	0
161	2	M201	1	1.897	0.577	-0.126	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
162			2	2.268	0.15	-0.219	0	0.425	-0.689
163			3	2.268	0.031	-0.219	0	-0.015	-0.87
164			4	2.268	-0.089	-0.219	0	-0.456	-0.812
165			5	2.61	-0.551	-0.161	0	0	0
166	2	M202	1	1.793	0.556	-0.421	0	0	0
167			2	2.243	0.151	-0.335	0	0.646	-0.688
168			3	2.243	0.031	-0.335	0	-0.027	-0.87
169			4	2.243	-0.088	-0.335	0	-0.7	-0.813
170			5	2.695	-0.527	-0.406	-0.001	0	0
171	2	M203	1	2.97	0.591	-0.241	0	0	0
172			2	2.507	0.116	-0.275	0.001	0.535	-0.742
173			3	2.507	-0.004	-0.275	0.001	-0.016	-0.854
174			4	2.507	-0.123	-0.275	0.001	-0.568	-0.727
175			5	2.086	-0.55	-0.239	0	0	0
176	2	M204	1	2.115	0.512	-0.225	0	0	0
177			2	2.548	0.087	-0.276	0	0.532	-0.798
178			3	2.548	-0.033	-0.276	0	-0.021	-0.853
179			4	2.548	-0.153	-0.276	0	-0.575	-0.666
180			5	3.015	-0.623	-0.258	0	0	0
181	2	M205	1	1.766	0.563	-0.477	0	0	0
182			2	1.561	0.139	-0.372	0	0.717	-0.696
183			3	1.561	0.02	-0.372	0	-0.029	-0.856
184			4	1.561	-0.1	-0.372	0	-0.776	-0.775
185			5	1.289	-0.51	-0.453	0	0	0
186	2	M206	1	1.846	0.651	-0.2	0.001	0	0
187			2	1.965	0.21	-0.262	0.001	0.509	-0.559
188			3	1.965	0.09	-0.262	0.001	-0.018	-0.86
189			4	1.965	-0.03	-0.262	0.001	-0.544	-0.921
190			5	2.047	-0.482	-0.225	0	0	0
191	2	M207	1	1.775	0.573	-0.395	0	0	0
192			2	2.208	0.165	-0.341	0.001	0.658	-0.647
193			3	2.208	0.045	-0.341	0.001	-0.027	-0.857
194			4	2.208	-0.075	-0.341	0.001	-0.713	-0.827
195			5	2.68	-0.524	-0.395	0	0	0
196	2	M218	1	2.514	0.601	-0.441	-0.001	0	0
197			2	2.115	0.164	-0.342	0	0.659	-0.663
198			3	2.115	0.044	-0.342	0	-0.028	-0.872
199			4	2.115	-0.076	-0.342	0	-0.715	-0.84
200			5	1.705	-0.486	-0.417	0	0	0
201	2	M208	1	2.881	0.739	-0.353	0	0	0
202			2	2.349	0.264	-0.316	0.001	0.614	-0.453
203			3	2.349	0.145	-0.316	0.001	-0.022	-0.864
204			4	2.349	0.025	-0.316	0.001	-0.657	-1.035
205			5	1.898	-0.398	-0.338	0	0	0
206	2	M219	1	2.771	0.639	-0.153	0	0	0
207			2	2.366	0.167	-0.226	0	0.441	-0.656
208			3	2.366	0.048	-0.226	0	-0.014	-0.872
209			4	2.366	-0.072	-0.226	0	-0.468	-0.848
210			5	1.961	-0.501	-0.165	0	0	0
211	2	M209	1	1.734	0.776	-0.311	0.001	0	0
212			2	2.145	0.368	-0.299	0.001	0.576	-0.252
213			3	2.145	0.249	-0.299	0.001	-0.023	-0.871
214			4	2.145	0.129	-0.299	0.001	-0.623	-1.25
215			5	2.62	-0.319	-0.327	0	0	0
216	2	M210	1	0.988	0.715	-0.499	0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
217			2	1.112	0.312	-0.375	0.001	0.723	-0.362
218			3	1.112	0.192	-0.375	0.001	-0.03	-0.867
219			4	1.112	0.072	-0.375	0.001	-0.782	-1.133
220			5	1.134	-0.344	-0.474	0	0	0
221	2	M220	1	2.157	0.581	-0.186	0	0	0
222			2	2.661	0.16	-0.245	0	0.474	-0.669
223			3	2.661	0.041	-0.245	0	-0.018	-0.871
224			4	2.661	-0.079	-0.245	0	-0.511	-0.832
225			5	3.211	-0.549	-0.215	0	0	0
226	2	M211	1	1.877	0.887	-0.24	0	0	0
227			2	1.682	0.442	-0.259	0.001	0.505	-0.109
228			3	1.682	0.323	-0.259	0.001	-0.015	-0.877
229			4	1.682	0.203	-0.259	0.001	-0.536	-1.405
230			5	1.478	-0.203	-0.243	0.001	0	0
231	2	M212	1	1.592	0.918	-0.401	0.001	0	0
232			2	1.355	0.518	-0.316	0.001	0.61	0.037
233			3	1.355	0.399	-0.316	0.001	-0.024	-0.883
234			4	1.355	0.279	-0.316	0.001	-0.657	-1.563
235			5	1.116	-0.111	-0.383	0	0	0
236	2	M264	1	1.465	0.572	-0.484	0	0	0
237			2	1.786	0.167	-0.362	0	0.696	-0.655
238			3	1.786	0.048	-0.362	0	-0.03	-0.871
239			4	1.786	-0.072	-0.362	0	-0.756	-0.847
240			5	2.026	-0.497	-0.457	0	0	0
241	2	M265	1	3.195	0.64	-0.385	-0.001	0	0
242			2	2.6	0.182	-0.322	0	0.62	-0.628
243			3	2.6	0.062	-0.322	0	-0.026	-0.873
244			4	2.6	-0.057	-0.322	0	-0.671	-0.877
245			5	2.082	-0.471	-0.368	0	0	0
246	2	M266	1	2.15	0.638	-0.117	0	0	0
247			2	2.003	0.181	-0.216	0	0.422	-0.628
248			3	2.003	0.062	-0.216	0	-0.012	-0.872
249			4	2.003	-0.058	-0.216	0	-0.447	-0.876
250			5	1.779	-0.494	-0.138	0	0	0
251	2	M267	1	2.402	0.589	-0.277	0	0	0
252			2	3.002	0.176	-0.285	0	0.55	-0.639
253			3	3.002	0.056	-0.285	0	-0.022	-0.872
254			4	3.002	-0.064	-0.285	0	-0.594	-0.864
255			5	3.714	-0.535	-0.293	-0.001	0	0
256	2	M268	1	1.311	0.593	-0.541	0	0	0
257			2	1.435	0.188	-0.388	0	0.746	-0.615
258			3	1.435	0.068	-0.388	0	-0.033	-0.872
259			4	1.435	-0.051	-0.388	0	-0.812	-0.889
260			5	1.412	-0.465	-0.505	0	0	0
261	2	M277	1	3.701	0.684	-0.332	-0.001	0	0
262			2	2.988	0.202	-0.303	0	0.585	-0.588
263			3	2.988	0.082	-0.303	0	-0.023	-0.873
264			4	2.988	-0.037	-0.303	0	-0.63	-0.919
265			5	2.408	-0.456	-0.317	0	0	0
266	2	M278	1	1.767	0.633	-0.113	0	0	0
267			2	1.896	0.196	-0.221	0	0.429	-0.599
268			3	1.896	0.076	-0.221	0	-0.015	-0.872
269			4	1.896	-0.043	-0.221	0	-0.458	-0.905
270			5	1.928	-0.491	-0.145	0	0	0
271	2	M280A	1	2.654	0.52	-0.412	-0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
272			2	2.227	0.081	-0.336	0	0.649	-0.816
273			3	2.227	-0.039	-0.336	0	-0.026	-0.859
274			4	2.227	-0.158	-0.336	0	-0.701	-0.661
275			5	1.804	-0.568	-0.39	0	0	0
276	2	M251A	1	-0.928	0.161	0	0	0	0
277			2	-0.928	0.161	0	0	0	-0.079
278			3	-0.928	0.161	0	0	0	-0.159
279			4	-0.928	0.161	0	0	0	-0.238
280			5	-0.928	0.161	0	0	0	-0.317
281	2	M253A	1	0.682	0.078	0	0	0	0
282			2	0.682	0.078	0	0	0	-0.039
283			3	0.682	0.078	0	0	0	-0.077
284			4	0.682	0.078	0	0	0	-0.116
285			5	0.682	0.078	0	0	0	-0.154
286	2	M277A	1	0.987	1.13	-0.4	0.004	0	0
287			2	1.25	0.603	-0.305	0.002	0.589	0.202
288			3	1.25	0.484	-0.305	0.002	-0.023	-0.89
289			4	1.25	0.364	-0.305	0.002	-0.636	-1.741
290			5	1.515	-0.239	-0.383	-0.004	0	0
291	2	M263A	1	0.878	-2.548	0	0	0	-5.39
292			2	0.878	-2.548	0	0	0	-4.071
293			3	0.878	-2.548	0	0	0	-2.753
294			4	0.878	-2.548	0	0	0	-1.435
295			5	0.878	-2.548	0	0	0	-0.116
296	2	M264A	1	0.878	-0.059	0	0	0	-0.116
297			2	0.878	-0.059	0	0	0	-0.087
298			3	0.878	-0.059	0	0	0	-0.058
299			4	0.878	-0.059	0	0	0	-0.029
300			5	0.878	-0.059	0	0	0	0
301	2	M265A	1	-0.723	-2.668	0	0	0	-5.643
302			2	-0.723	-2.668	0	0	0	-4.262
303			3	-0.723	-2.668	0	0	0	-2.882
304			4	-0.723	-2.668	0	0	0	-1.501
305			5	-0.723	-2.668	0	0	0	-0.121
306	2	M266A	1	-0.723	-0.061	0	0	0	-0.121
307			2	-0.723	-0.061	0	0	0	-0.09
308			3	-0.723	-0.061	0	0	0	-0.06
309			4	-0.723	-0.061	0	0	0	-0.03
310			5	-0.723	-0.061	0	0	0	0
311	2	M131	1	2.225	0.598	-0.359	0	0	0
312			2	2.781	0.19	-0.319	0	0.616	-0.609
313			3	2.781	0.071	-0.319	0	-0.025	-0.872
314			4	2.781	-0.049	-0.319	0	-0.667	-0.894
315			5	3.432	-0.507	-0.357	-0.001	0	0
316	2	M132	1	1.654	0.617	-0.526	0	0	0
317			2	1.557	0.201	-0.385	0	0.741	-0.589
318			3	1.557	0.081	-0.385	0	-0.033	-0.872
319			4	1.557	-0.038	-0.385	0	-0.806	-0.915
320			5	1.347	-0.449	-0.491	0	0	0
321	2	M133	1	3.409	0.692	-0.265	-0.001	0	0
322			2	2.772	0.206	-0.279	0	0.541	-0.578
323			3	2.772	0.087	-0.279	0	-0.02	-0.872
324			4	2.772	-0.033	-0.279	0	-0.58	-0.926
325			5	2.228	-0.457	-0.258	0	0	0
326	2	M134	1	1.79	0.619	-0.146	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
327			2	2.112	0.191	-0.238	0	0.461	-0.607
328			3	2.112	0.071	-0.238	0	-0.017	-0.87
329			4	2.112	-0.048	-0.238	0	-0.495	-0.893
330			5	2.39	-0.509	-0.177	0	0	0
331	2	M135	1	1.795	0.585	-0.429	0	0	0
332			2	2.267	0.181	-0.349	0	0.673	-0.626
333			3	2.267	0.061	-0.349	0	-0.029	-0.869
334			4	2.267	-0.059	-0.349	0	-0.731	-0.871
335			5	2.761	-0.502	-0.412	0	0	0
336	2	M136	1	2.198	0.614	-0.484	0	0	0
337			2	1.874	0.181	-0.37	0	0.712	-0.626
338			3	1.874	0.061	-0.37	0	-0.032	-0.868
339			4	1.874	-0.059	-0.37	0	-0.775	-0.87
340			5	1.516	-0.468	-0.452	0	0	0
341	2	M137	1	2.727	0.642	-0.215	0	0	0
342			2	2.293	0.167	-0.262	0.001	0.508	-0.651
343			3	2.293	0.047	-0.262	0.001	-0.018	-0.866
344			4	2.293	-0.072	-0.262	0.001	-0.544	-0.841
345			5	1.879	-0.5	-0.215	0	0	0
346	2	M138	1	1.901	0.558	-0.211	0	0	0
347			2	2.332	0.135	-0.265	0.001	0.512	-0.712
348			3	2.332	0.015	-0.265	0.001	-0.021	-0.863
349			4	2.332	-0.105	-0.265	0.001	-0.554	-0.773
350			5	2.784	-0.576	-0.23	0	0	0
351	2	M139	1	1.387	0.516	-0.487	0	0	0
352			2	1.718	0.109	-0.373	0	0.716	-0.76
353			3	1.718	-0.01	-0.373	0	-0.032	-0.86
354			4	1.718	-0.13	-0.373	0	-0.78	-0.719
355			5	1.997	-0.561	-0.456	0	0	0
356	2	M140	1	2.602	0.535	-0.439	0	0	0
357			2	2.136	0.086	-0.351	0.001	0.676	-0.805
358			3	2.136	-0.034	-0.351	0.001	-0.03	-0.857
359			4	2.136	-0.154	-0.351	0.001	-0.736	-0.668
360			5	1.715	-0.563	-0.408	0.001	0	0
361	2	M141	1	1.965	0.498	-0.197	0	0	0
362			2	1.755	0.04	-0.254	0.001	0.491	-0.893
363			3	1.755	-0.08	-0.254	0.001	-0.019	-0.852
364			4	1.755	-0.2	-0.254	0.001	-0.528	-0.571
365			5	1.497	-0.629	-0.199	0.001	0	0
366	2	M142	1	1.886	0.398	-0.289	0	0	0
367			2	2.348	-0.024	-0.291	0.001	0.559	-1.014
368			3	2.348	-0.144	-0.291	0.001	-0.025	-0.845
369			4	2.348	-0.263	-0.291	0.001	-0.609	-0.437
370			5	2.883	-0.741	-0.289	0	0	0
371	2	M143	1	1.052	0.33	-0.514	0	0	0
372			2	1.198	-0.082	-0.375	0.001	0.72	-1.124
373			3	1.198	-0.202	-0.375	0.001	-0.034	-0.839
374			4	1.198	-0.321	-0.375	0.001	-0.788	-0.314
375			5	1.243	-0.738	-0.471	0.001	0	0
376	2	M144	1	2.646	0.301	-0.389	0	0	0
377			2	2.131	-0.149	-0.319	0.001	0.612	-1.251
378			3	2.131	-0.268	-0.319	0.001	-0.028	-0.832
379			4	2.131	-0.388	-0.319	0.001	-0.668	-0.173
380			5	1.703	-0.79	-0.354	0.001	0	0
381	2	M145	1	1.284	0.178	-0.198	0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
382			2	1.272	-0.24	-0.239	0.002	0.46	-1.426
383			3	1.272	-0.36	-0.239	0.002	-0.02	-0.823
384			4	1.272	-0.48	-0.239	0.002	-0.501	0.02
385			5	1.192	-0.887	-0.196	0.001	0	0
386	2	M146	1	1.452	0.044	-0.323	0	0	0
387			2	1.797	-0.339	-0.281	0.002	0.539	-1.615
388			3	1.797	-0.459	-0.281	0.002	-0.026	-0.813
389			4	1.797	-0.579	-0.281	0.002	-0.59	0.229
390			5	2.205	-1.014	-0.301	0.001	0	0
391	2	M147	1	0.865	0.116	-0.458	-0.003	0	0
392			2	0.863	-0.422	-0.324	0.001	0.62	-1.772
393			3	0.863	-0.542	-0.324	0.001	-0.031	-0.804
394			4	0.863	-0.662	-0.324	0.001	-0.682	0.404
395			5	0.781	-1.221	-0.409	0.004	0	0
396	2	M88	1	-0.044	-1.923	-4.224	-0.177	7.782	-0.276
397			2	-0.044	-1.923	-4.224	-0.177	6.198	0.445
398			3	-0.044	-1.923	-4.224	-0.177	4.614	1.167
399			4	-0.044	-1.923	-4.224	-0.177	3.03	1.888
400			5	-0.044	-1.923	-4.224	-0.177	1.446	2.609
401	2	M89	1	3.857	2.264	5.034	-0.133	-9.241	0.352
402			2	3.857	2.264	5.034	-0.133	-7.353	-0.498
403			3	3.857	2.264	5.034	-0.133	-5.465	-1.347
404			4	3.857	2.264	5.034	-0.133	-3.578	-2.196
405			5	3.857	2.264	5.034	-0.133	-1.69	-3.045
406	2	M90	1	-0.409	6.417	0.318	0	0	0
407			2	-0.409	3.762	0.318	0	2.889	-46.17
408			3	-4.727	1.151	-1.382	0.128	-4.287	-60.737
409			4	0.419	-5.36	0.619	0	-4.376	-44.644
410			5	0	0	0	0	0	0
411	2	M91	1	1.907	-2.171	-5.965	-0.194	10.549	-0.397
412			2	1.907	-2.171	-5.965	-0.194	8.312	0.417
413			3	1.907	-2.171	-5.965	-0.194	6.076	1.231
414			4	1.907	-2.171	-5.965	-0.194	3.839	2.045
415			5	1.907	-2.171	-5.965	-0.194	1.602	2.859
416	2	M92	1	3.52	2.396	6.591	-0.158	-11.632	0.453
417			2	3.52	2.396	6.591	-0.158	-9.16	-0.445
418			3	3.52	2.396	6.591	-0.158	-6.688	-1.344
419			4	3.52	2.396	6.591	-0.158	-4.216	-2.242
420			5	3.52	2.396	6.591	-0.158	-1.745	-3.141
421	2	M93	1	-0.312	7.559	0.399	0	0	0
422			2	-0.312	4.905	0.399	0	3.623	-56.536
423			3	-6.382	0.343	-1.458	0.151	-3.746	-66.947
424			4	0.326	-5.832	0.592	0	-4.191	-47.983
425			5	0	0	0	0	0	0
426	2	M94	1	2.94	-2.383	-6.988	-0.195	12.217	-0.469
427			2	2.94	-2.383	-6.988	-0.195	9.597	0.425
428			3	2.94	-2.383	-6.988	-0.195	6.976	1.318
429			4	2.94	-2.383	-6.988	-0.195	4.356	2.212
430			5	2.94	-2.383	-6.988	-0.195	1.735	3.106
431	2	M95	1	3.216	2.51	7.418	-0.153	-12.933	0.506
432			2	3.216	2.51	7.418	-0.153	-10.151	-0.435
433			3	3.216	2.51	7.418	-0.153	-7.37	-1.376
434			4	3.216	2.51	7.418	-0.153	-4.588	-2.318
435			5	3.216	2.51	7.418	-0.153	-1.806	-3.259
436	2	M96	1	-0.21	8.121	0.475	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
437			2	-0.21	5.466	0.475	0	4.311	-61.628
438			3	-7.313	-0.129	-1.541	0.166	-3.329	-69.24
439			4	0.226	-6	0.58	0	-4.1	-49.17
440			5	0	0	0	0	0	0
441	2	M100	1	3.329	-2.544	-7.623	-0.175	13.27	-0.518
442			2	3.329	-2.544	-7.623	-0.175	10.412	0.436
443			3	3.329	-2.544	-7.623	-0.175	7.553	1.39
444			4	3.329	-2.544	-7.623	-0.175	4.695	2.344
445			5	3.329	-2.544	-7.623	-0.175	1.836	3.298
446	2	M101	1	3.048	2.605	7.895	-0.163	-13.707	0.541
447			2	3.048	2.605	7.895	-0.163	-10.747	-0.436
448			3	3.048	2.605	7.895	-0.163	-7.786	-1.413
449			4	3.048	2.605	7.895	-0.163	-4.825	-2.39
450			5	3.048	2.605	7.895	-0.163	-1.864	-3.367
451	2	M102	1	-0.129	8.316	0.531	0	0	0
452			2	-0.129	5.661	0.531	0	4.82	-63.397
453			3	-7.875	-0.323	-1.613	0.171	-3.101	-69.38
454			4	0.146	-6.026	0.578	0	-4.085	-49.356
455			5	0	0	0	0	0	0
456	2	M103	1	3.391	-2.665	-8.074	-0.179	14.02	-0.557
457			2	3.391	-2.665	-8.074	-0.179	10.993	0.443
458			3	3.391	-2.665	-8.074	-0.179	7.965	1.442
459			4	3.391	-2.665	-8.074	-0.179	4.937	2.442
460			5	3.391	-2.665	-8.074	-0.179	1.91	3.441
461	2	M104	1	2.994	2.685	8.225	-0.154	-14.252	0.569
462			2	2.994	2.685	8.225	-0.154	-11.168	-0.438
463			3	2.994	2.685	8.225	-0.154	-8.084	-1.445
464			4	2.994	2.685	8.225	-0.154	-4.999	-2.452
465			5	2.994	2.685	8.225	-0.154	-1.915	-3.459
466	2	M105	1	-0.067	8.34	0.57	0	0	0
467			2	-0.067	5.686	0.57	0	5.174	-63.621
468			3	-8.269	-0.36	-1.672	0.172	-2.977	-68.705
469			4	0.085	-6.008	0.582	0	-4.116	-49.229
470			5	0	0	0	0	0	0
471	2	M106	1	3.302	-2.731	-8.044	-0.161	14.03	-0.557
472			2	3.302	-2.731	-8.044	-0.161	11.013	0.467
473			3	3.302	-2.731	-8.044	-0.161	7.996	1.491
474			4	3.302	-2.731	-8.044	-0.161	4.98	2.515
475			5	3.302	-2.731	-8.044	-0.161	1.963	3.54
476	2	M107	1	2.998	2.73	8.12	-0.152	-14.136	0.563
477			2	2.998	2.73	8.12	-0.152	-11.091	-0.461
478			3	2.998	2.73	8.12	-0.152	-8.047	-1.484
479			4	2.998	2.73	8.12	-0.152	-5.002	-2.508
480			5	2.998	2.73	8.12	-0.152	-1.957	-3.531
481	2	M108	1	-0.029	8.288	0.595	0	0	0
482			2	-0.029	5.634	0.595	0	5.399	-63.149
483			3	-8.205	-0.324	-1.714	0.171	-2.949	-68.285
484			4	0.046	-5.976	0.589	0	-4.167	-49
485			5	0	0	0	0	0	0
486	2	M109	1	3.211	-2.797	-8.319	-0.161	14.481	-0.582
487			2	3.211	-2.797	-8.319	-0.161	11.361	0.467
488			3	3.211	-2.797	-8.319	-0.161	8.241	1.516
489			4	3.211	-2.797	-8.319	-0.161	5.121	2.565
490			5	3.211	-2.797	-8.319	-0.161	2.002	3.614
491	2	M110	1	3.068	2.784	8.344	-0.159	-14.506	0.583

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
492			2	3.068	2.784	8.344	-0.159	-11.377	-0.461
493			3	3.068	2.784	8.344	-0.159	-8.248	-1.505
494			4	3.068	2.784	8.344	-0.159	-5.119	-2.549
495			5	3.068	2.784	8.344	-0.159	-1.99	-3.593
496	2	M111	1	-0.003	8.259	0.612	0	0	0
497			2	-0.003	5.604	0.612	0	5.549	-62.88
498			3	-8.457	-0.262	-1.749	0.17	-2.958	-67.846
499			4	0.021	-5.984	0.597	0	-4.223	-49.06
500			5	0	0	0	0	0	0
501	2	M112	1	3.119	-2.817	-8.115	-0.161	14.201	-0.567
502			2	3.119	-2.817	-8.115	-0.161	11.157	0.489
503			3	3.119	-2.817	-8.115	-0.161	8.114	1.546
504			4	3.119	-2.817	-8.115	-0.161	5.071	2.602
505			5	3.119	-2.817	-8.115	-0.161	2.028	3.658
506	2	M113	1	3.137	2.798	8.105	-0.147	-14.17	0.566
507			2	3.137	2.798	8.105	-0.147	-11.131	-0.484
508			3	3.137	2.798	8.105	-0.147	-8.092	-1.533
509			4	3.137	2.798	8.105	-0.147	-5.052	-2.582
510			5	3.137	2.798	8.105	-0.147	-2.013	-3.631
511	2	M114	1	0.015	8.228	0.622	0	0	0
512			2	0.015	5.573	0.622	0	5.639	-62.602
513			3	-8.237	-0.201	-1.77	0.17	-2.962	-68.121
514			4	0.003	-5.993	0.603	0	-4.263	-49.121
515			5	0	0	0	0	0	0
516	2	M115	1	3.105	-2.847	-8.299	-0.154	14.492	-0.582
517			2	3.105	-2.847	-8.299	-0.154	11.38	0.485
518			3	3.105	-2.847	-8.299	-0.154	8.268	1.553
519			4	3.105	-2.847	-8.299	-0.154	5.156	2.621
520			5	3.105	-2.847	-8.299	-0.154	2.043	3.689
521	2	M116	1	3.22	2.825	8.269	-0.151	-14.432	0.579
522			2	3.22	2.825	8.269	-0.151	-11.331	-0.48
523			3	3.22	2.825	8.269	-0.151	-8.23	-1.539
524			4	3.22	2.825	8.269	-0.151	-5.129	-2.599
525			5	3.22	2.825	8.269	-0.151	-2.029	-3.658
526	2	M117	1	0.025	8.252	0.628	0	0	0
527			2	0.025	5.597	0.628	0	5.697	-62.817
528			3	-8.412	-0.163	-1.784	0.17	-2.978	-68.344
529			4	-0.007	-6.038	0.607	0	-4.292	-49.44
530			5	0	0	0	0	0	0
531	2	M118	1	3.119	-2.876	-8.563	-0.157	14.9	-0.604
532			2	3.119	-2.876	-8.563	-0.157	11.689	0.475
533			3	3.119	-2.876	-8.563	-0.157	8.478	1.553
534			4	3.119	-2.876	-8.563	-0.157	5.267	2.632
535			5	3.119	-2.876	-8.563	-0.157	2.056	3.71
536	2	M119	1	3.306	2.852	8.544	-0.154	-14.853	0.601
537			2	3.306	2.852	8.544	-0.154	-11.649	-0.468
538			3	3.306	2.852	8.544	-0.154	-8.445	-1.538
539			4	3.306	2.852	8.544	-0.154	-5.241	-2.607
540			5	3.306	2.852	8.544	-0.154	-2.037	-3.676
541	2	M120	1	0.02	8.292	0.629	0	0	0
542			2	0.02	5.637	0.629	0	5.705	-63.181
543			3	-8.683	-0.135	-1.793	0.171	-2.997	-68.596
544			4	-0.002	-6.095	0.61	0	-4.315	-49.845
545			5	0	0	0	0	0	0
546	2	M121	1	3.113	-2.854	-8.375	-0.16	14.61	-0.587

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
547			2	3.113	-2.854	-8.375	-0.16	11.47	0.483
548			3	3.113	-2.854	-8.375	-0.16	8.329	1.553
549			4	3.113	-2.854	-8.375	-0.16	5.188	2.623
550			5	3.113	-2.854	-8.375	-0.16	2.048	3.693
551	2	M122	1	3.343	2.833	8.355	-0.144	-14.565	0.585
552			2	3.343	2.833	8.355	-0.144	-11.431	-0.478
553			3	3.343	2.833	8.355	-0.144	-8.298	-1.54
554			4	3.343	2.833	8.355	-0.144	-5.165	-2.603
555			5	3.343	2.833	8.355	-0.144	-2.032	-3.665
556	2	M123	1	0.02	8.304	0.628	0	0	0
557			2	0.02	5.649	0.628	0	5.696	-63.292
558			3	-8.493	-0.119	-1.786	0.172	-2.987	-69.125
559			4	-0.001	-6.117	0.609	0	-4.304	-49.997
560			5	0	0	0	0	0	0
561	2	M124	1	3.104	-2.832	-8.3	-0.153	14.483	-0.579
562			2	3.104	-2.832	-8.3	-0.153	11.371	0.483
563			3	3.104	-2.832	-8.3	-0.153	8.258	1.545
564			4	3.104	-2.832	-8.3	-0.153	5.146	2.606
565			5	3.104	-2.832	-8.3	-0.153	2.034	3.668
566	2	M125	1	3.39	2.815	8.293	-0.148	-14.458	0.578
567			2	3.39	2.815	8.293	-0.148	-11.349	-0.478
568			3	3.39	2.815	8.293	-0.148	-8.239	-1.533
569			4	3.39	2.815	8.293	-0.148	-5.129	-2.589
570			5	3.39	2.815	8.293	-0.148	-2.02	-3.644
571	2	M126	1	0.013	8.315	0.622	0	0	0
572			2	0.013	5.661	0.622	0	5.645	-63.394
573			3	-8.423	-0.099	-1.774	0.173	-2.989	-69.513
574			4	0.005	-6.143	0.606	0	-4.284	-50.18
575			5	0	0	0	0	0	0
576	2	M127	1	3.082	-2.805	-8.332	-0.151	14.51	-0.579
577			2	3.082	-2.805	-8.332	-0.151	11.385	0.473
578			3	3.082	-2.805	-8.332	-0.151	8.261	1.525
579			4	3.082	-2.805	-8.332	-0.151	5.136	2.577
580			5	3.082	-2.805	-8.332	-0.151	2.011	3.629
581	2	M128	1	3.468	2.79	8.324	-0.16	-14.485	0.578
582			2	3.468	2.79	8.324	-0.16	-11.364	-0.468
583			3	3.468	2.79	8.324	-0.16	-8.242	-1.514
584			4	3.468	2.79	8.324	-0.16	-5.12	-2.56
585			5	3.468	2.79	8.324	-0.16	-1.999	-3.607
586	2	M129	1	0.013	8.331	0.614	0	0	0
587			2	0.013	5.676	0.614	0	5.572	-63.538
588			3	-8.454	-0.06	-1.754	0.174	-2.969	-69.909
589			4	0.005	-6.183	0.599	0	-4.236	-50.465
590			5	0	0	0	0	0	0
591	2	M130	1	3.064	-2.776	-8.483	-0.161	14.706	-0.588
592			2	3.064	-2.776	-8.483	-0.161	11.525	0.453
593			3	3.064	-2.776	-8.483	-0.161	8.344	1.494
594			4	3.064	-2.776	-8.483	-0.161	5.162	2.535
595			5	3.064	-2.776	-8.483	-0.161	1.981	3.576
596	2	M151	1	3.579	2.751	8.432	-0.167	-14.612	0.583
597			2	3.579	2.751	8.432	-0.167	-11.45	-0.448
598			3	3.579	2.751	8.432	-0.167	-8.288	-1.48
599			4	3.579	2.751	8.432	-0.167	-5.126	-2.512
600			5	3.579	2.751	8.432	-0.167	-1.964	-3.544
601	2	M152	1	0.036	8.365	0.607	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
602			2	0.036	5.71	0.607	0	5.505	-63.841
603			3	-8.582	-0.01	-1.725	0.176	-2.871	-70.424
604			4	-0.017	-6.243	0.584	0	-4.134	-50.888
605			5	0	0	0	0	0	0
606	2	M153	1	3.07	-2.718	-8.349	-0.17	14.464	-0.574
607			2	3.07	-2.718	-8.349	-0.17	11.333	0.445
608			3	3.07	-2.718	-8.349	-0.17	8.202	1.464
609			4	3.07	-2.718	-8.349	-0.17	5.071	2.483
610			5	3.07	-2.718	-8.349	-0.17	1.94	3.502
611	2	M154	1	3.652	2.67	8.212	-0.164	-14.23	0.562
612			2	3.652	2.67	8.212	-0.164	-11.15	-0.439
613			3	3.652	2.67	8.212	-0.164	-8.071	-1.44
614			4	3.652	2.67	8.212	-0.164	-4.991	-2.441
615			5	3.652	2.67	8.212	-0.164	-1.911	-3.443
616	2	M159	1	0.079	8.401	0.6	0	0	0
617			2	0.079	5.746	0.6	0	5.445	-64.172
618			3	-8.402	0.021	-1.68	0.177	-2.671	-71.291
619			4	-0.061	-6.286	0.56	0	-3.959	-51.194
620			5	0	0	0	0	0	0
621	2	M175	1	3.166	-2.636	-8.054	-0.165	13.966	-0.55
622			2	3.166	-2.636	-8.054	-0.165	10.946	0.438
623			3	3.166	-2.636	-8.054	-0.165	7.926	1.427
624			4	3.166	-2.636	-8.054	-0.165	4.906	2.415
625			5	3.166	-2.636	-8.054	-0.165	1.885	3.403
626	2	M176	1	3.567	2.549	7.804	-0.173	-13.542	0.528
627			2	3.567	2.549	7.804	-0.173	-10.615	-0.428
628			3	3.567	2.549	7.804	-0.173	-7.689	-1.384
629			4	3.567	2.549	7.804	-0.173	-4.762	-2.34
630			5	3.567	2.549	7.804	-0.173	-1.835	-3.296
631	2	M177	1	0.135	8.435	0.596	0	0	0
632			2	0.135	5.78	0.596	0	5.403	-64.482
633			3	-8.045	-0.04	-1.618	0.175	-2.361	-71.836
634			4	-0.118	-6.262	0.522	0	-3.692	-51.021
635			5	0	0	0	0	0	0
636	2	M178	1	3.39	-2.536	-7.562	-0.158	13.165	-0.517
637			2	3.39	-2.536	-7.562	-0.158	10.33	0.435
638			3	3.39	-2.536	-7.562	-0.158	7.494	1.386
639			4	3.39	-2.536	-7.562	-0.158	4.659	2.337
640			5	3.39	-2.536	-7.562	-0.158	1.823	3.288
641	2	M179	1	3.091	2.383	7.161	-0.188	-12.473	0.481
642			2	3.091	2.383	7.161	-0.188	-9.787	-0.413
643			3	3.091	2.383	7.161	-0.188	-7.102	-1.307
644			4	3.091	2.383	7.161	-0.188	-4.416	-2.2
645			5	3.091	2.383	7.161	-0.188	-1.731	-3.094
646	2	M180	1	0.212	8.404	0.599	0	0	0
647			2	0.212	5.75	0.599	0	5.435	-64.202
648			3	-7.472	-0.296	-1.541	0.167	-1.862	-70.726
649			4	-0.196	-6.041	0.466	0	-3.297	-49.458
650			5	0	0	0	0	0	0
651	2	M182	1	3.615	-2.43	-6.668	-0.151	11.772	-0.461
652			2	3.615	-2.43	-6.668	-0.151	9.272	0.45
653			3	3.615	-2.43	-6.668	-0.151	6.771	1.362
654			4	3.615	-2.43	-6.668	-0.151	4.271	2.273
655			5	3.615	-2.43	-6.668	-0.151	1.771	3.184
656	2	M183	1	1.986	2.173	6.081	-0.193	-10.725	0.406

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
657			2	1.986	2.173	6.081	-0.193	-8.445	-0.408
658			3	1.986	2.173	6.081	-0.193	-6.164	-1.223
659			4	1.986	2.173	6.081	-0.193	-3.884	-2.038
660			5	1.986	2.173	6.081	-0.193	-1.603	-2.853
661	2	M186	1	0.307	8.134	0.62	0	0	0
662			2	0.307	5.479	0.62	0	5.626	-61.751
663			3	-6.479	-0.791	-1.461	0.151	-1.13	-65.862
664			4	-0.293	-5.432	0.393	0	-2.778	-45.15
665			5	0	0	0	0	0	0
666	2	M187	1	3.383	-2.294	-4.872	-0.129	9.043	-0.35
667			2	3.383	-2.294	-4.872	-0.129	7.216	0.511
668			3	3.383	-2.294	-4.872	-0.129	5.389	1.371
669			4	3.383	-2.294	-4.872	-0.129	3.562	2.231
670			5	3.383	-2.294	-4.872	-0.129	1.735	3.091
671	2	M188	1	0.209	1.913	4.124	-0.175	-7.648	0.277
672			2	0.209	1.913	4.124	-0.175	-6.101	-0.44
673			3	0.209	1.913	4.124	-0.175	-4.554	-1.158
674			4	0.209	1.913	4.124	-0.175	-3.008	-1.875
675			5	0.209	1.913	4.124	-0.175	-1.461	-2.592
676	2	M189	1	0.389	7.309	0.655	0	0	0
677			2	0.389	4.654	0.655	0	5.942	-54.26
678			3	-4.597	-1.384	-1.384	0.12	-0.266	-55.012
679			4	-0.379	-4.248	0.312	0	-2.205	-36.778
680			5	0	0	0	0	0	0
681	2	M213	1	3.812	-2.056	-0.739	-0.081	3.089	-0.083
682			2	3.812	-2.056	-0.739	-0.081	2.811	0.688
683			3	3.812	-2.056	-0.739	-0.081	2.534	1.459
684			4	3.812	-2.056	-0.739	-0.081	2.257	2.23
685			5	3.812	-2.056	-0.739	-0.081	1.98	3.001
686	2	M214	1	-2.558	1.594	-0.104	-0.193	-17.198	0.816
687			2	-2.558	1.594	-0.104	-0.193	-17.237	0.219
688			3	-2.558	1.594	-0.104	-0.193	-17.276	-0.379
689			4	-2.558	1.594	-0.104	-0.193	-17.315	-0.977
690			5	-2.558	1.594	-0.104	-0.193	-17.354	-1.575
691	10	M155	1	0	0	0	0	0	0
692			2	-1.323	-0.088	1.248	-0.005	-0.412	0.788
693			3	-0.933	-0.378	-0.582	-0.006	0.122	-0.734
694			4	2.248	-0.328	0.609	0	0.51	0.042
695			5	-0.209	1.057	-0.186	-0.029	0.094	-4.573
696	10	M156	1	-1.386	0.076	0.221	-0.017	0.008	-2.245
697			2	2.168	0.64	2.267	0.009	0.552	0.779
698			3	-1.651	0.048	-0.267	0.004	0.18	-1.674
699			4	-0.63	-0.04	0.158	0	0.726	-1.248
700			5	0	0	0	0.071	0	0
701	10	M157	1	3.001	0.24	0.26	0	0	0
702			2	3.742	0.239	0.159	0	-0.327	-0.463
703			3	3.742	0.239	0.159	0	-0.007	-0.942
704			4	3.742	0.239	0.159	0	0.313	-1.422
705			5	4.505	-0.971	0.385	0	0	0
706	10	M158	1	2.574	0.251	-0.038	0	0	0
707			2	3.292	0.259	0.037	0	-0.099	-0.424
708			3	3.292	0.259	0.037	0	-0.023	-0.945
709			4	3.292	0.259	0.037	0	0.052	-1.465
710			5	3.959	-0.933	0.145	-0.001	0	0
711	10	M160	1	3.723	0.314	0.775	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
712			2	3.288	0.3	0.314	0	-0.637	-0.346
713			3	3.288	0.3	0.314	0	-0.007	-0.949
714			4	3.288	0.3	0.314	0	0.623	-1.551
715			5	2.979	-0.871	0.819	0	0	0
716	10	M161	1	-1.703	0.3	0.843	0	0	0
717			2	-0.772	0.304	0.276	0	-0.579	-0.338
718			3	-0.772	0.304	0.276	0	-0.026	-0.949
719			4	-0.772	0.304	0.276	0	0.528	-1.56
720			5	0.265	-0.914	0.782	0	0	0
721	10	M162	1	-9.205	0.303	-0.205	0	0	0
722			2	-6.7	0.314	-0.157	0	0.272	-0.319
723			3	-6.7	0.314	-0.157	0	-0.043	-0.95
724			4	-6.7	0.314	-0.157	0	-0.357	-1.582
725			5	-4.688	-0.85	0.028	0	0	0
726	10	M163	1	-1.217	0.33	-1.104	0	0	0
727			2	-0.685	0.32	-0.546	0	1.028	-0.309
728			3	-0.685	0.32	-0.546	0	-0.069	-0.951
729			4	-0.685	0.32	-0.546	0	-1.166	-1.593
730			5	0.132	-0.84	-0.667	0	0	0
731	10	M164	1	-0.961	0.312	-0.998	0	0	0
732			2	-1.099	0.311	-0.575	0	1.064	-0.326
733			3	-1.099	0.311	-0.575	0	-0.091	-0.95
734			4	-1.099	0.311	-0.575	0	-1.245	-1.575
735			5	-1.232	-0.878	-0.694	0	0	0
736	10	M165	1	-1.738	0.292	-0.552	0	0	0
737			2	-2.115	0.299	-0.425	0	0.786	-0.349
738			3	-2.115	0.299	-0.425	0	-0.068	-0.949
739			4	-2.115	0.299	-0.425	0	-0.921	-1.549
740			5	-2.524	-0.895	-0.309	0	0	0
741	10	M166	1	-2.019	0.284	-0.289	0	0	0
742			2	-1.675	0.289	-0.341	0	0.632	-0.368
743			3	-1.675	0.289	-0.341	0	-0.053	-0.949
744			4	-1.675	0.289	-0.341	0	-0.738	-1.529
745			5	-1.261	-0.868	-0.108	0	0	0
746	10	M167	1	1.978	0.193	-0.038	0	0	0
747			2	1.804	0.191	0.004	0	-0.023	-0.554
748			3	1.804	0.191	0.004	0	-0.014	-0.937
749			4	1.804	0.191	0.004	0	-0.005	-1.319
750			5	1.641	-0.965	0.082	0	0	0
751	10	M168	1	1.874	0.198	0.137	0	0	0
752			2	2.117	0.19	0.087	0	-0.179	-0.555
753			3	2.117	0.19	0.087	0	-0.004	-0.937
754			4	2.117	0.19	0.087	0	0.172	-1.319
755			5	2.307	-0.992	0.253	0	0	0
756	10	M169	1	2.452	0.191	-0.026	0	0	0
757			2	3.239	0.194	0.026	0	-0.071	-0.549
758			3	3.239	0.194	0.026	0	-0.017	-0.938
759			4	3.239	0.194	0.026	0	0.036	-1.326
760			5	4.135	-1.024	0.093	-0.001	0	0
761	10	M170	1	1.4	0.204	-0.153	0	0	0
762			2	1.539	0.211	-0.012	0	0.001	-0.515
763			3	1.539	0.211	-0.012	0	-0.024	-0.939
764			4	1.539	0.211	-0.012	0	-0.049	-1.364
765			5	1.525	-0.945	0.012	0	0	0
766	10	M171	1	3.624	0.242	0.151	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
767			2	3.193	0.228	0.125	0	-0.256	-0.483
768			3	3.193	0.228	0.125	0	-0.005	-0.941
769			4	3.193	0.228	0.125	0	0.246	-1.4
770			5	2.817	-0.934	0.321	0	0	0
771	10	M172	1	1.013	0.179	-0.146	0	0	0
772			2	1.434	0.186	-0.057	0	0.093	-0.563
773			3	1.434	0.186	-0.057	0	-0.02	-0.936
774			4	1.434	0.186	-0.057	0	-0.134	-1.31
775			5	1.788	-0.989	-0.043	0	0	0
776	10	M173	1	-2.019	-0.294	0.044	0.746	0.065	-0.887
777			2	-0.907	-0.011	0.069	-4	0.069	0.034
778			3	-0.409	0.002	0.631	-6.272	-0.519	-0.008
779			4	0.414	-0.004	0.285	-6.246	0.037	0.003
780			5	2.532	-0.845	0	0	-0.001	-0.064
781	10	M174	1	-3.036	0.268	0.467	-2.746	-0.387	-1.037
782			2	0.2	-0.008	-0.104	-5.498	0.073	-0.076
783			3	-0.108	0.563	0.522	-6.728	-0.411	0.149
784			4	0.215	0	0.21	-5.602	0.042	-0.117
785			5	3.164	-1.065	0	0	0	-0.295
786	10	M181	1	-2.941	0.277	-0.412	0	0	0
787			2	-2.29	0.273	-0.4	0	0.747	-0.399
788			3	-2.29	0.273	-0.4	0	-0.056	-0.947
789			4	-2.29	0.273	-0.4	0	-0.86	-1.495
790			5	-1.704	-0.892	-0.221	0	0	0
791	10	M184	1	0.076	-1.319	0.479	0.008	0.355	-0.007
792			2	0.076	-1.319	0.479	0.008	0.534	0.487
793			3	0.076	-1.319	0.479	0.008	0.714	0.982
794			4	0.076	-1.319	0.479	0.008	0.893	1.477
795			5	0.076	-1.319	0.479	0.008	1.073	1.972
796	10	M190	1	-1.237	0.251	-0.428	0	0	0
797			2	-1.256	0.254	-0.403	0	0.755	-0.435
798			3	-1.256	0.254	-0.403	0	-0.053	-0.946
799			4	-1.256	0.254	-0.403	0	-0.862	-1.456
800			5	-1.258	-0.958	-0.213	0	0	0
801	10	M191	1	-0.625	0.241	-0.226	0	0	0
802			2	-0.564	0.247	-0.328	0	0.609	-0.449
803			3	-0.564	0.247	-0.328	0	-0.049	-0.945
804			4	-0.564	0.247	-0.328	0	-0.707	-1.441
805			5	-0.437	-0.928	-0.075	0	0	0
806	10	M192	1	-1.795	0.247	-0.213	0	0	0
807			2	-1.291	0.242	-0.32	0	0.595	-0.459
808			3	-1.291	0.242	-0.32	0	-0.047	-0.945
809			4	-1.291	0.242	-0.32	0	-0.689	-1.43
810			5	-0.842	-0.914	-0.073	0	0	0
811	10	M193	1	-0.992	0.228	-0.307	0	0	0
812			2	-0.667	0.227	-0.345	0	0.646	-0.487
813			3	-0.667	0.227	-0.345	0	-0.047	-0.943
814			4	-0.667	0.227	-0.345	0	-0.739	-1.4
815			5	-0.334	-0.944	-0.135	0	0	0
816	10	M194	1	-0.305	0.21	-0.263	0	0	0
817			2	-0.18	0.213	-0.32	0	0.597	-0.514
818			3	-0.18	0.213	-0.32	0	-0.046	-0.942
819			4	-0.18	0.213	-0.32	0	-0.69	-1.371
820			5	-0.045	-1.011	-0.103	0	0	0
821	10	M195	1	-0.295	0.211	-0.163	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
822			2	-0.117	0.215	-0.275	0	0.508	-0.51
823			3	-0.117	0.215	-0.275	0	-0.044	-0.943
824			4	-0.117	0.215	-0.275	0	-0.596	-1.375
825			5	0.095	-0.946	-0.036	0	0	0
826	10	M196	1	-1.099	0.226	-0.161	0	0	0
827			2	-0.709	0.216	-0.263	0	0.487	-0.508
828			3	-0.709	0.216	-0.263	0	-0.04	-0.943
829			4	-0.709	0.216	-0.263	0	-0.568	-1.377
830			5	-0.374	-0.94	-0.026	0	0	0
831	10	M197	1	-0.196	0.205	-0.2	0	0	0
832			2	0.077	0.207	-0.263	0	0.491	-0.526
833			3	0.077	0.207	-0.263	0	-0.038	-0.942
834			4	0.077	0.207	-0.263	0	-0.567	-1.358
835			5	0.364	-0.98	-0.042	0	0	0
836	10	M198	1	0.231	0.2	-0.187	0	0	0
837			2	0.493	0.204	-0.252	0	0.466	-0.533
838			3	0.493	0.204	-0.252	0	-0.041	-0.942
839			4	0.493	0.204	-0.252	0	-0.548	-1.351
840			5	0.785	-1.008	-0.047	0	0	0
841	10	M199	1	-0.184	0.211	-0.154	0	0	0
842			2	0.036	0.212	-0.232	0	0.425	-0.517
843			3	0.036	0.212	-0.232	0	-0.04	-0.942
844			4	0.036	0.212	-0.232	0	-0.506	-1.368
845			5	0.248	-0.946	-0.027	0	0	0
846	10	M200	1	-0.407	0.224	-0.128	0	0	0
847			2	-0.134	0.216	-0.208	0	0.384	-0.51
848			3	-0.134	0.216	-0.208	0	-0.035	-0.943
849			4	-0.134	0.216	-0.208	0	-0.453	-1.376
850			5	0.105	-0.944	0.012	0	0	0
851	10	M201	1	0.297	0.208	-0.14	0	0	0
852			2	0.621	0.211	-0.203	0	0.374	-0.518
853			3	0.621	0.211	-0.203	0	-0.034	-0.942
854			4	0.621	0.211	-0.203	0	-0.441	-1.367
855			5	0.967	-0.991	0.007	0	0	0
856	10	M202	1	0.418	0.21	-0.163	0	0	0
857			2	0.737	0.215	-0.209	0	0.381	-0.511
858			3	0.737	0.215	-0.209	0	-0.038	-0.943
859			4	0.737	0.215	-0.209	0	-0.457	-1.375
860			5	1.079	-0.98	-0.031	0	0	0
861	10	M203	1	1.307	0.213	0.033	0	0	0
862			2	1.34	0.203	-0.006	0	0.008	-0.53
863			3	1.34	0.203	-0.006	0	-0.004	-0.937
864			4	1.34	0.203	-0.006	0	-0.017	-1.344
865			5	1.35	-0.963	0.105	0	0	0
866	10	M204	1	1.647	0.188	0.012	0	0	0
867			2	2.23	0.188	-0.006	0	0.002	-0.559
868			3	2.23	0.188	-0.006	0	-0.01	-0.936
869			4	2.23	0.188	-0.006	0	-0.023	-1.313
870			5	2.867	-1.028	0.081	0	0	0
871	10	M205	1	0.709	0.212	-0.105	0	0	0
872			2	0.83	0.217	-0.081	0	0.148	-0.502
873			3	0.83	0.217	-0.081	0	-0.015	-0.938
874			4	0.83	0.217	-0.081	0	-0.178	-1.374
875			5	0.89	-0.938	-0.057	0	0	0
876	10	M206	1	0.769	0.261	0.021	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
877			2	1.13	0.258	-0.055	0.001	0.11	-0.423
878			3	1.13	0.258	-0.055	0.001	-0.001	-0.941
879			4	1.13	0.258	-0.055	0.001	-0.112	-1.459
880			5	1.465	-0.936	0.02	0	0	0
881	10	M207	1	1.114	0.226	-0.085	0	0	0
882			2	1.604	0.231	-0.087	0	0.164	-0.475
883			3	1.604	0.231	-0.087	0	-0.012	-0.939
884			4	1.604	0.231	-0.087	0	-0.187	-1.403
885			5	2.125	-0.971	-0.063	0	0	0
886	10	M218	1	-0.025	0.23	-0.143	0	0	0
887			2	0.174	0.227	-0.194	0	0.352	-0.489
888			3	0.174	0.227	-0.194	0	-0.037	-0.944
889			4	0.174	0.227	-0.194	0	-0.426	-1.399
890			5	0.354	-0.929	-0.014	0	0	0
891	10	M208	1	0.589	0.301	-0.011	0	0	0
892			2	0.684	0.293	-0.082	0.001	0.165	-0.356
893			3	0.684	0.293	-0.082	0.001	-0.001	-0.944
894			4	0.684	0.293	-0.082	0.001	-0.166	-1.533
895			5	0.755	-0.867	-0.04	0	0	0
896	10	M219	1	-0.016	0.235	-0.095	0	0	0
897			2	0.218	0.229	-0.163	0	0.297	-0.483
898			3	0.218	0.229	-0.163	0	-0.03	-0.944
899			4	0.218	0.229	-0.163	0	-0.357	-1.405
900			5	0.421	-0.936	0.048	0	0	0
901	10	M209	1	0.798	0.35	-0.009	0	0	0
902			2	1.236	0.357	-0.109	0.001	0.225	-0.233
903			3	1.236	0.357	-0.109	0.001	0.006	-0.949
904			4	1.236	0.357	-0.109	0.001	-0.213	-1.666
905			5	1.707	-0.853	-0.112	0	0	0
906	10	M210	1	0.298	0.314	-0.07	0	0	0
907			2	0.583	0.324	-0.123	0.001	0.243	-0.296
908			3	0.583	0.324	-0.123	0.001	-0.004	-0.947
909			4	0.583	0.324	-0.123	0.001	-0.25	-1.598
910			5	0.808	-0.84	-0.138	0	0	0
911	10	M220	1	0.683	0.224	-0.115	0	0	0
912			2	1.078	0.228	-0.166	0	0.302	-0.487
913			3	1.078	0.228	-0.166	0	-0.031	-0.944
914			4	1.078	0.228	-0.166	0	-0.365	-1.401
915			5	1.521	-0.991	0.024	0	0	0
916	10	M211	1	-0.01	0.404	0.058	0	0	0
917			2	0.282	0.4	-0.093	0.001	0.204	-0.15
918			3	0.282	0.4	-0.093	0.001	0.017	-0.953
919			4	0.282	0.4	-0.093	0.001	-0.17	-1.756
920			5	0.505	-0.767	-0.089	0	0	0
921	10	M212	1	-0.108	0.431	0.059	0	0	0
922			2	0.132	0.438	-0.111	0.001	0.242	-0.076
923			3	0.132	0.438	-0.111	0.001	0.019	-0.956
924			4	0.132	0.438	-0.111	0.001	-0.205	-1.836
925			5	0.315	-0.718	-0.161	0	0	0
926	10	M264	1	0.38	0.231	-0.163	0	0	0
927			2	0.706	0.236	-0.184	0	0.333	-0.47
928			3	0.706	0.236	-0.184	0	-0.037	-0.945
929			4	0.706	0.236	-0.184	0	-0.406	-1.419
930			5	1.026	-0.947	-0.034	0	0	0
931	10	M265	1	0.173	0.254	-0.128	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
932			2	0.329	0.247	-0.163	0	0.295	-0.45
933			3	0.329	0.247	-0.163	0	-0.033	-0.946
934			4	0.329	0.247	-0.163	0	-0.361	-1.441
935			5	0.475	-0.91	0.002	0	0	0
936	10	M266	1	0.202	0.249	-0.07	0	0	0
937			2	0.458	0.246	-0.132	0	0.239	-0.451
938			3	0.458	0.246	-0.132	0	-0.026	-0.946
939			4	0.458	0.246	-0.132	0	-0.29	-1.44
940			5	0.678	-0.925	0.07	0	0	0
941	10	M267	1	0.961	0.24	-0.117	0	0	0
942			2	1.423	0.244	-0.15	0	0.271	-0.455
943			3	1.423	0.244	-0.15	0	-0.03	-0.945
944			4	1.423	0.244	-0.15	0	-0.332	-1.436
945			5	1.959	-0.978	0.012	0	0	0
946	10	M268	1	0.265	0.25	-0.173	0	0	0
947			2	0.545	0.256	-0.173	0	0.311	-0.433
948			3	0.545	0.256	-0.173	0	-0.036	-0.946
949			4	0.545	0.256	-0.173	0	-0.383	-1.46
950			5	0.788	-0.912	-0.051	0	0	0
951	10	M277	1	0.367	0.277	-0.109	0	0	0
952			2	0.487	0.265	-0.14	0	0.253	-0.416
953			3	0.487	0.265	-0.14	0	-0.029	-0.947
954			4	0.487	0.265	-0.14	0	-0.31	-1.478
955			5	0.609	-0.896	0.019	0	0	0
956	10	M278	1	0.415	0.258	-0.056	0	0	0
957			2	0.735	0.26	-0.115	0	0.207	-0.425
958			3	0.735	0.26	-0.115	0	-0.023	-0.947
959			4	0.735	0.26	-0.115	0	-0.254	-1.469
960			5	1.031	-0.923	0.071	0	0	0
961	10	M280A	1	4.207	0.291	0.147	0	0	0
962			2	3.623	0.286	0.104	0	-0.227	-0.374
963			3	3.623	0.286	0.104	0	-0.019	-0.947
964			4	3.623	0.286	0.104	0	0.19	-1.521
965			5	3.046	-0.873	0.333	0	0	0
966	10	M251A	1	2.532	0.033	0	0	0	0
967			2	2.532	0.033	0	0	0	-0.016
968			3	2.532	0.033	0	0	0	-0.032
969			4	2.532	0.033	0	0	0	-0.048
970			5	2.532	0.033	0	0	0.001	-0.064
971	10	M253A	1	3.164	0.15	0	0	0	0
972			2	3.164	0.15	0	0	0	-0.074
973			3	3.164	0.15	0	0	0	-0.147
974			4	3.164	0.15	0	0	0	-0.221
975			5	3.164	0.15	0	0	0	-0.295
976	10	M277A	1	0.255	0.479	0.066	0.001	0	0
977			2	0.575	0.467	-0.122	0.001	0.271	-0.02
978			3	0.575	0.467	-0.122	0.001	0.026	-0.959
979			4	0.575	0.467	-0.122	0.001	-0.218	-1.897
980			5	0.87	-0.765	-0.214	-0.001	0	0
981	10	M263A	1	-2.323	-0.465	0	0	0	-0.904
982			2	-2.323	-0.465	0	0	0	-0.663
983			3	-2.323	-0.465	0	0	0	-0.423
984			4	-2.323	-0.465	0	0	0	-0.183
985			5	-2.323	-0.465	0	0	0	0.058
986	10	M264A	1	-2.323	0.029	0	0	0	0.058

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
987			2	-2.323	0.029	0	0	0	0.043
988			3	-2.323	0.029	0	0	0	0.029
989			4	-2.323	0.029	0	0	0	0.014
990			5	-2.323	0.029	0	0	0	0
991	10	M265A	1	-3.158	-0.565	0	0	-0.001	-1.07
992			2	-3.158	-0.565	0	0	-0.001	-0.777
993			3	-3.158	-0.565	0	0	-0.001	-0.485
994			4	-3.158	-0.565	0	0	-0.001	-0.193
995			5	-3.158	-0.565	0	0	-0.001	0.1
996	10	M266A	1	-3.158	0.051	0	0	-0.001	0.1
997			2	-3.158	0.051	0	0	0	0.075
998			3	-3.158	0.051	0	0	0	0.05
999			4	-3.158	0.051	0	0	0	0.025
1000			5	-3.158	0.051	0	0	0	0
1001	10	M131	1	0.975	0.253	-0.126	0	0	0
1002			2	1.439	0.258	-0.145	0	0.261	-0.428
1003			3	1.439	0.258	-0.145	0	-0.029	-0.946
1004			4	1.439	0.258	-0.145	0	-0.32	-1.465
1005			5	1.972	-0.95	-0.01	0	0	0
1006	10	M132	1	0.244	0.265	-0.162	0	0	0
1007			2	0.47	0.268	-0.16	0	0.288	-0.409
1008			3	0.47	0.268	-0.16	0	-0.033	-0.947
1009			4	0.47	0.268	-0.16	0	-0.353	-1.486
1010			5	0.656	-0.89	-0.053	0	0	0
1011	10	M133	1	0.418	0.284	-0.079	0	0	0
1012			2	0.538	0.272	-0.12	0	0.218	-0.402
1013			3	0.538	0.272	-0.12	0	-0.023	-0.947
1014			4	0.538	0.272	-0.12	0	-0.264	-1.493
1015			5	0.656	-0.893	0.034	0	0	0
1016	10	M134	1	0.661	0.26	-0.048	0	0	0
1017			2	1.052	0.264	-0.107	0	0.195	-0.417
1018			3	1.052	0.264	-0.107	0	-0.02	-0.947
1019			4	1.052	0.264	-0.107	0	-0.236	-1.476
1020			5	1.453	-0.94	0.054	0	0	0
1021	10	M135	1	0.803	0.255	-0.129	0	0	0
1022			2	1.238	0.261	-0.143	0	0.261	-0.422
1023			3	1.238	0.261	-0.143	0	-0.027	-0.946
1024			4	1.238	0.261	-0.143	0	-0.314	-1.47
1025			5	1.712	-0.933	-0.04	0	0	0
1026	10	M136	1	0.302	0.267	-0.133	0	0	0
1027			2	0.467	0.265	-0.145	0	0.264	-0.414
1028			3	0.467	0.265	-0.145	0	-0.026	-0.947
1029			4	0.467	0.265	-0.145	0	-0.317	-1.479
1030			5	0.609	-0.887	-0.053	0	0	0
1031	10	M137	1	0.385	0.269	-0.04	0	0	0
1032			2	0.544	0.26	-0.103	0	0.191	-0.424
1033			3	0.544	0.26	-0.103	0	-0.016	-0.946
1034			4	0.544	0.26	-0.103	0	-0.223	-1.468
1035			5	0.687	-0.905	0.038	0	0	0
1036	10	M138	1	0.885	0.243	-0.04	0	0	0
1037			2	1.327	0.247	-0.106	0	0.198	-0.449
1038			3	1.327	0.247	-0.106	0	-0.015	-0.945
1039			4	1.327	0.247	-0.106	0	-0.228	-1.44
1040			5	1.821	-0.97	0.016	0	0	0
1041	10	M139	1	0.581	0.234	-0.117	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1042			2	0.959	0.241	-0.142	0	0.264	-0.46
1043			3	0.959	0.241	-0.142	0	-0.021	-0.944
1044			4	0.959	0.241	-0.142	0	-0.306	-1.428
1045			5	1.346	-0.944	-0.081	0	0	0
1046	10	M140	1	0.372	0.24	-0.081	0	0	0
1047			2	0.493	0.235	-0.128	0	0.242	-0.471
1048			3	0.493	0.235	-0.128	0	-0.015	-0.943
1049			4	0.493	0.235	-0.128	0	-0.272	-1.415
1050			5	0.618	-0.917	-0.062	0	0	0
1051	10	M141	1	0.352	0.221	0.014	0	0	0
1052			2	0.562	0.216	-0.089	0	0.174	-0.507
1053			3	0.562	0.216	-0.089	0	-0.004	-0.941
1054			4	0.562	0.216	-0.089	0	-0.182	-1.375
1055			5	0.751	-0.95	0.017	0	0	0
1056	10	M142	1	1.039	0.189	-0.011	0	0	0
1057			2	1.509	0.191	-0.105	0	0.207	-0.555
1058			3	1.509	0.191	-0.105	0	-0.004	-0.939
1059			4	1.509	0.191	-0.105	0	-0.216	-1.322
1060			5	2.071	-1.031	-0.045	0	0	0
1061	10	M143	1	0.358	0.168	-0.066	0	0	0
1062			2	0.656	0.173	-0.135	0	0.265	-0.589
1063			3	0.656	0.173	-0.135	0	-0.006	-0.937
1064			4	0.656	0.173	-0.135	0	-0.278	-1.285
1065			5	0.941	-0.997	-0.136	0	0	0
1066	10	M144	1	0.425	0.15	0.016	0	0	0
1067			2	0.515	0.148	-0.105	0.001	0.216	-0.637
1068			3	0.515	0.148	-0.105	0.001	0.005	-0.934
1069			4	0.515	0.148	-0.105	0.001	-0.206	-1.232
1070			5	0.636	-1.007	-0.089	0	0	0
1071	10	M145	1	0.378	0.1	0.115	0	0	0
1072			2	0.638	0.106	-0.071	0.001	0.16	-0.717
1073			3	0.638	0.106	-0.071	0.001	0.018	-0.93
1074			4	0.638	0.106	-0.071	0.001	-0.124	-1.144
1075			5	0.903	-1.061	-0.037	0	0	0
1076	10	M146	1	0.928	0.049	0.093	0	0	0
1077			2	1.365	0.061	-0.093	0.001	0.206	-0.802
1078			3	1.365	0.061	-0.093	0.001	0.02	-0.926
1079			4	1.365	0.061	-0.093	0.001	-0.166	-1.049
1080			5	1.908	-1.136	-0.124	0	0	0
1081	10	M147	1	0.173	0.062	0.08	-0.001	0	0
1082			2	0.414	0.027	-0.112	0.001	0.25	-0.867
1083			3	0.414	0.027	-0.112	0.001	0.025	-0.923
1084			4	0.414	0.027	-0.112	0.001	-0.2	-0.978
1085			5	0.655	-1.169	-0.206	0.001	0	0
1086	10	M88	1	1.791	-1.46	-1.254	0.006	3.024	-0.13
1087			2	1.791	-1.46	-1.254	0.006	2.554	0.417
1088			3	1.791	-1.46	-1.254	0.006	2.083	0.965
1089			4	1.791	-1.46	-1.254	0.006	1.613	1.512
1090			5	1.791	-1.46	-1.254	0.006	1.143	2.06
1091	10	M89	1	1.068	0.546	-0.295	-0.089	-0.038	-0.025
1092			2	1.068	0.546	-0.295	-0.089	-0.148	-0.23
1093			3	1.068	0.546	-0.295	-0.089	-0.259	-0.435
1094			4	1.068	0.546	-0.295	-0.089	-0.37	-0.64
1095			5	1.068	0.546	-0.295	-0.089	-0.481	-0.844
1096	10	M90	1	0.798	1.657	0.682	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1097			2	0.798	1.657	0.682	0	6.183	-15.034
1098			3	-0.53	-0.134	-0.711	0.027	3.971	-16.255
1099			4	-0.797	-1.202	-0.15	0	1.062	-8.501
1100			5	0	0	0	0	0	0
1101	10	M91	1	2.841	-1.651	-2.995	0.012	5.734	-0.258
1102			2	2.841	-1.651	-2.995	0.012	4.611	0.361
1103			3	2.841	-1.651	-2.995	0.012	3.487	0.981
1104			4	2.841	-1.651	-2.995	0.012	2.364	1.6
1105			5	2.841	-1.651	-2.995	0.012	1.241	2.219
1106	10	M92	1	0.865	0.729	1.554	-0.078	-2.881	0.11
1107			2	0.865	0.729	1.554	-0.078	-2.298	-0.164
1108			3	0.865	0.729	1.554	-0.078	-1.715	-0.437
1109			4	0.865	0.729	1.554	-0.078	-1.133	-0.71
1110			5	0.865	0.729	1.554	-0.078	-0.55	-0.984
1111	10	M93	1	0.746	2.254	0.714	0	0	0
1112			2	0.746	2.254	0.714	0	6.476	-20.447
1113			3	-2.331	-0.587	-0.78	0.04	3.946	-18.044
1114			4	-0.741	-1.452	-0.132	0	0.936	-10.273
1115			5	0	0	0	0	0	0
1116	10	M94	1	3.363	-1.815	-4.73	0.026	8.395	-0.394
1117			2	3.363	-1.815	-4.73	0.026	6.621	0.287
1118			3	3.363	-1.815	-4.73	0.026	4.847	0.967
1119			4	3.363	-1.815	-4.73	0.026	3.074	1.648
1120			5	3.363	-1.815	-4.73	0.026	1.3	2.328
1121	10	M95	1	0.75	0.92	3.488	-0.045	-5.852	0.262
1122			2	0.75	0.92	3.488	-0.045	-4.544	-0.083
1123			3	0.75	0.92	3.488	-0.045	-3.236	-0.428
1124			4	0.75	0.92	3.488	-0.045	-1.928	-0.773
1125			5	0.75	0.92	3.488	-0.045	-0.62	-1.119
1126	10	M96	1	0.648	2.538	0.728	0	0	0
1127			2	0.648	2.538	0.728	0	6.602	-23.024
1128			3	-4.17	-0.825	-0.839	0.042	3.741	-17.389
1129			4	-0.639	-1.575	-0.101	0	0.716	-11.143
1130			5	0	0	0	0	0	0
1131	10	M100	1	3.583	-1.95	-6.784	0.061	11.494	-0.557
1132			2	3.583	-1.95	-6.784	0.061	8.95	0.174
1133			3	3.583	-1.95	-6.784	0.061	6.406	0.905
1134			4	3.583	-1.95	-6.784	0.061	3.862	1.636
1135			5	3.583	-1.95	-6.784	0.061	1.319	2.368
1136	10	M101	1	0.746	1.137	5.884	-0.006	-9.518	0.454
1137			2	0.746	1.137	5.884	-0.006	-7.311	0.028
1138			3	0.746	1.137	5.884	-0.006	-5.105	-0.399
1139			4	0.746	1.137	5.884	-0.006	-2.898	-0.825
1140			5	0.746	1.137	5.884	-0.006	-0.692	-1.252
1141	10	M102	1	0.477	2.662	0.712	0	0	0
1142			2	0.477	2.662	0.712	0	6.462	-24.147
1143			3	-6.399	-0.921	-0.882	0.04	3.259	-15.209
1144			4	-0.464	-1.667	-0.052	0	0.37	-11.79
1145			5	0	0	0	0	0	0
1146	10	M103	1	3.656	-2.046	-9.604	0.081	15.678	-0.779
1147			2	3.656	-2.046	-9.604	0.081	12.077	-0.011
1148			3	3.656	-2.046	-9.604	0.081	8.475	0.756
1149			4	3.656	-2.046	-9.604	0.081	4.873	1.523
1150			5	3.656	-2.046	-9.604	0.081	1.272	2.29
1151	10	M104	1	0.959	1.377	9.212	0.057	-14.561	0.72

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1152			2	0.959	1.377	9.212	0.057	-11.106	0.204
1153			3	0.959	1.377	9.212	0.057	-7.652	-0.312
1154			4	0.959	1.377	9.212	0.057	-4.198	-0.829
1155			5	0.959	1.377	9.212	0.057	-0.743	-1.345
1156	10	M105	1	0.223	2.766	0.656	0	0	0
1157			2	0.223	2.766	0.656	0	5.953	-25.095
1158			3	-9.474	-0.89	-0.887	0.036	2.528	-12.472
1159			4	-0.203	-1.849	0.009	0	-0.062	-13.075
1160			5	0	0	0	0	0	0
1161	10	M106	1	3.793	-2.059	-13.557	0.132	21.41	-1.083
1162			2	3.793	-2.059	-13.557	0.132	16.326	-0.31
1163			3	3.793	-2.059	-13.557	0.132	11.242	0.462
1164			4	3.793	-2.059	-13.557	0.132	6.158	1.234
1165			5	3.793	-2.059	-13.557	0.132	1.074	2.006
1166	10	M107	1	1.392	1.602	13.88	0.174	-21.515	1.088
1167			2	1.392	1.602	13.88	0.174	-16.31	0.487
1168			3	1.392	1.602	13.88	0.174	-11.105	-0.114
1169			4	1.392	1.602	13.88	0.174	-5.9	-0.714
1170			5	1.392	1.602	13.88	0.174	-0.695	-1.315
1171	10	M108	1	-0.134	2.986	0.544	0	0	0
1172			2	-0.134	2.986	0.544	0	4.932	-27.09
1173			3	-13.781	-0.807	-0.808	0.03	1.592	-9.898
1174			4	0.164	-2.199	0.071	0	-0.501	-15.551
1175			5	0	0	0	0	0	0
1176	10	M109	1	3.252	-1.033	-1.543	0.279	3.114	-0.103
1177			2	3.252	-1.033	-1.543	0.279	2.535	0.284
1178			3	3.252	-1.033	-1.543	0.279	1.956	0.672
1179			4	3.252	-1.033	-1.543	0.279	1.378	1.059
1180			5	3.252	-1.033	-1.543	0.279	0.799	1.446
1181	10	M110	1	1.01	0.813	2.748	-0.468	-4.699	0.185
1182			2	1.01	0.813	2.748	-0.468	-3.668	-0.119
1183			3	1.01	0.813	2.748	-0.468	-2.638	-0.424
1184			4	1.01	0.813	2.748	-0.468	-1.607	-0.729
1185			5	1.01	0.813	2.748	-0.468	-0.577	-1.034
1186	10	M111	1	-0.594	2.446	0.351	0	0	0
1187			2	-0.594	2.446	0.351	0	3.188	-22.19
1188			3	-2.189	-0.806	-0.6	0.059	0.368	-21.679
1189			4	0.598	-1.817	0.069	0	-0.488	-12.848
1190			5	0	0	0	0	0	0
1191	10	M112	1	2.812	-0.291	9.149	-0.282	-13.026	0.764
1192			2	2.812	-0.291	9.149	-0.282	-9.595	0.873
1193			3	2.812	-0.291	9.149	-0.282	-6.164	0.982
1194			4	2.812	-0.291	9.149	-0.282	-2.733	1.091
1195			5	2.812	-0.291	9.149	-0.282	0.698	1.2
1196	10	M113	1	0.609	-0.187	-8.924	-0.247	13.079	-0.766
1197			2	0.609	-0.187	-8.924	-0.247	9.733	-0.696
1198			3	0.609	-0.187	-8.924	-0.247	6.386	-0.626
1199			4	0.609	-0.187	-8.924	-0.247	3.04	-0.556
1200			5	0.609	-0.187	-8.924	-0.247	-0.307	-0.486
1201	10	M114	1	-0.11	2.054	0.373	0	0	0
1202			2	-0.11	2.054	0.373	0	3.383	-18.638
1203			3	9.012	-0.758	-0.393	0.087	2.435	-33.386
1204			4	0.09	-1.366	-0.116	0	0.822	-9.664
1205			5	0	0	0	0	0	0
1206	10	M115	1	3.314	-0.538	4.415	-0.168	-5.959	0.39

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1207			2	3.314	-0.538	4.415	-0.168	-4.303	0.592
1208			3	3.314	-0.538	4.415	-0.168	-2.647	0.794
1209			4	3.314	-0.538	4.415	-0.168	-0.992	0.996
1210			5	3.314	-0.538	4.415	-0.168	0.664	1.197
1211	10	M116	1	0.77	-0.172	-4.967	-0.213	7.34	-0.462
1212			2	0.77	-0.172	-4.967	-0.213	5.477	-0.397
1213			3	0.77	-0.172	-4.967	-0.213	3.614	-0.333
1214			4	0.77	-0.172	-4.967	-0.213	1.752	-0.269
1215			5	0.77	-0.172	-4.967	-0.213	-0.111	-0.204
1216	10	M117	1	0.289	2.48	0.451	0	0	0
1217			2	0.289	2.48	0.451	0	4.095	-22.498
1218			3	4.67	-0.834	-0.316	0.08	3.739	-31.007
1219			4	-0.299	-1.604	-0.229	0	1.621	-11.346
1220			5	0	0	0	0	0	0
1221	10	M118	1	3.598	-0.784	1.327	-0.111	-1.258	0.142
1222			2	3.598	-0.784	1.327	-0.111	-0.76	0.436
1223			3	3.598	-0.784	1.327	-0.111	-0.263	0.73
1224			4	3.598	-0.784	1.327	-0.111	0.235	1.024
1225			5	3.598	-0.784	1.327	-0.111	0.733	1.318
1226	10	M119	1	0.804	-0.122	-2.518	-0.185	3.731	-0.27
1227			2	0.804	-0.122	-2.518	-0.185	2.787	-0.224
1228			3	0.804	-0.122	-2.518	-0.185	1.842	-0.178
1229			4	0.804	-0.122	-2.518	-0.185	0.898	-0.132
1230			5	0.804	-0.122	-2.518	-0.185	-0.046	-0.087
1231	10	M120	1	0.618	2.71	0.536	0	0	0
1232			2	0.618	2.71	0.536	0	4.86	-24.584
1233			3	1.9	-0.891	-0.311	0.076	4.728	-28.748
1234			4	-0.622	-1.694	-0.303	0	2.141	-11.982
1235			5	0	0	0	0	0	0
1236	10	M121	1	3.68	-0.996	-0.853	-0.066	2.087	-0.037
1237			2	3.68	-0.996	-0.853	-0.066	1.767	0.337
1238			3	3.68	-0.996	-0.853	-0.066	1.448	0.71
1239			4	3.68	-0.996	-0.853	-0.066	1.128	1.084
1240			5	3.68	-0.996	-0.853	-0.066	0.808	1.457
1241	10	M122	1	0.842	-0.041	-0.804	-0.166	1.169	-0.132
1242			2	0.842	-0.041	-0.804	-0.166	0.867	-0.117
1243			3	0.842	-0.041	-0.804	-0.166	0.566	-0.102
1244			4	0.842	-0.041	-0.804	-0.166	0.264	-0.086
1245			5	0.842	-0.041	-0.804	-0.166	-0.037	-0.071
1246	10	M123	1	0.854	2.799	0.608	0	0	0
1247			2	0.854	2.799	0.608	0	5.512	-25.391
1248			3	-0.049	-0.881	-0.343	0.072	5.363	-26.533
1249			4	-0.854	-1.723	-0.342	0	2.421	-12.184
1250			5	0	0	0	0	0	0
1251	10	M124	1	3.644	-1.169	-2.216	-0.031	4.212	-0.151
1252			2	3.644	-1.169	-2.216	-0.031	3.381	0.287
1253			3	3.644	-1.169	-2.216	-0.031	2.549	0.725
1254			4	3.644	-1.169	-2.216	-0.031	1.718	1.164
1255			5	3.644	-1.169	-2.216	-0.031	0.887	1.602
1256	10	M125	1	0.889	0.04	0.235	-0.15	-0.41	-0.046
1257			2	0.889	0.04	0.235	-0.15	-0.322	-0.061
1258			3	0.889	0.04	0.235	-0.15	-0.234	-0.076
1259			4	0.889	0.04	0.235	-0.15	-0.145	-0.091
1260			5	0.889	0.04	0.235	-0.15	-0.057	-0.106
1261	10	M126	1	1.02	2.81	0.665	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1262			2	1.02	2.81	0.665	0	6.028	-25.493
1263			3	-1.254	-0.834	-0.388	0.068	5.749	-24.824
1264			4	-1.017	-1.723	-0.36	0	2.549	-12.189
1265			5	0	0	0	0	0	0
1266	10	M127	1	3.573	-1.304	-3.078	-0.006	5.574	-0.225
1267			2	3.573	-1.304	-3.078	-0.006	4.42	0.264
1268			3	3.573	-1.304	-3.078	-0.006	3.266	0.753
1269			4	3.573	-1.304	-3.078	-0.006	2.112	1.241
1270			5	3.573	-1.304	-3.078	-0.006	0.958	1.73
1271	10	M128	1	0.949	0.114	0.877	-0.141	-1.404	0.008
1272			2	0.949	0.114	0.877	-0.141	-1.075	-0.034
1273			3	0.949	0.114	0.877	-0.141	-0.747	-0.077
1274			4	0.949	0.114	0.877	-0.141	-0.418	-0.12
1275			5	0.949	0.114	0.877	-0.141	-0.089	-0.163
1276	10	M129	1	1.132	2.798	0.708	0	0	0
1277			2	1.132	2.798	0.708	0	6.421	-25.384
1278			3	-2.009	-0.775	-0.435	0.064	5.967	-23.668
1279			4	-1.128	-1.724	-0.366	0	2.588	-12.195
1280			5	0	0	0	0	0	0
1281	10	M130	1	3.513	-1.409	-3.648	0.007	6.49	-0.275
1282			2	3.513	-1.409	-3.648	0.007	5.122	0.253
1283			3	3.513	-1.409	-3.648	0.007	3.754	0.782
1284			4	3.513	-1.409	-3.648	0.007	2.386	1.31
1285			5	3.513	-1.409	-3.648	0.007	1.018	1.838
1286	10	M151	1	1.013	0.179	1.295	-0.137	-2.066	0.045
1287			2	1.013	0.179	1.295	-0.137	-1.58	-0.022
1288			3	1.013	0.179	1.295	-0.137	-1.095	-0.089
1289			4	1.013	0.179	1.295	-0.137	-0.609	-0.157
1290			5	1.013	0.179	1.295	-0.137	-0.124	-0.224
1291	10	M152	1	1.21	2.791	0.74	0	0	0
1292			2	1.21	2.791	0.74	0	6.716	-25.321
1293			3	-2.507	-0.722	-0.478	0.062	6.09	-22.988
1294			4	-1.204	-1.735	-0.365	0	2.585	-12.269
1295			5	0	0	0	0	0	0
1296	10	M153	1	3.477	-1.481	-3.93	0.012	6.958	-0.301
1297			2	3.477	-1.481	-3.93	0.012	5.484	0.254
1298			3	3.477	-1.481	-3.93	0.012	4.011	0.81
1299			4	3.477	-1.481	-3.93	0.012	2.537	1.365
1300			5	3.477	-1.481	-3.93	0.012	1.063	1.921
1301	10	M154	1	1.055	0.225	1.474	-0.132	-2.364	0.062
1302			2	1.055	0.225	1.474	-0.132	-1.811	-0.022
1303			3	1.055	0.225	1.474	-0.132	-1.259	-0.107
1304			4	1.055	0.225	1.474	-0.132	-0.706	-0.191
1305			5	1.055	0.225	1.474	-0.132	-0.154	-0.275
1306	10	M159	1	1.262	2.789	0.764	0	0	0
1307			2	1.262	2.789	0.764	0	6.929	-25.306
1308			3	-2.739	-0.688	-0.512	0.06	6.164	-22.703
1309			4	-1.256	-1.743	-0.363	0	2.569	-12.329
1310			5	0	0	0	0	0	0
1311	10	M175	1	3.492	-1.526	-4.045	0.021	7.162	-0.314
1312			2	3.492	-1.526	-4.045	0.021	5.645	0.258
1313			3	3.492	-1.526	-4.045	0.021	4.128	0.831
1314			4	3.492	-1.526	-4.045	0.021	2.611	1.403
1315			5	3.492	-1.526	-4.045	0.021	1.094	1.975
1316	10	M176	1	1.027	0.252	1.525	-0.129	-2.461	0.07

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1317			2	1.027	0.252	1.525	-0.129	-1.889	-0.025
1318			3	1.027	0.252	1.525	-0.129	-1.317	-0.119
1319			4	1.027	0.252	1.525	-0.129	-0.745	-0.213
1320			5	1.027	0.252	1.525	-0.129	-0.174	-0.308
1321	10	M177	1	1.295	2.791	0.78	0	0	0
1322			2	1.295	2.791	0.78	0	7.077	-25.322
1323			3	-2.824	-0.701	-0.534	0.058	6.218	-22.441
1324			4	-1.288	-1.728	-0.362	0	2.561	-12.22
1325			5	0	0	0	0	0	0
1326	10	M178	1	3.568	-1.551	-4.066	0.03	7.211	-0.32
1327			2	3.568	-1.551	-4.066	0.03	5.686	0.261
1328			3	3.568	-1.551	-4.066	0.03	4.161	0.843
1329			4	3.568	-1.551	-4.066	0.03	2.636	1.424
1330			5	3.568	-1.551	-4.066	0.03	1.112	2.006
1331	10	M179	1	0.849	0.259	1.508	-0.128	-2.443	0.073
1332			2	0.849	0.259	1.508	-0.128	-1.877	-0.025
1333			3	0.849	0.259	1.508	-0.128	-1.312	-0.122
1334			4	0.849	0.259	1.508	-0.128	-0.746	-0.219
1335			5	0.849	0.259	1.508	-0.128	-0.181	-0.316
1336	10	M180	1	1.314	2.774	0.792	0	0	0
1337			2	1.314	2.774	0.792	0	7.189	-25.164
1338			3	-2.827	-0.795	-0.546	0.054	6.289	-21.619
1339			4	-1.308	-1.644	-0.365	0	2.58	-11.626
1340			5	0	0	0	0	0	0
1341	10	M182	1	3.617	-1.567	-4.004	0.037	7.131	-0.322
1342			2	3.617	-1.567	-4.004	0.037	5.63	0.266
1343			3	3.617	-1.567	-4.004	0.037	4.128	0.853
1344			4	3.617	-1.567	-4.004	0.037	2.627	1.441
1345			5	3.617	-1.567	-4.004	0.037	1.125	2.028
1346	10	M183	1	0.492	0.257	1.433	-0.122	-2.33	0.072
1347			2	0.492	0.257	1.433	-0.122	-1.793	-0.024
1348			3	0.492	0.257	1.433	-0.122	-1.256	-0.12
1349			4	0.492	0.257	1.433	-0.122	-0.718	-0.216
1350			5	0.492	0.257	1.433	-0.122	-0.181	-0.313
1351	10	M186	1	1.321	2.668	0.805	0	0	0
1352			2	1.321	2.668	0.805	0	7.301	-24.208
1353			3	-2.759	-0.949	-0.553	0.049	6.39	-19.492
1354			4	-1.315	-1.44	-0.371	0	2.62	-10.188
1355			5	0	0	0	0	0	0
1356	10	M187	1	3.346	-1.553	-3.568	0.048	6.489	-0.297
1357			2	3.346	-1.553	-3.568	0.048	5.151	0.285
1358			3	3.346	-1.553	-3.568	0.048	3.813	0.867
1359			4	3.346	-1.553	-3.568	0.048	2.475	1.449
1360			5	3.346	-1.553	-3.568	0.048	1.137	2.032
1361	10	M188	1	0.069	0.228	1.031	-0.12	-1.724	0.05
1362			2	0.069	0.228	1.031	-0.12	-1.338	-0.036
1363			3	0.069	0.228	1.031	-0.12	-0.951	-0.121
1364			4	0.069	0.228	1.031	-0.12	-0.565	-0.207
1365			5	0.069	0.228	1.031	-0.12	-0.178	-0.293
1366	10	M189	1	1.304	2.329	0.814	0	0	0
1367			2	1.304	2.329	0.814	0	7.381	-21.127
1368			3	-2.34	-1.017	-0.552	0.04	6.488	-15.607
1369			4	-1.299	-1.086	-0.378	0	2.672	-7.681
1370			5	0	0	0	0	0	0
1371	10	M213	1	3.834	-1.421	-2.233	0.058	4.478	-0.223

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1372			2	3.834	-1.421	-2.233	0.058	3.641	0.31
1373			3	3.834	-1.421	-2.233	0.058	2.804	0.843
1374			4	3.834	-1.421	-2.233	0.058	1.966	1.376
1375			5	3.834	-1.421	-2.233	0.058	1.129	1.909
1376	10	M214	1	-1.057	0.093	-0.264	-0.094	-9.675	0.493
1377			2	-1.057	0.093	-0.264	-0.094	-9.774	0.458
1378			3	-1.057	0.093	-0.264	-0.094	-9.872	0.423
1379			4	-1.057	0.093	-0.264	-0.094	-9.971	0.389
1380			5	-1.057	0.093	-0.264	-0.094	-10.07	0.354
1381	11	M155	1	0	0	0	0	0	0
1382			2	2.135	-0.055	1.117	-0.003	-0.808	-1.623
1383			3	0.966	-0.651	2.324	0	1.721	-0.886
1384			4	-0.549	-0.781	2.831	0.001	1.334	-1.09
1385			5	-1.423	2.577	0.478	-0.064	0.209	-9.956
1386	11	M156	1	-1.68	-1.886	1.154	-0.036	-0.238	-3.508
1387			2	-1.985	0.281	2.063	0.001	0.046	-1.446
1388			3	0.04	-0.32	1.091	-0.001	1.787	-1.368
1389			4	2.518	-0.195	0.675	-0.003	1.594	-1.944
1390			5	0	0	0	0.293	0	0
1391	11	M157	1	2.361	0.493	-0.158	0	0	0
1392			2	2.697	0.063	-0.247	0	0.482	-0.849
1393			3	2.697	-0.056	-0.247	0	-0.015	-0.856
1394			4	2.697	-0.176	-0.247	0	-0.512	-0.623
1395			5	3.032	-0.641	-0.214	0	0	0
1396	11	M158	1	1.881	0.476	-0.411	0	0	0
1397			2	2.255	0.068	-0.346	0	0.669	-0.842
1398			3	2.255	-0.052	-0.346	0	-0.026	-0.857
1399			4	2.255	-0.172	-0.346	0	-0.721	-0.632
1400			5	2.611	-0.606	-0.426	-0.001	0	0
1401	11	M160	1	2.709	0.548	-0.159	0	0	0
1402			2	2.444	0.085	-0.239	0	0.47	-0.809
1403			3	2.444	-0.035	-0.239	0	-0.01	-0.86
1404			4	2.444	-0.154	-0.239	0	-0.489	-0.67
1405			5	2.151	-0.589	-0.182	0	0	0
1406	11	M161	1	2.735	0.502	-0.262	0	0	0
1407			2	3.294	0.083	-0.287	0	0.555	-0.813
1408			3	3.294	-0.036	-0.287	0	-0.021	-0.86
1409			4	3.294	-0.156	-0.287	0	-0.597	-0.667
1410			5	3.963	-0.629	-0.304	-0.001	0	0
1411	11	M162	1	1.401	0.502	-0.502	0	0	0
1412			2	1.51	0.096	-0.379	0	0.732	-0.789
1413			3	1.51	-0.023	-0.379	0	-0.03	-0.862
1414			4	1.51	-0.143	-0.379	0	-0.792	-0.695
1415			5	1.475	-0.553	-0.495	0	0	0
1416	11	M163	1	3.578	0.584	-0.312	-0.001	0	0
1417			2	2.921	0.111	-0.297	0	0.579	-0.762
1418			3	2.921	-0.009	-0.297	0	-0.018	-0.864
1419			4	2.921	-0.129	-0.297	0	-0.615	-0.726
1420			5	2.358	-0.547	-0.309	0	0	0
1421	11	M164	1	2.328	0.547	-0.14	0	0	0
1422			2	2.518	0.11	-0.235	0	0.457	-0.764
1423			3	2.518	-0.01	-0.235	0	-0.014	-0.864
1424			4	2.518	-0.129	-0.235	0	-0.485	-0.724
1425			5	2.67	-0.587	-0.185	0	0	0
1426	11	M165	1	2.208	0.523	-0.371	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1427			2	2.67	0.113	-0.327	0	0.632	-0.758
1428			3	2.67	-0.007	-0.327	0	-0.025	-0.865
1429			4	2.67	-0.126	-0.327	0	-0.682	-0.731
1430			5	3.173	-0.571	-0.387	-0.001	0	0
1431	11	M166	1	2.129	0.555	-0.442	0	0	0
1432			2	1.858	0.127	-0.353	0	0.681	-0.731
1433			3	1.858	0.008	-0.353	0	-0.027	-0.866
1434			4	1.858	-0.112	-0.353	0	-0.735	-0.762
1435			5	1.526	-0.521	-0.437	0	0	0
1436	11	M167	1	2.949	0.527	-0.366	0	0	0
1437			2	2.424	0.072	-0.332	0	0.648	-0.829
1438			3	2.424	-0.048	-0.332	0	-0.019	-0.853
1439			4	2.424	-0.167	-0.332	0	-0.687	-0.637
1440			5	1.941	-0.58	-0.387	0	0	0
1441	11	M168	1	2.422	0.516	-0.154	0	0	0
1442			2	2.352	0.062	-0.247	0	0.486	-0.85
1443			3	2.352	-0.058	-0.247	0	-0.01	-0.853
1444			4	2.352	-0.178	-0.247	0	-0.506	-0.616
1445			5	2.235	-0.621	-0.203	0	0	0
1446	11	M169	1	2.551	0.468	-0.319	0	0	0
1447			2	3.087	0.052	-0.316	0	0.614	-0.868
1448			3	3.087	-0.067	-0.316	0	-0.022	-0.853
1449			4	3.087	-0.187	-0.316	0	-0.657	-0.598
1450			5	3.718	-0.653	-0.364	-0.001	0	0
1451	11	M170	1	1.579	0.474	-0.493	0	0	0
1452			2	1.521	0.061	-0.381	0	0.737	-0.853
1453			3	1.521	-0.059	-0.381	0	-0.028	-0.854
1454			4	1.521	-0.179	-0.381	0	-0.794	-0.615
1455			5	1.333	-0.586	-0.496	0	0	0
1456	11	M171	1	3.473	0.544	-0.26	-0.001	0	0
1457			2	2.865	0.068	-0.281	0	0.551	-0.839
1458			3	2.865	-0.051	-0.281	0	-0.014	-0.856
1459			4	2.865	-0.171	-0.281	0	-0.579	-0.633
1460			5	2.332	-0.593	-0.273	0	0	0
1461	11	M172	1	1.553	0.481	-0.456	0	0	0
1462			2	1.809	0.073	-0.374	0	0.726	-0.825
1463			3	1.809	-0.046	-0.374	0	-0.025	-0.852
1464			4	1.809	-0.166	-0.374	0	-0.776	-0.639
1465			5	1.988	-0.59	-0.484	0	0	0
1466	11	M173	1	-0.223	-1.662	0.374	4.144	-0.377	-5.227
1467			2	0.149	-0.027	0.846	-11.506	0.04	-0.022
1468			3	-0.016	0.172	0.228	-12.539	-0.195	0.084
1469			4	-0.163	-0.024	0.837	-17.418	0.037	-0.021
1470			5	0.322	-2.898	0	0	0	-0.321
1471	11	M174	1	-1.881	-1.63	0.675	-9.917	-0.691	-5.496
1472			2	-0.382	-0.008	0.827	-16.246	0.044	-0.043
1473			3	0.082	0.137	0.31	-13.163	-0.274	0.03
1474			4	0.559	-0.003	0.827	-14.472	0.042	-0.056
1475			5	1.974	-2.422	0	0	0.001	-0.161
1476	11	M181	1	3.041	0.607	-0.198	0	0	0
1477			2	2.617	0.135	-0.251	0	0.491	-0.717
1478			3	2.617	0.015	-0.251	0	-0.012	-0.868
1479			4	2.617	-0.105	-0.251	0	-0.515	-0.778
1480			5	2.207	-0.535	-0.209	0	0	0
1481	11	M184	1	-1.886	-2.029	-0.195	-0.238	1.962	0.043

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1482			2	-1.886	-2.029	-0.195	-0.238	1.889	0.803
1483			3	-1.886	-2.029	-0.195	-0.238	1.816	1.564
1484			4	-1.886	-2.029	-0.195	-0.238	1.743	2.325
1485			5	-1.886	-2.029	-0.195	-0.238	1.669	3.085
1486	11	M190	1	2.606	0.554	-0.218	0	0	0
1487			2	3.099	0.132	-0.266	0	0.516	-0.723
1488			3	3.099	0.012	-0.266	0	-0.019	-0.868
1489			4	3.099	-0.108	-0.266	0	-0.554	-0.772
1490			5	3.661	-0.579	-0.26	-0.001	0	0
1491	11	M191	1	1.587	0.545	-0.477	0	0	0
1492			2	1.816	0.14	-0.367	0	0.707	-0.707
1493			3	1.816	0.021	-0.367	0	-0.029	-0.869
1494			4	1.816	-0.099	-0.367	0	-0.766	-0.79
1495			5	1.949	-0.518	-0.472	0	0	0
1496	11	M192	1	3.203	0.612	-0.343	-0.001	0	0
1497			2	2.593	0.151	-0.31	0	0.6	-0.686
1498			3	2.593	0.032	-0.31	0	-0.022	-0.87
1499			4	2.593	-0.088	-0.31	0	-0.645	-0.813
1500			5	2.065	-0.501	-0.347	0	0	0
1501	11	M193	1	2.06	0.596	-0.097	0	0	0
1502			2	1.983	0.145	-0.211	0	0.415	-0.698
1503			3	1.983	0.026	-0.211	0	-0.009	-0.87
1504			4	1.983	-0.094	-0.211	0	-0.432	-0.801
1505			5	1.811	-0.533	-0.131	0	0	0
1506	11	M194	1	2.749	0.55	-0.285	0	0	0
1507			2	3.352	0.136	-0.29	0	0.561	-0.716
1508			3	3.352	0.016	-0.29	0	-0.02	-0.869
1509			4	3.352	-0.103	-0.29	0	-0.602	-0.782
1510			5	4.092	-0.575	-0.312	-0.001	0	0
1511	11	M195	1	1.441	0.551	-0.525	0	0	0
1512			2	1.504	0.146	-0.384	0	0.74	-0.698
1513			3	1.504	0.026	-0.384	0	-0.031	-0.87
1514			4	1.504	-0.094	-0.384	0	-0.803	-0.802
1515			5	1.413	-0.501	-0.511	0	0	0
1516	11	M196	1	3.668	0.636	-0.297	-0.001	0	0
1517			2	2.958	0.155	-0.289	0	0.561	-0.68
1518			3	2.958	0.035	-0.289	0	-0.019	-0.871
1519			4	2.958	-0.084	-0.289	0	-0.598	-0.822
1520			5	2.369	-0.503	-0.3	0	0	0
1521	11	M197	1	1.919	0.58	-0.101	0	0	0
1522			2	2.096	0.146	-0.214	0	0.419	-0.697
1523			3	2.096	0.026	-0.214	0	-0.011	-0.87
1524			4	2.096	-0.093	-0.214	0	-0.442	-0.803
1525			5	2.185	-0.546	-0.146	0	0	0
1526	11	M198	1	2.44	0.55	-0.354	0	0	0
1527			2	2.971	0.141	-0.316	0	0.611	-0.707
1528			3	2.971	0.021	-0.316	0	-0.023	-0.87
1529			4	2.971	-0.098	-0.316	0	-0.657	-0.792
1530			5	3.593	-0.552	-0.368	-0.001	0	0
1531	11	M199	1	1.904	0.572	-0.484	0	0	0
1532			2	1.728	0.152	-0.366	0	0.706	-0.686
1533			3	1.728	0.032	-0.366	0	-0.03	-0.871
1534			4	1.728	-0.087	-0.366	0	-0.765	-0.816
1535			5	1.456	-0.495	-0.474	0	0	0
1536	11	M200	1	3.251	0.637	-0.214	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1537			2	2.667	0.158	-0.255	0	0.497	-0.673
1538			3	2.667	0.039	-0.255	0	-0.014	-0.871
1539			4	2.667	-0.081	-0.255	0	-0.525	-0.829
1540			5	2.146	-0.505	-0.228	0	0	0
1541	11	M201	1	2.11	0.576	-0.128	0	0	0
1542			2	2.469	0.15	-0.225	0	0.44	-0.69
1543			3	2.469	0.03	-0.225	0	-0.013	-0.871
1544			4	2.469	-0.09	-0.225	0	-0.466	-0.811
1545			5	2.809	-0.553	-0.174	0	0	0
1546	11	M202	1	2.037	0.556	-0.413	0	0	0
1547			2	2.47	0.151	-0.338	0	0.654	-0.688
1548			3	2.47	0.031	-0.338	0	-0.026	-0.871
1549			4	2.47	-0.089	-0.338	0	-0.705	-0.813
1550			5	2.915	-0.525	-0.417	-0.001	0	0
1551	11	M203	1	2.896	0.589	-0.218	0	0	0
1552			2	2.459	0.115	-0.277	0.001	0.547	-0.744
1553			3	2.459	-0.005	-0.277	0.001	-0.008	-0.854
1554			4	2.459	-0.125	-0.277	0.001	-0.564	-0.724
1555			5	2.044	-0.552	-0.27	0	0	0
1556	11	M204	1	2.356	0.509	-0.211	0	0	0
1557			2	2.781	0.085	-0.28	0	0.548	-0.801
1558			3	2.781	-0.034	-0.28	0	-0.015	-0.853
1559			4	2.781	-0.154	-0.28	0	-0.577	-0.664
1560			5	3.249	-0.625	-0.288	0	0	0
1561	11	M205	1	1.808	0.563	-0.443	0	0	0
1562			2	1.602	0.139	-0.372	0	0.726	-0.698
1563			3	1.602	0.019	-0.372	0	-0.022	-0.856
1564			4	1.602	-0.101	-0.372	0	-0.769	-0.774
1565			5	1.32	-0.51	-0.487	0	0	0
1566	11	M206	1	1.97	0.649	-0.169	0.001	0	0
1567			2	2.091	0.209	-0.266	0.001	0.529	-0.56
1568			3	2.091	0.089	-0.266	0.001	-0.006	-0.86
1569			4	2.091	-0.03	-0.266	0.001	-0.54	-0.92
1570			5	2.17	-0.484	-0.272	0	0	0
1571	11	M207	1	2.032	0.573	-0.363	0.001	0	0
1572			2	2.453	0.164	-0.344	0.001	0.673	-0.648
1573			3	2.453	0.044	-0.344	0.001	-0.018	-0.857
1574			4	2.453	-0.075	-0.344	0.001	-0.709	-0.826
1575			5	2.918	-0.524	-0.437	0	0	0
1576	11	M218	1	2.487	0.601	-0.43	0	0	0
1577			2	2.096	0.164	-0.344	0	0.665	-0.663
1578			3	2.096	0.044	-0.344	0	-0.027	-0.872
1579			4	2.096	-0.076	-0.344	0	-0.718	-0.84
1580			5	1.687	-0.485	-0.427	0	0	0
1581	11	M208	1	2.76	0.739	-0.305	0	0	0
1582			2	2.261	0.265	-0.318	0.001	0.629	-0.453
1583			3	2.261	0.145	-0.318	0.001	-0.008	-0.864
1584			4	2.261	0.025	-0.318	0.001	-0.646	-1.035
1585			5	1.816	-0.398	-0.388	0	0	0
1586	11	M219	1	2.725	0.637	-0.151	0	0	0
1587			2	2.336	0.167	-0.231	0	0.452	-0.657
1588			3	2.336	0.047	-0.231	0	-0.011	-0.872
1589			4	2.336	-0.073	-0.231	0	-0.474	-0.846
1590			5	1.937	-0.503	-0.176	0	0	0
1591	11	M209	1	1.982	0.778	-0.255	0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1592			2	2.387	0.37	-0.303	0.001	0.602	-0.249
1593			3	2.387	0.25	-0.303	0.001	-0.005	-0.872
1594			4	2.387	0.131	-0.303	0.001	-0.613	-1.254
1595			5	2.855	-0.318	-0.398	0	0	0
1596	11	M210	1	1.148	0.717	-0.44	0.001	0	0
1597			2	1.256	0.313	-0.375	0.001	0.738	-0.36
1598			3	1.256	0.193	-0.375	0.001	-0.015	-0.868
1599			4	1.256	0.074	-0.375	0.001	-0.769	-1.136
1600			5	1.258	-0.341	-0.533	0	0	0
1601	11	M220	1	2.415	0.58	-0.186	0	0	0
1602			2	2.908	0.16	-0.25	0	0.487	-0.671
1603			3	2.908	0.04	-0.25	0	-0.016	-0.871
1604			4	2.908	-0.08	-0.25	0	-0.518	-0.831
1605			5	3.459	-0.551	-0.228	0	0	0
1606	11	M211	1	1.833	0.888	-0.171	0	0	0
1607			2	1.664	0.445	-0.262	0.001	0.532	-0.104
1608			3	1.664	0.325	-0.262	0.001	0.006	-0.878
1609			4	1.664	0.206	-0.262	0.001	-0.521	-1.411
1610			5	1.46	-0.201	-0.322	0.001	0	0
1611	11	M212	1	1.562	0.924	-0.306	0.001	0	0
1612			2	1.345	0.522	-0.316	0.001	0.634	0.045
1613			3	1.345	0.403	-0.316	0.001	0	-0.884
1614			4	1.345	0.283	-0.316	0.001	-0.634	-1.572
1615			5	1.099	-0.106	-0.472	0	0	0
1616	11	M264	1	1.669	0.573	-0.472	0	0	0
1617			2	1.971	0.167	-0.364	0	0.702	-0.656
1618			3	1.971	0.048	-0.364	0	-0.028	-0.872
1619			4	1.971	-0.072	-0.364	0	-0.759	-0.847
1620			5	2.2	-0.496	-0.469	0	0	0
1621	11	M265	1	3.102	0.641	-0.374	-0.001	0	0
1622			2	2.528	0.182	-0.324	0	0.626	-0.628
1623			3	2.528	0.062	-0.324	0	-0.023	-0.873
1624			4	2.528	-0.058	-0.324	0	-0.673	-0.877
1625			5	2.018	-0.471	-0.378	0	0	0
1626	11	M266	1	2.19	0.636	-0.115	0	0	0
1627			2	2.046	0.181	-0.221	0	0.434	-0.63
1628			3	2.046	0.061	-0.221	0	-0.009	-0.872
1629			4	2.046	-0.059	-0.221	0	-0.452	-0.874
1630			5	1.822	-0.496	-0.151	0	0	0
1631	11	M267	1	2.686	0.588	-0.273	0	0	0
1632			2	3.276	0.175	-0.289	0	0.56	-0.64
1633			3	3.276	0.055	-0.289	0	-0.019	-0.872
1634			4	3.276	-0.064	-0.289	0	-0.599	-0.863
1635			5	3.992	-0.536	-0.308	-0.001	0	0
1636	11	M268	1	1.462	0.593	-0.525	0	0	0
1637			2	1.567	0.188	-0.389	0	0.75	-0.616
1638			3	1.567	0.068	-0.389	0	-0.031	-0.872
1639			4	1.567	-0.052	-0.389	0	-0.812	-0.889
1640			5	1.531	-0.464	-0.518	0	0	0
1641	11	M277	1	3.57	0.684	-0.321	-0.001	0	0
1642			2	2.887	0.201	-0.304	0	0.592	-0.589
1643			3	2.887	0.082	-0.304	0	-0.019	-0.873
1644			4	2.887	-0.038	-0.304	0	-0.63	-0.917
1645			5	2.319	-0.457	-0.33	0	0	0
1646	11	M278	1	1.906	0.631	-0.111	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1647			2	2.027	0.195	-0.225	0	0.441	-0.602
1648			3	2.027	0.075	-0.225	0	-0.01	-0.872
1649			4	2.027	-0.045	-0.225	0	-0.462	-0.903
1650			5	2.056	-0.494	-0.161	0	0	0
1651	11	M280A	1	2.623	0.521	-0.4	0	0	0
1652			2	2.207	0.081	-0.338	0	0.654	-0.817
1653			3	2.207	-0.039	-0.338	0	-0.024	-0.859
1654			4	2.207	-0.158	-0.338	0	-0.703	-0.661
1655			5	1.784	-0.568	-0.403	0	0	0
1656	11	M251A	1	0.322	0.163	0	0	0	0
1657			2	0.322	0.163	0	0	0	-0.08
1658			3	0.322	0.163	0	0	0	-0.16
1659			4	0.322	0.163	0	0	0	-0.24
1660			5	0.322	0.163	0	0	0	-0.321
1661	11	M253A	1	1.974	0.082	0	0	0	0
1662			2	1.974	0.082	0	0	0	-0.04
1663			3	1.974	0.082	0	0	0	-0.08
1664			4	1.974	0.082	0	0	0	-0.121
1665			5	1.974	0.082	0	0	-0.001	-0.161
1666	11	M277A	1	1.207	1.135	-0.291	0.004	0	0
1667			2	1.464	0.609	-0.307	0.002	0.62	0.212
1668			3	1.464	0.489	-0.307	0.002	0.005	-0.891
1669			4	1.464	0.37	-0.307	0.002	-0.611	-1.753
1670			5	1.709	-0.231	-0.487	-0.004	0	0
1671	11	M263A	1	-0.394	-2.53	0	0	0	-5.344
1672			2	-0.394	-2.53	0	0	0	-4.035
1673			3	-0.394	-2.53	0	0	0	-2.725
1674			4	-0.394	-2.53	0	0	0	-1.416
1675			5	-0.394	-2.53	0	0	0	-0.107
1676	11	M264A	1	-0.394	-0.055	0	0	0	-0.107
1677			2	-0.394	-0.055	0	0	0	-0.081
1678			3	-0.394	-0.055	0	0	0	-0.054
1679			4	-0.394	-0.055	0	0	0	-0.027
1680			5	-0.394	-0.055	0	0	0	0
1681	11	M265A	1	-1.982	-2.659	0	0	-0.001	-5.619
1682			2	-1.982	-2.659	0	0	-0.001	-4.243
1683			3	-1.982	-2.659	0	0	-0.001	-2.867
1684			4	-1.982	-2.659	0	0	-0.001	-1.491
1685			5	-1.982	-2.659	0	0	0	-0.115
1686	11	M266A	1	-1.982	-0.058	0	0	0	-0.115
1687			2	-1.982	-0.058	0	0	0	-0.086
1688			3	-1.982	-0.058	0	0	0	-0.057
1689			4	-1.982	-0.058	0	0	0	-0.029
1690			5	-1.982	-0.058	0	0	0	0
1691	11	M131	1	2.508	0.597	-0.348	0	0	0
1692			2	3.054	0.19	-0.322	0	0.624	-0.611
1693			3	3.054	0.07	-0.322	0	-0.022	-0.872
1694			4	3.054	-0.05	-0.322	0	-0.668	-0.892
1695			5	3.706	-0.507	-0.374	-0.001	0	0
1696	11	M132	1	1.735	0.617	-0.507	0	0	0
1697			2	1.627	0.2	-0.385	0	0.743	-0.59
1698			3	1.627	0.08	-0.385	0	-0.03	-0.872
1699			4	1.627	-0.039	-0.385	0	-0.803	-0.913
1700			5	1.408	-0.448	-0.508	0	0	0
1701	11	M133	1	3.308	0.69	-0.251	-0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1702			2	2.694	0.205	-0.28	0	0.547	-0.581
1703			3	2.694	0.085	-0.28	0	-0.015	-0.872
1704			4	2.694	-0.035	-0.28	0	-0.576	-0.923
1705			5	2.161	-0.459	-0.274	0	0	0
1706	11	M134	1	2.005	0.617	-0.137	0	0	0
1707			2	2.317	0.189	-0.24	0	0.47	-0.61
1708			3	2.317	0.07	-0.24	0	-0.012	-0.87
1709			4	2.317	-0.05	-0.24	0	-0.494	-0.89
1710			5	2.596	-0.513	-0.198	0	0	0
1711	11	M135	1	2.06	0.584	-0.409	0	0	0
1712			2	2.518	0.18	-0.349	0	0.677	-0.628
1713			3	2.518	0.06	-0.349	0	-0.024	-0.869
1714			4	2.518	-0.06	-0.349	0	-0.725	-0.869
1715			5	3.011	-0.502	-0.435	0	0	0
1716	11	M136	1	2.215	0.614	-0.458	0	0	0
1717			2	1.889	0.179	-0.368	0	0.714	-0.628
1718			3	1.889	0.06	-0.368	0	-0.026	-0.868
1719			4	1.889	-0.06	-0.368	0	-0.766	-0.868
1720			5	1.527	-0.469	-0.475	0	0	0
1721	11	M137	1	2.697	0.639	-0.192	0	0	0
1722			2	2.275	0.165	-0.26	0.001	0.512	-0.655
1723			3	2.275	0.046	-0.26	0.001	-0.01	-0.866
1724			4	2.275	-0.074	-0.26	0.001	-0.533	-0.838
1725			5	1.865	-0.502	-0.239	0	0	0
1726	11	M138	1	2.178	0.556	-0.189	0	0	0
1727			2	2.601	0.133	-0.264	0.001	0.518	-0.716
1728			3	2.601	0.013	-0.264	0.001	-0.012	-0.863
1729			4	2.601	-0.106	-0.264	0.001	-0.543	-0.77
1730			5	3.062	-0.579	-0.261	0	0	0
1731	11	M139	1	1.625	0.515	-0.453	0	0	0
1732			2	1.938	0.108	-0.37	0	0.718	-0.763
1733			3	1.938	-0.011	-0.37	0	-0.024	-0.86
1734			4	1.938	-0.131	-0.37	0	-0.766	-0.717
1735			5	2.212	-0.56	-0.491	0	0	0
1736	11	M140	1	2.583	0.534	-0.398	0	0	0
1737			2	2.12	0.084	-0.346	0.001	0.675	-0.808
1738			3	2.12	-0.035	-0.346	0.001	-0.02	-0.857
1739			4	2.12	-0.155	-0.346	0.001	-0.715	-0.666
1740			5	1.698	-0.564	-0.444	0.001	0	0
1741	11	M141	1	2.03	0.495	-0.155	0	0	0
1742			2	1.818	0.038	-0.248	0.001	0.493	-0.896
1743			3	1.818	-0.082	-0.248	0.001	-0.005	-0.852
1744			4	1.818	-0.201	-0.248	0.001	-0.503	-0.568
1745			5	1.559	-0.632	-0.237	0.001	0	0
1746	11	M142	1	2.221	0.396	-0.242	0	0	0
1747			2	2.681	-0.025	-0.286	0.001	0.563	-1.016
1748			3	2.681	-0.145	-0.286	0.001	-0.011	-0.845
1749			4	2.681	-0.265	-0.286	0.001	-0.585	-0.434
1750			5	3.239	-0.743	-0.338	0	0	0
1751	11	M143	1	1.257	0.329	-0.454	0	0	0
1752			2	1.38	-0.083	-0.369	0.001	0.722	-1.126
1753			3	1.38	-0.203	-0.369	0.001	-0.019	-0.839
1754			4	1.38	-0.323	-0.369	0.001	-0.76	-0.312
1755			5	1.415	-0.737	-0.529	0.001	0	0
1756	11	M144	1	2.644	0.3	-0.314	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1757			2	2.125	-0.15	-0.309	0.001	0.611	-1.254
1758			3	2.125	-0.27	-0.309	0.001	-0.009	-0.832
1759			4	2.125	-0.39	-0.309	0.001	-0.629	-0.17
1760			5	1.695	-0.792	-0.414	0.001	0	0
1761	11	M145	1	1.459	0.176	-0.112	0.001	0	0
1762			2	1.436	-0.243	-0.228	0.002	0.46	-1.43
1763			3	1.436	-0.362	-0.228	0.002	0.003	-0.823
1764			4	1.436	-0.482	-0.228	0.002	-0.454	0.025
1765			5	1.358	-0.891	-0.261	0.001	0	0
1766	11	M146	1	1.815	0.042	-0.225	0	0	0
1767			2	2.161	-0.342	-0.271	0.002	0.545	-1.619
1768			3	2.161	-0.461	-0.271	0.002	0	-0.813
1769			4	2.161	-0.581	-0.271	0.002	-0.545	0.233
1770			5	2.605	-1.015	-0.386	0.001	0	0
1771	11	M147	1	1.033	0.115	-0.343	-0.003	0	0
1772			2	1.006	-0.424	-0.315	0.001	0.63	-1.775
1773			3	1.006	-0.543	-0.315	0.001	-0.002	-0.804
1774			4	1.006	-0.663	-0.315	0.001	-0.634	0.407
1775			5	0.916	-1.222	-0.511	0.004	0	0
1776	11	M88	1	-0.069	-2.172	-4.377	-0.149	8.207	-0.297
1777			2	-0.069	-2.172	-4.377	-0.149	6.566	0.517
1778			3	-0.069	-2.172	-4.377	-0.149	4.925	1.332
1779			4	-0.069	-2.172	-4.377	-0.149	3.283	2.146
1780			5	-0.069	-2.172	-4.377	-0.149	1.642	2.961
1781	11	M89	1	3.857	2.026	4.332	-0.166	-8.024	0.288
1782			2	3.857	2.026	4.332	-0.166	-6.4	-0.472
1783			3	3.857	2.026	4.332	-0.166	-4.775	-1.231
1784			4	3.857	2.026	4.332	-0.166	-3.151	-1.991
1785			5	3.857	2.026	4.332	-0.166	-1.526	-2.75
1786	11	M90	1	0.031	6.449	0.552	0	0	0
1787			2	0.031	3.794	0.552	0	5.009	-46.464
1788			3	-4.453	1.208	-1.39	0.129	-1.528	-61.045
1789			4	-0.021	-5.304	0.409	0	-2.894	-44.245
1790			5	0	0	0	0	0	0
1791	11	M91	1	1.9	-2.426	-6.163	-0.166	11.046	-0.422
1792			2	1.9	-2.426	-6.163	-0.166	8.735	0.488
1793			3	1.9	-2.426	-6.163	-0.166	6.424	1.398
1794			4	1.9	-2.426	-6.163	-0.166	4.112	2.308
1795			5	1.9	-2.426	-6.163	-0.166	1.801	3.217
1796	11	M92	1	3.521	2.157	5.922	-0.191	-10.463	0.392
1797			2	3.521	2.157	5.922	-0.191	-8.243	-0.417
1798			3	3.521	2.157	5.922	-0.191	-6.022	-1.226
1799			4	3.521	2.157	5.922	-0.191	-3.801	-2.035
1800			5	3.521	2.157	5.922	-0.191	-1.58	-2.844
1801	11	M93	1	0.134	7.604	0.636	0	0	0
1802			2	0.134	4.949	0.636	0	5.77	-56.941
1803			3	-6.148	0.394	-1.466	0.152	-0.956	-67.297
1804			4	-0.121	-5.781	0.381	0	-2.695	-47.624
1805			5	0	0	0	0	0	0
1806	11	M94	1	2.943	-2.646	-7.226	-0.167	12.777	-0.498
1807			2	2.943	-2.646	-7.226	-0.167	10.067	0.495
1808			3	2.943	-2.646	-7.226	-0.167	7.357	1.487
1809			4	2.943	-2.646	-7.226	-0.167	4.648	2.479
1810			5	2.943	-2.646	-7.226	-0.167	1.938	3.471
1811	11	M95	1	3.215	2.274	6.779	-0.186	-11.811	0.447

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1812			2	3.215	2.274	6.779	-0.186	-9.269	-0.405
1813			3	3.215	2.274	6.779	-0.186	-6.727	-1.258
1814			4	3.215	2.274	6.779	-0.186	-4.185	-2.111
1815			5	3.215	2.274	6.779	-0.186	-1.643	-2.963
1816	11	M96	1	0.24	8.171	0.715	0	0	0
1817			2	0.24	5.517	0.715	0	6.484	-62.089
1818			3	-7.114	-0.082	-1.552	0.166	-0.516	-69.581
1819			4	-0.225	-5.951	0.367	0	-2.595	-48.825
1820			5	0	0	0	0	0	0
1821	11	M100	1	3.335	-2.812	-7.879	-0.146	13.861	-0.548
1822			2	3.335	-2.812	-7.879	-0.146	10.906	0.506
1823			3	3.335	-2.812	-7.879	-0.146	7.951	1.561
1824			4	3.335	-2.812	-7.879	-0.146	4.997	2.616
1825			5	3.335	-2.812	-7.879	-0.146	2.042	3.67
1826	11	M101	1	3.046	2.37	7.268	-0.196	-12.603	0.483
1827			2	3.046	2.37	7.268	-0.196	-9.878	-0.406
1828			3	3.046	2.37	7.268	-0.196	-7.152	-1.295
1829			4	3.046	2.37	7.268	-0.196	-4.427	-2.184
1830			5	3.046	2.37	7.268	-0.196	-1.701	-3.072
1831	11	M102	1	0.325	8.368	0.774	0	0	0
1832			2	0.325	5.713	0.774	0	7.017	-63.874
1833			3	-7.69	-0.277	-1.625	0.172	-0.268	-69.704
1834			4	-0.308	-5.977	0.364	0	-2.572	-49.011
1835			5	0	0	0	0	0	0
1836	11	M103	1	3.395	-2.938	-8.335	-0.149	14.622	-0.587
1837			2	3.395	-2.938	-8.335	-0.149	11.497	0.514
1838			3	3.395	-2.938	-8.335	-0.149	8.371	1.616
1839			4	3.395	-2.938	-8.335	-0.149	5.245	2.718
1840			5	3.395	-2.938	-8.335	-0.149	2.119	3.819
1841	11	M104	1	2.992	2.452	7.597	-0.187	-13.148	0.511
1842			2	2.992	2.452	7.597	-0.187	-10.299	-0.409
1843			3	2.992	2.452	7.597	-0.187	-7.45	-1.328
1844			4	2.992	2.452	7.597	-0.187	-4.602	-2.247
1845			5	2.992	2.452	7.597	-0.187	-1.753	-3.167
1846	11	M105	1	0.39	8.393	0.815	0	0	0
1847			2	0.39	5.738	0.815	0	7.391	-64.095
1848			3	-8.088	-0.313	-1.686	0.172	-0.13	-69.022
1849			4	-0.373	-5.959	0.367	0	-2.597	-48.882
1850			5	0	0	0	0	0	0
1851	11	M106	1	3.305	-3.007	-8.301	-0.131	14.627	-0.588
1852			2	3.305	-3.007	-8.301	-0.131	11.514	0.54
1853			3	3.305	-3.007	-8.301	-0.131	8.401	1.668
1854			4	3.305	-3.007	-8.301	-0.131	5.288	2.795
1855			5	3.305	-3.007	-8.301	-0.131	2.176	3.923
1856	11	M107	1	2.997	2.497	7.482	-0.186	-13.019	0.504
1857			2	2.997	2.497	7.482	-0.186	-10.213	-0.432
1858			3	2.997	2.497	7.482	-0.186	-7.407	-1.368
1859			4	2.997	2.497	7.482	-0.186	-4.602	-2.304
1860			5	2.997	2.497	7.482	-0.186	-1.796	-3.241
1861	11	M108	1	0.431	8.34	0.841	0	0	0
1862			2	0.431	5.685	0.841	0	7.634	-63.619
1863			3	-8.016	-0.275	-1.73	0.172	-0.089	-68.609
1864			4	-0.414	-5.926	0.374	0	-2.645	-48.651
1865			5	0	0	0	0	0	0
1866	11	M109	1	3.211	-3.076	-8.561	-0.131	15.058	-0.611

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1867			2	3.211	-3.076	-8.561	-0.131	11.848	0.542
1868			3	3.211	-3.076	-8.561	-0.131	8.637	1.695
1869			4	3.211	-3.076	-8.561	-0.131	5.427	2.849
1870			5	3.211	-3.076	-8.561	-0.131	2.217	4.002
1871	11	M110	1	3.069	2.551	7.686	-0.193	-13.358	0.523
1872			2	3.069	2.551	7.686	-0.193	-10.475	-0.434
1873			3	3.069	2.551	7.686	-0.193	-7.593	-1.39
1874			4	3.069	2.551	7.686	-0.193	-4.711	-2.347
1875			5	3.069	2.551	7.686	-0.193	-1.829	-3.303
1876	11	M111	1	0.46	8.31	0.86	0	0	0
1877			2	0.46	5.655	0.86	0	7.8	-63.345
1878			3	-8.25	-0.212	-1.766	0.171	-0.085	-68.192
1879			4	-0.442	-5.935	0.381	0	-2.696	-48.708
1880			5	0	0	0	0	0	0
1881	11	M112	1	3.119	-3.098	-8.333	-0.132	14.746	-0.595
1882			2	3.119	-3.098	-8.333	-0.132	11.621	0.567
1883			3	3.119	-3.098	-8.333	-0.132	8.496	1.728
1884			4	3.119	-3.098	-8.333	-0.132	5.371	2.89
1885			5	3.119	-3.098	-8.333	-0.132	2.246	4.052
1886	11	M113	1	3.138	2.564	7.417	-0.182	-12.979	0.503
1887			2	3.138	2.564	7.417	-0.182	-10.198	-0.459
1888			3	3.138	2.564	7.417	-0.182	-7.416	-1.42
1889			4	3.138	2.564	7.417	-0.182	-4.635	-2.382
1890			5	3.138	2.564	7.417	-0.182	-1.854	-3.344
1891	11	M114	1	0.48	8.279	0.871	0	0	0
1892			2	0.48	5.624	0.871	0	7.906	-63.064
1893			3	-8.004	-0.15	-1.789	0.171	-0.078	-68.5
1894			4	-0.463	-5.943	0.386	0	-2.733	-48.766
1895			5	0	0	0	0	0	0
1896	11	M115	1	3.104	-3.13	-8.483	-0.124	14.989	-0.607
1897			2	3.104	-3.13	-8.483	-0.124	11.808	0.567
1898			3	3.104	-3.13	-8.483	-0.124	8.627	1.74
1899			4	3.104	-3.13	-8.483	-0.124	5.446	2.914
1900			5	3.104	-3.13	-8.483	-0.124	2.265	4.088
1901	11	M116	1	3.22	2.591	7.538	-0.186	-13.178	0.513
1902			2	3.22	2.591	7.538	-0.186	-10.351	-0.458
1903			3	3.22	2.591	7.538	-0.186	-7.524	-1.43
1904			4	3.22	2.591	7.538	-0.186	-4.698	-2.401
1905			5	3.22	2.591	7.538	-0.186	-1.871	-3.373
1906	11	M117	1	0.495	8.302	0.88	0	0	0
1907			2	0.495	5.647	0.88	0	7.982	-63.272
1908			3	-8.14	-0.112	-1.805	0.171	-0.083	-68.763
1909			4	-0.477	-5.986	0.39	0	-2.759	-49.072
1910			5	0	0	0	0	0	0
1911	11	M118	1	3.119	-3.166	-8.768	-0.128	15.434	-0.631
1912			2	3.119	-3.166	-8.768	-0.128	12.146	0.557
1913			3	3.119	-3.166	-8.768	-0.128	8.858	1.744
1914			4	3.119	-3.166	-8.768	-0.128	5.57	2.931
1915			5	3.119	-3.166	-8.768	-0.128	2.283	4.119
1916	11	M119	1	3.306	2.622	7.826	-0.189	-13.62	0.536
1917			2	3.306	2.622	7.826	-0.189	-10.686	-0.447
1918			3	3.306	2.622	7.826	-0.189	-7.751	-1.43
1919			4	3.306	2.622	7.826	-0.189	-4.816	-2.413
1920			5	3.306	2.622	7.826	-0.189	-1.882	-3.396
1921	11	M120	1	0.495	8.344	0.883	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1922			2	0.495	5.689	0.883	0	8.014	-63.651
1923			3	-8.429	-0.083	-1.818	0.171	-0.091	-68.998
1924			4	-0.477	-6.044	0.393	0	-2.781	-49.48
1925			5	0	0	0	0	0	0
1926	11	M121	1	3.114	-3.151	-8.6	-0.131	15.179	-0.616
1927			2	3.114	-3.151	-8.6	-0.131	11.954	0.565
1928			3	3.114	-3.151	-8.6	-0.131	8.729	1.747
1929			4	3.114	-3.151	-8.6	-0.131	5.504	2.929
1930			5	3.114	-3.151	-8.6	-0.131	2.279	4.11
1931	11	M122	1	3.344	2.609	7.652	-0.179	-13.358	0.521
1932			2	3.344	2.609	7.652	-0.179	-10.489	-0.457
1933			3	3.344	2.609	7.652	-0.179	-7.619	-1.435
1934			4	3.344	2.609	7.652	-0.179	-4.75	-2.414
1935			5	3.344	2.609	7.652	-0.179	-1.88	-3.392
1936	11	M123	1	0.497	8.357	0.884	0	0	0
1937			2	0.497	5.702	0.884	0	8.023	-63.769
1938			3	-8.257	-0.068	-1.815	0.172	-0.08	-69.504
1939			4	-0.479	-6.065	0.393	0	-2.776	-49.634
1940			5	0	0	0	0	0	0
1941	11	M124	1	3.104	-3.136	-8.535	-0.123	15.072	-0.609
1942			2	3.104	-3.136	-8.535	-0.123	11.872	0.567
1943			3	3.104	-3.136	-8.535	-0.123	8.671	1.743
1944			4	3.104	-3.136	-8.535	-0.123	5.47	2.918
1945			5	3.104	-3.136	-8.535	-0.123	2.27	4.094
1946	11	M125	1	3.39	2.597	7.596	-0.182	-13.268	0.516
1947			2	3.39	2.597	7.596	-0.182	-10.419	-0.458
1948			3	3.39	2.597	7.596	-0.182	-7.571	-1.432
1949			4	3.39	2.597	7.596	-0.182	-4.722	-2.406
1950			5	3.39	2.597	7.596	-0.182	-1.873	-3.38
1951	11	M126	1	0.491	8.368	0.881	0	0	0
1952			2	0.491	5.713	0.881	0	7.988	-63.871
1953			3	-8.196	-0.047	-1.807	0.174	-0.088	-69.873
1954			4	-0.474	-6.091	0.391	0	-2.767	-49.815
1955			5	0	0	0	0	0	0
1956	11	M127	1	3.082	-3.116	-8.573	-0.12	15.112	-0.61
1957			2	3.082	-3.116	-8.573	-0.12	11.897	0.559
1958			3	3.082	-3.116	-8.573	-0.12	8.683	1.727
1959			4	3.082	-3.116	-8.573	-0.12	5.468	2.896
1960			5	3.082	-3.116	-8.573	-0.12	2.253	4.064
1961	11	M128	1	3.468	2.579	7.634	-0.193	-13.309	0.516
1962			2	3.468	2.579	7.634	-0.193	-10.446	-0.451
1963			3	3.468	2.579	7.634	-0.193	-7.583	-1.418
1964			4	3.468	2.579	7.634	-0.193	-4.721	-2.385
1965			5	3.468	2.579	7.634	-0.193	-1.858	-3.352
1966	11	M129	1	0.492	8.383	0.874	0	0	0
1967			2	0.492	5.729	0.874	0	7.929	-64.011
1968			3	-8.232	-0.009	-1.792	0.175	-0.081	-70.25
1969			4	-0.474	-6.131	0.386	0	-2.734	-50.098
1970			5	0	0	0	0	0	0
1971	11	M130	1	3.064	-3.095	-8.731	-0.13	15.325	-0.62
1972			2	3.064	-3.095	-8.731	-0.13	12.051	0.54
1973			3	3.064	-3.095	-8.731	-0.13	8.776	1.701
1974			4	3.064	-3.095	-8.731	-0.13	5.502	2.861
1975			5	3.064	-3.095	-8.731	-0.13	2.228	4.022
1976	11	M151	1	3.577	2.55	7.752	-0.2	-13.457	0.523

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1977			2	3.577	2.55	7.752	-0.2	-10.551	-0.433
1978			3	3.577	2.55	7.752	-0.2	-7.644	-1.389
1979			4	3.577	2.55	7.752	-0.2	-4.737	-2.346
1980			5	3.577	2.55	7.752	-0.2	-1.83	-3.302
1981	11	M152	1	0.512	8.416	0.868	0	0	0
1982			2	0.512	5.761	0.868	0	7.873	-64.308
1983			3	-8.369	0.041	-1.769	0.176	-0.003	-70.736
1984			4	-0.494	-6.19	0.375	0	-2.651	-50.515
1985			5	0	0	0	0	0	0
1986	11	M153	1	3.071	-3.044	-8.613	-0.139	15.112	-0.608
1987			2	3.071	-3.044	-8.613	-0.139	11.882	0.533
1988			3	3.071	-3.044	-8.613	-0.139	8.652	1.675
1989			4	3.071	-3.044	-8.613	-0.139	5.422	2.816
1990			5	3.071	-3.044	-8.613	-0.139	2.192	3.958
1991	11	M154	1	3.649	2.48	7.556	-0.196	-13.12	0.504
1992			2	3.649	2.48	7.556	-0.196	-10.286	-0.426
1993			3	3.649	2.48	7.556	-0.196	-7.453	-1.356
1994			4	3.649	2.48	7.556	-0.196	-4.619	-2.286
1995			5	3.649	2.48	7.556	-0.196	-1.786	-3.215
1996	11	M159	1	0.551	8.452	0.862	0	0	0
1997			2	0.551	5.797	0.862	0	7.819	-64.631
1998			3	-8.209	0.07	-1.73	0.177	0.167	-71.553
1999			4	-0.533	-6.233	0.354	0	-2.502	-50.816
2000			5	0	0	0	0	0	0
2001	11	M175	1	3.168	-2.97	-8.349	-0.134	14.667	-0.587
2002			2	3.168	-2.97	-8.349	-0.134	11.536	0.527
2003			3	3.168	-2.97	-8.349	-0.134	8.405	1.641
2004			4	3.168	-2.97	-8.349	-0.134	5.274	2.755
2005			5	3.168	-2.97	-8.349	-0.134	2.144	3.869
2006	11	M176	1	3.561	2.373	7.194	-0.204	-12.51	0.475
2007			2	3.561	2.373	7.194	-0.204	-9.812	-0.415
2008			3	3.561	2.373	7.194	-0.204	-7.114	-1.305
2009			4	3.561	2.373	7.194	-0.204	-4.416	-2.195
2010			5	3.561	2.373	7.194	-0.204	-1.719	-3.085
2011	11	M177	1	0.601	8.485	0.857	0	0	0
2012			2	0.601	5.83	0.857	0	7.777	-64.933
2013			3	-7.892	0.007	-1.675	0.175	0.436	-72.023
2014			4	-0.584	-6.208	0.321	0	-2.269	-50.643
2015			5	0	0	0	0	0	0
2016	11	M178	1	3.393	-2.88	-7.916	-0.126	13.96	-0.558
2017			2	3.393	-2.88	-7.916	-0.126	10.991	0.522
2018			3	3.393	-2.88	-7.916	-0.126	8.023	1.602
2019			4	3.393	-2.88	-7.916	-0.126	5.054	2.682
2020			5	3.393	-2.88	-7.916	-0.126	2.086	3.762
2021	11	M179	1	3.086	2.224	6.633	-0.217	-11.573	0.434
2022			2	3.086	2.224	6.633	-0.217	-9.086	-0.4
2023			3	3.086	2.224	6.633	-0.217	-6.599	-1.234
2024			4	3.086	2.224	6.633	-0.217	-4.112	-2.068
2025			5	3.086	2.224	6.633	-0.217	-1.624	-2.902
2026	11	M180	1	0.666	8.454	0.86	0	0	0
2027			2	0.666	5.799	0.86	0	7.801	-64.653
2028			3	-7.39	-0.249	-1.605	0.167	0.88	-70.812
2029			4	-0.65	-5.989	0.271	0	-1.916	-49.095
2030			5	0	0	0	0	0	0
2031	11	M182	1	3.614	-2.784	-7.13	-0.118	12.733	-0.511

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2032			2	3.614	-2.784	-7.13	-0.118	10.059	0.533
2033			3	3.614	-2.784	-7.13	-0.118	7.385	1.577
2034			4	3.614	-2.784	-7.13	-0.118	4.711	2.621
2035			5	3.614	-2.784	-7.13	-0.118	2.037	3.665
2036	11	M183	1	1.996	2.036	5.693	-0.218	-10.048	0.372
2037			2	1.996	2.036	5.693	-0.218	-7.913	-0.392
2038			3	1.996	2.036	5.693	-0.218	-5.778	-1.155
2039			4	1.996	2.036	5.693	-0.218	-3.643	-1.918
2040			5	1.996	2.036	5.693	-0.218	-1.508	-2.682
2041	11	M186	1	0.745	8.185	0.879	0	0	0
2042			2	0.745	5.531	0.879	0	7.972	-62.214
2043			3	-6.522	-0.739	-1.532	0.15	1.542	-65.83
2044			4	-0.73	-5.389	0.205	0	-1.447	-44.851
2045			5	0	0	0	0	0	0
2046	11	M187	1	3.371	-2.653	-5.454	-0.094	10.183	-0.409
2047			2	3.371	-2.653	-5.454	-0.094	8.137	0.586
2048			3	3.371	-2.653	-5.454	-0.094	6.092	1.58
2049			4	3.371	-2.653	-5.454	-0.094	4.047	2.575
2050			5	3.371	-2.653	-5.454	-0.094	2.001	3.57
2051	11	M188	1	0.249	1.795	3.902	-0.199	-7.229	0.256
2052			2	0.249	1.795	3.902	-0.199	-5.766	-0.417
2053			3	0.249	1.795	3.902	-0.199	-4.303	-1.09
2054			4	0.249	1.795	3.902	-0.199	-2.839	-1.764
2055			5	0.249	1.795	3.902	-0.199	-1.376	-2.437
2056	11	M189	1	0.803	7.362	0.909	0	0	0
2057			2	0.803	4.707	0.909	0	8.243	-54.745
2058			3	-4.783	-1.319	-1.459	0.12	2.322	-54.909
2059			4	-0.793	-4.223	0.131	0	-0.926	-36.6
2060			5	0	0	0	0	0	0
2061	11	M213	1	3.9	-2.402	-1.336	-0.047	4.231	-0.146
2062			2	3.9	-2.402	-1.336	-0.047	3.73	0.755
2063			3	3.9	-2.402	-1.336	-0.047	3.229	1.656
2064			4	3.9	-2.402	-1.336	-0.047	2.728	2.557
2065			5	3.9	-2.402	-1.336	-0.047	2.227	3.458
2066	11	M214	1	-2.576	1.476	-0.272	-0.209	-17.656	0.843
2067			2	-2.576	1.476	-0.272	-0.209	-17.758	0.29
2068			3	-2.576	1.476	-0.272	-0.209	-17.86	-0.263
2069			4	-2.576	1.476	-0.272	-0.209	-17.962	-0.817
2070			5	-2.576	1.476	-0.272	-0.209	-18.064	-1.37
2071	12	M155	1	0	0	0	0	0	0
2072			2	-8.043	-2.835	3.26	-0.158	-2.37	1.416
2073			3	-8.945	0.428	2.012	0.009	1.229	0.272
2074			4	-3.88	-0.527	2.635	0	1.197	-1.548
2075			5	-1.598	2.848	0.653	-0.067	0.187	-10.676
2076	12	M156	1	-2.767	1.684	3.362	-0.194	-0.863	-6.913
2077			2	12.364	-2.18	5.584	0.154	0.155	9.013
2078			3	8.185	-0.094	0.935	-0.004	1.257	-0.466
2079			4	4.257	-0.161	0.631	-0.003	1.374	-2.121
2080			5	0	0	0	0.297	0	0
2081	12	M157	1	5.051	-2.092	-0.211	0.001	0	0
2082			2	5.623	-2.6	-0.446	-0.001	0.851	-5.844
2083			3	5.623	-2.719	-0.446	-0.001	-0.044	-0.504
2084			4	5.623	-2.839	-0.446	-0.001	-0.939	5.076
2085			5	6.136	-3.442	-0.274	-0.002	0	0
2086	12	M158	1	3.556	-1.982	-0.694	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2087			2	4.31	-2.457	-0.607	-0.003	1.162	-5.573
2088			3	4.31	-2.576	-0.607	-0.003	-0.058	-0.52
2089			4	4.31	-2.696	-0.607	-0.003	-1.278	4.774
2090			5	5.022	-3.234	-0.651	-0.004	0	0
2091	12	M160	1	5.001	-1.465	-0.154	-0.003	0	0
2092			2	4.346	-1.935	-0.347	-0.005	0.672	-4.578
2093			3	4.346	-2.055	-0.347	-0.005	-0.025	-0.572
2094			4	4.346	-2.175	-0.347	-0.005	-0.723	3.674
2095			5	3.681	-2.591	-0.149	-0.003	0	0
2096	12	M161	1	3.911	-1.183	-0.209	-0.003	0	0
2097			2	4.725	-1.654	-0.366	-0.005	0.699	-4.042
2098			3	4.725	-1.774	-0.366	-0.005	-0.037	-0.6
2099			4	4.725	-1.893	-0.366	-0.005	-0.772	3.082
2100			5	5.669	-2.456	-0.245	-0.004	0	0
2101	12	M162	1	1.791	-0.927	-0.578	-0.003	0	0
2102			2	1.978	-1.352	-0.494	-0.005	0.945	-3.465
2103			3	1.978	-1.472	-0.494	-0.005	-0.047	-0.63
2104			4	1.978	-1.591	-0.494	-0.005	-1.039	2.445
2105			5	1.956	-1.982	-0.53	-0.003	0	0
2106	12	M163	1	4.934	-0.639	-0.321	-0.005	0	0
2107			2	3.987	-1.07	-0.375	-0.004	0.724	-2.926
2108			3	3.987	-1.189	-0.375	-0.004	-0.03	-0.658
2109			4	3.987	-1.309	-0.375	-0.004	-0.783	1.851
2110			5	3.197	-1.695	-0.285	-0.002	0	0
2111	12	M164	1	2.72	-0.369	-0.039	-0.003	0	0
2112			2	2.886	-0.831	-0.264	-0.004	0.507	-2.47
2113			3	2.886	-0.95	-0.264	-0.004	-0.023	-0.682
2114			4	2.886	-1.07	-0.264	-0.004	-0.553	1.346
2115			5	2.992	-1.537	-0.08	-0.002	0	0
2116	12	M165	1	2.257	-0.194	-0.291	-0.003	0	0
2117			2	2.792	-0.624	-0.357	-0.003	0.683	-2.075
2118			3	2.792	-0.743	-0.357	-0.003	-0.033	-0.703
2119			4	2.792	-0.863	-0.357	-0.003	-0.749	0.91
2120			5	3.367	-1.322	-0.291	-0.002	0	0
2121	12	M166	1	2.154	-0.031	-0.394	-0.003	0	0
2122			2	1.89	-0.441	-0.391	-0.003	0.75	-1.728
2123			3	1.89	-0.561	-0.391	-0.003	-0.034	-0.721
2124			4	1.89	-0.681	-0.391	-0.003	-0.819	0.526
2125			5	1.563	-1.074	-0.371	-0.001	0	0
2126	12	M167	1	10.643	-1.608	-1.45	0.006	0	0
2127			2	8.63	-1.993	-1.049	0.006	2.016	-4.667
2128			3	8.63	-2.112	-1.049	0.006	-0.089	-0.546
2129			4	8.63	-2.232	-1.049	0.006	-2.195	3.816
2130			5	6.816	-2.577	-1.298	0.002	0	0
2131	12	M168	1	7.974	-1.756	-0.538	0.005	0	0
2132			2	7.433	-2.223	-0.67	0.004	1.292	-5.112
2133			3	7.433	-2.343	-0.67	0.004	-0.052	-0.527
2134			4	7.433	-2.463	-0.67	0.004	-1.397	4.297
2135			5	6.772	-2.752	-0.542	0.001	0	0
2136	12	M169	1	6.841	-1.926	-0.874	0.004	0	0
2137			2	8.323	-2.407	-0.788	0.003	1.508	-5.468
2138			3	8.323	-2.527	-0.788	0.003	-0.075	-0.513
2139			4	8.323	-2.647	-0.788	0.003	-1.658	4.681
2140			5	10.031	-3.186	-0.875	-0.001	0	0
2141	12	M170	1	4.094	-2.117	-1.366	0.003	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2142			2	3.923	-2.536	-0.945	0.002	1.809	-5.716
2143			3	3.923	-2.655	-0.945	0.002	-0.089	-0.504
2144			4	3.923	-2.775	-0.945	0.002	-1.987	4.948
2145			5	3.386	-3.138	-1.23	-0.001	0	0
2146	12	M171	1	9.5	-2.211	-0.677	0.001	0	0
2147			2	7.664	-2.611	-0.632	0.001	1.218	-5.863
2148			3	7.664	-2.73	-0.632	0.001	-0.051	-0.5
2149			4	7.664	-2.85	-0.632	0.001	-1.319	5.102
2150			5	6.104	-3.221	-0.589	-0.001	0	0
2151	12	M172	1	5.074	-1.136	-1.798	0.009	0	0
2152			2	6.019	-1.602	-1.227	0.01	2.354	-3.916
2153			3	6.019	-1.722	-1.227	0.01	-0.11	-0.579
2154			4	6.019	-1.842	-1.227	0.01	-2.574	2.999
2155			5	6.671	-2.544	-1.658	0.001	0	0
2156	12	M173	1	2.634	-3.978	1.664	0.319	-1.692	-12.077
2157			2	-2.669	-0.083	2.197	-101.179	0.112	0.159
2158			3	-1.461	0.172	0.333	-24.402	-0.307	0.103
2159			4	-0.849	-0.024	0.887	-24.079	0.034	-0.027
2160			5	-1.099	-2.91	0	0	0	-0.321
2161	12	M174	1	-2.011	-4.768	1.85	-36.609	-1.873	-15.201
2162			2	2.594	-0.122	2.034	-119.513	0.119	0.295
2163			3	1.249	0.142	0.407	-30.976	-0.379	0.045
2164			4	0.731	-0.002	0.862	-23.987	0.036	-0.06
2165			5	0.607	-2.427	0	0	0	-0.157
2166	12	M181	1	3.121	0.162	-0.139	-0.003	0	0
2167			2	2.656	-0.296	-0.283	-0.002	0.55	-1.45
2168			3	2.656	-0.416	-0.283	-0.002	-0.019	-0.736
2169			4	2.656	-0.535	-0.283	-0.002	-0.588	0.219
2170			5	2.224	-0.958	-0.141	-0.001	0	0
2171	12	M184	1	1.69	-4.053	-1.599	-0.863	5.58	0.06
2172			2	1.69	-4.053	-1.599	-0.863	4.981	1.58
2173			3	1.69	-4.053	-1.599	-0.863	4.381	3.1
2174			4	1.69	-4.053	-1.599	-0.863	3.782	4.62
2175			5	1.69	-4.053	-1.599	-0.863	3.182	6.14
2176	12	M190	1	2.238	0.248	-0.139	-0.002	0	0
2177			2	2.707	-0.188	-0.288	-0.002	0.553	-1.244
2178			3	2.707	-0.307	-0.288	-0.002	-0.025	-0.747
2179			4	2.707	-0.427	-0.288	-0.002	-0.604	-0.01
2180			5	3.223	-0.904	-0.172	-0.001	0	0
2181	12	M191	1	1.267	0.311	-0.395	-0.002	0	0
2182			2	1.51	-0.095	-0.385	-0.001	0.74	-1.069
2183			3	1.51	-0.215	-0.385	-0.001	-0.033	-0.757
2184			4	1.51	-0.335	-0.385	-0.001	-0.806	-0.206
2185			5	1.665	-0.746	-0.379	-0.001	0	0
2186	12	M192	1	2.833	0.415	-0.292	-0.002	0	0
2187			2	2.298	-0.023	-0.342	-0.001	0.661	-0.931
2188			3	2.298	-0.143	-0.342	-0.001	-0.027	-0.765
2189			4	2.298	-0.262	-0.342	-0.001	-0.714	-0.359
2190			5	1.846	-0.669	-0.289	0	0	0
2191	12	M193	1	1.691	0.474	-0.078	-0.001	0	0
2192			2	1.626	0.019	-0.257	0	0.499	-0.853
2193			3	1.626	-0.101	-0.257	0	-0.017	-0.77
2194			4	1.626	-0.221	-0.257	0	-0.532	-0.447
2195			5	1.482	-0.66	-0.106	0	0	0
2196	12	M194	1	2.054	0.462	-0.241	-0.001	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2197			2	2.572	0.043	-0.324	0	0.625	-0.808
2198			3	2.572	-0.077	-0.324	0	-0.026	-0.774
2199			4	2.572	-0.197	-0.324	0	-0.677	-0.499
2200			5	3.195	-0.666	-0.257	-0.001	0	0
2201	12	M195	1	1.062	0.471	-0.457	-0.001	0	0
2202			2	1.14	0.071	-0.409	0	0.786	-0.755
2203			3	1.14	-0.049	-0.409	0	-0.034	-0.777
2204			4	1.14	-0.168	-0.409	0	-0.855	-0.559
2205			5	1.093	-0.57	-0.436	0	0	0
2206	12	M196	1	3.045	0.559	-0.275	-0.002	0	0
2207			2	2.458	0.091	-0.336	0	0.65	-0.718
2208			3	2.458	-0.029	-0.336	0	-0.024	-0.78
2209			4	2.458	-0.149	-0.336	0	-0.698	-0.602
2210			5	1.983	-0.565	-0.276	0	0	0
2211	12	M197	1	1.398	0.529	-0.119	0	0	0
2212			2	1.556	0.088	-0.277	0	0.536	-0.724
2213			3	1.556	-0.031	-0.277	0	-0.02	-0.781
2214			4	1.556	-0.151	-0.277	0	-0.575	-0.598
2215			5	1.635	-0.606	-0.155	0	0	0
2216	12	M198	1	1.739	0.495	-0.335	0	0	0
2217			2	2.18	0.084	-0.362	0	0.697	-0.732
2218			3	2.18	-0.035	-0.362	0	-0.029	-0.781
2219			4	2.18	-0.155	-0.362	0	-0.755	-0.591
2220			5	2.687	-0.606	-0.336	-0.001	0	0
2221	12	M199	1	1.482	0.504	-0.447	0	0	0
2222			2	1.349	0.092	-0.406	0	0.781	-0.719
2223			3	1.349	-0.028	-0.406	0	-0.033	-0.783
2224			4	1.349	-0.148	-0.406	0	-0.848	-0.607
2225			5	1.145	-0.552	-0.43	0	0	0
2226	12	M200	1	2.666	0.568	-0.227	-0.001	0	0
2227			2	2.185	0.093	-0.317	0	0.615	-0.717
2228			3	2.185	-0.027	-0.317	0	-0.021	-0.784
2229			4	2.185	-0.146	-0.317	0	-0.658	-0.61
2230			5	1.766	-0.569	-0.238	0	0	0
2231	12	M201	1	1.511	0.511	-0.162	0	0	0
2232			2	1.815	0.079	-0.294	0	0.57	-0.745
2233			3	1.815	-0.041	-0.294	0	-0.021	-0.783
2234			4	1.815	-0.161	-0.294	0	-0.612	-0.581
2235			5	2.095	-0.626	-0.196	0	0	0
2236	12	M202	1	1.454	0.479	-0.404	0	0	0
2237			2	1.818	0.073	-0.388	0	0.748	-0.757
2238			3	1.818	-0.047	-0.388	0	-0.031	-0.784
2239			4	1.818	-0.166	-0.388	0	-0.81	-0.57
2240			5	2.184	-0.603	-0.397	-0.001	0	0
2241	12	M203	1	12.52	0.366	-1.145	0.01	0	0
2242			2	10.423	-0.019	-0.991	0.016	1.921	-0.876
2243			3	10.423	-0.138	-0.991	0.016	-0.07	-0.718
2244			4	10.423	-0.258	-0.991	0.016	-2.06	-0.32
2245			5	8.527	0.004	-1.054	0.005	0	0
2246	12	M204	1	8.223	-0.428	-0.91	0.011	0	0
2247			2	9.72	-0.917	-0.912	0.016	1.75	-2.599
2248			3	9.72	-1.036	-0.912	0.016	-0.081	-0.639
2249			4	9.72	-1.156	-0.912	0.016	-1.911	1.562
2250			5	11.316	-2.081	-0.976	0.004	0	0
2251	12	M205	1	7.551	1.087	-2.196	0.009	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2252			2	6.653	0.751	-1.44	0.014	2.767	0.603
2253			3	6.653	0.632	-1.44	0.014	-0.123	-0.786
2254			4	6.653	0.512	-1.44	0.014	-3.014	-1.934
2255			5	5.451	0.192	-2.011	0.006	0	0
2256	12	M206	1	8.32	2.678	-0.982	0.007	0	0
2257			2	8.799	2.228	-0.987	0.015	1.912	3.44
2258			3	8.799	2.109	-0.987	0.015	-0.07	-0.915
2259			4	8.799	1.989	-0.987	0.015	-2.052	-5.029
2260			5	9.107	1.525	-1.043	0.007	0	0
2261	12	M207	1	7.854	1.858	-1.825	0.008	0	0
2262			2	9.737	1.46	-1.318	0.014	2.536	1.963
2263			3	9.737	1.34	-1.318	0.014	-0.11	-0.848
2264			4	9.737	1.22	-1.318	0.014	-2.757	-3.418
2265			5	11.783	0.509	-1.77	0.006	0	0
2266	12	M218	1	2.057	0.508	-0.418	-0.001	0	0
2267			2	1.729	0.079	-0.393	0	0.758	-0.747
2268			3	1.729	-0.041	-0.393	0	-0.031	-0.785
2269			4	1.729	-0.161	-0.393	0	-0.82	-0.582
2270			5	1.397	-0.567	-0.407	0	0	0
2271	12	M208	1	13.121	3.431	-1.7	0.004	0	0
2272			2	10.695	2.96	-1.248	0.013	2.418	4.845
2273			3	10.695	2.841	-1.248	0.013	-0.089	-0.979
2274			4	10.695	2.721	-1.248	0.013	-2.596	-6.563
2275			5	8.632	2.362	-1.577	0.007	0	0
2276	12	M219	1	2.249	0.546	-0.185	0	0	0
2277			2	1.924	0.076	-0.299	0	0.58	-0.753
2278			3	1.924	-0.044	-0.299	0	-0.019	-0.785
2279			4	1.924	-0.164	-0.299	0	-0.619	-0.577
2280			5	1.595	-0.592	-0.204	0	0	0
2281	12	M209	1	7.986	4.265	-1.407	0.002	0	0
2282			2	9.948	3.912	-1.147	0.008	2.218	6.676
2283			3	9.948	3.793	-1.147	0.008	-0.085	-1.06
2284			4	9.948	3.673	-1.147	0.008	-2.389	-8.555
2285			5	12.208	2.661	-1.477	0.006	0	0
2286	12	M210	1	4.52	3.817	-2.33	0.003	0	0
2287			2	5.135	3.524	-1.513	0.009	2.916	5.928
2288			3	5.135	3.404	-1.513	0.009	-0.121	-1.028
2289			4	5.135	3.284	-1.513	0.009	-3.159	-7.743
2290			5	5.265	3.342	-2.187	0.006	0	0
2291	12	M220	1	1.775	0.488	-0.218	0	0	0
2292			2	2.191	0.063	-0.315	0	0.608	-0.779
2293			3	2.191	-0.057	-0.315	0	-0.023	-0.784
2294			4	2.191	-0.177	-0.315	0	-0.655	-0.55
2295			5	2.644	-0.652	-0.247	0	0	0
2296	12	M211	1	8.298	4.801	-0.998	0	0	0
2297			2	7.526	4.299	-0.939	0.006	1.839	7.421
2298			3	7.526	4.18	-0.939	0.006	-0.047	-1.092
2299			4	7.526	4.06	-0.939	0.006	-1.933	-9.365
2300			5	6.699	3.872	-1.017	0.008	0	0
2301	12	M212	1	6.925	4.843	-1.635	-0.002	0	0
2302			2	5.938	4.478	-1.171	0.001	2.27	7.766
2303			3	5.938	4.358	-1.171	0.001	-0.081	-1.105
2304			4	5.938	4.239	-1.171	0.001	-2.433	-9.737
2305			5	4.93	4.367	-1.589	0	0	0
2306	12	M264	1	1.225	0.47	-0.465	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2307			2	1.49	0.065	-0.41	0	0.79	-0.775
2308			3	1.49	-0.055	-0.41	0	-0.033	-0.785
2309			4	1.49	-0.175	-0.41	0	-0.856	-0.554
2310			5	1.69	-0.598	-0.449	0	0	0
2311	12	M265	1	2.695	0.526	-0.379	-0.001	0	0
2312			2	2.191	0.074	-0.374	0	0.722	-0.757
2313			3	2.191	-0.045	-0.374	0	-0.029	-0.786
2314			4	2.191	-0.165	-0.374	0	-0.78	-0.575
2315			5	1.753	-0.575	-0.373	0	0	0
2316	12	M266	1	1.802	0.529	-0.155	0	0	0
2317			2	1.682	0.07	-0.284	0	0.553	-0.765
2318			3	1.682	-0.049	-0.284	0	-0.018	-0.786
2319			4	1.682	-0.169	-0.284	0	-0.589	-0.567
2320			5	1.494	-0.604	-0.181	0	0	0
2321	12	M267	1	2.044	0.479	-0.296	0	0	0
2322			2	2.554	0.062	-0.342	0	0.66	-0.782
2323			3	2.554	-0.058	-0.342	0	-0.026	-0.786
2324			4	2.554	-0.178	-0.342	0	-0.713	-0.549
2325			5	3.16	-0.655	-0.313	-0.001	0	0
2326	12	M268	1	1.142	0.477	-0.519	0	0	0
2327			2	1.241	0.072	-0.428	0	0.824	-0.763
2328			3	1.241	-0.048	-0.428	0	-0.035	-0.787
2329			4	1.241	-0.168	-0.428	0	-0.894	-0.571
2330			5	1.216	-0.578	-0.494	0	0	0
2331	12	M277	1	3.211	0.559	-0.335	-0.001	0	0
2332			2	2.592	0.084	-0.352	0	0.68	-0.74
2333			3	2.592	-0.036	-0.352	0	-0.026	-0.788
2334			4	2.592	-0.155	-0.352	0	-0.732	-0.597
2335			5	2.088	-0.57	-0.33	0	0	0
2336	12	M278	1	1.529	0.518	-0.149	0	0	0
2337			2	1.645	0.077	-0.28	0	0.542	-0.753
2338			3	1.645	-0.042	-0.28	0	-0.019	-0.788
2339			4	1.645	-0.162	-0.28	0	-0.58	-0.583
2340			5	1.673	-0.61	-0.182	0	0	0
2341	12	M280A	1	5.031	-1.808	-0.681	-0.002	0	0
2342			2	4.182	-2.217	-0.576	-0.004	1.104	-5.116
2343			3	4.182	-2.337	-0.576	-0.004	-0.053	-0.544
2344			4	4.182	-2.456	-0.576	-0.004	-1.209	4.268
2345			5	3.325	-2.783	-0.611	-0.002	0	0
2346	12	M251A	1	-1.099	0.163	0	0	0	0
2347			2	-1.099	0.163	0	0	0	-0.08
2348			3	-1.099	0.163	0	0	0	-0.16
2349			4	-1.099	0.163	0	0	0	-0.24
2350			5	-1.099	0.163	0	0	0	-0.321
2351	12	M253A	1	0.607	0.08	0	0	0	0
2352			2	0.607	0.08	0	0	0	-0.039
2353			3	0.607	0.08	0	0	0	-0.078
2354			4	0.607	0.08	0	0	0	-0.117
2355			5	0.607	0.08	0	0	0	-0.157
2356	12	M277A	1	4.218	5.07	-1.575	0.006	0	0
2357			2	5.418	4.446	-1.117	0	2.167	7.708
2358			3	5.418	4.326	-1.117	0	-0.076	-1.099
2359			4	5.418	4.206	-1.117	0	-2.32	-9.665
2360			5	6.602	3.043	-1.56	-0.01	0	0
2361	12	M263A	1	2.509	-6.312	-0.001	0	0.003	-12.335

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2362			2	2.509	-6.312	-0.001	0	0.002	-9.069
2363			3	2.509	-6.312	-0.001	0	0.002	-5.803
2364			4	2.509	-6.312	-0.001	0	0.002	-2.536
2365			5	2.509	-6.312	-0.001	0	0.001	0.73
2366	12	M264A	1	2.509	0.371	-0.001	0	0.001	0.73
2367			2	2.509	0.371	-0.001	0	0.001	0.547
2368			3	2.509	0.371	-0.001	0	0.001	0.365
2369			4	2.509	0.371	-0.001	0	0	0.182
2370			5	2.509	0.371	-0.001	0	0	0
2371	12	M265A	1	-1.994	-7.778	0.001	0	-0.002	-15.546
2372			2	-1.994	-7.778	0.001	0	-0.002	-11.521
2373			3	-1.994	-7.778	0.001	0	-0.002	-7.496
2374			4	-1.994	-7.778	0.001	0	-0.001	-3.471
2375			5	-1.994	-7.778	0.001	0	-0.001	0.554
2376	12	M266A	1	-1.994	0.282	0.001	0	-0.001	0.554
2377			2	-1.994	0.282	0.001	0	-0.001	0.416
2378			3	-1.994	0.282	0.001	0	-0.001	0.277
2379			4	-1.994	0.282	0.001	0	0	0.139
2380			5	-1.994	0.282	0.001	0	0	0
2381	12	M131	1	1.955	0.482	-0.366	0	0	0
2382			2	2.439	0.072	-0.364	0	0.703	-0.764
2383			3	2.439	-0.048	-0.364	0	-0.029	-0.787
2384			4	2.439	-0.168	-0.364	0	-0.76	-0.571
2385			5	3.006	-0.631	-0.367	-0.001	0	0
2386	12	M132	1	1.48	0.497	-0.511	0	0	0
2387			2	1.387	0.082	-0.419	0	0.808	-0.743
2388			3	1.387	-0.037	-0.419	0	-0.035	-0.789
2389			4	1.387	-0.157	-0.419	0	-0.877	-0.593
2390			5	1.197	-0.564	-0.484	0	0	0
2391	12	M133	1	3.036	0.569	-0.276	-0.001	0	0
2392			2	2.466	0.088	-0.323	0	0.626	-0.733
2393			3	2.466	-0.032	-0.323	0	-0.023	-0.789
2394			4	2.466	-0.151	-0.323	0	-0.671	-0.605
2395			5	1.979	-0.572	-0.276	0	0	0
2396	12	M134	1	1.595	0.506	-0.174	0	0	0
2397			2	1.885	0.074	-0.285	0	0.552	-0.76
2398			3	1.885	-0.046	-0.285	0	-0.021	-0.788
2399			4	1.885	-0.166	-0.285	0	-0.593	-0.575
2400			5	2.134	-0.629	-0.204	0	0	0
2401	12	M135	1	1.617	0.472	-0.429	0	0	0
2402			2	2.04	0.065	-0.384	0	0.739	-0.777
2403			3	2.04	-0.055	-0.384	0	-0.031	-0.787
2404			4	2.04	-0.175	-0.384	0	-0.801	-0.556
2405			5	2.481	-0.621	-0.415	0	0	0
2406	12	M136	1	2.007	0.496	-0.476	0	0	0
2407			2	1.707	0.066	-0.4	0	0.769	-0.775
2408			3	1.707	-0.054	-0.4	0	-0.033	-0.787
2409			4	1.707	-0.174	-0.4	0	-0.836	-0.558
2410			5	1.377	-0.58	-0.449	0	0	0
2411	12	M137	1	2.478	0.526	-0.231	0	0	0
2412			2	2.083	0.054	-0.299	0.001	0.58	-0.798
2413			3	2.083	-0.066	-0.299	0.001	-0.021	-0.785
2414			4	2.083	-0.186	-0.299	0.001	-0.622	-0.532
2415			5	1.705	-0.611	-0.233	0	0	0
2416	12	M138	1	1.735	0.45	-0.23	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2417			2	2.126	0.023	-0.301	0.001	0.581	-0.856
2418			3	2.126	-0.097	-0.301	0.001	-0.024	-0.782
2419			4	2.126	-0.216	-0.301	0.001	-0.629	-0.468
2420			5	2.536	-0.692	-0.247	0	0	0
2421	12	M139	1	1.277	0.409	-0.483	0	0	0
2422			2	1.578	0	-0.397	0	0.764	-0.9
2423			3	1.578	-0.12	-0.397	0	-0.034	-0.78
2424			4	1.578	-0.24	-0.397	0	-0.832	-0.418
2425			5	1.831	-0.671	-0.453	0	0	0
2426	12	M140	1	2.411	0.422	-0.437	0	0	0
2427			2	1.978	-0.023	-0.375	0.001	0.721	-0.943
2428			3	1.978	-0.142	-0.375	0.001	-0.032	-0.777
2429			4	1.978	-0.262	-0.375	0.001	-0.786	-0.371
2430			5	1.587	-0.668	-0.407	0.001	0	0
2431	12	M141	1	1.816	0.391	-0.214	0	0	0
2432			2	1.62	-0.067	-0.283	0.001	0.547	-1.027
2433			3	1.62	-0.187	-0.283	0.001	-0.021	-0.773
2434			4	1.62	-0.306	-0.283	0.001	-0.59	-0.278
2435			5	1.379	-0.735	-0.213	0.001	0	0
2436	12	M142	1	1.749	0.296	-0.301	0	0	0
2437			2	2.176	-0.129	-0.316	0.001	0.607	-1.146
2438			3	2.176	-0.249	-0.316	0.001	-0.027	-0.766
2439			4	2.176	-0.369	-0.316	0.001	-0.662	-0.146
2440			5	2.67	-0.851	-0.296	0	0	0
2441	12	M143	1	0.989	0.227	-0.511	0	0	0
2442			2	1.12	-0.186	-0.392	0.001	0.752	-1.255
2443			3	1.12	-0.306	-0.392	0.001	-0.036	-0.76
2444			4	1.12	-0.426	-0.392	0.001	-0.824	-0.026
2445			5	1.157	-0.841	-0.463	0.001	0	0
2446	12	M144	1	2.484	0.191	-0.392	0	0	0
2447			2	1.999	-0.253	-0.337	0.002	0.647	-1.382
2448			3	1.999	-0.373	-0.337	0.002	-0.03	-0.753
2449			4	1.999	-0.493	-0.337	0.002	-0.707	0.115
2450			5	1.596	-0.892	-0.352	0.001	0	0
2451	12	M145	1	1.203	0.074	-0.215	0.001	0	0
2452			2	1.192	-0.346	-0.26	0.002	0.5	-1.559
2453			3	1.192	-0.466	-0.26	0.002	-0.023	-0.744
2454			4	1.192	-0.585	-0.26	0.002	-0.546	0.311
2455			5	1.113	-0.992	-0.203	0.001	0	0
2456	12	M146	1	1.371	-0.062	-0.334	0	0	0
2457			2	1.693	-0.448	-0.298	0.002	0.57	-1.754
2458			3	1.693	-0.568	-0.298	0.002	-0.029	-0.734
2459			4	1.693	-0.687	-0.298	0.002	-0.627	0.526
2460			5	2.072	-1.126	-0.3	0.001	0	0
2461	12	M147	1	0.832	0.004	-0.461	-0.003	0	0
2462			2	0.824	-0.535	-0.335	0.002	0.64	-1.92
2463			3	0.824	-0.655	-0.335	0.002	-0.034	-0.725
2464			4	0.824	-0.775	-0.335	0.002	-0.707	0.711
2465			5	0.739	-1.333	-0.398	0.004	0	0
2466	12	M88	1	18.113	-4.705	-20.336	-0.674	33.605	-1.377
2467			2	18.113	-4.705	-20.336	-0.674	25.979	0.388
2468			3	18.113	-4.705	-20.336	-0.674	18.353	2.152
2469			4	18.113	-4.705	-20.336	-0.674	10.727	3.917
2470			5	18.113	-4.705	-20.336	-0.674	3.101	5.681
2471	12	M89	1	16.969	6.557	24.076	-0.469	-40.704	1.746

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2472			2	16.969	6.557	24.076	-0.469	-31.676	-0.713
2473			3	16.969	6.557	24.076	-0.469	-22.647	-3.172
2474			4	16.969	6.557	24.076	-0.469	-13.619	-5.631
2475			5	16.969	6.557	24.076	-0.469	-4.591	-8.089
2476	12	M90	1	-1.889	23.049	0.247	0	0	0
2477			2	-1.889	20.394	0.247	0	2.244	-197.055
2478			3	-22.464	-0.371	-3.365	0.369	-16.594	-227.319
2479			4	1.936	-19.997	1.96	0	-13.866	-148.168
2480			5	0	0	0	0	0	0
2481	12	M91	1	38.684	-5.801	-29.962	-0.789	48.685	-2.022
2482			2	38.684	-5.801	-29.962	-0.789	37.449	0.153
2483			3	38.684	-5.801	-29.962	-0.789	26.214	2.328
2484			4	38.684	-5.801	-29.962	-0.789	14.978	4.504
2485			5	38.684	-5.801	-29.962	-0.789	3.743	6.679
2486	12	M92	1	7.458	6.756	32.289	-0.679	-52.977	2.245
2487			2	7.458	6.756	32.289	-0.679	-40.868	-0.288
2488			3	7.458	6.756	32.289	-0.679	-28.76	-2.822
2489			4	7.458	6.756	32.289	-0.679	-16.652	-5.356
2490			5	7.458	6.756	32.289	-0.679	-4.543	-7.889
2491	12	M93	1	-1.133	32.759	0.728	0	0	0
2492			2	-1.133	30.104	0.728	0	6.603	-285.142
2493			3	-31.407	-11.226	-3.49	0.507	-11.407	-264.548
2494			4	1.2	-21.347	1.58	0	-11.175	-157.719
2495			5	0	0	0	0	0	0
2496	12	M94	1	48.53	-6.988	-32.655	-0.774	53.754	-2.145
2497			2	48.53	-6.988	-32.655	-0.774	41.508	0.476
2498			3	48.53	-6.988	-32.655	-0.774	29.262	3.097
2499			4	48.53	-6.988	-32.655	-0.774	17.017	5.717
2500			5	48.53	-6.988	-32.655	-0.774	4.771	8.338
2501	12	M95	1	-1.284	6.877	33.249	-0.698	-54.466	2.182
2502			2	-1.284	6.877	33.249	-0.698	-41.998	-0.397
2503			3	-1.284	6.877	33.249	-0.698	-29.53	-2.976
2504			4	-1.284	6.877	33.249	-0.698	-17.061	-5.555
2505			5	-1.284	6.877	33.249	-0.698	-4.593	-8.134
2506	12	M96	1	-0.227	35.855	1.419	0	0	0
2507			2	-0.227	33.2	1.419	0	12.874	-313.23
2508			3	-33.261	-17.972	-3.904	0.647	-5.535	-256.381
2509			4	0.298	-19.355	1.226	0	-8.671	-143.631
2510			5	0	0	0	0	0	0
2511	12	M100	1	42.542	-7.689	-29.606	-0.574	49.954	-1.907
2512			2	42.542	-7.689	-29.606	-0.574	38.852	0.977
2513			3	42.542	-7.689	-29.606	-0.574	27.75	3.86
2514			4	42.542	-7.689	-29.606	-0.574	16.647	6.743
2515			5	42.542	-7.689	-29.606	-0.574	5.545	9.626
2516	12	M101	1	-3.419	6.763	28.708	-0.671	-47.623	1.785
2517			2	-3.419	6.763	28.708	-0.671	-36.858	-0.75
2518			3	-3.419	6.763	28.708	-0.671	-26.092	-3.286
2519			4	-3.419	6.763	28.708	-0.671	-15.327	-5.822
2520			5	-3.419	6.763	28.708	-0.671	-4.562	-8.358
2521	12	M102	1	0.528	31.25	1.952	0	0	0
2522			2	0.528	28.595	1.952	0	17.707	-271.456
2523			3	-29.48	-16.593	-4.259	0.688	-1.418	-212.679
2524			4	-0.464	-15.838	0.995	0	-7.038	-118.751
2525			5	0	0	0	0	0	0
2526	12	M103	1	32.214	-7.275	-23.999	-0.402	41.204	-1.606

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2527			2	32.214	-7.275	-23.999	-0.402	32.205	1.122
2528			3	32.214	-7.275	-23.999	-0.402	23.205	3.851
2529			4	32.214	-7.275	-23.999	-0.402	14.205	6.579
2530			5	32.214	-7.275	-23.999	-0.402	5.206	9.307
2531	12	M104	1	-4.506	6.062	22.254	-0.481	-37.558	1.416
2532			2	-4.506	6.062	22.254	-0.481	-29.213	-0.857
2533			3	-4.506	6.062	22.254	-0.481	-20.868	-3.13
2534			4	-4.506	6.062	22.254	-0.481	-12.523	-5.404
2535			5	-4.506	6.062	22.254	-0.481	-4.178	-7.677
2536	12	M105	1	0.942	24.193	2.01	0	0	0
2537			2	0.942	21.539	2.01	0	18.238	-207.437
2538			3	-23.426	-13.326	-4.06	0.535	0.319	-155.573
2539			4	-0.892	-11.48	0.834	0	-5.901	-87.929
2540			5	0	0	0	0	0	0
2541	12	M106	1	18.684	-6.519	-16.903	-0.209	30.129	-1.169
2542			2	18.684	-6.519	-16.903	-0.209	23.79	1.276
2543			3	18.684	-6.519	-16.903	-0.209	17.451	3.721
2544			4	18.684	-6.519	-16.903	-0.209	11.113	6.165
2545			5	18.684	-6.519	-16.903	-0.209	4.774	8.61
2546	12	M107	1	-1.776	5.41	14.972	-0.327	-26.329	0.971
2547			2	-1.776	5.41	14.972	-0.327	-20.714	-1.058
2548			3	-1.776	5.41	14.972	-0.327	-15.1	-3.086
2549			4	-1.776	5.41	14.972	-0.327	-9.486	-5.115
2550			5	-1.776	5.41	14.972	-0.327	-3.871	-7.143
2551	12	M108	1	1.016	16.505	1.856	0	0	0
2552			2	1.016	13.85	1.856	0	16.842	-137.687
2553			3	-16.212	-7.488	-3.797	0.396	-0.156	-108.62
2554			4	-0.981	-8.368	0.824	0	-5.827	-65.918
2555			5	0	0	0	0	0	0
2556	12	M109	1	10.211	-5.558	-12.123	-0.126	22.237	-0.893
2557			2	10.211	-5.558	-12.123	-0.126	17.691	1.192
2558			3	10.211	-5.558	-12.123	-0.126	13.144	3.276
2559			4	10.211	-5.558	-12.123	-0.126	8.598	5.36
2560			5	10.211	-5.558	-12.123	-0.126	4.052	7.444
2561	12	M110	1	-0.146	4.785	10.499	-0.23	-19.284	0.739
2562			2	-0.146	4.785	10.499	-0.23	-15.347	-1.055
2563			3	-0.146	4.785	10.499	-0.23	-11.41	-2.85
2564			4	-0.146	4.785	10.499	-0.23	-7.473	-4.644
2565			5	-0.146	4.785	10.499	-0.23	-3.536	-6.438
2566	12	M111	1	0.846	11.631	1.542	0	0	0
2567			2	0.846	8.977	1.542	0	13.989	-93.477
2568			3	-11.554	-3.89	-3.384	0.262	-1.562	-79.118
2569			4	-0.821	-6.398	0.846	0	-5.987	-51.987
2570			5	0	0	0	0	0	0
2571	12	M112	1	5.719	-4.765	-8.514	-0.109	16.316	-0.647
2572			2	5.719	-4.765	-8.514	-0.109	13.123	1.14
2573			3	5.719	-4.765	-8.514	-0.109	9.93	2.927
2574			4	5.719	-4.765	-8.514	-0.109	6.737	4.714
2575			5	5.719	-4.765	-8.514	-0.109	3.544	6.501
2576	12	M113	1	1.011	4.313	7.369	-0.168	-14.339	0.544
2577			2	1.011	4.313	7.369	-0.168	-11.575	-1.073
2578			3	1.011	4.313	7.369	-0.168	-8.812	-2.691
2579			4	1.011	4.313	7.369	-0.168	-6.048	-4.308
2580			5	1.011	4.313	7.369	-0.168	-3.285	-5.925
2581	12	M114	1	0.593	9.145	1.269	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2582			2	0.593	6.49	1.269	0	11.514	-70.919
2583			3	-8.159	-1.884	-3.047	0.201	-2.86	-66.984
2584			4	-0.576	-5.549	0.875	0	-6.19	-45.98
2585			5	0	0	0	0	0	0
2586	12	M115	1	3.721	-4.195	-6.894	-0.117	13.503	-0.527
2587			2	3.721	-4.195	-6.894	-0.117	10.917	1.046
2588			3	3.721	-4.195	-6.894	-0.117	8.332	2.62
2589			4	3.721	-4.195	-6.894	-0.117	5.747	4.193
2590			5	3.721	-4.195	-6.894	-0.117	3.161	5.766
2591	12	M116	1	1.946	3.973	6.208	-0.16	-12.364	0.467
2592			2	1.946	3.973	6.208	-0.16	-10.036	-1.022
2593			3	1.946	3.973	6.208	-0.16	-7.708	-2.512
2594			4	1.946	3.973	6.208	-0.16	-5.38	-4.002
2595			5	1.946	3.973	6.208	-0.16	-3.052	-5.492
2596	12	M117	1	0.356	8.19	1.063	0	0	0
2597			2	0.356	5.535	1.063	0	9.639	-62.253
2598			3	-6.748	-0.841	-2.768	0.175	-3.674	-64.499
2599			4	-0.341	-5.441	0.876	0	-6.193	-45.22
2600			5	0	0	0	0	0	0
2601	12	M118	1	3.099	-3.781	-6.349	-0.145	12.39	-0.476
2602			2	3.099	-3.781	-6.349	-0.145	10.009	0.942
2603			3	3.099	-3.781	-6.349	-0.145	7.628	2.36
2604			4	3.099	-3.781	-6.349	-0.145	5.247	3.778
2605			5	3.099	-3.781	-6.349	-0.145	2.866	5.196
2606	12	M119	1	2.569	3.702	6.045	-0.164	-11.9	0.451
2607			2	2.569	3.702	6.045	-0.164	-9.633	-0.937
2608			3	2.569	3.702	6.045	-0.164	-7.367	-2.325
2609			4	2.569	3.702	6.045	-0.164	-5.1	-3.713
2610			5	2.569	3.702	6.045	-0.164	-2.833	-5.101
2611	12	M120	1	0.162	8.01	0.91	0	0	0
2612			2	0.162	5.355	0.91	0	8.258	-60.619
2613			3	-6.378	-0.4	-2.531	0.167	-4.045	-66.088
2614			4	-0.149	-5.624	0.851	0	-6.019	-46.509
2615			5	0	0	0	0	0	0
2616	12	M121	1	3.129	-3.467	-6.053	-0.168	11.716	-0.439
2617			2	3.129	-3.467	-6.053	-0.168	9.446	0.861
2618			3	3.129	-3.467	-6.053	-0.168	7.176	2.16
2619			4	3.129	-3.467	-6.053	-0.168	4.907	3.46
2620			5	3.129	-3.467	-6.053	-0.168	2.637	4.76
2621	12	M122	1	2.837	3.464	5.98	-0.161	-11.613	0.434
2622			2	2.837	3.464	5.98	-0.161	-9.37	-0.865
2623			3	2.837	3.464	5.98	-0.161	-7.128	-2.164
2624			4	2.837	3.464	5.98	-0.161	-4.885	-3.463
2625			5	2.837	3.464	5.98	-0.161	-2.643	-4.762
2626	12	M123	1	0.044	8.121	0.81	0	0	0
2627			2	0.044	5.466	0.81	0	7.35	-61.629
2628			3	-6.183	-0.318	-2.336	0.169	-4.084	-68.602
2629			4	-0.03	-5.81	0.811	0	-5.739	-47.826
2630			5	0	0	0	0	0	0
2631	12	M124	1	3.323	-3.251	-6.154	-0.174	11.695	-0.434
2632			2	3.323	-3.251	-6.154	-0.174	9.388	0.785
2633			3	3.323	-3.251	-6.154	-0.174	7.08	2.004
2634			4	3.323	-3.251	-6.154	-0.174	4.772	3.223
2635			5	3.323	-3.251	-6.154	-0.174	2.464	4.442
2636	12	M125	1	2.944	3.282	6.214	-0.168	-11.807	0.44

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2637			2	2.944	3.282	6.214	-0.168	-9.477	-0.791
2638			3	2.944	3.282	6.214	-0.168	-7.147	-2.022
2639			4	2.944	3.282	6.214	-0.168	-4.817	-3.253
2640			5	2.944	3.282	6.214	-0.168	-2.486	-4.483
2641	12	M126	1	-0.024	8.281	0.742	0	0	0
2642			2	-0.024	5.626	0.742	0	6.732	-63.079
2643			3	-6.339	-0.352	-2.184	0.173	-3.987	-70.359
2644			4	0.037	-5.95	0.77	0	-5.446	-48.818
2645			5	0	0	0	0	0	0
2646	12	M127	1	3.462	-3.094	-6.457	-0.177	12.012	-0.447
2647			2	3.462	-3.094	-6.457	-0.177	9.591	0.714
2648			3	3.462	-3.094	-6.457	-0.177	7.17	1.874
2649			4	3.462	-3.094	-6.457	-0.177	4.748	3.034
2650			5	3.462	-3.094	-6.457	-0.177	2.327	4.194
2651	12	M128	1	3.023	3.135	6.567	-0.178	-12.204	0.457
2652			2	3.023	3.135	6.567	-0.178	-9.741	-0.719
2653			3	3.023	3.135	6.567	-0.178	-7.279	-1.895
2654			4	3.023	3.135	6.567	-0.178	-4.816	-3.071
2655			5	3.023	3.135	6.567	-0.178	-2.354	-4.246
2656	12	M129	1	-0.049	8.399	0.694	0	0	0
2657			2	-0.049	5.744	0.694	0	6.294	-64.155
2658			3	-6.659	-0.373	-2.06	0.177	-3.821	-71.354
2659			4	0.063	-6.051	0.729	0	-5.159	-49.529
2660			5	0	0	0	0	0	0
2661	12	M130	1	3.524	-2.975	-6.887	-0.186	12.542	-0.472
2662			2	3.524	-2.975	-6.887	-0.186	9.96	0.644
2663			3	3.524	-2.975	-6.887	-0.186	7.377	1.759
2664			4	3.524	-2.975	-6.887	-0.186	4.795	2.875
2665			5	3.524	-2.975	-6.887	-0.186	2.212	3.99
2666	12	M151	1	3.127	3.007	6.967	-0.183	-12.686	0.479
2667			2	3.127	3.007	6.967	-0.183	-10.073	-0.649
2668			3	3.127	3.007	6.967	-0.183	-7.46	-1.776
2669			4	3.127	3.007	6.967	-0.183	-4.848	-2.904
2670			5	3.127	3.007	6.967	-0.183	-2.235	-4.032
2671	12	M152	1	-0.033	8.481	0.659	0	0	0
2672			2	-0.033	5.826	0.659	0	5.981	-64.893
2673			3	-7.067	-0.353	-1.953	0.18	-3.586	-71.928
2674			4	0.048	-6.135	0.688	0	-4.864	-50.125
2675			5	0	0	0	0	0	0
2676	12	M153	1	3.547	-2.856	-7.05	-0.191	12.684	-0.478
2677			2	3.547	-2.856	-7.05	-0.191	10.04	0.593
2678			3	3.547	-2.856	-7.05	-0.191	7.397	1.664
2679			4	3.547	-2.856	-7.05	-0.191	4.753	2.735
2680			5	3.547	-2.856	-7.05	-0.191	2.109	3.807
2681	12	M154	1	3.207	2.864	7.041	-0.178	-12.681	0.478
2682			2	3.207	2.864	7.041	-0.178	-10.04	-0.596
2683			3	3.207	2.864	7.041	-0.178	-7.4	-1.67
2684			4	3.207	2.864	7.041	-0.178	-4.76	-2.744
2685			5	3.207	2.864	7.041	-0.178	-2.119	-3.818
2686	12	M159	1	0.012	8.53	0.634	0	0	0
2687			2	0.012	5.876	0.634	0	5.753	-65.344
2688			3	-7.178	-0.326	-1.852	0.181	-3.275	-72.55
2689			4	0.003	-6.187	0.642	0	-4.542	-50.496
2690			5	0	0	0	0	0	0
2691	12	M175	1	3.626	-2.736	-7.018	-0.185	12.539	-0.473

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2692			2	3.626	-2.736	-7.018	-0.185	9.907	0.553
2693			3	3.626	-2.736	-7.018	-0.185	7.275	1.579
2694			4	3.626	-2.736	-7.018	-0.185	4.644	2.605
2695			5	3.626	-2.736	-7.018	-0.185	2.012	3.631
2696	12	M176	1	3.136	2.701	6.884	-0.184	-12.325	0.461
2697			2	3.136	2.701	6.884	-0.184	-9.743	-0.551
2698			3	3.136	2.701	6.884	-0.184	-7.162	-1.564
2699			4	3.136	2.701	6.884	-0.184	-4.58	-2.577
2700			5	3.136	2.701	6.884	-0.184	-1.998	-3.59
2701	12	M177	1	0.075	8.561	0.617	0	0	0
2702			2	0.075	5.906	0.617	0	5.597	-65.62
2703			3	-7.076	-0.375	-1.75	0.179	-2.878	-72.769
2704			4	-0.06	-6.166	0.589	0	-4.168	-50.347
2705			5	0	0	0	0	0	0
2706	12	M178	1	3.828	-2.612	-6.749	-0.175	12.044	-0.456
2707			2	3.828	-2.612	-6.749	-0.175	9.513	0.524
2708			3	3.828	-2.612	-6.749	-0.175	6.982	1.504
2709			4	3.828	-2.612	-6.749	-0.175	4.451	2.483
2710			5	3.828	-2.612	-6.749	-0.175	1.92	3.463
2711	12	M179	1	2.679	2.509	6.453	-0.196	-11.543	0.429
2712			2	2.679	2.509	6.453	-0.196	-9.123	-0.511
2713			3	2.679	2.509	6.453	-0.196	-6.703	-1.452
2714			4	2.679	2.509	6.453	-0.196	-4.283	-2.393
2715			5	2.679	2.509	6.453	-0.196	-1.863	-3.333
2716	12	M180	1	0.158	8.523	0.612	0	0	0
2717			2	0.158	5.868	0.612	0	5.554	-65.275
2718			3	-6.719	-0.615	-1.646	0.17	-2.319	-71.361
2719			4	-0.144	-5.948	0.523	0	-3.701	-48.802
2720			5	0	0	0	0	0	0
2721	12	M182	1	4.029	-2.495	-6.052	-0.164	10.928	-0.414
2722			2	4.029	-2.495	-6.052	-0.164	8.658	0.521
2723			3	4.029	-2.495	-6.052	-0.164	6.389	1.457
2724			4	4.029	-2.495	-6.052	-0.164	4.119	2.393
2725			5	4.029	-2.495	-6.052	-0.164	1.85	3.328
2726	12	M183	1	1.601	2.287	5.564	-0.197	-10.065	0.37
2727			2	1.601	2.287	5.564	-0.197	-7.979	-0.488
2728			3	1.601	2.287	5.564	-0.197	-5.892	-1.346
2729			4	1.601	2.287	5.564	-0.197	-3.806	-2.203
2730			5	1.601	2.287	5.564	-0.197	-1.719	-3.061
2731	12	M186	1	0.256	8.247	0.628	0	0	0
2732			2	0.256	5.592	0.628	0	5.698	-62.776
2733			3	-5.919	-1.091	-1.55	0.153	-1.557	-66.269
2734			4	-0.243	-5.346	0.444	0	-3.143	-44.547
2735			5	0	0	0	0	0	0
2736	12	M187	1	3.727	-2.363	-4.471	-0.14	8.516	-0.319
2737			2	3.727	-2.363	-4.471	-0.14	6.84	0.567
2738			3	3.727	-2.363	-4.471	-0.14	5.163	1.453
2739			4	3.727	-2.363	-4.471	-0.14	3.486	2.339
2740			5	3.727	-2.363	-4.471	-0.14	1.81	3.225
2741	12	M188	1	-0.093	2.032	3.825	-0.175	-7.313	0.256
2742			2	-0.093	2.032	3.825	-0.175	-5.879	-0.506
2743			3	-0.093	2.032	3.825	-0.175	-4.444	-1.268
2744			4	-0.093	2.032	3.825	-0.175	-3.01	-2.03
2745			5	-0.093	2.032	3.825	-0.175	-1.575	-2.792
2746	12	M189	1	0.336	7.409	0.661	0	0	0

Member Section Forces (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
2747			2	0.336	4.754	0.661	0	5.994	-55.171
2748			3	-4.252	-1.628	-1.468	0.123	-0.692	-55.289
2749			4	-0.327	-4.19	0.363	0	-2.564	-36.367
2750			5	0	0	0	0	0	0
2751	12	M213	1	4.209	-2.12	-0.521	-0.086	2.822	-0.07
2752			2	4.209	-2.12	-0.521	-0.086	2.626	0.725
2753			3	4.209	-2.12	-0.521	-0.086	2.431	1.52
2754			4	4.209	-2.12	-0.521	-0.086	2.235	2.315
2755			5	4.209	-2.12	-0.521	-0.086	2.04	3.111
2756	12	M214	1	-2.847	1.713	-0.203	-0.187	-18.695	0.895
2757			2	-2.847	1.713	-0.203	-0.187	-18.771	0.252
2758			3	-2.847	1.713	-0.203	-0.187	-18.847	-0.39
2759			4	-2.847	1.713	-0.203	-0.187	-18.923	-1.032
2760			5	-2.847	1.713	-0.203	-0.187	-18.999	-1.675

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N490	max	0	13-1	0	13-1	0	13-1	4.214	13-70	0	13-1	0	13-1
2		min	0	2	0	2	0	2	-3.742	8-71	0	2	0	2
3	N491	max	0	13-1	0	13-1	0	13-1	1112.31	13-58	0	13-1	0	13-1
4		min	0	2	0	2	0	2	-261.848	8-66	0	2	0	2
5	N819A	max	0	13-1	37.381	9-72	0	13-1	0	13-1	0	13-1	0	13-1
6		min	0	2	-15.095	13-72	0	2	0	2	0	2	0	2
7	N820A	max	0	13-1	35.043	9-75	0	13-1	0	13-1	0	13-1	0	13-1
8		min	0	2	-8.625	13-76	0	2	0	2	0	2	0	2
9	N825A	max	46.804	8-65	3.525	8-78	0	13-1	0	13-1	0	13-1	0	13-1
10		min	-51.542	13-76	-2.366	3-64	0	2	0	2	0	2	0	2
11	N826A	max	40.519	8-9	3.458	8-78	0	13-1	0	13-1	0	13-1	0	13-1
12		min	-53.014	13-65	-2.361	3-65	0	2	0	2	0	2	0	2
13	N831A	max	0	13-1	44.234	8-9	0	13-1	0	13-1	0	13-1	0	13-1
14		min	0	2	-42.365	13-57	0	2	0	2	0	2	0	2
15	N832A	max	0	13-1	44.756	8-9	0	13-1	0	13-1	0	13-1	0	13-1
16		min	0	2	-29.591	13-57	0	2	0	2	0	2	0	2
17	N837A	max	46.759	8-10	5.311	3-1	0	13-1	0	13-1	0	13-1	0	13-1
18		min	-51.882	13-65	-2.897	9-15	0	2	0	2	0	2	0	2
19	N838A	max	39.083	8-1	5.325	3-1	0	13-1	0	13-1	0	13-1	0	13-1
20		min	-45.866	13-53	-2.176	9-18	0	2	0	2	0	2	0	2
21	N315	max	15.5	13-13	72.982	8-10	56.827	13-41	0	13-1	0	13-1	0	13-1
22		min	-8.217	13-72	0	3-80	-6.837	7-15	0	2	0	2	0	2
23	N318	max	7.172	13-44	76.135	8-9	58.914	13-41	0	13-1	0	13-1	0	13-1
24		min	-5.688	9-19	0	3-74	-4.281	7-13	0	2	0	2	0	2
25	N322	max	14.571	13-13	72.748	8-14	53.895	13-41	0	13-1	0	13-1	0	13-1
26		min	-7.089	13-76	0	3-80	-6.032	7-20	0	2	0	2	0	2
27	N325	max	7.361	13-47	79.763	8-10	56.647	13-41	0	13-1	0	13-1	0	13-1
28		min	-5.984	9-23	0	3-80	-3.128	7-19	0	2	0	2	0	2
29	N329	max	12.313	13-17	71.529	8-17	52.04	13-48	0	13-1	0	13-1	0	13-1
30		min	-6.41	13-76	0	3-80	-5.717	7-24	0	2	0	2	0	2
31	N332	max	7.493	13-50	81.819	9-14	52.672	13-45	0	13-1	0	13-1	0	13-1
32		min	-6.158	9-10	0	3-80	-2.916	3-24	0	2	0	2	0	2
33	N336	max	11.626	13-20	71.005	9-21	52.094	13-53	0	13-1	0	13-1	0	13-1
34		min	-5.633	13-79	0	3-80	-5.595	7-27	0	2	0	2	0	2
35	N339	max	6.976	13-52	82.425	9-17	52.694	13-51	0	13-1	0	13-1	0	13-1
36		min	-6.54	9-13	0	3-80	-2.978	3-28	0	2	0	2	0	2
37	N343	max	11.568	13-25	70.893	8-25	52.222	13-54	0	13-1	0	13-1	0	13-1
38		min	-4.889	13-84	0	3-80	-5.521	7-31	0	2	0	2	0	2

Envelope Node Reactions (Continued)

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
39	N346	max	7.228	13-63	81.968	9-21	53.058	13-53	0	13-1	0	13-1	0	13-1
40		min	-6.734	9-16	0	3-80	-3.033	3-32	0	2	0	2	0	2
41	N350	max	10.829	13-29	71.243	8-28	52.256	13-58	0	13-1	0	13-1	0	13-1
42		min	-4.452	13-88	0	3-80	-5.691	9-35	0	2	0	2	0	2
43	N353	max	7.759	13-62	81.739	9-24	52.589	13-57	0	13-1	0	13-1	0	13-1
44		min	-6.817	9-19	0	3-80	-3.101	3-35	0	2	0	2	0	2
45	N357	max	10.888	13-33	71.215	8-32	52.524	13-61	0	13-1	0	13-1	0	13-1
46		min	-4.127	13-91	0	3-80	-6.019	9-38	0	2	0	2	0	2
47	N360	max	8.288	13-65	80.989	9-28	52.367	13-61	0	13-1	0	13-1	0	13-1
48		min	-6.838	9-23	0	3-80	-3.228	8-39	0	2	0	2	0	2
49	N364	max	11.053	13-36	71.206	8-35	52.881	13-65	0	13-1	0	13-1	0	13-1
50		min	-3.84	13-94	0	3-80	-5.428	9-42	0	2	0	2	0	2
51	N367	max	8.535	13-69	80.647	9-31	52.258	13-64	0	13-1	0	13-1	0	13-1
52		min	-6.582	9-26	0	3-80	-3.124	3-42	0	2	0	2	0	2
53	N371	max	11.146	13-39	72.385	8-39	53.172	13-68	0	13-1	0	13-1	0	13-1
54		min	-3.709	13-104	0	3-80	-5.303	7-45	0	2	0	2	0	2
55	N374	max	8.858	13-72	81.924	9-35	52.641	13-68	0	13-1	0	13-1	0	13-1
56		min	-6.432	9-30	0	3-80	-3.112	3-46	0	2	0	2	0	2
57	N378	max	11.263	13-43	73.314	8-43	53.698	13-72	0	13-1	0	13-1	0	13-1
58		min	-3.739	13-104	0	3-80	-5.303	7-49	0	2	0	2	0	2
59	N461	max	9.34	13-76	83.235	9-38	52.826	13-72	0	13-1	0	13-1	0	13-1
60		min	-6.371	9-34	0	3-80	-3.121	3-50	0	2	0	2	0	2
61	N463	max	11.373	13-47	73.652	8-46	53.824	13-76	0	13-1	0	13-1	0	13-1
62		min	-3.496	13-104	0	3-80	-5.286	7-53	0	2	0	2	0	2
63	N467	max	9.59	13-79	83.85	9-42	52.881	13-75	0	13-1	0	13-1	0	13-1
64		min	-6.35	9-37	0	3-80	-3.11	3-53	0	2	0	2	0	2
65	N471	max	11.455	13-51	73.763	8-50	53.557	13-79	0	13-1	0	13-1	0	13-1
66		min	-3.123	13-107	0	3-80	-5.306	7-56	0	2	0	2	0	2
67	N474	max	9.741	13-84	83.929	9-46	52.769	13-79	0	13-1	0	13-1	0	13-1
68		min	-6.362	9-41	0	3-80	-3.13	3-57	0	2	0	2	0	2
69	N478	max	11.606	13-55	73.814	8-54	53.062	13-84	0	13-1	0	13-1	0	13-1
70		min	-2.287	13-107	0	3-80	-5.32	7-60	0	2	0	2	0	2
71	N481	max	9.847	13-88	83.828	9-49	52.911	13-83	0	13-1	0	13-1	0	13-1
72		min	-6.376	9-45	0	3-80	-3.122	3-61	0	2	0	2	0	2
73	N485	max	11.773	13-58	74.209	8-57	52.761	13-87	0	13-1	0	13-1	0	13-1
74		min	-1.964	9-3	0	3-80	-5.217	7-64	0	2	0	2	0	2
75	N488	max	10.103	13-91	83.995	9-53	52.839	13-87	0	13-1	0	13-1	0	13-1
76		min	-6.386	9-48	0	3-80	-3.059	3-65	0	2	0	2	0	2
77	N560	max	11.907	13-62	74.576	8-61	52.74	13-91	0	13-1	0	13-1	0	13-1
78		min	-1.924	9-3	0	3-80	-4.982	7-67	0	2	0	2	0	2
79	N564	max	10.557	13-104	83.914	9-57	52.431	13-91	0	13-1	0	13-1	0	13-1
80		min	-6.422	9-52	0	3-80	-2.981	3-68	0	2	0	2	0	2
81	N568	max	11.846	13-66	74.5	8-65	52.128	13-94	0	13-1	0	13-1	0	13-1
82		min	-1.89	9-3	0	3-80	-4.498	3-70	0	2	0	2	0	2
83	N575	max	11.673	13-104	83.926	9-61	52.209	13-94	0	13-1	0	13-1	0	13-1
84		min	-6.478	9-56	0	3-80	-2.682	3-71	0	2	0	2	0	2
85	N583	max	11.733	13-67	73.965	9-68	52.244	13-72	0	13-1	0	13-1	0	13-1
86		min	-1.858	9-3	0	3-51	-3.333	3-72	0	2	0	2	0	2
87	N586	max	12.49	13-104	84.536	9-64	53.607	13-72	0	13-1	0	13-1	0	13-1
88		min	-6.527	9-59	0	3-48	-1.753	3-72	0	2	0	2	0	2
89	N678	max	12.188	13-70	71.552	9-72	56.153	13-76	0	13-1	0	13-1	0	13-1
90		min	-1.82	9-3	0	3-54	-1.504	13-38	0	2	0	2	0	2
91	N684	max	13.589	13-104	85.363	9-68	56.455	13-76	0	13-1	0	13-1	0	13-1
92		min	-6.477	9-63	0	3-52	-0.457	3-78	0	2	0	2	0	2
93	N688	max	13.225	13-74	64.704	9-72	58.378	13-104	0	13-1	0	13-1	0	13-1

Node with highest vertical reaction

LC 9, moving load step 68

Envelope Node Reactions (Continued)

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
94		min	-1.826	9-3	0	3-61	-2.035	13-42	0	2	0	2	0	2
95	N691	max	13.829	13-107	81.112	9-71	59.492	13-76	0	13-1	0	13-1	0	13-1
96		min	-7.669	13-57	0	3-55	-0.276	3-31	0	2	0	2	0	2

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M155	1	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	7.1	8-15
2			min	0	2	0	2	0	2	0	2	0	2	-12.7	9-9
3		2	max	156.046	13-27	39.306	8-27	30.289	13-23	0.567	3-31	38.844	13-30	117.197	9-11
4			min	-104.258	13-84	-45.586	9-17	-15.978	13-74	-0.706	3-19	-23.496	13-16	-282.983	3-21
5		3	max	160.763	13-43	17.918	8-46	39.245	13-38	0.589	3-49	44.873	13-41	126.385	9-51
6			min	-113.697	13-104	-51.622	9-36	-42.353	13-76	-0.701	3-36	-28.517	13-95	-273.515	8-39
7		4	max	174.799	13-61	13.083	8-65	49.683	13-56	0.612	3-68	49.985	13-59	124.298	4-70
8			min	-78.035	13-119	-53.004	9-55	-48.851	13-107	-0.693	3-55	-26.544	13-69	-275.099	3-58
9		5	max	22.45	13-103	138.731	13-58	10.777	13-102	0.466	3-62	3.073	9-71	101.012	8-66
10			min	-26.014	13-58	-14.366	3-9	-43.474	13-84	-4.248	13-58	-2.581	13-57	-571.34	13-58
11	M156	1	max	20.568	13-69	62.468	13-63	46.635	13-5	0.861	13-41	1.874	13-43	31.82	13-69
12			min	-33.418	13-14	-29.785	9-16	-16.606	13-16	-0.822	9-13	-4.759	8-9	-59.381	13-10
13		2	max	127.678	13-10	54.272	8-27	47.116	13-23	0.674	3-14	32.202	13-25	120.491	9-12
14			min	-150.077	13-28	-22.193	9-17	-22.883	13-74	-0.725	3-27	-16.311	13-60	-275.072	3-24
15		3	max	104.138	13-25	46.243	8-46	21.943	13-38	0.642	3-32	52.067	13-41	114.987	7-53
16			min	-151.785	13-74	-43.287	9-36	-24.696	13-76	-0.75	3-45	-27.984	13-95	-293.679	9-42
17		4	max	97.67	13-43	44.284	8-65	19.336	13-56	0.646	3-51	59.176	13-59	113.934	8-71
18			min	-160.785	13-92	-46.405	9-55	-19.241	13-92	-0.766	3-63	-22.896	13-114	-296.328	9-61
19		5	max	0	13-128	0	11	0	11	3.742	8-71	0	13-128	0	13-128
20			min	0	2	0	2	0	2	-4.214	13-70	0	2	0	2
21	M157	1	max	42.58	13-22	38.014	8-29	11.816	13-24	0.266	9-20	0	13-128	0	13-128
22			min	-45.976	13-60	-10.88	3-18	-8.168	13-73	-0.211	8-29	0	2	0	2
23		2	max	49.203	13-22	9.803	3-29	7.188	13-24	0.057	3-26	10.304	13-73	11.938	3-29
24			min	-23.853	13-79	-10.109	7-18	-5.297	13-73	-0.02	9-13	-13.52	13-24	-28.099	9-18
25		3	max	49.203	13-22	9.803	3-29	7.188	13-24	0.057	3-26	0.914	13-24	-0.027	13-128
26			min	-23.853	13-79	-10.228	7-18	-5.297	13-73	-0.02	9-13	-0.56	9-23	-9.427	9-29
27		4	max	49.203	13-22	9.803	3-29	7.188	13-24	0.057	3-26	15.347	13-24	14.17	3-18
28			min	-23.853	13-79	-10.348	7-18	-5.297	13-73	-0.02	9-13	-10.968	13-73	-28.391	8-29
29		5	max	90.376	13-25	10.035	3-32	9.664	13-24	0.279	8-29	0	13-128	0	13-128
30			min	-26.726	13-79	-46.708	9-21	-7.435	13-73	-0.299	9-20	0	2	0	2
31	M158	1	max	36.331	13-27	37.468	8-30	6.659	13-25	0.265	9-21	0	13-128	0	13-128
32			min	-44.042	13-61	-11.079	3-19	-6.82	9-26	-0.216	8-30	0	2	0	2
33		2	max	45.033	13-25	9.84	3-30	4.933	13-25	0.051	3-26	7.834	13-74	12.056	3-30
34			min	-19.794	13-80	-10.183	3-19	-4.058	13-74	-0.021	9-14	-9.36	13-25	-28.034	9-19
35		3	max	45.033	13-25	9.84	3-30	4.933	13-25	0.051	3-26	0.545	13-25	-0.026	13-128
36			min	-19.794	13-80	-10.237	7-19	-4.058	13-74	-0.021	9-14	-0.68	9-25	-9.383	9-30
37		4	max	45.033	13-25	9.84	3-30	4.933	13-25	0.051	3-26	10.45	13-25	14.445	3-19
38			min	-19.794	13-80	-10.357	7-19	-4.058	13-74	-0.021	9-14	-8.464	13-74	-28.455	8-30
39		5	max	80.711	13-26	10.254	3-33	4.72	13-25	0.279	8-30	0	13-128	0	13-128
40			min	-23.85	13-79	-46.108	9-22	-6.815	8-26	-0.307	9-21	0	2	0	2
41	M160	1	max	41.65	13-25	38.136	8-32	12.999	13-27	0.267	9-23	0	13-128	0	13-128
42			min	-77.69	13-63	-10.854	3-21	-7.676	13-76	-0.222	8-32	0	2	0	2
43		2	max	38.062	13-25	9.913	3-32	7.882	13-27	0.058	3-28	9.867	13-76	12.279	3-32
44			min	-32.602	13-79	-10.044	3-20	-5.095	13-76	-0.022	3-15	-14.798	13-27	-27.69	9-21
45		3	max	38.062	13-25	9.913	3-32	7.882	13-27	0.058	3-28	1.028	13-27	-0.026	13-128
46			min	-32.602	13-79	-10.148	7-21	-5.095	13-76	-0.022	3-15	-0.532	9-25	-9.316	9-32
47		4	max	38.062	13-25	9.913	3-32	7.882	13-27	0.058	3-28	16.854	13-27	14.274	3-20
48			min	-32.602	13-79	-10.268	7-21	-5.095	13-76	-0.022	3-15	-10.593	13-76	-28.782	8-32
49		5	max	52.29	13-30	10.112	3-35	11.204	13-27	0.294	8-32	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
50			min	-27.741	13-78	-44.407	9-24	-7.168	13-76	-0.302	9-23	0	2	0	2
51	M161	1	max	53.013	13-27	36.497	8-33	9.784	13-28	0.266	9-24	0	13-128	0	13-128
52			min	-42.925	13-64	-10.93	3-22	-7.107	13-77	-0.226	8-33	0	2	0	2
53		2	max	66.805	13-28	9.764	3-33	6.437	13-28	0.056	3-29	9.643	13-77	12.03	3-33
54			min	-29.997	13-83	-10.146	3-22	-4.976	13-77	-0.022	3-16	-12.155	13-28	-27.743	9-22
55		3	max	66.805	13-28	9.764	3-33	6.437	13-28	0.056	3-29	0.771	13-28	-0.026	13-128
56			min	-29.997	13-83	-10.214	7-22	-4.976	13-77	-0.022	3-16	-0.638	9-27	-9.268	9-33
57		4	max	66.805	13-28	9.764	3-33	6.437	13-28	0.056	3-29	13.697	13-28	14.484	3-22
58			min	-29.997	13-83	-10.334	7-22	-4.976	13-77	-0.022	3-16	-10.339	13-77	-28.431	8-33
59		5	max	108.091	13-29	10.165	3-36	7.665	13-28	0.296	8-33	0	13-128	0	13-128
60			min	-36.448	13-82	-45.819	9-25	-6.551	13-62	-0.304	9-24	0	2	0	2
61	M162	1	max	24.044	13-28	36.396	8-34	6.089	13-57	0.264	9-25	0	13-128	0	13-128
62			min	-53.754	13-65	-11.029	3-23	-8.052	9-29	-0.23	8-34	0	2	0	2
63		2	max	26.167	13-28	10.01	3-34	4.676	13-29	0.051	3-30	7.97	8-30	12.533	3-34
64			min	-15.957	13-83	-10.092	3-23	-3.964	9-30	-0.022	3-17	-8.921	13-29	-27.533	9-23
65		3	max	26.167	13-28	10.01	3-34	4.676	13-29	0.051	3-30	0.498	8-47	-0.025	13-128
66			min	-15.957	13-83	-10.153	7-23	-3.964	9-30	-0.022	3-17	-0.755	9-28	-9.261	9-34
67		4	max	26.167	13-28	10.01	3-34	4.676	13-29	0.051	3-30	9.858	13-29	14.411	3-23
68			min	-15.957	13-83	-10.272	7-23	-3.964	9-30	-0.022	3-17	-8.713	9-29	-28.916	8-34
69		5	max	55.81	13-32	10.321	3-37	4.011	13-57	0.299	8-34	0	13-128	0	13-128
70			min	-16.012	13-83	-43.564	9-26	-7.807	8-30	-0.302	9-25	0	2	0	2
71	M163	1	max	54.08	13-28	37.967	8-35	10.781	13-30	0.262	9-26	0	13-128	0	13-128
72			min	-101.219	13-66	-10.879	3-24	-6.926	9-30	-0.239	8-35	0	2	0	2
73		2	max	43.87	13-28	10.179	8-35	7.013	13-30	0.056	3-31	8.315	13-79	12.787	3-35
74			min	-45.782	13-66	-9.974	3-23	-4.302	13-79	-0.023	3-18	-13.245	13-30	-27.283	9-24
75		3	max	43.87	13-28	10.127	3-35	7.013	13-30	0.056	3-31	0.837	13-30	-0.025	13-128
76			min	-45.782	13-66	-10.056	7-24	-4.302	13-79	-0.023	3-18	-0.677	9-28	-9.252	9-35
77		4	max	43.87	13-28	10.127	3-35	7.013	13-30	0.056	3-31	14.918	13-30	14.24	3-23
78			min	-45.782	13-66	-10.176	7-24	-4.302	13-79	-0.023	3-18	-8.961	13-79	-29.313	8-35
79		5	max	47.259	13-27	10.207	3-38	9.113	13-30	0.304	8-35	0	13-128	0	13-128
80			min	-38.401	13-65	-42.805	9-29	-6.58	8-30	-0.297	9-26	0	2	0	2
81	M164	1	max	40.188	13-29	36.557	8-33	12.973	13-31	0.265	9-27	0	13-128	0	13-128
82			min	-55.455	13-67	-10.668	3-25	-8.501	13-80	-0.236	8-36	0	2	0	2
83		2	max	44.802	13-28	9.961	8-36	7.883	13-31	0.06	3-32	10.786	13-80	12.381	3-36
84			min	-26.273	13-83	-9.914	3-25	-5.559	13-80	-0.023	3-19	-14.844	13-31	-27.206	9-25
85		3	max	44.802	13-28	9.902	3-36	7.883	13-31	0.06	3-32	0.985	13-31	-0.025	13-128
86			min	-26.273	13-83	-10.033	7-25	-5.559	13-80	-0.023	3-19	-0.649	9-29	-9.208	9-36
87		4	max	44.802	13-28	9.902	3-36	7.883	13-31	0.06	3-32	16.815	13-31	14.126	3-25
88			min	-26.273	13-83	-10.153	7-25	-5.559	13-80	-0.023	3-19	-11.539	13-80	-28.832	8-36
89		5	max	77.109	13-34	10.107	3-39	10.945	13-31	0.309	8-36	0	13-128	0	13-128
90			min	-27.091	13-82	-43.939	9-30	-7.602	13-80	-0.294	9-27	0	2	0	2
91	M165	1	max	44.162	13-31	36.129	8-34	7.96	13-32	0.262	9-28	0	13-128	0	13-128
92			min	-45.366	13-68	-10.775	3-26	-6.971	9-33	-0.238	8-37	0	2	0	2
93		2	max	54.609	13-32	9.964	3-37	5.744	13-32	0.055	3-33	8.461	13-81	12.522	3-37
94			min	-24.631	13-86	-9.979	3-26	-4.385	13-81	-0.022	3-20	-10.902	13-32	-27.185	9-26
95		3	max	54.609	13-32	9.964	3-37	5.744	13-32	0.055	3-33	0.631	13-32	-0.025	13-128
96			min	-24.631	13-86	-10.043	7-26	-4.385	13-81	-0.022	3-20	-0.726	9-32	-9.187	9-37
97		4	max	54.609	13-32	9.964	3-37	5.744	13-32	0.055	3-33	12.164	13-32	14.305	3-26
98			min	-24.631	13-86	-10.162	7-26	-4.385	13-81	-0.022	3-20	-9.15	13-81	-28.779	8-37
99		5	max	88.013	13-35	10.437	3-40	6.014	13-32	0.307	8-37	0	13-128	0	13-128
100			min	-30.562	13-86	-44.189	9-31	-7.085	8-33	-0.302	9-28	0	2	0	2
101	M166	1	max	32.484	13-32	37.108	8-35	7.936	13-33	0.26	9-29	0	13-128	0	13-128
102			min	-75.145	13-69	-10.799	3-27	-7.564	9-33	-0.244	8-38	0	2	0	2
103		2	max	27.595	13-32	10.21	8-38	5.593	13-33	0.054	3-34	7.827	8-33	12.906	3-38
104			min	-27.757	13-82	-9.901	3-26	-3.871	9-33	-0.022	3-21	-10.652	13-33	-26.985	9-27

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
105		3	max	27.595	13-32	10.154	3-38	5.593	13-33	0.054	3-34	0.578	13-33	-0.025	13-128
106			min	-27.757	13-82	-9.955	7-27	-3.871	9-33	-0.022	3-21	-0.745	9-32	-9.194	9-38
107		4	max	27.595	13-32	10.154	3-38	5.593	13-33	0.054	3-34	11.809	13-33	14.215	3-26
108			min	-27.757	13-82	-10.075	7-27	-3.871	9-33	-0.022	3-21	-8.516	9-33	-29.319	8-38
109		5	max	45.369	13-36	10.47	3-40	6.095	13-33	0.311	8-38	0	13-128	0	13-128
110			min	-22.646	13-83	-42.609	9-32	-7.416	8-33	-0.295	9-29	0	2	0	2
111	M167	1	max	41.999	13-17	40.71	8-24	8.281	13-22	0.26	9-15	0	13-128	0	13-128
112			min	-86	13-55	-10.233	7-13	-6.257	9-19	-0.195	8-25	0	2	0	2
113		2	max	34.282	13-17	9.972	3-24	5.389	13-19	0.057	9-21	7.229	13-68	11.972	3-24
114			min	-39.278	13-55	-9.603	7-13	-3.696	13-68	-0.021	8-9	-10.152	13-19	-27.173	9-13
115		3	max	34.282	13-17	9.972	3-24	5.389	13-19	0.057	9-21	0.668	13-19	-0.028	13-128
116			min	-39.278	13-55	-9.723	7-13	-3.696	13-68	-0.021	8-9	-0.595	9-18	-9.744	9-24
117		4	max	34.282	13-17	9.972	3-24	5.389	13-19	0.057	9-21	11.489	13-19	12.763	7-13
118			min	-39.278	13-55	-9.842	7-13	-3.696	13-68	-0.021	8-9	-7.614	13-68	-28.759	8-24
119		5	max	50.611	13-20	10.148	3-27	6.22	13-19	0.256	8-19	0	13-128	0	13-128
120			min	-33.865	13-54	-46.59	9-16	-6.047	8-19	-0.299	9-15	0	2	0	2
121	M168	1	max	39.051	13-18	39.774	8-25	12.221	13-20	0.264	9-16	0	13-128	0	13-128
122			min	-63.299	13-56	-10.231	7-14	-7.857	13-57	-0.187	8-25	0	2	0	2
123		2	max	38.519	13-18	9.841	3-25	7.282	13-20	0.061	3-22	9.807	13-69	11.784	3-25
124			min	-28.073	13-72	-9.823	7-14	-5.02	13-69	-0.02	8-9	-13.63	13-20	-27.655	9-14
125		3	max	38.519	13-18	9.841	3-25	7.282	13-20	0.061	3-22	0.993	13-20	-0.028	13-128
126			min	-28.073	13-72	-9.943	7-14	-5.02	13-69	-0.02	8-9	-0.492	9-18	-9.661	9-25
127		4	max	38.519	13-18	9.841	3-25	7.282	13-20	0.061	3-22	15.615	13-20	13.192	7-14
128			min	-28.073	13-72	-10.063	7-14	-5.02	13-69	-0.02	8-9	-10.354	13-69	-28.42	8-25
129		5	max	65.719	13-21	10.046	3-28	10.181	13-20	0.256	8-20	0	13-128	0	13-128
130			min	-24.455	13-71	-47.106	9-17	-7.84	13-57	-0.298	9-16	0	2	0	2
131	M169	1	max	50.988	13-23	38.516	8-26	8.078	13-21	0.264	9-17	0	13-128	0	13-128
132			min	-38.453	13-57	-10.62	3-15	-6.062	13-55	-0.194	8-26	0	2	0	2
133		2	max	62.776	13-21	9.708	3-26	5.443	13-21	0.056	3-23	8.856	13-70	11.595	3-26
134			min	-26.423	13-76	-10.032	7-15	-4.549	13-70	-0.02	8-10	-10.255	13-21	-28.066	9-15
135		3	max	62.776	13-21	9.708	3-26	5.443	13-21	0.056	3-23	0.675	13-21	-0.028	13-128
136			min	-26.423	13-76	-10.152	7-15	-4.549	13-70	-0.02	8-10	-0.615	9-21	-9.585	9-26
137		4	max	62.776	13-21	9.708	3-26	5.443	13-21	0.056	3-23	11.606	13-21	13.617	7-15
138			min	-26.423	13-76	-10.272	7-15	-4.549	13-70	-0.02	8-10	-9.412	13-70	-28.13	8-26
139		5	max	110.562	13-22	10.163	3-29	5.915	13-21	0.255	8-26	0	13-128	0	13-128
140			min	-32.087	13-75	-48.314	9-18	-6.563	13-55	-0.307	9-17	0	2	0	2
141	M170	1	max	23.871	13-21	38.791	8-27	6.034	13-53	0.263	9-18	0	13-128	0	13-128
142			min	-57.213	13-58	-10.976	3-16	-7.793	9-22	-0.202	8-27	0	2	0	2
143		2	max	23.707	13-21	9.976	3-27	4.308	13-22	0.052	3-24	7.656	8-23	12.163	3-27
144			min	-17.619	13-72	-10.064	7-16	-3.824	9-22	-0.022	8-11	-8.188	13-22	-28.084	9-16
145		3	max	23.707	13-21	9.976	3-27	4.308	13-22	0.052	3-24	0.469	8-40	-0.027	13-128
146			min	-17.619	13-72	-10.183	7-16	-3.824	9-22	-0.022	8-11	-0.703	9-21	-9.548	9-27
147		4	max	23.707	13-21	9.976	3-27	4.308	13-22	0.052	3-24	9.112	13-22	13.921	3-16
148			min	-17.619	13-72	-10.303	7-16	-3.824	9-22	-0.022	8-11	-8.38	9-22	-28.655	8-27
149		5	max	49.64	13-23	10.19	3-30	3.497	13-22	0.263	8-27	0	13-128	0	13-128
150			min	-16.246	13-72	-46.052	9-19	-7.511	8-23	-0.303	9-18	0	2	0	2
151	M171	1	max	51.581	13-21	40.076	8-28	10.965	13-23	0.264	9-19	0	13-128	0	13-128
152			min	-95.515	13-59	-10.947	3-17	-5.78	13-72	-0.208	8-28	0	2	0	2
153		2	max	42.263	13-21	10.076	3-28	6.881	13-23	0.055	3-25	8.549	13-72	12.41	3-28
154			min	-43.583	13-59	-10.057	7-17	-4.403	13-72	-0.021	8-12	-12.936	13-23	-28.032	9-17
155		3	max	42.263	13-21	10.076	3-28	6.881	13-23	0.055	3-25	0.882	13-23	-0.027	13-128
156			min	-43.583	13-59	-10.177	7-17	-4.403	13-72	-0.021	8-12	-0.561	9-21	-9.502	9-28
157		4	max	42.263	13-21	10.076	3-28	6.881	13-23	0.055	3-25	14.699	13-23	13.92	3-17
158			min	-43.583	13-59	-10.296	7-17	-4.403	13-72	-0.021	8-12	-9.134	13-72	-28.912	8-28
159		5	max	50.05	13-20	10.08	3-31	9.206	13-23	0.272	8-28	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
160			min	-37.97	13-58	-45.559	9-20	-6.047	13-60	-0.3	9-19	0	2	0	2
161	M172	1	max	29.414	13-20	39.329	8-23	6.147	13-49	0.26	9-14	0	13-128	0	13-128
162			min	-41.061	13-54	-9.909	7-12	-7.245	9-19	-0.191	8-24	0	2	0	2
163		2	max	35.051	13-18	9.796	3-23	4.039	13-18	0.056	9-20	7.533	8-19	11.569	3-23
164			min	-16.358	13-72	-9.359	7-12	-3.773	9-19	-0.019	8-9	-7.629	13-18	-26.631	9-12
165		3	max	35.051	13-18	9.796	3-23	4.039	13-18	0.056	9-20	0.482	13-18	-0.027	13-128
166			min	-16.358	13-72	-9.479	7-12	-3.773	9-19	-0.019	8-9	-0.635	9-18	-9.795	9-23
167		4	max	35.051	13-18	9.796	3-23	4.039	13-18	0.056	9-20	8.592	13-18	12.305	7-12
168			min	-16.358	13-72	-9.599	7-12	-3.773	9-19	-0.019	8-9	-8.206	9-19	-28.297	8-23
169		5	max	72.865	13-19	10.207	3-26	3.152	13-21	0.256	8-18	0	13-128	0	13-128
170			min	-19.202	13-72	-47.706	9-15	-7.061	8-19	-0.302	9-14	0	2	0	2
171	M173	1	max	44.4	8-12	30.739	13-57	22.201	13-13	74.006	8-5	11.942	13-5	86.912	13-57
172			min	-45.051	13-69	-48.334	8-9	-11.631	13-5	-46.485	9-16	-11.48	8-9	-110.314	8-9
173		2	max	16.763	13-32	19.822	3-25	10.474	9-23	378.198	13-76	6.979	13-23	4.562	4-29
174			min	-16.857	13-88	-24.838	8-27	-22.687	13-23	-583.45	3-19	-0.742	13-72	-22.396	3-19
175		3	max	17.505	13-51	43.36	9-43	55.58	13-77	230.524	7-72	17.038	13-40	8.77	7-44
176			min	-17.019	13-104	-5.843	3-45	-17.473	13-41	-487.726	3-37	-17.478	13-90	-16.865	3-40
177		4	max	18.494	13-57	16.167	3-56	10.575	9-59	311.192	7-72	11.754	13-62	4.26	9-65
178			min	-12.795	8-49	-28.823	8-58	-28.638	13-62	-479.351	13-53	-0.944	13-96	-28.723	3-58
179		5	max	51.542	13-76	12.688	13-75	0.05	8-61	0	13-128	0.105	13-65	4.676	3-64
180			min	-46.804	8-65	-40.065	9-75	-0.049	13-65	0	2	-0.091	8-61	-7.501	9-78
181	M174	1	max	37.289	8-1	19.723	13-57	31.243	13-41	200.834	13-57	8.7	13-5	59.887	13-57
182			min	-42.29	13-57	-48.33	8-9	-8.278	13-5	-128.724	8-11	-16.943	13-41	-111.484	8-9
183		2	max	15.002	8-15	27.232	8-25	10.544	13-59	509.783	8-9	7.18	13-23	6.987	7-23
184			min	-20.485	13-65	-33.15	9-27	-22.669	13-23	-443.631	9-28	-0.714	13-72	-28.532	3-19
185		3	max	13.8	13-25	56.683	8-43	54.728	13-77	298.784	7-9	16.546	13-40	11.542	4-44
186			min	-19.334	13-80	-9.529	3-45	-17.034	13-41	-528.562	3-46	-16.668	13-90	-22.194	3-40
187		4	max	16.053	13-41	22.629	8-56	10.473	8-59	148.016	9-40	12.01	13-62	5.394	3-57
188			min	-18.083	13-97	-38.1	9-58	-27.51	13-62	-638.302	8-64	-0.853	13-96	-37.44	8-61
189		5	max	53.014	13-65	6.91	13-76	0.009	8-60	0	13-128	0.359	13-65	4.627	3-65
190			min	-40.519	8-9	-38.317	9-75	-0.165	13-65	0	2	-0.016	8-60	-7.713	9-78
191	M181	1	max	46.703	13-32	38.008	8-36	12.937	13-34	0.261	9-30	0	13-128	0	13-128
192			min	-88.792	13-70	-10.478	3-28	-7.24	13-83	-0.24	8-39	0	2	0	2
193		2	max	40.406	13-32	10.209	8-39	7.873	13-34	0.059	3-35	10.14	13-83	12.806	3-39
194			min	-39.713	13-86	-9.782	3-27	-5.243	13-83	-0.023	3-22	-14.81	13-34	-26.808	9-28
195		3	max	40.406	13-32	10.093	3-39	7.873	13-34	0.059	3-35	0.999	13-34	-0.024	13-128
196			min	-39.713	13-86	-9.864	7-28	-5.243	13-83	-0.023	3-22	-0.606	9-32	-9.179	9-39
197		4	max	40.406	13-32	10.093	3-39	7.873	13-34	0.059	3-35	16.807	13-34	14.001	3-27
198			min	-39.713	13-86	-9.984	7-28	-5.243	13-83	-0.023	3-22	-10.915	13-83	-29.303	8-39
199		5	max	46.184	13-37	10.369	3-41	11.207	13-34	0.315	8-39	0	13-128	0	13-128
200			min	-33.251	13-85	-42.712	9-33	-6.908	13-83	-0.29	9-30	0	2	0	2
201	M184	1	max	62.509	13-63	17.754	13-69	28.503	13-15	1.874	13-43	77.774	13-5	0.848	13-16
202			min	-29.706	9-16	-37.209	13-10	-40.242	13-5	-4.759	8-9	-27.629	13-16	-4.762	13-33
203		2	max	62.509	13-63	17.754	13-69	28.503	13-15	1.874	13-43	62.684	13-5	10.432	13-13
204			min	-29.706	9-16	-37.209	13-10	-40.242	13-5	-4.759	8-9	-19.143	13-44	-8.156	13-69
205		3	max	62.509	13-63	17.754	13-69	28.503	13-15	1.874	13-43	47.593	13-5	23.777	13-10
206			min	-29.706	9-16	-37.209	13-10	-40.242	13-5	-4.759	8-9	-12.411	13-44	-14.814	13-69
207		4	max	62.509	13-63	17.754	13-69	28.503	13-15	1.874	13-43	38.393	13-10	37.73	13-10
208			min	-29.706	9-16	-37.209	13-10	-40.242	13-5	-4.759	8-9	-11.56	13-65	-21.472	13-69
209		5	max	62.509	13-63	17.754	13-69	28.503	13-15	1.874	13-43	29.243	13-10	51.684	13-10
210			min	-29.706	9-16	-37.209	13-10	-40.242	13-5	-4.759	8-9	-14.886	13-69	-28.13	13-69
211	M190	1	max	49.364	13-34	36.654	8-37	11.054	13-35	0.258	9-31	0	13-128	0	13-128
212			min	-45.534	13-71	-10.475	3-29	-7.651	13-84	-0.243	8-40	0	2	0	2
213		2	max	60.348	13-35	10.016	3-40	6.985	13-35	0.059	3-36	10.307	13-84	12.669	3-40
214			min	-29.771	13-90	-9.793	3-29	-5.316	13-84	-0.022	3-22	-13.181	13-35	-26.798	9-29

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
215		3	max	60.348	13-35	10.016	3-40	6.985	13-35	0.059	3-36	0.845	13-35	-0.024	13-128
216			min	-29.771	13-90	-9.861	7-29	-5.316	13-84	-0.022	3-22	-0.656	9-34	-9.149	9-40
217		4	max	60.348	13-35	10.016	3-40	6.985	13-35	0.059	3-36	14.87	13-35	14.018	3-29
218			min	-29.771	13-90	-9.98	7-29	-5.316	13-84	-0.022	3-22	-11.04	13-84	-28.872	8-40
219		5	max	98.336	13-35	10.336	3-43	9.004	13-35	0.317	8-40	0	13-128	0	13-128
220			min	-35.777	13-89	-44.211	9-34	-6.925	13-84	-0.288	9-31	0	2	0	2
221	M191	1	max	29.753	13-35	36.621	8-38	6.793	13-64	0.254	9-32	0	13-128	0	13-128
222			min	-50.443	13-72	-10.522	3-30	-7.875	9-36	-0.244	8-41	0	2	0	2
223		2	max	33.496	13-35	10.144	8-41	4.973	13-36	0.055	3-37	8.096	8-37	12.877	3-41
224			min	-18.397	13-90	-9.769	3-29	-4.015	9-37	-0.022	3-24	-9.484	13-36	-26.602	9-30
225		3	max	33.496	13-35	10.12	3-41	4.973	13-36	0.055	3-37	0.503	8-54	-0.024	13-128
226			min	-18.397	13-90	-9.774	7-30	-4.015	9-37	-0.022	3-24	-0.758	9-35	-9.155	9-41
227		4	max	33.496	13-35	10.12	3-41	4.973	13-36	0.055	3-37	10.489	13-36	14.035	3-29
228			min	-18.397	13-90	-9.893	7-30	-4.015	9-37	-0.022	3-24	-8.814	9-37	-29.149	8-41
229		5	max	63.759	13-39	10.614	3-43	4.878	13-36	0.316	8-41	0	13-128	0	13-128
230			min	-20.033	13-90	-42.78	9-35	-7.811	8-37	-0.29	9-32	0	2	0	2
231	M192	1	max	47.637	13-32	38.492	8-41	10.664	13-37	0.252	9-33	0	13-128	0	13-128
232			min	-96.582	13-73	-10.49	3-30	-6.435	9-37	-0.251	8-42	0	2	0	2
233		2	max	37.887	13-32	10.266	8-42	6.818	13-37	0.059	3-38	8.536	13-86	12.91	3-42
234			min	-43.777	13-86	-9.638	3-30	-4.414	13-86	-0.023	3-25	-12.948	13-37	-26.302	9-31
235		3	max	37.887	13-32	10.146	8-42	6.818	13-37	0.059	3-38	0.742	13-37	-0.024	13-128
236			min	-43.777	13-86	-9.638	3-30	-4.414	13-86	-0.023	3-25	-0.698	9-36	-9.16	9-42
237		4	max	37.887	13-32	10.134	3-42	6.818	13-37	0.059	3-38	14.431	13-37	13.786	3-30
238			min	-43.777	13-86	-9.745	7-31	-4.414	13-86	-0.023	3-25	-9.191	13-86	-29.401	8-42
239		5	max	44.848	13-37	10.531	3-44	8.701	13-37	0.319	8-42	0	13-128	0	13-128
240			min	-34.849	13-84	-41.839	9-36	-6.469	8-37	-0.283	9-33	0	2	0	2
241	M193	1	max	30.049	13-36	37.793	8-42	14.14	13-38	0.253	9-34	0	13-128	0	13-128
242			min	-65.332	13-74	-10.17	3-32	-8.767	13-87	-0.244	8-43	0	2	0	2
243		2	max	31.685	13-35	9.935	8-43	8.136	13-38	0.065	9-39	11.427	13-87	12.438	3-43
244			min	-26.394	13-89	-9.544	3-31	-5.898	13-87	-0.022	3-25	-15.279	13-38	-26.23	9-32
245		3	max	31.685	13-35	9.887	3-43	8.136	13-38	0.065	9-39	1.058	13-38	-0.024	13-128
246			min	-26.394	13-89	-9.579	7-32	-5.898	13-87	-0.022	3-25	-0.562	9-35	-9.127	9-43
247		4	max	31.685	13-35	9.887	3-43	8.136	13-38	0.065	9-39	17.394	13-38	13.614	3-31
248			min	-26.394	13-89	-9.699	7-32	-5.898	13-87	-0.022	3-25	-12.261	13-87	-28.706	8-43
249		5	max	52.63	13-41	10.271	3-45	12.248	13-38	0.322	8-43	0	13-128	0	13-128
250			min	-24.087	13-89	-42.333	9-37	-7.992	13-87	-0.278	9-34	0	2	0	2
251	M194	1	max	53.518	13-38	37.054	8-43	9.774	13-39	0.248	9-35	0	13-128	0	13-128
252			min	-41.23	13-75	-10.316	3-32	-6.711	13-75	-0.245	8-44	0	2	0	2
253		2	max	66.894	13-39	9.718	8-44	6.268	13-39	0.061	3-40	9.563	13-88	12.104	3-44
254			min	-31.154	13-93	-9.74	3-32	-4.945	13-88	-0.021	3-26	-11.837	13-39	-26.485	9-33
255		3	max	66.894	13-39	9.714	3-44	6.268	13-39	0.061	3-40	0.748	13-39	-0.024	13-128
256			min	-31.154	13-93	-9.74	3-32	-4.945	13-88	-0.021	3-26	-0.659	9-38	-9.108	9-44
257		4	max	66.894	13-39	9.714	3-44	6.268	13-39	0.061	3-40	13.334	13-39	14.043	3-32
258			min	-31.154	13-93	-9.832	7-33	-4.945	13-88	-0.021	3-26	-10.295	13-88	-28.252	8-44
259		5	max	111.8	13-39	10.328	3-46	7.759	13-39	0.319	8-44	0	13-128	0	13-128
260			min	-39.402	13-93	-44.696	9-35	-6.648	13-75	-0.279	9-35	0	2	0	2
261	M195	1	max	23.964	13-39	37.727	8-44	6.812	13-68	0.244	9-36	0	13-128	0	13-128
262			min	-54.425	13-76	-10.495	3-33	-8.415	9-40	-0.245	8-45	0	2	0	2
263		2	max	24.13	13-39	9.973	8-45	5.012	13-40	0.056	3-41	8.41	8-40	12.407	3-45
264			min	-17.237	13-93	-9.75	3-33	-4.182	9-40	-0.021	3-28	-9.582	13-40	-26.457	9-34
265		3	max	24.13	13-39	9.874	3-45	5.012	13-40	0.056	3-41	0.508	8-58	-0.024	13-128
266			min	-17.237	13-93	-9.75	3-33	-4.182	9-40	-0.021	3-28	-0.78	9-39	-9.137	9-45
267		4	max	24.13	13-39	9.874	3-45	5.012	13-40	0.056	3-41	10.547	13-40	14.081	3-33
268			min	-17.237	13-93	-9.832	7-34	-4.182	9-40	-0.021	3-28	-9.176	9-40	-28.793	8-45
269		5	max	51.423	13-43	10.616	3-47	4.777	13-40	0.319	8-45	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
270			min	-15.753	13-90	-43.166	9-36	-8.227	8-40	-0.271	9-36	0	2	0	2
271	M196	1	max	52.596	13-35	40.107	8-45	11.944	13-41	0.24	9-37	0	13-128	0	13-128
272			min	-100.737	13-77	-10.56	3-34	-5.886	9-41	-0.251	8-46	0	2	0	2
273		2	max	42.683	13-35	10.097	8-46	7.265	13-41	0.061	3-42	8.903	13-90	12.559	3-46
274			min	-49.865	13-89	-9.67	3-34	-4.593	13-90	-0.022	3-29	-13.747	13-41	-26.304	9-35
275		3	max	42.683	13-35	9.978	8-46	7.265	13-41	0.061	3-42	0.842	13-41	-0.024	13-128
276			min	-49.865	13-89	-9.67	3-34	-4.593	13-90	-0.022	3-29	-0.664	9-39	-9.155	9-46
277		4	max	42.683	13-35	9.958	3-46	7.265	13-41	0.061	3-42	15.431	13-41	13.925	3-34
278			min	-49.865	13-89	-9.755	7-35	-4.593	13-90	-0.022	3-29	-9.543	13-90	-29.061	8-46
279		5	max	49.078	13-41	10.473	3-48	10.054	13-41	0.321	8-46	0	13-128	0	13-128
280			min	-40.532	13-88	-43.112	9-37	-5.942	8-41	-0.264	9-37	0	2	0	2
281	M197	1	max	31.097	13-40	38.486	8-46	13.75	13-42	0.238	9-38	0	13-128	0	13-128
282			min	-50.285	13-78	-10.382	3-35	-8.797	13-78	-0.247	8-47	0	2	0	2
283		2	max	35.681	13-39	9.759	8-47	8.036	13-42	0.066	3-43	11.119	13-91	12.094	3-47
284			min	-22.343	13-93	-9.746	3-35	-5.726	13-91	-0.021	3-29	-15.111	13-42	-26.365	9-36
285		3	max	35.681	13-39	9.722	3-47	8.036	13-42	0.066	3-43	1.026	13-42	-0.024	13-128
286			min	-22.343	13-93	-9.746	3-35	-5.726	13-91	-0.021	3-29	-0.575	9-40	-9.133	9-47
287		4	max	35.681	13-39	9.722	3-47	8.036	13-42	0.066	3-43	17.163	13-42	14.095	3-35
288			min	-22.343	13-93	-9.804	7-35	-5.726	13-91	-0.021	3-29	-11.876	13-91	-28.363	8-47
289		5	max	68.948	13-42	10.209	3-49	11.797	13-42	0.323	8-47	0	13-128	0	13-128
290			min	-23.18	13-93	-44.547	9-38	-7.959	13-78	-0.258	9-38	0	2	0	2
291	M198	1	max	49.145	13-42	38.259	8-47	8.614	13-43	0.232	9-39	0	13-128	0	13-128
292			min	-39.747	13-79	-10.568	3-36	-6.863	13-79	-0.246	8-48	0	2	0	2
293		2	max	59.926	13-43	9.692	8-48	5.865	13-43	0.06	3-44	8.587	13-92	11.874	3-48
294			min	-28.197	13-97	-9.914	3-36	-4.444	13-92	-0.021	3-57	-11.118	13-43	-26.616	9-37
295		3	max	59.926	13-43	9.615	3-48	5.865	13-43	0.06	3-44	0.659	13-43	-0.024	13-128
296			min	-28.197	13-97	-9.914	3-36	-4.444	13-92	-0.021	3-57	-0.684	9-43	-9.141	9-48
297		4	max	59.926	13-43	9.615	3-48	5.865	13-43	0.06	3-44	12.436	13-43	14.453	3-36
298			min	-28.197	13-97	-9.914	3-36	-4.444	13-92	-0.021	3-57	-9.26	13-92	-28.235	8-48
299		5	max	106.434	13-43	10.57	3-50	6.683	13-43	0.318	8-48	0	13-128	0	13-128
300			min	-35.128	13-97	-46.034	9-39	-7.065	13-79	-0.261	9-39	0	2	0	2
301	M199	1	max	28.954	13-43	39.455	8-48	7.745	13-44	0.226	9-40	0	13-128	0	13-128
302			min	-64.689	13-80	-10.71	3-37	-7.976	9-44	-0.248	8-49	0	2	0	2
303		2	max	25.024	13-43	9.975	8-49	5.609	13-44	0.057	3-45	7.997	8-44	12.128	3-49
304			min	-24.401	13-93	-9.849	3-37	-3.959	9-44	-0.021	3-32	-10.717	13-44	-26.556	9-38
305		3	max	25.024	13-43	9.855	8-49	5.609	13-44	0.057	3-45	0.546	13-44	-0.025	13-128
306			min	-24.401	13-93	-9.849	3-37	-3.959	9-44	-0.021	3-32	-0.761	9-43	-9.184	9-49
307		4	max	25.024	13-43	9.757	3-49	5.609	13-44	0.057	3-45	11.809	13-44	14.319	3-37
308			min	-24.401	13-93	-9.893	7-38	-3.959	9-44	-0.021	3-32	-8.708	9-44	-28.848	8-49
309		5	max	50.843	13-44	10.678	3-51	5.872	13-44	0.318	8-49	0	13-128	0	13-128
310			min	-20.534	13-91	-44.597	9-40	-7.841	8-44	-0.25	9-40	0	2	0	2
311	M200	1	max	46.824	13-40	40.999	8-49	13.05	13-45	0.223	9-41	0	13-128	0	13-128
312			min	-88.85	13-81	-10.649	3-38	-7.131	13-81	-0.245	8-50	0	2	0	2
313		2	max	37.482	13-42	9.988	8-50	7.87	13-45	0.064	3-46	9.461	13-94	12.339	3-50
314			min	-43.837	13-93	-9.798	3-38	-4.875	13-94	-0.021	3-32	-14.855	13-45	-26.398	9-38
315		3	max	37.482	13-42	9.88	3-50	7.87	13-45	0.064	3-46	0.948	13-45	-0.025	13-128
316			min	-43.837	13-93	-9.798	3-38	-4.875	13-94	-0.021	3-32	-0.614	9-43	-9.207	9-49
317		4	max	37.482	13-42	9.88	3-50	7.87	13-45	0.064	3-46	16.751	13-45	14.212	3-38
318			min	-43.837	13-93	-9.837	7-38	-4.875	13-94	-0.021	3-32	-10.117	13-94	-28.897	8-50
319		5	max	51.424	13-45	10.441	3-52	11.161	13-45	0.32	8-50	0	13-128	0	13-128
320			min	-37.446	13-92	-44.756	9-41	-6.973	13-81	-0.241	9-41	0	2	0	2
321	M201	1	max	38.332	13-45	39.464	8-50	12.68	13-46	0.218	9-42	0	13-128	0	13-128
322			min	-42.117	13-82	-10.608	3-39	-9.706	13-82	-0.244	8-51	0	2	0	2
323		2	max	45.335	13-46	9.7	8-51	7.666	13-46	0.066	3-47	10.84	13-95	11.804	3-51
324			min	-23.456	13-97	-9.939	3-39	-5.581	13-95	-0.021	3-60	-14.428	13-46	-26.574	9-39

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
325		3	max	45.335	13-46	9.613	3-51	7.666	13-46	0.066	3-47	0.966	13-46	-0.025	13-128
326			min	-23.456	13-97	-9.939	3-39	-5.581	13-95	-0.021	3-60	-0.582	9-44	-9.205	9-50
327		4	max	45.335	13-46	9.613	3-51	7.666	13-46	0.066	3-47	16.359	13-46	14.507	3-39
328			min	-23.456	13-97	-9.939	3-39	-5.581	13-95	-0.021	3-60	-11.574	13-95	-28.316	8-51
329		5	max	90.509	13-46	10.354	3-53	10.731	13-46	0.32	8-51	0	13-128	0	13-128
330			min	-27.116	13-97	-46.54	9-42	-8.932	13-82	-0.232	9-42	0	2	0	2
331	M202	1	max	41.697	13-46	39.494	8-51	7.409	13-47	0.211	9-48	0	13-128	0	13-128
332			min	-40.194	13-83	-10.708	3-40	-7.117	9-47	-0.243	8-52	0	2	0	2
333		2	max	48.876	13-46	9.776	8-52	5.438	13-47	0.06	3-48	7.518	13-83	11.698	3-52
334			min	-22.845	13-101	-9.969	3-40	-3.893	13-83	-0.021	3-61	-10.344	13-47	-26.642	9-41
335		3	max	48.876	13-46	9.656	8-52	5.438	13-47	0.06	3-48	0.575	13-47	-0.025	13-128
336			min	-22.845	13-101	-9.969	3-40	-3.893	13-83	-0.021	3-61	-0.71	9-46	-9.235	9-52
337		4	max	48.876	13-46	9.573	3-52	5.438	13-47	0.06	3-48	11.495	13-47	14.561	3-40
338			min	-22.845	13-101	-9.969	3-40	-3.893	13-83	-0.021	3-61	-8.117	13-83	-28.502	8-52
339		5	max	94.946	13-47	10.758	3-54	5.556	13-47	0.315	8-52	0	13-128	0	13-128
340			min	-27.378	13-101	-46.961	9-43	-7.214	8-48	-0.24	9-42	0	2	0	2
341	M203	1	max	45.769	13-14	41.477	8-21	10.837	13-16	0.259	9-12	0	13-128	0	13-128
342			min	-84.506	13-52	-8.864	7-10	-6.685	13-53	-0.195	8-22	0	2	0	2
343		2	max	38.71	13-14	9.85	3-21	6.372	13-16	0.063	9-18	8.568	13-65	11.557	3-21
344			min	-39.292	13-52	-8.395	7-10	-4.332	13-65	-0.016	3-31	-11.886	13-16	-24.62	9-11
345		3	max	38.71	13-14	9.85	3-21	6.372	13-16	0.063	9-18	0.909	13-16	-0.026	13-128
346			min	-39.292	13-52	-8.514	7-10	-4.332	13-65	-0.016	3-31	-0.448	9-14	-9.952	9-21
347		4	max	38.71	13-14	9.85	3-21	6.372	13-16	0.063	9-18	13.703	13-16	10.468	7-10
348			min	-39.292	13-52	-8.634	7-10	-4.332	13-65	-0.016	3-31	-8.828	13-65	-28.668	8-21
349		5	max	55.551	13-17	10.108	3-24	8.76	13-16	0.267	8-16	0	13-128	0	13-128
350			min	-33.707	13-51	-46.942	9-13	-7.761	13-53	-0.294	9-12	0	2	0	2
351	M204	1	max	44.953	13-19	39.616	8-22	10.191	13-17	0.26	9-13	0	13-128	0	13-128
352			min	-38.518	13-66	-9.389	7-11	-7.545	13-26	-0.193	8-23	0	2	0	2
353		2	max	54.968	13-17	9.677	3-22	6.262	13-17	0.062	9-19	9.58	13-66	11.279	3-22
354			min	-24.721	13-72	-8.956	7-11	-4.862	13-66	-0.017	3-31	-11.731	13-17	-25.754	9-11
355		3	max	54.968	13-17	9.677	3-22	6.262	13-17	0.062	9-19	0.844	13-17	-0.027	13-128
356			min	-24.721	13-72	-9.076	7-11	-4.862	13-66	-0.017	3-31	-0.507	9-16	-9.857	9-22
357		4	max	54.968	13-17	9.677	3-22	6.262	13-17	0.062	9-19	13.419	13-17	11.532	7-11
358			min	-24.721	13-72	-9.196	7-11	-4.862	13-66	-0.017	3-31	-9.945	13-66	-28.103	8-22
359		5	max	105.607	13-18	10.096	3-25	7.795	13-17	0.266	8-17	0	13-128	0	13-128
360			min	-29.156	13-72	-48.711	9-14	-8.025	13-54	-0.295	9-13	0	2	0	2
361	M205	1	max	27.086	13-14	40.768	8-20	7.918	13-46	0.255	9-11	0	13-128	0	13-128
362			min	-60.495	13-51	-8.537	7-9	-7.054	9-15	-0.2	8-21	0	2	0	2
363		2	max	24.892	13-14	9.889	3-20	4.027	13-15	0.059	9-17	7.665	8-15	11.567	3-20
364			min	-24.713	13-52	-7.993	7-10	-3.837	9-15	-0.018	13-70	-7.578	13-15	-23.695	9-10
365		3	max	24.892	13-14	9.889	3-20	4.027	13-15	0.059	9-17	0.579	13-18	-0.025	13-128
366			min	-24.713	13-52	-8.113	7-10	-3.837	9-15	-0.018	13-70	-0.569	9-14	-10.024	9-20
367		4	max	24.892	13-14	9.889	3-20	4.027	13-15	0.059	9-17	8.595	13-15	9.726	7-9
368			min	-24.713	13-52	-8.232	7-10	-3.837	9-15	-0.018	13-70	-8.273	9-15	-28.744	9-20
369		5	max	51.913	13-16	10.306	3-23	4.53	13-18	0.266	8-15	0	13-128	0	13-128
370			min	-23.006	13-50	-46.724	9-12	-6.765	8-16	-0.295	9-11	0	2	0	2
371	M206	1	max	35.866	13-11	41.175	9-18	11.438	13-13	0.252	9-9	0	13-128	0	13-128
372			min	-52.849	13-47	-7.108	7-7	-9.037	13-22	-0.2	8-19	0	2	0	2
373		2	max	38.919	13-13	10.043	3-18	7.013	13-13	0.068	9-15	11.307	13-50	11.764	3-18
374			min	-22.888	13-65	-6.628	7-7	-5.652	13-50	-0.027	13-53	-13.071	13-13	-19.043	8-7
375		3	max	38.919	13-13	10.043	3-18	7.013	13-13	0.068	9-15	1.011	13-13	-0.022	13-128
376			min	-22.888	13-65	-6.747	7-7	-5.652	13-50	-0.027	13-53	-0.359	9-11	-10.138	9-18
377		4	max	38.919	13-13	10.043	3-18	7.013	13-13	0.068	9-15	15.094	13-13	8.523	7-7
378			min	-22.888	13-65	-6.867	7-7	-5.652	13-50	-0.027	13-53	-11.392	13-50	-29.223	9-18
379		5	max	82.316	13-14	10.218	3-21	8.799	13-13	0.276	8-13	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
380			min	-21.991	13-67	-47.086	8-10	-10.195	13-50	-0.287	9-9	0	2	0	2
381	M207	1	max	43.346	13-13	40.173	9-19	6.681	13-42	0.253	9-10	0	13-128	0	13-128
382			min	-35.788	13-63	-7.613	7-8	-5.874	9-15	-0.198	8-20	0	2	0	2
383		2	max	55.387	13-14	9.812	3-19	4.711	13-13	0.062	9-16	7.932	13-63	11.364	3-19
384			min	-22.367	13-69	-7.535	7-9	-3.971	13-63	-0.022	13-69	-8.878	13-13	-22.425	9-9
385		3	max	55.387	13-14	9.812	3-19	4.711	13-13	0.062	9-16	0.634	13-14	-0.024	13-128
386			min	-22.367	13-69	-7.655	7-9	-3.971	13-63	-0.022	13-69	-0.497	9-14	-10.07	9-19
387		4	max	55.387	13-14	9.812	3-19	4.711	13-13	0.062	9-16	10.04	13-13	9.272	7-8
388			min	-22.367	13-69	-7.775	7-9	-3.971	13-63	-0.022	13-69	-8.015	13-63	-28.608	9-19
389		5	max	104.197	13-15	10.364	3-22	4.142	13-14	0.265	8-14	0	13-128	0	13-128
390			min	-27.043	13-69	-48.134	8-11	-7.147	13-51	-0.298	9-10	0	2	0	2
391	M218	1	max	35.555	13-43	41.121	8-52	8.85	13-48	0.211	9-49	0	13-128	0	13-128
392			min	-73.901	13-84	-10.865	3-41	-7.358	9-48	-0.247	8-53	0	2	0	2
393		2	max	29.52	13-43	10.04	8-53	6.056	13-48	0.06	3-49	7.485	8-48	12.113	3-53
394			min	-33.317	13-97	-9.908	3-41	-3.682	9-48	-0.021	3-36	-11.544	13-48	-26.5	9-41
395		3	max	29.52	13-43	9.92	8-53	6.056	13-48	0.06	3-49	0.616	13-48	-0.026	13-128
396			min	-33.317	13-97	-9.908	3-41	-3.682	9-48	-0.021	3-36	-0.731	9-47	-9.295	9-52
397		4	max	29.52	13-43	9.807	3-53	6.056	13-48	0.06	3-49	12.776	13-48	14.422	3-41
398			min	-33.317	13-97	-9.908	3-41	-3.682	9-48	-0.021	3-36	-8.119	9-48	-29.087	8-53
399		5	max	52.986	13-48	10.72	3-55	6.917	13-48	0.315	8-53	0	13-128	0	13-128
400			min	-27.787	13-95	-45.745	9-44	-7.29	8-48	-0.238	9-43	0	2	0	2
401	M208	1	max	45.6	13-10	43.004	9-17	9.175	13-15	0.252	9-8	0	13-128	0	13-128
402			min	-84.687	13-46	-5.317	7-6	-5.258	13-21	-0.207	8-18	0	2	0	2
403		2	max	36.911	13-10	10.357	3-17	4.643	13-12	0.065	9-14	8.554	13-49	12.339	3-17
404			min	-43.424	13-49	-5.906	7-7	-4.216	13-49	-0.03	13-53	-8.618	13-12	-17.754	8-7
405		3	max	36.911	13-10	10.357	3-17	4.643	13-12	0.065	9-14	0.83	13-43	-0.02	13-128
406			min	-43.424	13-49	-6.025	7-7	-4.216	13-49	-0.03	13-53	-0.381	9-11	-10.203	9-17
407		4	max	36.911	13-10	10.357	3-17	4.643	13-12	0.065	9-14	10.029	13-12	7.329	13-76
408			min	-43.424	13-49	-6.145	7-7	-4.216	13-49	-0.03	13-53	-8.378	13-49	-30.128	9-17
409		5	max	59.019	13-13	10.521	3-20	6.007	13-15	0.274	8-12	0	13-128	0	13-128
410			min	-41.18	13-47	-45.848	8-9	-8.052	13-49	-0.283	9-8	0	2	0	2
411	M219	1	max	39.361	13-44	41.698	8-53	13.379	13-49	0.22	9-50	0	13-128	0	13-128
412			min	-75.47	13-85	-10.723	3-42	-8.946	13-85	-0.24	8-54	0	2	0	2
413		2	max	34.539	13-46	9.937	8-54	8.056	13-49	0.066	3-50	10.164	13-98	12.058	3-54
414			min	-36.069	13-97	-9.9	3-42	-5.231	13-98	-0.021	3-63	-15.162	13-49	-26.494	9-42
415		3	max	34.539	13-46	9.817	8-54	8.056	13-49	0.066	3-50	1.014	13-49	-0.026	13-128
416			min	-36.069	13-97	-9.9	3-42	-5.231	13-98	-0.021	3-63	-0.573	9-46	-9.329	8-53
417		4	max	34.539	13-46	9.797	3-54	8.056	13-49	0.066	3-50	17.19	13-49	14.392	3-42
418			min	-36.069	13-97	-9.9	3-42	-5.231	13-98	-0.021	3-63	-10.843	13-98	-28.907	8-54
419		5	max	55.284	13-49	10.458	3-56	11.538	13-49	0.317	8-54	0	13-128	0	13-128
420			min	-30.908	13-96	-46.142	9-45	-8.446	13-85	-0.239	9-44	0	2	0	2
421	M209	1	max	48.456	13-10	42.023	9-15	7.716	13-10	0.247	9-6	0	13-128	0	13-128
422			min	-35.583	13-44	-6.43	13-76	-8.516	13-19	-0.202	8-16	0	2	0	2
423		2	max	60.358	13-10	10.594	3-15	5.472	13-10	0.068	9-12	11.97	13-47	12.766	3-15
424			min	-22.2	13-65	-6.624	13-76	-5.92	13-47	-0.039	13-53	-10.175	13-10	-13.796	8-4
425		3	max	60.358	13-10	10.594	3-15	5.472	13-10	0.068	9-12	0.982	13-41	-0.015	13-128
426			min	-22.2	13-65	-6.624	13-76	-5.92	13-47	-0.039	13-53	-0.272	9-10	-10.293	9-15
427		4	max	60.358	13-10	10.594	3-15	5.472	13-10	0.068	9-12	11.8	13-10	12.967	13-76
428			min	-22.2	13-65	-6.624	13-76	-5.92	13-47	-0.039	13-53	-11.804	13-47	-31.148	9-15
429		5	max	113.209	13-11	11.016	3-18	4.904	13-10	0.278	8-10	0	13-128	0	13-128
430			min	-27.296	13-65	-45.855	8-7	-10.834	13-47	-0.275	9-6	0	2	0	2
431	M210	1	max	24.538	13-13	41.599	9-16	7.224	13-42	0.247	9-7	0	13-128	0	13-128
432			min	-42.935	13-45	-5.338	7-5	-6.784	9-12	-0.202	8-17	0	2	0	2
433		2	max	26.018	13-10	10.329	3-16	3.383	13-14	0.063	9-13	8.119	8-12	12.275	3-16
434			min	-12.973	13-65	-5.177	13-76	-4.156	8-12	-0.035	13-53	-6.206	13-14	-14.384	8-7

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
435		3	max	26.018	13-10	10.329	3-16	3.383	13-14	0.063	9-13	0.689	13-42	-0.018	13-128
436			min	-12.973	13-65	-5.177	13-76	-4.156	8-12	-0.035	13-53	-0.418	9-11	-10.246	9-16
437		4	max	26.018	13-10	10.329	3-16	3.383	13-14	0.063	9-13	7.38	13-14	9.942	13-76
438			min	-12.973	13-65	-5.177	13-76	-4.156	8-12	-0.035	13-53	-8.647	9-12	-30.471	9-16
439		5	max	62.9	13-12	10.901	3-19	2.844	13-14	0.273	8-11	0	13-128	0	13-128
440			min	-14.085	13-65	-44.665	8-8	-6.903	13-48	-0.284	9-7	0	2	0	2
441	M220	1	max	47.342	13-49	40.46	8-54	10.818	13-50	0.219	9-51	0	13-128	0	13-128
442			min	-38.186	13-102	-10.687	3-43	-9.812	13-86	-0.241	8-55	0	2	0	2
443		2	max	58.179	13-50	9.734	8-55	6.882	13-50	0.065	3-51	9.968	13-86	11.533	3-55
444			min	-25.661	13-105	-9.98	3-43	-5.112	13-86	-0.021	3-64	-12.959	13-50	-26.664	9-43
445		3	max	58.179	13-50	9.615	8-55	6.882	13-50	0.065	3-51	0.861	13-50	-0.026	13-128
446			min	-25.661	13-105	-9.98	3-43	-5.112	13-86	-0.021	3-64	-0.602	9-49	-9.346	8-54
447		4	max	58.179	13-50	9.543	3-55	6.882	13-50	0.065	3-51	14.68	13-50	14.54	3-43
448			min	-25.661	13-105	-9.98	3-43	-5.112	13-86	-0.021	3-64	-10.562	13-86	-28.525	8-55
449		5	max	111.013	13-50	10.6	3-57	8.905	13-50	0.316	8-55	0	13-128	0	13-128
450			min	-30.822	13-105	-48.27	9-46	-9.246	13-86	-0.241	9-45	0	2	0	2
451	M211	1	max	27.449	13-8	44.224	9-14	8.212	13-9	0.241	9-5	0	13-128	0	13-128
452			min	-74.939	13-43	-8.472	13-72	-8.437	13-18	-0.203	8-9	0	2	0	2
453		2	max	25.212	13-8	11.392	9-14	4.681	13-9	0.069	9-11	11.69	13-46	14.159	3-14
454			min	-33.231	13-44	-8.461	13-72	-5.708	13-46	-0.045	13-53	-8.586	13-9	-17.191	13-72
455		3	max	25.212	13-8	11.318	3-14	4.681	13-9	0.069	9-11	1.032	13-40	-0.012	13-128
456			min	-33.231	13-44	-8.461	13-72	-5.708	13-46	-0.045	13-53	-0.274	8-9	-10.366	9-14
457		4	max	25.212	13-8	11.318	3-14	4.681	13-9	0.069	9-11	10.214	13-9	16.789	13-72
458			min	-33.231	13-44	-8.461	13-72	-5.708	13-46	-0.045	13-53	-11.233	13-46	-32.88	9-14
459		5	max	63.17	13-10	11.14	3-17	5.996	13-9	0.282	8-15	0	13-128	0	13-128
460			min	-31.353	13-44	-41.516	8-6	-11.488	13-46	-0.272	9-5	0	2	0	2
461	M212	1	max	22.057	13-8	44.752	9-13	8.243	13-39	0.237	9-4	0	13-128	0	13-128
462			min	-66.898	13-44	-10.162	13-71	-6.745	8-9	-0.206	8-14	0	2	0	2
463		2	max	18.402	13-8	12.128	9-13	3.709	13-11	0.06	9-10	8.104	13-45	15.67	3-13
464			min	-34.074	13-44	-10.768	13-71	-3.985	8-9	-0.056	13-57	-6.726	13-11	-21.628	13-71
465		3	max	18.402	13-8	12.093	3-13	3.709	13-11	0.06	9-10	0.962	13-39	-0.005	13-71
466			min	-34.074	13-44	-10.768	13-71	-3.985	8-9	-0.056	13-57	-0.511	8-9	-10.407	9-13
467		4	max	18.402	13-8	12.093	3-13	3.709	13-11	0.06	9-10	8.17	13-11	21.618	13-71
468			min	-34.074	13-44	-10.768	13-71	-3.985	8-9	-0.056	13-57	-8.512	8-9	-34.399	9-13
469		5	max	46.536	13-9	11.762	3-16	3.442	13-11	0.279	8-14	0	13-128	0	13-128
470			min	-26.548	13-43	-41.838	8-5	-9.241	13-45	-0.285	9-4	0	2	0	2
471	M264	1	max	33.404	13-50	40.68	8-55	6.271	13-51	0.221	9-52	0	13-128	0	13-128
472			min	-41.05	13-87	-10.78	3-44	-7.763	9-51	-0.239	8-56	0	2	0	2
473		2	max	37.748	13-50	9.938	8-56	4.893	13-51	0.059	3-52	7.85	8-51	11.644	3-56
474			min	-18.222	13-105	-9.956	3-44	-3.878	9-51	-0.021	3-65	-9.328	13-51	-26.613	9-44
475		3	max	37.748	13-50	9.819	8-56	4.893	13-51	0.059	3-52	0.505	8-69	-0.027	13-128
476			min	-18.222	13-105	-9.956	3-44	-3.878	9-51	-0.021	3-65	-0.736	9-50	-9.408	8-55
477		4	max	37.748	13-50	9.699	8-56	4.893	13-51	0.059	3-52	10.32	13-51	14.47	3-44
478			min	-18.222	13-105	-9.956	3-44	-3.878	9-51	-0.021	3-65	-8.521	9-51	-29.001	8-56
479		5	max	79.722	13-51	10.927	3-58	4.468	13-51	0.31	8-56	0	13-128	0	13-128
480			min	-19.935	13-105	-47.533	9-47	-7.694	8-51	-0.249	9-46	0	2	0	2
481	M265	1	max	44.952	13-47	42.586	8-56	9.651	13-52	0.219	9-53	0	13-128	0	13-128
482			min	-82.512	13-88	-10.876	3-45	-6.681	9-51	-0.244	8-57	0	2	0	2
483		2	max	35.904	13-47	10.156	8-57	6.424	13-52	0.062	3-53	7.114	13-101	12.176	3-57
484			min	-40.677	13-100	-9.862	3-45	-3.656	13-101	-0.021	3-40	-12.204	13-52	-26.461	9-45
485		3	max	35.904	13-47	10.036	8-57	6.424	13-52	0.062	3-53	0.695	13-52	-0.027	13-128
486			min	-40.677	13-100	-9.862	3-45	-3.656	13-101	-0.021	3-40	-0.695	9-51	-9.488	8-56
487		4	max	35.904	13-47	9.926	3-57	6.424	13-52	0.062	3-53	13.595	13-52	14.25	3-45
488			min	-40.677	13-100	-9.862	3-45	-3.656	13-101	-0.021	3-40	-7.568	13-101	-29.507	8-57
489		5	max	56.385	13-52	10.812	3-59	7.695	13-52	0.31	8-57	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
490			min	-34.455	13-99	-46.537	9-48	-6.675	8-52	-0.248	9-47	0	2	0	2
491	M266	1	max	31.739	13-48	42.036	8-57	12.842	13-53	0.227	9-54	0	13-128	0	13-128
492			min	-57.674	13-89	-10.708	3-46	-9.983	13-89	-0.235	8-58	0	2	0	2
493		2	max	32.354	13-50	9.942	8-58	7.726	13-53	0.068	3-54	9.921	13-102	11.792	3-58
494			min	-26.201	13-105	-9.908	3-46	-5.094	13-102	-0.021	3-67	-14.486	13-53	-26.503	9-46
495		3	max	32.354	13-50	9.823	8-58	7.726	13-53	0.068	3-54	1.027	13-53	-0.028	13-128
496			min	-26.201	13-105	-9.908	3-46	-5.094	13-102	-0.021	3-67	-0.546	9-50	-9.528	8-57
497		4	max	32.354	13-50	9.751	3-58	7.726	13-53	0.068	3-54	16.54	13-53	14.317	3-46
498			min	-26.201	13-105	-9.908	3-46	-5.094	13-102	-0.021	3-67	-10.536	13-102	-29.126	8-57
499		5	max	61.722	13-53	10.651	3-60	11.06	13-53	0.311	8-58	0	13-128	0	13-128
500			min	-23.312	13-104	-47.163	9-49	-9.277	13-89	-0.249	9-48	0	2	0	2
501	M267	1	max	54.597	13-53	41.116	8-58	8.382	13-54	0.226	9-55	0	13-128	0	13-128
502			min	-39.246	13-106	-10.685	3-47	-9.14	13-90	-0.235	8-59	0	2	0	2
503		2	max	67.149	13-54	9.816	8-59	5.811	13-50	0.064	3-55	9.335	13-90	11.648	3-62
504			min	-28.212	13-108	-9.939	3-47	-4.796	13-90	-0.021	3-68	-11.095	13-50	-26.683	9-47
505		3	max	67.149	13-54	9.696	8-59	5.811	13-50	0.064	3-55	0.719	13-54	-0.028	13-128
506			min	-28.212	13-108	-9.939	3-47	-4.796	13-90	-0.021	3-68	-0.63	9-53	-9.566	8-58
507		4	max	67.149	13-54	9.631	3-62	5.811	13-50	0.064	3-55	12.244	13-54	14.349	3-47
508			min	-28.212	13-108	-9.939	3-47	-4.796	13-90	-0.021	3-68	-9.924	13-90	-28.897	8-59
509		5	max	124.922	13-54	10.95	3-61	6.479	13-54	0.307	8-59	0	13-128	0	13-128
510			min	-35.104	13-108	-49.334	9-50	-8.948	13-90	-0.255	9-49	0	2	0	2
511	M268	1	max	25.829	13-54	41.7	8-59	5.211	13-83	0.227	9-56	0	13-128	0	13-128
512			min	-42.821	13-88	-10.781	3-48	-8.298	9-55	-0.234	8-60	0	2	0	2
513		2	max	26.894	13-54	10.111	8-60	4.368	13-55	0.059	3-56	8.328	8-55	11.864	3-60
514			min	-15.943	13-108	-9.877	3-48	-4.127	9-55	-0.021	3-43	-8.335	13-55	-26.544	9-48
515		3	max	26.894	13-54	9.992	8-60	4.368	13-55	0.059	3-56	0.486	8-74	-0.029	13-128
516			min	-15.943	13-108	-9.877	3-48	-4.127	9-55	-0.021	3-43	-0.755	9-54	-9.649	8-59
517		4	max	26.894	13-54	9.872	8-60	4.368	13-55	0.059	3-56	9.205	13-55	14.185	3-48
518			min	-15.943	13-108	-9.877	3-48	-4.127	9-55	-0.021	3-43	-9.039	9-55	-29.569	8-60
519		5	max	65.732	13-55	11.106	3-62	3.264	13-55	0.305	8-60	0	13-128	0	13-128
520			min	-14.23	13-109	-47.728	9-51	-8.12	8-55	-0.256	9-50	0	2	0	2
521	M277	1	max	51.807	13-51	43.916	8-60	9.952	13-56	0.227	9-57	0	13-128	0	13-128
522			min	-86.182	13-92	-10.895	3-49	-6.962	13-92	-0.238	8-61	0	2	0	2
523		2	max	41.789	13-50	10.37	8-60	6.553	13-56	0.064	3-57	7.639	13-92	12.395	3-61
524			min	-45.527	13-104	-9.853	3-49	-3.896	13-92	-0.021	3-43	-12.377	13-56	-26.381	9-49
525		3	max	41.789	13-50	10.251	8-60	6.553	13-56	0.064	3-57	0.782	13-56	-0.029	13-128
526			min	-45.527	13-104	-9.853	3-49	-3.896	13-92	-0.021	3-43	-0.648	9-54	-9.73	8-60
527		4	max	41.789	13-50	10.136	3-61	6.553	13-56	0.064	3-57	13.941	13-56	14.096	3-49
528			min	-45.527	13-104	-9.853	3-49	-3.896	13-92	-0.021	3-43	-8.006	13-92	-30.193	8-60
529		5	max	59.301	13-56	10.86	3-63	8.042	13-56	0.304	8-61	0	13-128	0	13-128
530			min	-38.323	13-103	-47.229	9-52	-7.386	13-92	-0.256	9-51	0	2	0	2
531	M278	1	max	31.128	13-54	42.127	8-61	11.488	13-57	0.231	9-58	0	13-128	0	13-128
532			min	-45.296	13-90	-10.6	3-50	-10.414	13-93	-0.231	8-62	0	2	0	2
533		2	max	34.951	13-54	10.108	8-61	7.249	13-56	0.069	3-58	10.057	13-93	11.796	3-61
534			min	-20.422	13-108	-9.817	3-50	-5.118	13-93	-0.02	3-44	-13.637	13-56	-26.451	9-50
535		3	max	34.951	13-54	9.989	8-61	7.249	13-56	0.069	3-58	0.983	13-57	-0.03	13-128
536			min	-20.422	13-108	-9.817	3-50	-5.118	13-93	-0.02	3-44	-0.538	9-55	-9.756	8-61
537		4	max	34.951	13-54	9.869	8-61	7.249	13-56	0.069	3-58	15.474	13-56	13.976	3-50
538			min	-20.422	13-108	-9.817	3-50	-5.118	13-93	-0.02	3-44	-10.496	13-93	-29.693	8-61
539		5	max	76.269	13-57	10.714	3-64	9.621	13-57	0.304	8-62	0	13-128	0	13-128
540			min	-20.294	13-108	-48.118	9-53	-9.729	13-93	-0.258	9-52	0	2	0	2
541	M280A	1	max	36.991	13-24	38.561	8-31	8.143	13-26	0.264	9-22	0	13-128	0	13-128
542			min	-82.096	13-62	-11.246	3-20	-6.596	9-26	-0.224	8-31	0	2	0	2
543		2	max	30.94	13-24	10.075	3-31	5.698	13-26	0.052	3-27	7.267	13-75	12.55	3-31
544			min	-32.814	13-62	-10.158	3-20	-3.763	13-75	-0.022	3-14	-10.817	13-26	-27.868	9-20

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
545		3	max	30.94	13-24	10.075	3-31	5.698	13-26	0.052	3-27	0.624	13-26	-0.026	13-128
546			min	-32.814	13-62	-10.203	7-20	-3.763	13-75	-0.022	3-14	-0.674	9-25	-9.366	9-31
547		4	max	30.94	13-24	10.075	3-31	5.698	13-26	0.052	3-27	12.065	13-26	14.431	3-20
548			min	-32.814	13-62	-10.323	7-20	-3.763	13-75	-0.022	3-14	-7.846	13-75	-29.043	8-31
549		5	max	43.449	13-27	10.063	3-34	6.309	13-26	0.286	8-31	0	8-26	0	3-34
550			min	-28.427	13-61	-44.256	9-23	-6.438	8-26	-0.302	9-22	0	13-26	-0.001	9-23
551	M251A	1	max	51.542	13-76	3.811	9-78	0.046	8-61	0	13-128	0	13-128	0	13-128
552			min	-46.804	8-65	-2.376	3-64	-0.053	13-65	0	2	0	2	0	2
553		2	max	51.542	13-76	3.811	9-78	0.046	8-61	0	13-128	0.023	8-61	1.169	3-64
554			min	-46.804	8-65	-2.376	3-64	-0.053	13-65	0	2	-0.026	13-65	-1.875	9-78
555		3	max	51.542	13-76	3.811	9-78	0.046	8-61	0	13-128	0.045	8-61	2.338	3-64
556			min	-46.804	8-65	-2.376	3-64	-0.053	13-65	0	2	-0.053	13-65	-3.75	9-78
557		4	max	51.542	13-76	3.811	9-78	0.046	8-61	0	13-128	0.068	8-61	3.507	3-64
558			min	-46.804	8-65	-2.376	3-64	-0.053	13-65	0	2	-0.079	13-65	-5.626	9-78
559		5	max	51.542	13-76	3.811	9-78	0.046	8-61	0	13-128	0.091	8-61	4.676	3-64
560			min	-46.804	8-65	-2.376	3-64	-0.053	13-65	0	2	-0.105	13-65	-7.501	9-78
561	M253A	1	max	53.014	13-65	3.919	9-78	0.008	8-60	0	13-128	0	13-128	0	13-128
562			min	-40.519	8-9	-2.351	3-65	-0.182	13-65	0	2	0	2	0	2
563		2	max	53.014	13-65	3.919	9-78	0.008	8-60	0	13-128	0.004	8-60	1.157	3-65
564			min	-40.519	8-9	-2.351	3-65	-0.182	13-65	0	2	-0.09	13-65	-1.928	9-78
565		3	max	53.014	13-65	3.919	9-78	0.008	8-60	0	13-128	0.008	8-60	2.314	3-65
566			min	-40.519	8-9	-2.351	3-65	-0.182	13-65	0	2	-0.179	13-65	-3.857	9-78
567		4	max	53.014	13-65	3.919	9-78	0.008	8-60	0	13-128	0.012	8-60	3.471	3-65
568			min	-40.519	8-9	-2.351	3-65	-0.182	13-65	0	2	-0.269	13-65	-5.785	9-78
569		5	max	53.014	13-65	3.919	9-78	0.008	8-60	0	13-128	0.016	8-60	4.627	3-65
570			min	-40.519	8-9	-2.351	3-65	-0.182	13-65	0	2	-0.359	13-65	-7.713	9-78
571	M277A	1	max	24.912	13-9	45.001	9-12	7.003	13-38	0.274	9-9	0	13-128	0	13-128
572			min	-35.569	13-28	-15.083	13-70	-7.304	8-9	-0.185	3-13	0	2	0	2
573		2	max	35.313	13-8	12.565	9-12	3.875	13-10	0.055	9-9	11.468	13-44	16.604	3-12
574			min	-14.191	13-44	-13.764	13-70	-5.538	13-44	-0.07	13-57	-7.036	13-10	-27.381	13-70
575		3	max	35.313	13-8	12.554	3-12	3.875	13-10	0.055	9-9	1.095	13-38	0.256	13-70
576			min	-14.191	13-44	-13.764	13-70	-5.538	13-44	-0.07	13-57	-0.636	8-9	-10.429	9-13
577		4	max	35.313	13-8	12.554	3-12	3.875	13-10	0.055	9-9	8.525	13-10	27.894	13-70
578			min	-14.191	13-44	-13.764	13-70	-5.538	13-44	-0.07	13-57	-10.773	13-44	-35.267	9-12
579		5	max	85.937	13-8	12.483	3-15	1.518	13-10	0.262	3-13	0	13-128	0	13-128
580			min	-13.858	13-62	-46.533	8-4	-10.766	13-44	-0.311	8-3	0	2	0	2
581	M263A	1	max	46.759	8-10	42.756	13-57	0.012	13-38	0	13-128	0.471	13-65	89.029	13-57
582			min	-51.882	13-65	-49.275	8-9	-0.122	13-65	0	2	-0.046	13-38	-112.334	8-9
583		2	max	46.759	8-10	42.756	13-57	0.012	13-38	0	13-128	0.408	13-65	66.903	13-57
584			min	-51.882	13-65	-49.275	8-9	-0.122	13-65	0	2	-0.04	13-38	-86.834	8-9
585		3	max	46.759	8-10	42.756	13-57	0.012	13-38	0	13-128	0.345	13-65	44.776	13-57
586			min	-51.882	13-65	-49.275	8-9	-0.122	13-65	0	2	-0.034	13-38	-61.334	8-9
587		4	max	46.759	8-10	42.756	13-57	0.012	13-38	0	13-128	0.282	13-65	22.65	13-57
588			min	-51.882	13-65	-49.275	8-9	-0.122	13-65	0	2	-0.028	13-38	-35.835	8-9
589		5	max	46.759	8-10	42.756	13-57	0.012	13-38	0	13-128	0.219	13-65	5.996	9-15
590			min	-51.882	13-65	-49.275	8-9	-0.122	13-65	0	2	-0.022	13-38	-10.91	8-1
591	M264A	1	max	46.759	8-10	3.047	9-15	0.011	13-38	0	13-128	0.219	13-65	5.996	9-15
592			min	-51.882	13-65	-5.544	8-1	-0.111	13-65	0	2	-0.022	13-38	-10.91	8-1
593		2	max	46.759	8-10	3.047	9-15	0.011	13-38	0	13-128	0.164	13-65	4.497	9-15
594			min	-51.882	13-65	-5.544	8-1	-0.111	13-65	0	2	-0.016	13-38	-8.183	8-1
595		3	max	46.759	8-10	3.047	9-15	0.011	13-38	0	13-128	0.109	13-65	2.998	9-15
596			min	-51.882	13-65	-5.544	8-1	-0.111	13-65	0	2	-0.011	13-38	-5.455	8-1
597		4	max	46.759	8-10	3.047	9-15	0.011	13-38	0	13-128	0.055	13-65	1.499	9-15
598			min	-51.882	13-65	-5.544	8-1	-0.111	13-65	0	2	-0.005	13-38	-2.728	8-1
599		5	max	46.759	8-10	3.047	9-15	0.011	13-38	0	13-128	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
600			min	-51.882	13-65	-5.544	8-1	-0.111	13-65	0	2	0	2	0	2
601	M265A	1	max	39.083	8-1	29.58	13-57	0.063	13-38	0	13-128	0.118	13-65	61.064	13-57
602			min	-45.866	13-53	-49.784	8-9	-0.03	13-65	0	2	-0.245	13-38	-113.278	8-9
603		2	max	39.083	8-1	29.58	13-57	0.063	13-38	0	13-128	0.102	13-65	45.756	13-57
604			min	-45.866	13-53	-49.784	8-9	-0.03	13-65	0	2	-0.212	13-38	-87.515	8-9
605		3	max	39.083	8-1	29.58	13-57	0.063	13-38	0	13-128	0.086	13-65	30.448	13-57
606			min	-45.866	13-53	-49.784	8-9	-0.03	13-65	0	2	-0.18	13-38	-61.752	8-9
607		4	max	39.083	8-1	29.58	13-57	0.063	13-38	0	13-128	0.071	13-65	15.14	13-57
608			min	-45.866	13-53	-49.784	8-9	-0.03	13-65	0	2	-0.147	13-38	-35.988	8-9
609		5	max	39.083	8-1	29.58	13-57	0.063	13-38	0	13-128	0.055	13-65	4.638	9-15
610			min	-45.866	13-53	-49.784	8-9	-0.03	13-65	0	2	-0.115	13-38	-10.701	8-1
611	M266A	1	max	39.083	8-1	2.357	9-15	0.058	13-38	0	13-128	0.055	13-65	4.638	9-15
612			min	-45.866	13-53	-5.438	8-1	-0.028	13-65	0	2	-0.115	13-38	-10.701	8-1
613		2	max	39.083	8-1	2.357	9-15	0.058	13-38	0	13-128	0.041	13-65	3.478	9-15
614			min	-45.866	13-53	-5.438	8-1	-0.028	13-65	0	2	-0.086	13-38	-8.026	8-1
615		3	max	39.083	8-1	2.357	9-15	0.058	13-38	0	13-128	0.028	13-65	2.319	9-15
616			min	-45.866	13-53	-5.438	8-1	-0.028	13-65	0	2	-0.057	13-38	-5.351	8-1
617		4	max	39.083	8-1	2.357	9-15	0.058	13-38	0	13-128	0.014	13-65	1.159	9-15
618			min	-45.866	13-53	-5.438	8-1	-0.028	13-65	0	2	-0.029	13-38	-2.675	8-1
619		5	max	39.083	8-1	2.357	9-15	0.058	13-38	0	13-128	0	13-128	0	13-128
620			min	-45.866	13-53	-5.438	8-1	-0.028	13-65	0	2	0	2	0	2
621	M131	1	max	51.802	13-57	41.63	8-62	5.978	13-58	0.229	9-59	0	13-128	0	13-128
622			min	-37.463	13-110	-10.646	3-51	-8.063	13-94	-0.229	8-63	0	2	0	2
623		2	max	62.66	13-58	9.991	8-62	5.177	13-56	0.063	3-59	8.439	13-94	11.501	3-62
624			min	-25.067	13-112	-9.844	3-51	-4.336	13-94	-0.02	3-46	-9.831	13-56	-26.583	9-51
625		3	max	62.66	13-58	9.872	8-62	5.177	13-56	0.063	3-59	0.597	13-58	-0.031	13-128
626			min	-25.067	13-112	-9.844	3-51	-4.336	13-94	-0.02	3-46	-0.64	9-57	-9.791	8-62
627		4	max	62.66	13-58	9.752	8-62	5.177	13-56	0.063	3-59	10.961	13-56	13.987	3-51
628			min	-25.067	13-112	-9.844	3-51	-4.336	13-94	-0.02	3-46	-8.974	13-94	-29.493	8-62
629		5	max	120.649	13-58	10.895	3-65	4.14	13-57	0.298	8-63	0	13-128	0	13-128
630			min	-31.017	13-112	-49.537	9-54	-8.414	13-94	-0.268	9-53	0	2	0	2
631	M132	1	max	27.094	13-58	42.604	8-63	5.894	13-61	0.229	9-60	0	13-128	0	13-128
632			min	-52.861	13-92	-10.827	3-52	-7.981	9-59	-0.229	8-64	0	2	0	2
633		2	max	24.447	13-57	10.3	8-63	4.232	13-59	0.059	3-60	8.187	8-59	11.813	3-63
634			min	-19.493	13-108	-9.828	3-52	-4.041	9-59	-0.021	9-48	-8.04	13-59	-26.431	9-52
635		3	max	24.447	13-57	10.181	8-63	4.232	13-59	0.059	3-60	0.48	13-61	-0.032	13-128
636			min	-19.493	13-108	-9.828	3-52	-4.041	9-59	-0.021	9-48	-0.725	9-58	-9.857	8-63
637		4	max	24.447	13-57	10.061	8-63	4.232	13-59	0.059	3-60	8.957	13-59	13.904	3-52
638			min	-19.493	13-108	-9.828	3-52	-4.041	9-59	-0.021	9-48	-8.836	9-59	-30.18	8-63
639		5	max	59.934	13-59	10.697	3-66	3.352	13-61	0.297	8-64	0	13-128	0	13-128
640			min	-16.868	13-106	-47.807	9-55	-7.809	8-59	-0.264	9-54	0	2	0	2
641	M133	1	max	48.076	13-54	44.194	8-64	9.69	13-60	0.233	9-61	0	13-128	0	13-128
642			min	-80.435	13-93	-10.753	3-53	-7.943	13-96	-0.228	8-65	0	2	0	2
643		2	max	39.332	13-54	10.41	8-64	6.431	13-59	0.066	3-61	8.192	13-96	12.048	3-64
644			min	-40.169	13-108	-9.764	3-53	-4.155	13-96	-0.02	3-47	-12.096	13-59	-26.317	9-53
645		3	max	39.332	13-54	10.291	8-64	6.431	13-59	0.066	3-61	0.863	13-60	-0.033	13-4
646			min	-40.169	13-108	-9.764	3-53	-4.155	13-96	-0.02	3-47	-0.575	9-58	-9.893	8-64
647		4	max	39.332	13-54	10.171	8-64	6.431	13-59	0.066	3-61	13.732	13-59	13.715	3-53
648			min	-40.169	13-108	-9.764	3-53	-4.155	13-96	-0.02	3-47	-8.495	13-96	-30.437	8-64
649		5	max	59.249	13-60	10.194	3-67	7.675	13-60	0.298	8-65	0	13-128	0	13-128
650			min	-34.339	13-107	-47.724	9-56	-8.208	13-96	-0.265	9-55	0	2	0	2
651	M134	1	max	36.454	13-58	42.203	8-65	10.625	13-60	0.234	9-62	0	13-128	0	13-128
652			min	-38.929	13-109	-10.524	3-54	-10.075	13-97	-0.225	8-66	0	2	0	2
653		2	max	43.174	13-58	10.014	8-65	7.02	13-60	0.069	3-62	9.595	13-97	11.363	3-65
654			min	-19.157	13-116	-9.721	3-54	-4.872	13-97	-0.019	3-49	-13.157	13-60	-26.427	9-54

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
655		3	max	43.174	13-58	9.894	8-65	7.02	13-60	0.069	3-62	0.939	13-60	-0.033	13-4
656			min	-19.157	13-116	-9.721	3-54	-4.872	13-97	-0.019	3-49	-0.52	9-59	-9.866	8-65
657		4	max	43.174	13-58	9.774	8-65	7.02	13-60	0.069	3-62	15.035	13-60	13.566	3-54
658			min	-19.157	13-116	-9.721	3-54	-4.872	13-97	-0.019	3-49	-9.97	13-97	-29.613	8-65
659		5	max	95.185	13-61	9.969	3-68	8.415	13-60	0.297	8-66	0	13-128	0	13-128
660			min	-21.342	13-116	-49.125	9-57	-9.723	13-97	-0.265	9-56	0	2	0	2
661	M135	1	max	43.656	13-61	41.675	8-66	5.751	13-64	0.234	9-57	0	13-128	0	13-128
662			min	-34.77	13-110	-10.639	3-55	-6.735	9-62	-0.223	8-67	0	2	0	2
663		2	max	52.139	13-61	9.863	8-66	4.694	13-60	0.062	3-63	7.383	8-62	10.821	3-66
664			min	-20.41	13-116	-9.779	3-55	-3.712	13-98	-0.02	9-50	-8.871	13-60	-26.502	9-55
665		3	max	52.139	13-61	9.743	8-66	4.694	13-60	0.062	3-63	0.575	13-64	-0.033	13-4
666			min	-20.41	13-116	-9.779	3-55	-3.712	13-98	-0.02	9-50	-0.633	9-61	-9.841	8-66
667		4	max	52.139	13-61	9.623	8-66	4.694	13-60	0.062	3-63	9.98	13-60	13.629	3-55
668			min	-20.41	13-116	-9.779	3-55	-3.712	13-98	-0.02	9-50	-7.902	9-62	-29.285	8-66
669		5	max	105.742	13-62	9.901	3-69	3.012	13-64	0.29	8-67	0	13-128	0	13-128
670			min	-24.393	13-116	-49.288	9-58	-7.656	13-98	-0.277	9-57	0	2	0	2
671	M136	1	max	32.683	13-58	42.833	4-67	7.685	13-65	0.234	9-58	0	13-128	0	13-128
672			min	-61.91	13-96	-10.834	3-56	-7.251	9-62	-0.226	8-68	0	2	0	2
673		2	max	28.109	13-61	10.04	8-67	4.428	13-62	0.061	3-64	7.771	8-63	10.731	3-67
674			min	-26.045	13-99	-9.773	3-56	-3.828	4-63	-0.02	9-51	-8.339	13-62	-26.38	9-56
675		3	max	28.109	13-61	9.92	8-67	4.428	13-62	0.061	3-64	0.651	13-65	-0.034	13-4
676			min	-26.045	13-99	-9.773	3-56	-3.828	4-63	-0.02	9-51	-0.654	9-62	-9.86	9-67
677		4	max	28.109	13-61	9.8	8-67	4.428	13-62	0.061	3-64	9.443	13-62	13.548	3-56
678			min	-26.045	13-99	-9.773	3-56	-3.828	4-63	-0.02	9-51	-8.332	9-63	-29.655	8-67
679		5	max	58.359	13-63	9.45	3-70	4.403	13-65	0.29	8-68	0	13-128	0	13-128
680			min	-21.142	13-112	-47.697	9-59	-7.1	8-63	-0.272	9-58	0	2	0	2
681	M137	1	max	41.966	13-61	43.22	8-68	11.004	13-63	0.238	9-59	0	13-128	0	13-128
682			min	-70.185	13-97	-10.648	3-57	-8.5	13-100	-0.218	8-69	0	2	0	2
683		2	max	35.499	13-61	9.857	8-68	7.076	13-63	0.068	3-65	8.627	13-100	10.75	13-72
684			min	-31.246	13-116	-9.721	3-57	-4.343	13-100	-0.019	9-52	-13.185	13-63	-26.362	9-57
685		3	max	35.499	13-61	9.737	8-68	7.076	13-63	0.068	3-65	1.027	13-66	-0.035	13-4
686			min	-31.246	13-116	-9.721	3-57	-4.343	13-100	-0.019	9-52	-0.483	9-61	-9.835	9-68
687		4	max	35.499	13-61	9.617	8-68	7.076	13-63	0.068	3-65	15.231	13-63	13.368	3-57
688			min	-31.246	13-116	-9.721	3-57	-4.343	13-100	-0.019	9-52	-8.813	13-100	-29.259	8-68
689		5	max	59.022	13-64	8.724	3-71	8.395	13-63	0.291	8-69	0	13-128	0	13-128
690			min	-25.213	13-115	-47.856	9-60	-8.92	13-72	-0.272	9-59	0	2	0	2
691	M138	1	max	46.17	13-66	41.433	9-69	10.222	13-64	0.24	9-60	0	13-128	0	13-128
692			min	-33.986	13-117	-10.631	3-58	-9.012	13-101	-0.218	8-70	0	2	0	2
693		2	max	54.969	13-65	9.38	9-69	6.612	13-64	0.068	3-66	8.712	13-101	11.267	13-72
694			min	-20.067	13-119	-9.814	3-58	-4.398	13-101	-0.019	3-53	-12.279	13-64	-26.571	9-58
695		3	max	54.969	13-65	9.261	9-69	6.612	13-64	0.068	3-66	0.997	13-64	-0.036	13-4
696			min	-20.067	13-119	-9.814	3-58	-4.398	13-101	-0.019	3-53	-0.477	9-64	-9.766	9-69
697		4	max	54.969	13-65	9.141	9-69	6.612	13-64	0.068	3-66	14.273	13-64	13.493	3-58
698			min	-20.067	13-119	-9.814	3-58	-4.398	13-101	-0.019	3-53	-8.949	13-101	-28.242	9-69
699		5	max	112.223	13-65	8.259	7-72	7.127	13-64	0.289	8-70	0	13-128	0	13-128
700			min	-24.077	13-119	-49.686	9-61	-9.342	13-73	-0.273	9-60	0	2	0	2
701	M139	1	max	34.201	13-65	41.208	9-70	6.573	13-68	0.24	9-61	0	13-128	0	13-128
702			min	-34.627	13-99	-10.853	3-59	-7.115	9-66	-0.216	8-71	0	2	0	2
703		2	max	40.78	13-65	9.294	9-70	4.18	13-64	0.061	8-67	7.834	8-66	11.748	13-76
704			min	-15.209	13-119	-9.929	3-59	-3.925	9-66	-0.02	9-54	-7.775	13-64	-26.839	8-59
705		3	max	40.78	13-65	9.174	9-70	4.18	13-64	0.061	8-67	0.689	13-68	-0.036	13-4
706			min	-15.209	13-119	-9.929	3-59	-3.925	9-66	-0.02	9-54	-0.587	9-65	-9.719	9-70
707		4	max	40.78	13-65	9.055	9-70	4.18	13-64	0.061	8-67	9.01	13-64	13.661	3-59
708			min	-15.209	13-119	-9.929	3-59	-3.925	9-66	-0.02	9-54	-8.466	9-66	-28.021	9-70
709		5	max	88.178	13-66	7.343	3-73	2.838	13-96	0.283	8-71	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
710			min	-18.16	13-119	-49.078	8-62	-7.091	13-74	-0.282	9-61	0	2	0	2
711	M140	1	max	41.008	13-62	42.367	9-71	9.443	13-69	0.241	9-62	0	13-128	0	13-128
712			min	-70.345	13-100	-11.034	3-60	-6.342	9-66	-0.219	8-72	0	2	0	2
713		2	max	33.518	13-61	9.317	9-71	5.069	13-66	0.063	8-68	7.262	8-67	11.853	13-76
714			min	-33.892	13-103	-9.953	3-60	-3.632	9-67	-0.019	9-55	-9.365	13-66	-27.051	8-60
715		3	max	33.518	13-61	9.197	9-71	5.069	13-66	0.063	8-68	0.898	13-69	-0.037	13-4
716			min	-33.892	13-103	-9.953	3-60	-3.632	9-67	-0.019	9-55	-0.536	9-65	-9.672	9-71
717		4	max	33.518	13-61	9.078	9-71	5.069	13-66	0.063	8-68	10.99	13-66	13.645	3-60
718			min	-33.892	13-103	-9.953	3-60	-3.632	9-67	-0.019	9-55	-7.822	9-67	-28.02	9-71
719		5	max	57.154	13-67	7.055	7-74	5.321	13-97	0.282	8-72	0	13-128	0	13-128
720			min	-25.662	13-101	-47.807	8-63	-7.226	13-75	-0.279	9-62	0	2	0	2
721	M141	1	max	34.791	13-65	41.319	9-72	12.56	13-67	0.246	9-63	0	13-128	0	13-128
722			min	-59.116	13-101	-10.85	3-61	-8.623	13-104	-0.207	8-73	0	2	0	2
723		2	max	31.931	13-65	8.811	9-72	7.332	13-67	0.069	8-69	9.489	13-104	11.316	13-76
724			min	-22.59	13-119	-9.985	3-61	-4.735	13-104	-0.018	3-56	-13.445	13-67	-27.5	8-61
725		3	max	31.931	13-65	8.691	9-72	7.332	13-67	0.069	8-69	1.278	13-67	-0.036	13-4
726			min	-22.59	13-119	-9.985	3-61	-4.735	13-104	-0.018	3-56	-0.355	9-65	-9.526	9-71
727		4	max	31.931	13-65	8.572	9-72	7.332	13-67	0.069	8-69	16.002	13-67	13.651	3-61
728			min	-22.59	13-119	-9.985	3-61	-4.735	13-104	-0.018	3-56	-9.526	13-104	-26.849	9-72
729		5	max	60.925	13-68	6.546	7-75	8.449	13-67	0.284	8-73	0	13-128	0	13-128
730			min	-18.966	13-119	-48.233	8-64	-9.817	13-76	-0.278	9-63	0	2	0	2
731	M142	1	max	53.065	13-98	38.103	9-73	9.739	13-68	0.246	9-64	0	13-128	0	13-128
732			min	-31.406	13-121	-11.173	3-62	-6.886	13-105	-0.205	8-74	0	2	0	2
733		2	max	64.521	13-97	6.467	9-73	5.862	13-68	0.066	8-70	6.704	13-105	9.916	13-76
734			min	-17.277	13-122	-10.345	3-62	-3.326	13-105	-0.018	3-57	-10.639	13-68	-28.251	8-62
735		3	max	64.521	13-97	6.347	9-73	5.862	13-68	0.066	8-70	1.131	13-68	-0.034	13-4
736			min	-17.277	13-122	-10.345	3-62	-3.326	13-105	-0.018	3-57	-0.382	9-68	-9.412	9-71
737		4	max	64.521	13-97	6.227	9-73	5.862	13-68	0.066	8-70	12.901	13-68	14.342	3-62
738			min	-17.277	13-122	-10.345	3-62	-3.326	13-105	-0.018	3-57	-6.671	13-122	-21.635	9-72
739		5	max	123.571	13-97	5.904	13-76	4.913	13-68	0.283	8-68	0	13-128	0	13-128
740			min	-22.516	13-122	-50.408	8-65	-8.571	13-77	-0.282	9-64	0	2	0	2
741	M143	1	max	23.964	13-97	37.902	9-74	7.966	13-72	0.247	9-65	0	13-128	0	13-128
742			min	-40.497	13-103	-11.609	3-63	-7.017	9-70	-0.201	8-75	0	2	0	2
743		2	max	29.201	13-97	6.266	9-74	3.659	13-65	0.062	9-71	8.106	8-70	7.096	13-76
744			min	-10.898	13-122	-10.64	3-63	-4.201	9-70	-0.019	3-58	-6.578	13-65	-28.757	8-63
745		3	max	29.201	13-97	6.146	9-74	3.659	13-65	0.062	9-71	0.916	13-72	-0.031	13-4
746			min	-10.898	13-122	-10.64	3-63	-4.201	9-70	-0.019	3-58	-0.459	9-69	-9.279	9-71
747		4	max	29.201	13-97	6.026	9-74	3.659	13-65	0.062	9-71	8.118	13-65	14.903	3-63
748			min	-10.898	13-122	-10.64	3-63	-4.201	9-70	-0.019	3-58	-8.888	9-70	-19.864	9-74
749		5	max	69.525	13-98	4.466	7-77	2.341	13-100	0.279	8-69	0	13-128	0	13-128
750			min	-11.539	13-119	-48.889	8-66	-6.64	13-78	-0.284	9-65	0	2	0	2
751	M144	1	max	47.295	13-65	38.441	9-75	11.38	13-73	0.249	9-66	0	13-128	0	13-128
752			min	-81.731	13-104	-11.882	3-64	-5.076	9-70	-0.198	8-76	0	2	0	2
753		2	max	38.161	13-65	5.633	9-75	5.347	13-98	0.07	9-72	6.69	8-71	4.946	13-107
754			min	-36.9	13-107	-10.767	3-64	-3.478	9-70	-0.02	3-59	-9.776	13-98	-29.041	8-64
755		3	max	38.161	13-65	5.514	9-75	5.347	13-98	0.07	9-72	1.297	13-73	-0.025	13-4
756			min	-36.9	13-107	-10.767	3-64	-3.478	9-70	-0.02	3-59	-0.324	9-69	-9.123	9-72
757		4	max	38.161	13-65	5.394	9-75	5.347	13-98	0.07	9-72	11.893	13-70	15.128	3-64
758			min	-36.9	13-107	-10.767	3-64	-3.478	9-70	-0.02	3-59	-7.305	9-70	-18.336	9-75
759		5	max	53.261	13-99	3.827	7-78	5.671	13-101	0.278	8-70	0	13-128	0	13-128
760			min	-25.308	13-105	-48.196	8-67	-8.018	13-79	-0.284	9-66	0	2	0	2
761	M145	1	max	29.611	13-97	34.312	9-76	13.621	13-71	0.256	9-67	0	13-128	0	13-128
762			min	-42.912	13-107	-11.68	3-65	-5.293	13-108	-0.19	8-77	0	2	0	2
763		2	max	30.429	13-97	3.069	9-76	6.718	13-99	0.092	13-61	5.559	13-124	2.106	13-107
764			min	-13.074	13-122	-10.86	3-65	-2.809	13-124	-0.021	3-59	-12.175	13-99	-29.306	8-65

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
765		3	max	30.429	13-97	2.949	9-76	6.718	13-99	0.092	13-61	1.622	13-71	-0.015	13-4
766			min	-13.074	13-122	-10.86	3-65	-2.809	13-124	-0.021	3-59	-0.225	8-70	-8.846	9-71
767		4	max	30.429	13-97	2.829	9-76	6.718	13-99	0.092	13-61	14.951	13-71	15.297	3-65
768			min	-13.074	13-122	-10.86	3-65	-2.809	13-124	-0.021	3-59	-5.72	13-124	-11.888	9-75
769		5	max	64.687	13-72	2.101	3-79	7.688	13-99	0.278	8-71	0	13-128	0	13-128
770			min	-11.429	13-122	-49.01	4-68	-7.905	13-80	-0.283	9-67	0	2	0	2
771	M146	1	max	51.046	13-74	32.495	9-77	9.957	13-72	0.253	9-68	0	13-128	0	13-128
772			min	-24.302	13-121	-11.915	3-66	-5.073	8-72	-0.195	8-78	0	2	0	2
773		2	max	64.581	13-73	2.026	9-77	4.796	13-68	0.121	13-61	6.722	9-72	1.844	3-1
774			min	-10.844	13-128	-12.172	13-58	-3.418	9-72	-0.022	3-60	-8.315	13-68	-29.599	8-66
775		3	max	64.581	13-73	1.906	9-77	4.796	13-68	0.121	13-61	1.44	13-72	0.456	13-59
776			min	-10.844	13-128	-12.172	13-58	-3.418	9-72	-0.022	3-60	-0.409	8-72	-8.666	9-71
777		4	max	64.581	13-73	1.787	9-77	4.796	13-68	0.121	13-61	10.946	13-68	24.894	13-58
778			min	-10.844	13-128	-12.172	13-58	-3.418	9-72	-0.022	3-60	-7.086	8-72	-9.341	9-49
779		5	max	121.779	13-73	1.713	3-4	3.042	13-100	0.279	8-72	0	13-128	0	13-128
780			min	-13.24	13-128	-51.116	8-69	-8.149	13-81	-0.284	9-68	0	2	0	2
781	M147	1	max	19.384	13-73	33.859	9-78	10.492	13-76	0.23	3-69	0	13-128	0	13-128
782			min	-46.933	13-107	-19.615	13-58	-7.459	8-72	-0.219	4-79	0	2	0	2
783		2	max	23.51	13-73	2.468	3-9	3.601	13-73	0.145	13-61	8.183	9-72	2.945	3-1
784			min	-9.829	13-122	-19.437	13-58	-4.141	9-72	-0.026	3-62	-6.257	13-101	-37.909	13-58
785		3	max	23.51	13-73	2.468	3-9	3.601	13-73	0.145	13-61	1.402	13-76	1.124	13-60
786			min	-9.829	13-122	-19.437	13-58	-4.141	9-72	-0.026	3-62	-0.629	8-72	-8.494	8-60
787		4	max	23.51	13-73	2.468	3-9	3.601	13-73	0.145	13-61	8.597	13-73	40.148	13-58
788			min	-9.829	13-122	-19.437	13-58	-4.141	9-72	-0.026	3-62	-8.695	8-72	-9.368	9-50
789		5	max	56.226	13-74	2.575	3-9	2.016	13-109	0.301	9-73	0	13-128	0	13-128
790			min	-7.076	13-127	-51.702	9-70	-7.308	13-79	-0.26	3-69	0	2	0	2
791	M88	1	max	72.111	8-9	13.562	13-66	66.272	13-16	2.88	13-10	226.224	13-8	4.453	13-16
792			min	-21.593	3-19	-44.579	13-10	-135.275	13-8	-2.863	8-9	-84.986	13-44	-12.277	13-8
793		2	max	72.111	8-9	13.562	13-66	66.272	13-16	2.88	13-10	176.406	13-10	10.353	13-16
794			min	-21.593	3-19	-44.579	13-10	-135.275	13-8	-2.863	8-9	-62.061	13-44	-4.826	13-73
795		3	max	72.111	8-9	13.562	13-66	66.272	13-16	2.88	13-10	127.645	13-10	22.926	13-13
796			min	-21.593	3-19	-44.579	13-10	-135.275	13-8	-2.863	8-9	-40.453	13-62	-9.468	13-69
797		4	max	72.111	8-9	13.562	13-66	66.272	13-16	2.88	13-10	78.885	13-10	38.38	13-13
798			min	-21.593	3-19	-44.579	13-10	-135.275	13-8	-2.863	8-9	-23.674	13-63	-14.5	13-69
799		5	max	72.111	8-9	13.562	13-66	66.272	13-16	2.88	13-10	30.124	13-10	54.625	13-10
800			min	-21.593	3-19	-44.579	13-10	-135.275	13-8	-2.863	8-9	-10.987	13-69	-19.532	13-69
801	M89	1	max	95.645	9-13	20.907	8-16	76.149	7-10	1.849	13-9	235.895	13-44	6.573	13-8
802			min	-32.059	13-71	-33.266	13-62	-147.009	13-16	-4.834	13-46	-123.409	8-10	-12.26	13-44
803		2	max	95.645	9-13	20.907	8-16	76.149	7-10	1.849	13-9	180.944	13-44	8.418	13-72
804			min	-32.059	13-71	-33.266	13-62	-147.009	13-16	-4.834	13-46	-95.5	8-10	-7.375	13-16
805		3	max	95.645	9-13	20.907	8-16	76.149	7-10	1.849	13-9	125.993	13-44	18.639	13-66
806			min	-32.059	13-71	-33.266	13-62	-147.009	13-16	-4.834	13-46	-67.592	8-10	-12.941	8-18
807		4	max	95.645	9-13	20.907	8-16	76.149	7-10	1.849	13-9	71.042	13-44	30.421	13-65
808			min	-32.059	13-71	-33.266	13-62	-147.009	13-16	-4.834	13-46	-39.684	8-10	-20.671	8-17
809		5	max	95.645	9-13	20.907	8-16	76.149	7-10	1.849	13-9	22.744	13-65	42.276	13-65
810			min	-32.059	13-71	-33.266	13-62	-147.009	13-16	-4.834	13-46	-15.982	8-16	-28.459	8-17
811	M90	1	max	55.784	13-41	76.125	8-9	20.431	13-13	0	13-128	0	13-128	0	13-128
812			min	-5.236	9-15	-0.002	3-22	-3.092	8-13	0	2	0	2	0	2
813		2	max	55.784	13-41	73.47	8-9	20.431	13-13	0	13-128	185.344	13-13	0.017	3-22
814			min	-5.236	9-15	-0.002	3-22	-3.092	8-13	0	2	-28.053	8-13	-678.558	8-9
815		3	max	106.266	13-16	37.565	9-15	15.342	13-65	1.478	8-9	213.183	13-41	118.854	13-8
816			min	-104.467	13-8	-32.059	13-71	-18.632	13-10	-0.599	13-38	-89.173	8-16	-790.568	8-10
817		4	max	5.341	9-14	0.536	13-41	8.937	8-16	0	13-128	115.116	13-55	3.794	13-41
818			min	-55.726	13-41	-70.341	8-10	-16.276	13-55	0	2	-63.209	8-16	-504.241	8-10
819		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
820			min	0	2	0	2	0	2	0	2	0	2	0	2
821	M91	1	max	95.205	8-9	13.711	13-68	66.929	13-65	5.026	13-10	295.594	13-10	5.872	13-65
822			min	-14.108	3-24	-46.131	13-13	-178.004	13-10	-2.618	8-12	-107.832	13-65	-16.04	13-10
823		2	max	95.205	8-9	13.711	13-68	66.929	13-65	5.026	13-10	228.842	13-10	10.182	13-20
824			min	-14.108	3-24	-46.131	13-13	-178.004	13-10	-2.618	8-12	-82.734	13-65	-3.47	13-76
825		3	max	95.205	8-9	13.711	13-68	66.929	13-65	5.026	13-10	162.09	13-10	20.427	13-13
826			min	-14.108	3-24	-46.131	13-13	-178.004	13-10	-2.618	8-12	-57.636	13-65	-7.484	13-73
827		4	max	95.205	8-9	13.711	13-68	66.929	13-65	5.026	13-10	95.339	13-10	37.726	13-13
828			min	-14.108	3-24	-46.131	13-13	-178.004	13-10	-2.618	8-12	-32.731	13-66	-11.97	13-72
829		5	max	95.205	8-9	13.711	13-68	66.929	13-65	5.026	13-10	30.146	13-13	55.025	13-13
830			min	-14.108	3-24	-46.131	13-13	-178.004	13-10	-2.618	8-12	-9.476	13-69	-16.879	13-69
831	M92	1	max	90.114	9-17	23.052	13-10	111.879	13-10	2.201	13-13	215.389	13-47	10.095	13-10
832			min	-16.62	13-76	-34.498	13-65	-134.233	13-21	-4.641	13-50	-181.191	13-10	-11.372	13-47
833		2	max	90.114	9-17	23.052	13-10	111.879	13-10	2.201	13-13	165.587	13-47	6.782	13-76
834			min	-16.62	13-76	-34.498	13-65	-134.233	13-21	-4.641	13-50	-139.236	13-10	-6.746	13-20
835		3	max	90.114	9-17	23.052	13-10	111.879	13-10	2.201	13-13	115.786	13-47	16.731	13-69
836			min	-16.62	13-76	-34.498	13-65	-134.233	13-21	-4.641	13-50	-97.282	13-10	-12.775	8-21
837		4	max	90.114	9-17	23.052	13-10	111.879	13-10	2.201	13-13	65.985	13-47	29.088	13-65
838			min	-16.62	13-76	-34.498	13-65	-134.233	13-21	-4.641	13-50	-55.327	13-10	-20.74	8-20
839		5	max	90.114	9-17	23.052	13-10	111.879	13-10	2.201	13-13	22.908	13-65	42.024	13-65
840			min	-16.62	13-76	-34.498	13-65	-134.233	13-21	-4.641	13-50	-16.247	8-20	-28.794	8-20
841	M93	1	max	53.286	13-41	79.778	8-10	20.188	13-41	0	13-128	0	13-128	0	13-128
842			min	-4.563	9-20	-0.001	3-26	-2.621	8-79	0	2	0	2	0	2
843		2	max	53.286	13-41	77.123	8-10	20.188	13-41	0	13-128	183.146	13-41	0.012	3-26
844			min	-4.563	9-20	-0.001	3-26	-2.621	8-79	0	2	-23.781	8-79	-711.692	8-10
845		3	max	92.334	13-21	32.839	3-18	14.536	13-69	1.396	8-12	206.127	13-45	206.631	13-10
846			min	-146.386	13-10	-27.104	8-7	-19.138	13-10	-0.68	13-10	-85.821	8-19	-774.973	8-13
847		4	max	4.667	9-20	0.557	13-48	8.743	8-20	0	13-128	115.779	13-56	3.936	13-48
848			min	-53.111	13-41	-70.095	8-14	-16.37	13-56	0	2	-61.836	8-20	-502.504	8-14
849		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
850			min	0	2	0	2	0	2	0	2	0	2	0	2
851	M94	1	max	102.508	9-12	14.334	13-69	76.662	13-69	5.191	13-13	305.165	13-14	6.676	13-69
852			min	-19.558	13-51	-45.658	13-13	-186.053	13-14	-2.502	8-16	-123.402	13-69	-16.486	13-14
853		2	max	102.508	9-12	14.334	13-69	76.662	13-69	5.191	13-13	235.395	13-14	9.634	13-23
854			min	-19.558	13-51	-45.658	13-13	-186.053	13-14	-2.502	8-16	-94.653	13-69	-2.965	13-80
855		3	max	102.508	9-12	14.334	13-69	76.662	13-69	5.191	13-13	165.625	13-14	18.147	13-13
856			min	-19.558	13-51	-45.658	13-13	-186.053	13-14	-2.502	8-16	-65.905	13-69	-6.692	13-76
857		4	max	102.508	9-12	14.334	13-69	76.662	13-69	5.191	13-13	96.005	13-13	35.268	13-13
858			min	-19.558	13-51	-45.658	13-13	-186.053	13-14	-2.502	8-16	-37.157	13-69	-11.128	13-73
859		5	max	102.508	9-12	14.334	13-69	76.662	13-69	5.191	13-13	28.656	13-13	52.39	13-13
860			min	-19.558	13-51	-45.658	13-13	-186.053	13-14	-2.502	8-16	-9.223	13-73	-16.073	13-73
861	M95	1	max	86.373	8-20	23.84	13-10	118.623	13-14	2.54	13-16	222.105	13-52	10.399	13-14
862			min	-4.996	13-88	-35.347	13-65	-137.335	13-52	-4.399	13-53	-188.009	13-14	-11.705	13-52
863		2	max	86.373	8-20	23.84	13-10	118.623	13-14	2.54	13-16	170.604	13-52	6.435	13-43
864			min	-4.996	13-88	-35.347	13-65	-137.335	13-52	-4.399	13-53	-143.525	13-14	-6.057	13-23
865		3	max	86.373	8-20	23.84	13-10	118.623	13-14	2.54	13-16	119.103	13-52	16.075	13-66
866			min	-4.996	13-88	-35.347	13-65	-137.335	13-52	-4.399	13-53	-99.239	13-13	-12.561	8-24
867		4	max	86.373	8-20	23.84	13-10	118.623	13-14	2.54	13-16	67.603	13-52	29.133	13-65
868			min	-4.996	13-88	-35.347	13-65	-137.335	13-52	-4.399	13-53	-56.151	13-13	-20.564	8-23
869		5	max	86.373	8-20	23.84	13-10	118.623	13-14	2.54	13-16	23.271	13-65	42.388	13-65
870			min	-4.996	13-88	-35.347	13-65	-137.335	13-52	-4.399	13-53	-16.291	8-23	-28.713	8-23
871	M96	1	max	50.124	13-48	81.837	8-14	18.883	13-41	0	13-128	0	13-128	0	13-128
872			min	-4.417	9-25	-0.538	13-53	-2.591	8-79	0	2	0	2	0	2
873		2	max	50.124	13-48	79.182	8-14	18.883	13-41	0	13-128	171.309	13-41	4.88	13-53
874			min	-4.417	9-25	-0.538	13-53	-2.591	8-79	0	2	-23.507	8-79	-730.375	8-14

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
875		3	max	95.249	13-69	31.389	3-22	14.641	13-69	1.39	8-16	206.43	13-51	228.404	13-14
876			min	-153.64	13-14	-32.919	9-10	-18.916	13-13	-0.629	13-14	-84.873	8-23	-763.819	8-16
877		4	max	4.52	9-24	0.588	13-51	8.701	8-23	0	13-128	116.907	13-56	4.156	13-51
878			min	-50.138	13-48	-68.868	8-17	-16.529	13-56	0	2	-61.539	8-23	-493.822	8-17
879		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
880			min	0	2	0	2	0	2	0	2	0	2	0	2
881	M100	1	max	107.533	9-15	14.176	13-73	78.818	13-72	5.15	13-17	302.368	13-18	6.912	13-72
882			min	-19.974	13-53	-40.555	13-13	-186.497	13-18	-2.266	8-20	-125.881	13-72	-16.252	13-18
883		2	max	107.533	9-15	14.176	13-73	78.818	13-72	5.15	13-17	232.432	13-18	9.006	13-27
884			min	-19.974	13-53	-40.555	13-13	-186.497	13-18	-2.266	8-20	-96.325	13-72	-2.595	13-84
885		3	max	107.533	9-15	14.176	13-73	78.818	13-72	5.15	13-17	162.495	13-18	18.505	13-25
886			min	-19.974	13-53	-40.555	13-13	-186.497	13-18	-2.266	8-20	-66.768	13-72	-6.019	13-80
887		4	max	107.533	9-15	14.176	13-73	78.818	13-72	5.15	13-17	92.957	13-17	32.078	13-13
888			min	-19.974	13-53	-40.555	13-13	-186.497	13-18	-2.266	8-20	-37.211	13-72	-10.279	13-76
889		5	max	107.533	9-15	14.176	13-73	78.818	13-72	5.15	13-17	26.072	13-13	47.286	13-13
890			min	-19.974	13-53	-40.555	13-13	-186.497	13-18	-2.266	8-20	-8.602	13-76	-15.157	13-76
891	M101	1	max	86.431	8-24	23.503	13-13	119.398	13-17	2.397	13-19	214.051	13-55	10.294	13-17
892			min	-6.832	3-8	-35.349	13-68	-132.438	13-55	-4.376	13-57	-187.967	13-17	-11.484	13-55
893		2	max	86.431	8-24	23.503	13-13	119.398	13-17	2.397	13-19	164.387	13-55	6.878	13-47
894			min	-6.832	3-8	-35.349	13-68	-132.438	13-55	-4.376	13-57	-143.193	13-17	-5.378	13-27
895		3	max	86.431	8-24	23.503	13-13	119.398	13-17	2.397	13-19	114.723	13-55	16.171	13-65
896			min	-6.832	3-8	-35.349	13-68	-132.438	13-55	-4.376	13-57	-99.395	13-14	-12.207	8-28
897		4	max	86.431	8-24	23.503	13-13	119.398	13-17	2.397	13-19	68.592	13-68	28.975	13-69
898			min	-6.832	3-8	-35.349	13-68	-132.438	13-55	-4.376	13-57	-55.731	13-14	-20.257	8-27
899		5	max	86.431	8-24	23.503	13-13	119.398	13-17	2.397	13-19	23.239	13-69	42.218	13-69
900			min	-6.832	3-8	-35.349	13-68	-132.438	13-55	-4.376	13-57	-16.106	8-26	-28.318	8-27
901	M102	1	max	50.203	13-51	82.425	9-17	17.903	13-41	0	13-128	0	13-128	0	13-128
902			min	-4.504	9-28	-0.592	13-53	-2.602	8-79	0	2	0	2	0	2
903		2	max	50.203	13-51	79.77	9-17	17.903	13-41	0	13-128	162.415	13-41	5.372	13-53
904			min	-4.504	9-28	-0.592	13-53	-2.602	8-79	0	2	-23.601	8-79	-735.712	9-17
905		3	max	98.293	13-72	31.413	3-25	14.194	13-72	1.39	8-19	209.471	13-53	226.206	13-17
906			min	-153.987	13-18	-36.556	9-14	-18.157	13-13	-0.54	13-18	-85.175	8-26	-748.412	8-20
907		4	max	4.612	9-28	0.619	13-53	8.66	8-26	0	13-128	118.076	13-62	4.376	13-53
908			min	-50.195	13-51	-68.37	9-21	-16.694	13-62	0	2	-61.247	8-26	-490.299	9-21
909		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
910			min	0	2	0	2	0	2	0	2	0	2	0	2
911	M103	1	max	108.075	9-18	13.983	13-76	81.943	13-76	4.885	13-20	311.239	13-21	7.216	13-76
912			min	-19.762	13-57	-39.052	13-20	-192.786	13-21	-2.348	8-23	-130.382	13-76	-16.702	13-21
913		2	max	108.075	9-18	13.983	13-76	81.943	13-76	4.885	13-20	238.945	13-21	8.366	13-31
914			min	-19.762	13-57	-39.052	13-20	-192.786	13-21	-2.348	8-23	-99.654	13-76	-2.684	13-22
915		3	max	108.075	9-18	13.983	13-76	81.943	13-76	4.885	13-20	166.65	13-21	16.952	13-38
916			min	-19.762	13-57	-39.052	13-20	-192.786	13-21	-2.348	8-23	-68.925	13-76	-5.535	13-84
917		4	max	108.075	9-18	13.983	13-76	81.943	13-76	4.885	13-20	94.355	13-21	29.833	13-25
918			min	-19.762	13-57	-39.052	13-20	-192.786	13-21	-2.348	8-23	-38.197	13-76	-9.64	13-80
919		5	max	108.075	9-18	13.983	13-76	81.943	13-76	4.885	13-20	23.782	13-25	42.996	13-25
920			min	-19.762	13-57	-39.052	13-20	-192.786	13-21	-2.348	8-23	-7.957	13-80	-14.302	13-79
921	M104	1	max	86.469	8-27	21.798	8-29	128.131	13-21	2.488	13-23	216.601	13-59	10.825	13-21
922			min	-13.578	3-12	-35.363	13-72	-133.357	13-59	-4.5	13-60	-198.135	13-21	-11.699	13-59
923		2	max	86.469	8-27	21.798	8-29	128.131	13-21	2.488	13-23	166.593	13-59	7.503	13-50
924			min	-13.578	3-12	-35.363	13-72	-133.357	13-59	-4.5	13-60	-150.085	13-21	-4.725	13-31
925		3	max	86.469	8-27	21.798	8-29	128.131	13-21	2.488	13-23	116.584	13-59	16.165	13-69
926			min	-13.578	3-12	-35.363	13-72	-133.357	13-59	-4.5	13-60	-102.036	13-21	-11.849	8-31
927		4	max	86.469	8-27	21.798	8-29	128.131	13-21	2.488	13-23	69.315	13-72	29.089	13-69
928			min	-13.578	3-12	-35.363	13-72	-133.357	13-59	-4.5	13-60	-55.45	13-18	-19.856	8-30
929		5	max	86.469	8-27	21.798	8-29	128.131	13-21	2.488	13-23	23.239	13-69	42.013	13-69

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
930			min	-13.578	3-12	-35.363	13-72	-133.357	13-59	-4.5	13-60	-15.895	8-30	-27.997	8-30
931	M105	1	max	50.368	13-54	81.966	9-21	18.351	13-53	0	13-128	0	13-128	0	13-128
932			min	-4.69	9-32	-0.614	13-53	-2.658	8-79	0	2	0	2	0	2
933		2	max	50.368	13-54	79.311	9-21	18.351	13-53	0	13-128	166.479	13-53	5.574	13-53
934			min	-4.69	9-32	-0.614	13-53	-2.658	8-79	0	2	-24.109	8-79	-731.546	9-21
935		3	max	100.362	13-76	31.673	3-29	13.812	13-76	1.358	8-23	210.446	13-57	237.518	13-21
936			min	-161.504	13-21	-37.785	9-17	-16.252	13-13	-0.529	13-21	-85.751	8-30	-739.281	8-23
937		4	max	4.801	9-32	0.617	13-57	8.676	8-30	0	13-128	119.45	13-63	4.365	13-57
938			min	-50.341	13-54	-68.236	8-25	-16.889	13-63	0	2	-61.36	8-30	-489.353	8-25
939		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
940			min	0	2	0	2	0	2	0	2	0	2	0	2
941	M106	1	max	107.187	9-22	13.862	13-80	82.132	13-80	5.12	13-24	311.38	13-25	7.216	13-80
942			min	-19.489	13-58	-40.743	13-25	-191.417	13-25	-2.172	8-27	-130.563	13-80	-16.662	13-25
943		2	max	107.187	9-22	13.862	13-80	82.132	13-80	5.12	13-24	239.598	13-25	9.234	13-34
944			min	-19.489	13-58	-40.743	13-25	-191.417	13-25	-2.172	8-27	-99.764	13-80	-2.452	8-28
945		3	max	107.187	9-22	13.862	13-80	82.132	13-80	5.12	13-24	167.817	13-25	17.27	13-33
946			min	-19.489	13-58	-40.743	13-25	-191.417	13-25	-2.172	8-27	-68.964	13-80	-5.314	13-88
947		4	max	107.187	9-22	13.862	13-80	82.132	13-80	5.12	13-24	96.035	13-25	29.174	13-25
948			min	-19.489	13-58	-40.743	13-25	-191.417	13-25	-2.172	8-27	-38.164	13-80	-9.456	13-84
949		5	max	107.187	9-22	13.862	13-80	82.132	13-80	5.12	13-24	24.254	13-25	44.453	13-25
950			min	-19.489	13-58	-40.743	13-25	-191.417	13-25	-2.172	8-27	-7.769	13-84	-13.927	13-84
951	M107	1	max	87.705	8-31	21.766	8-33	126.451	13-24	2.451	13-26	210.64	13-62	10.651	13-24
952			min	-18.114	3-15	-34.714	13-76	-128.371	13-62	-4.457	13-64	-195.689	13-24	-11.375	13-62
953		2	max	87.705	8-31	21.766	8-33	126.451	13-24	2.451	13-26	162.5	13-62	6.366	13-54
954			min	-18.114	3-15	-34.714	13-76	-128.371	13-62	-4.457	13-64	-148.27	13-24	-5.368	13-34
955		3	max	87.705	8-31	21.766	8-33	126.451	13-24	2.451	13-26	114.976	13-75	16.314	13-72
956			min	-18.114	3-15	-34.714	13-76	-128.371	13-62	-4.457	13-64	-101.329	13-21	-11.481	8-35
957		4	max	87.705	8-31	21.766	8-33	126.451	13-24	2.451	13-26	68.738	13-75	29.055	13-72
958			min	-18.114	3-15	-34.714	13-76	-128.371	13-62	-4.457	13-64	-54.951	13-21	-19.518	8-34
959		5	max	87.705	8-31	21.766	8-33	126.451	13-24	2.451	13-26	23.203	13-72	41.797	13-72
960			min	-18.114	3-15	-34.714	13-76	-128.371	13-62	-4.457	13-64	-15.657	8-33	-27.585	8-34
961	M108	1	max	50.132	13-58	81.737	9-24	18.031	13-53	0	13-128	0	13-128	0	13-128
962			min	-5.012	9-36	-0.613	13-57	-2.774	8-79	0	2	0	2	0	2
963		2	max	50.132	13-58	79.083	9-24	18.031	13-53	0	13-128	163.572	13-53	5.558	13-57
964			min	-5.012	9-36	-0.613	13-57	-2.774	8-79	0	2	-25.17	8-79	-729.473	9-24
965		3	max	101.035	13-79	31.605	3-32	13.666	13-76	1.358	8-26	210.747	13-60	233.873	13-24
966			min	-158.603	13-24	-37.179	9-20	-14.257	13-20	-0.482	13-24	-86.664	8-33	-735.706	8-27
967		4	max	5.133	9-35	0.6	13-58	8.682	8-34	0	13-128	121.749	13-62	4.242	13-58
968			min	-50.119	13-58	-68.587	8-28	-17.214	13-62	0	2	-61.407	8-34	-491.833	8-28
969		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
970			min	0	2	0	2	0	2	0	2	0	2	0	2
971	M109	1	max	106.226	9-25	14.008	13-84	89.895	13-83	5.071	13-27	322.187	13-28	7.827	13-83
972			min	-19.445	13-64	-38.786	13-29	-200.553	13-28	-2.068	8-30	-141.848	13-83	-17.251	13-28
973		2	max	106.226	9-25	14.008	13-84	89.895	13-83	5.071	13-27	246.98	13-28	11.701	13-38
974			min	-19.445	13-64	-38.786	13-29	-200.553	13-28	-2.068	8-30	-108.137	13-83	-3.131	13-28
975		3	max	106.226	9-25	14.008	13-84	89.895	13-83	5.071	13-27	171.773	13-28	20.273	13-38
976			min	-19.445	13-64	-38.786	13-29	-200.553	13-28	-2.068	8-30	-74.426	13-83	-5.192	13-91
977		4	max	106.226	9-25	14.008	13-84	89.895	13-83	5.071	13-27	96.565	13-28	28.845	13-38
978			min	-19.445	13-64	-38.786	13-29	-200.553	13-28	-2.068	8-30	-40.716	13-83	-9.3	13-88
979		5	max	106.226	9-25	14.008	13-84	89.895	13-83	5.071	13-27	23.381	13-25	42.475	13-25
980			min	-19.445	13-64	-38.786	13-29	-200.553	13-28	-2.068	8-30	-7.621	13-88	-13.742	13-84
981	M110	1	max	87.825	8-35	20.93	8-36	135.176	13-28	2.368	13-30	218.967	13-66	11.29	13-28
982			min	-19.549	3-18	-34.539	13-79	-135.955	13-38	-4.357	13-67	-207.467	13-28	-11.824	13-66
983		2	max	87.825	8-35	20.93	8-36	135.176	13-28	2.368	13-30	169.067	13-66	7.09	13-56
984			min	-19.549	3-18	-34.539	13-79	-135.955	13-38	-4.357	13-67	-156.776	13-28	-7.398	13-38

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
985		3	max	87.825	8-35	20.93	8-36	135.176	13-28	2.368	13-30	119.167	13-66	16.346	13-72
986			min	-19.549	3-18	-34.539	13-79	-135.955	13-38	-4.357	13-67	-106.084	13-28	-11.638	8-38
987		4	max	87.825	8-35	20.93	8-36	135.176	13-28	2.368	13-30	70.256	13-79	28.993	13-76
988			min	-19.549	3-18	-34.539	13-79	-135.955	13-38	-4.357	13-67	-56.859	13-25	-19.318	8-38
989		5	max	87.825	8-35	20.93	8-36	135.176	13-28	2.368	13-30	23.211	13-76	41.92	13-76
990			min	-19.549	3-18	-34.539	13-79	-135.955	13-38	-4.357	13-67	-15.425	8-37	-27.136	8-37
991	M111	1	max	50.315	13-61	80.983	9-28	17.679	13-57	0	13-128	0	13-128	0	13-128
992			min	-5.419	9-39	-0.613	13-59	-2.997	8-1	0	2	0	2	0	2
993		2	max	50.315	13-61	78.328	9-28	17.679	13-57	0	13-128	160.378	13-57	5.557	13-59
994			min	-5.419	9-39	-0.613	13-59	-2.997	8-1	0	2	-27.186	8-1	-722.624	9-28
995		3	max	109.114	13-83	32.091	3-36	13.277	13-79	1.379	8-30	211.683	13-62	247.715	13-28
996			min	-168.858	13-28	-37.239	9-24	-14.772	13-25	-0.509	13-28	-88.063	8-37	-746.182	8-30
997		4	max	5.519	9-39	0.586	13-62	8.677	8-37	0	13-128	123.859	13-65	4.141	13-62
998			min	-50.278	13-61	-68.563	8-32	-17.512	13-65	0	2	-61.372	8-37	-491.664	8-32
999		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1000			min	0	2	0	2	0	2	0	2	0	2	0	2
1001	M112	1	max	105.098	9-29	13.725	13-88	90.59	13-86	5.045	13-31	318.631	13-32	7.858	13-86
1002			min	-19.608	3-45	-38.388	13-33	-198.478	13-32	-2.651	8-34	-142.398	13-86	-17.041	13-32
1003		2	max	105.098	9-29	13.725	13-88	90.59	13-86	5.045	13-31	244.202	13-32	11.427	13-41
1004			min	-19.608	3-45	-38.388	13-33	-198.478	13-32	-2.651	8-34	-108.427	13-86	-3.172	13-32
1005		3	max	105.098	9-29	13.725	13-88	90.59	13-86	5.045	13-31	169.773	13-32	20.398	13-41
1006			min	-19.608	3-45	-38.388	13-33	-198.478	13-32	-2.651	8-34	-74.456	13-86	-5.112	13-94
1007		4	max	105.098	9-29	13.725	13-88	90.59	13-86	5.045	13-31	95.343	13-32	30.35	13-38
1008			min	-19.608	3-45	-38.388	13-33	-198.478	13-32	-2.651	8-34	-40.484	13-86	-9.168	13-91
1009		5	max	105.098	9-29	13.725	13-88	90.59	13-86	5.045	13-31	23.233	13-36	42.22	13-33
1010			min	-19.608	3-45	-38.388	13-33	-198.478	13-32	-2.651	8-34	-7.612	13-91	-13.677	13-88
1011	M113	1	max	88.793	8-38	19.823	8-40	129.748	13-32	2.362	13-33	222.793	13-82	10.792	13-31
1012			min	-19.417	3-21	-33.894	13-81	-134.671	13-82	-4.509	13-71	-199.369	13-28	-12.038	13-82
1013		2	max	88.793	8-38	19.823	8-40	129.748	13-32	2.362	13-33	172.291	13-82	7.513	13-61
1014			min	-19.417	3-21	-33.894	13-81	-134.671	13-82	-4.509	13-71	-151.446	13-28	-7.009	13-41
1015		3	max	88.793	8-38	19.823	8-40	129.748	13-32	2.362	13-33	121.789	13-82	16.483	13-76
1016			min	-19.417	3-21	-33.894	13-81	-134.671	13-82	-4.509	13-71	-103.523	13-28	-11.816	8-42
1017		4	max	88.793	8-38	19.823	8-40	129.748	13-32	2.362	13-33	71.288	13-82	28.786	13-76
1018			min	-19.417	3-21	-33.894	13-81	-134.671	13-82	-4.509	13-71	-55.6	13-28	-19.11	8-41
1019		5	max	88.793	8-38	19.823	8-40	129.748	13-32	2.362	13-33	22.822	13-76	41.089	13-76
1020			min	-19.417	3-21	-33.894	13-81	-134.671	13-82	-4.509	13-71	-15.08	8-40	-26.463	8-41
1021	M114	1	max	50.473	13-65	80.648	9-31	18.214	13-38	0	13-128	0	13-128	0	13-128
1022			min	-4.883	9-43	-0.603	13-62	-3.014	8-1	0	2	0	2	0	2
1023		2	max	50.473	13-65	77.993	9-31	18.214	13-38	0	13-128	165.231	13-38	5.471	13-62
1024			min	-4.883	9-43	-0.603	13-62	-3.014	8-1	0	2	-27.345	8-1	-719.587	9-31
1025		3	max	111.199	13-86	32.255	3-40	12.851	13-84	1.419	8-33	212.62	13-65	240.561	13-32
1026			min	-165.062	13-32	-36.335	9-28	-14.05	13-25	-0.484	13-32	-85.977	8-40	-764.546	8-34
1027		4	max	4.952	9-43	0.575	13-65	8.482	8-41	0	13-128	124.532	13-69	4.065	13-65
1028			min	-50.454	13-65	-68.547	8-35	-17.607	13-69	0	2	-59.991	8-41	-491.552	8-35
1029		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1030			min	0	2	0	2	0	2	0	2	0	2	0	2
1031	M115	1	max	106.524	9-32	13.934	13-91	94.264	13-90	5.121	13-34	315.634	13-35	8.161	13-90
1032			min	-21.096	3-49	-40.287	13-36	-195.476	13-35	-2.481	8-37	-148.083	13-90	-16.841	13-35
1033		2	max	106.524	9-32	13.934	13-91	94.264	13-90	5.121	13-34	242.33	13-35	11.063	13-45
1034			min	-21.096	3-49	-40.287	13-36	-195.476	13-35	-2.481	8-37	-112.734	13-90	-2.892	13-64
1035		3	max	106.524	9-32	13.934	13-91	94.264	13-90	5.121	13-34	169.027	13-35	19.327	13-45
1036			min	-21.096	3-49	-40.287	13-36	-195.476	13-35	-2.481	8-37	-77.385	13-90	-5.365	13-104
1037		4	max	106.524	9-32	13.934	13-91	94.264	13-90	5.121	13-34	95.723	13-35	30.901	13-41
1038			min	-21.096	3-49	-40.287	13-36	-195.476	13-35	-2.481	8-37	-42.036	13-90	-8.969	13-96
1039		5	max	106.524	9-32	13.934	13-91	94.264	13-90	5.121	13-34	24.794	13-38	45.13	13-38

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1040			min	-21.096	3-49	-40.287	13-36	-195.476	13-35	-2.481	8-37	-7.547	13-94	-13.582	13-94
1041	M116	1	max	90.105	8-42	19.901	8-43	130.77	13-32	2.374	13-37	231.013	13-86	10.989	13-32
1042			min	-18.443	3-25	-33.397	13-84	-140.665	13-86	-4.301	13-74	-203.121	13-32	-12.488	13-86
1043		2	max	90.105	8-42	19.901	8-43	130.77	13-32	2.374	13-37	178.263	13-86	7.954	13-64
1044			min	-18.443	3-25	-33.397	13-84	-140.665	13-86	-4.301	13-74	-154.083	13-32	-6.623	13-45
1045		3	max	90.105	8-42	19.901	8-43	130.77	13-32	2.374	13-37	125.514	13-86	15.884	13-76
1046			min	-18.443	3-25	-33.397	13-84	-140.665	13-86	-4.301	13-74	-105.044	13-32	-11.472	8-45
1047		4	max	90.105	8-42	19.901	8-43	130.77	13-32	2.374	13-37	72.764	13-86	27.665	13-76
1048			min	-18.443	3-25	-33.397	13-84	-140.665	13-86	-4.301	13-74	-56.006	13-32	-18.794	8-45
1049		5	max	90.105	8-42	19.901	8-43	130.77	13-32	2.374	13-37	22.01	13-76	39.498	13-79
1050			min	-18.443	3-25	-33.397	13-84	-140.665	13-86	-4.301	13-74	-14.959	8-44	-26.201	8-44
1051	M117	1	max	50.881	13-68	81.927	9-35	18.613	13-41	0	13-128	0	13-128	0	13-128
1052			min	-4.427	9-46	-0.592	13-65	-2.959	8-1	0	2	0	2	0	2
1053		2	max	50.881	13-68	79.272	9-35	18.613	13-41	0	13-128	168.852	13-41	5.368	13-65
1054			min	-4.427	9-46	-0.592	13-65	-2.959	8-1	0	2	-26.843	8-1	-731.188	9-35
1055		3	max	114.597	13-86	33.083	3-43	12.554	13-88	1.422	8-43	213.386	13-69	239.906	13-35
1056			min	-163.257	13-35	-37.021	9-31	-13.638	13-33	-0.44	13-35	-84.955	8-44	-767.965	8-37
1057		4	max	4.517	9-46	0.559	13-69	8.386	8-44	0	13-128	125.014	13-72	3.957	13-69
1058			min	-50.835	13-68	-69.724	8-39	-17.675	13-72	0	2	-59.313	8-44	-499.876	8-39
1059		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1060			min	0	2	0	2	0	2	0	2	0	2	0	2
1061	M118	1	max	108.676	9-36	13.976	13-94	95.362	13-93	5.064	13-38	318.326	13-39	8.248	13-93
1062			min	-21.724	3-52	-41.623	13-39	-195.678	13-39	-2.478	8-41	-149.476	13-93	-16.934	13-39
1063		2	max	108.676	9-36	13.976	13-94	95.362	13-93	5.064	13-38	244.947	13-39	10.66	13-49
1064			min	-21.724	3-52	-41.623	13-39	-195.678	13-39	-2.478	8-41	-113.715	13-93	-3.482	13-68
1065		3	max	108.676	9-36	13.976	13-94	95.362	13-93	5.064	13-38	171.567	13-39	19.407	13-48
1066			min	-21.724	3-52	-41.623	13-39	-195.678	13-39	-2.478	8-41	-77.954	13-93	-6.168	13-104
1067		4	max	108.676	9-36	13.976	13-94	95.362	13-93	5.064	13-38	98.188	13-39	30.999	13-41
1068			min	-21.724	3-52	-41.623	13-39	-195.678	13-39	-2.478	8-41	-42.194	13-93	-9.714	13-104
1069		5	max	108.676	9-36	13.976	13-94	95.362	13-93	5.064	13-38	25.09	13-41	45.873	13-41
1070			min	-21.724	3-52	-41.623	13-39	-195.678	13-39	-2.478	8-41	-7.559	13-100	-13.567	13-100
1071	M119	1	max	91.742	8-45	20.046	8-47	131.513	13-35	2.212	13-40	235.565	13-89	11.086	13-35
1072			min	-17.835	3-28	-33.063	13-88	-143.802	13-89	-4.29	13-78	-205.453	13-35	-12.727	13-89
1073		2	max	91.742	8-45	20.046	8-47	131.513	13-35	2.212	13-40	181.64	13-89	8.485	13-68
1074			min	-17.835	3-28	-33.063	13-88	-143.802	13-89	-4.29	13-78	-156.135	13-35	-6.19	13-49
1075		3	max	91.742	8-45	20.046	8-47	131.513	13-35	2.212	13-40	127.714	13-89	14.936	13-81
1076			min	-17.835	3-28	-33.063	13-88	-143.802	13-89	-4.29	13-78	-106.818	13-35	-11.261	8-49
1077		4	max	91.742	8-45	20.046	8-47	131.513	13-35	2.212	13-40	73.788	13-89	26.456	13-84
1078			min	-17.835	3-28	-33.063	13-88	-143.802	13-89	-4.29	13-78	-57.501	13-35	-18.591	8-48
1079		5	max	91.742	8-45	20.046	8-47	131.513	13-35	2.212	13-40	21.244	13-84	38.251	13-84
1080			min	-17.835	3-28	-33.063	13-88	-143.802	13-89	-4.29	13-78	-14.818	8-48	-26.059	8-48
1081	M120	1	max	51.293	13-72	83.243	9-38	18.501	13-43	0	13-128	0	13-128	0	13-128
1082			min	-4.096	9-50	-0.578	13-69	-2.894	8-1	0	2	0	2	0	2
1083		2	max	51.293	13-72	80.589	9-38	18.501	13-43	0	13-128	167.836	13-43	5.245	13-69
1084			min	-4.096	9-50	-0.578	13-69	-2.894	8-1	0	2	-26.25	8-1	-743.134	9-38
1085		3	max	116.92	13-93	33.573	3-47	12.274	13-91	1.415	8-47	213.925	13-72	240.404	13-39
1086			min	-162.6	13-39	-37.582	9-35	-14.605	13-38	-0.41	13-35	-83.835	8-48	-773.464	8-41
1087		4	max	4.189	9-50	0.535	13-72	8.302	8-48	0	13-128	125.15	13-76	3.784	13-72
1088			min	-51.248	13-72	-70.652	8-43	-17.695	13-76	0	2	-58.722	8-48	-506.44	8-43
1089		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1090			min	0	2	0	2	0	2	0	2	0	2	0	2
1091	M121	1	max	109.12	9-40	13.44	13-100	96.954	13-97	5.054	13-42	317.97	13-43	8.35	13-97
1092			min	-22.934	3-56	-41.916	13-43	-195.257	13-43	-2.463	8-45	-151.129	13-97	-16.901	13-43
1093		2	max	109.12	9-40	13.44	13-100	96.954	13-97	5.054	13-42	244.749	13-43	10.877	13-53
1094			min	-22.934	3-56	-41.916	13-43	-195.257	13-43	-2.463	8-45	-114.771	13-97	-4.096	13-72

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1095		3	max	109.12	9-40	13.44	13-100	96.954	13-97	5.054	13-42	171.527	13-43	19.716	13-51
1096			min	-22.934	3-56	-41.916	13-43	-195.257	13-43	-2.463	8-45	-78.414	13-97	-6.459	13-104
1097		4	max	109.12	9-40	13.44	13-100	96.954	13-97	5.054	13-42	98.306	13-43	30.673	13-46
1098			min	-22.934	3-56	-41.916	13-43	-195.257	13-43	-2.463	8-45	-42.056	13-97	-10.983	13-104
1099		5	max	109.12	9-40	13.44	13-100	96.954	13-97	5.054	13-42	25.084	13-43	45.973	13-43
1100			min	-22.934	3-56	-41.916	13-43	-195.257	13-43	-2.463	8-45	-8.638	13-104	-15.507	13-104
1101	M122	1	max	92.128	8-49	20.035	8-51	124.945	13-39	2.537	13-44	230.514	13-93	10.575	13-39
1102			min	-17.174	3-32	-32.01	13-93	-140.651	13-93	-4.335	13-82	-196.785	13-39	-12.465	13-93
1103		2	max	92.128	8-49	20.035	8-51	124.945	13-39	2.537	13-44	177.77	13-93	9.044	13-72
1104			min	-17.174	3-32	-32.01	13-93	-140.651	13-93	-4.335	13-82	-149.93	13-39	-6.273	13-53
1105		3	max	92.128	8-49	20.035	8-51	124.945	13-39	2.537	13-44	125.026	13-93	14.921	13-72
1106			min	-17.174	3-32	-32.01	13-93	-140.651	13-93	-4.335	13-82	-103.076	13-39	-11.253	8-53
1107		4	max	92.128	8-49	20.035	8-51	124.945	13-39	2.537	13-44	72.282	13-93	25.592	13-88
1108			min	-17.174	3-32	-32.01	13-93	-140.651	13-93	-4.335	13-82	-56.221	13-39	-18.607	8-52
1109		5	max	92.128	8-49	20.035	8-51	124.945	13-39	2.537	13-44	20.615	13-88	37.054	13-88
1110			min	-17.174	3-32	-32.01	13-93	-140.651	13-93	-4.335	13-82	-14.81	8-51	-26.035	8-52
1111	M123	1	max	51.368	13-76	83.86	9-42	18.785	13-48	0	13-128	0	13-128	0	13-128
1112			min	-3.84	9-54	-0.555	13-72	-2.835	8-1	0	2	0	2	0	2
1113		2	max	51.368	13-76	81.205	9-42	18.785	13-48	0	13-128	170.412	13-48	5.032	13-72
1114			min	-3.84	9-54	-0.555	13-72	-2.835	8-1	0	2	-25.718	8-1	-748.727	9-42
1115		3	max	117.927	13-97	33.355	3-51	11.892	13-94	1.424	8-44	212.596	13-76	237.169	13-43
1116			min	-160.811	13-43	-37.514	9-38	-14.871	13-39	-0.379	13-43	-83.065	8-51	-777.19	8-45
1117		4	max	3.929	9-54	0.499	13-76	8.255	8-52	0	13-128	122.781	13-76	3.53	13-76
1118			min	-51.324	13-76	-70.984	8-46	-17.36	13-76	0	2	-58.383	8-52	-508.791	8-46
1119		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1120			min	0	2	0	2	0	2	0	2	0	2	0	2
1121	M124	1	max	109.208	9-43	14.729	13-104	92.173	13-101	5.236	13-45	316.082	13-46	8.002	13-101
1122			min	-23.12	3-59	-41.962	13-47	-193.958	13-46	-2.352	8-49	-144.717	13-101	-16.796	13-46
1123		2	max	109.208	9-43	14.729	13-104	92.173	13-101	5.236	13-45	243.348	13-46	10.513	13-56
1124			min	-23.12	3-59	-41.962	13-47	-193.958	13-46	-2.352	8-49	-110.153	13-101	-4.776	13-75
1125		3	max	109.208	9-43	14.729	13-104	92.173	13-101	5.236	13-45	170.614	13-46	19.99	13-54
1126			min	-23.12	3-59	-41.962	13-47	-193.958	13-46	-2.352	8-49	-75.588	13-101	-6.62	13-107
1127		4	max	109.208	9-43	14.729	13-104	92.173	13-101	5.236	13-45	97.879	13-46	31.5	13-51
1128			min	-23.12	3-59	-41.962	13-47	-193.958	13-46	-2.352	8-49	-41.023	13-101	-11.354	13-107
1129		5	max	109.208	9-43	14.729	13-104	92.173	13-101	5.236	13-45	25.214	13-47	46.203	13-47
1130			min	-23.12	3-59	-41.962	13-47	-193.958	13-46	-2.352	8-49	-9.249	13-104	-16.755	13-104
1131	M125	1	max	92.182	8-53	20.104	8-55	126.61	13-46	2.546	13-48	231.073	13-97	10.613	13-43
1132			min	-16.423	3-36	-31.462	13-96	-142.2	13-97	-4.145	13-86	-197.616	13-43	-12.517	13-97
1133		2	max	92.182	8-53	20.104	8-55	126.61	13-46	2.546	13-48	177.748	13-97	9.54	13-75
1134			min	-16.423	3-36	-31.462	13-96	-142.2	13-97	-4.145	13-86	-150.536	13-43	-6.017	13-56
1135		3	max	92.182	8-53	20.104	8-55	126.61	13-46	2.546	13-48	124.423	13-97	15.987	13-76
1136			min	-16.423	3-36	-31.462	13-96	-142.2	13-97	-4.145	13-86	-103.456	13-43	-11.301	8-57
1137		4	max	92.182	8-53	20.104	8-55	126.61	13-46	2.546	13-48	71.098	13-97	24.711	13-91
1138			min	-16.423	3-36	-31.462	13-96	-142.2	13-97	-4.145	13-86	-56.377	13-43	-18.702	8-56
1139		5	max	92.182	8-53	20.104	8-55	126.61	13-46	2.546	13-48	19.896	13-94	35.884	13-94
1140			min	-16.423	3-36	-31.462	13-96	-142.2	13-97	-4.145	13-86	-14.914	8-55	-26.121	8-56
1141	M126	1	max	51.49	13-79	83.938	9-46	19.078	13-51	0	13-128	0	13-128	0	13-128
1142			min	-3.688	9-57	-0.523	13-76	-2.788	8-1	0	2	0	2	0	2
1143		2	max	51.49	13-79	81.283	9-46	19.078	13-51	0	13-128	173.072	13-51	4.741	13-76
1144			min	-3.688	9-57	-0.523	13-76	-2.788	8-1	0	2	-25.291	8-1	-749.436	9-46
1145		3	max	115.242	13-97	33.627	3-54	12.712	13-104	1.43	8-48	206.425	13-79	239.565	13-46
1146			min	-161.486	13-46	-37.802	9-42	-15.034	13-43	-0.372	13-46	-82.944	8-55	-777.222	8-48
1147		4	max	3.789	9-57	0.495	13-57	8.257	8-55	0	13-128	117.38	13-79	3.5	13-57
1148			min	-51.435	13-80	-71.096	8-50	-16.596	13-79	0	2	-58.397	8-55	-509.583	8-50
1149		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1150			min	0	2	0	2	0	2	0	2	0	2	0	2
1151	M127	1	max	109.365	9-47	15.555	13-104	87.53	13-105	5.466	13-49	322.691	13-50	7.656	13-105
1152			min	-24.344	3-63	-42.691	13-50	-198.035	13-50	-2.294	8-52	-138.36	13-105	-17.149	13-50
1153		2	max	109.365	9-47	15.555	13-104	87.53	13-105	5.466	13-49	248.428	13-50	10.554	13-60
1154			min	-24.344	3-63	-42.691	13-50	-198.035	13-50	-2.294	8-52	-105.536	13-105	-5.354	13-79
1155		3	max	109.365	9-47	15.555	13-104	87.53	13-105	5.466	13-49	174.165	13-50	20.093	13-58
1156			min	-24.344	3-63	-42.691	13-50	-198.035	13-50	-2.294	8-52	-72.712	13-105	-5.667	13-107
1157		4	max	109.365	9-47	15.555	13-104	87.53	13-105	5.466	13-49	99.901	13-50	32.288	13-54
1158			min	-24.344	3-63	-42.691	13-50	-198.035	13-50	-2.294	8-52	-39.888	13-105	-11.413	13-107
1159		5	max	109.365	9-47	15.555	13-104	87.53	13-105	5.466	13-49	26.001	13-51	47.607	13-51
1160			min	-24.344	3-63	-42.691	13-50	-198.035	13-50	-2.294	8-52	-9.413	13-107	-17.159	13-107
1161	M128	1	max	92.538	8-56	20.267	8-58	128.56	13-50	2.379	13-52	222.749	13-101	10.767	13-50
1162			min	-15.711	3-39	-32.005	13-104	-136.287	13-101	-4.015	13-89	-199.858	13-50	-12.075	13-101
1163		2	max	92.538	8-56	20.267	8-58	128.56	13-50	2.379	13-52	171.641	13-101	9.869	13-79
1164			min	-15.711	3-39	-32.005	13-104	-136.287	13-101	-4.015	13-89	-152.055	13-47	-6.064	13-60
1165		3	max	92.538	8-56	20.267	8-58	128.56	13-50	2.379	13-52	120.876	13-100	15.325	13-79
1166			min	-15.711	3-39	-32.005	13-104	-136.287	13-101	-4.015	13-89	-104.464	13-47	-11.368	8-60
1167		4	max	92.538	8-56	20.267	8-58	128.56	13-50	2.379	13-52	70.227	13-100	24.853	13-104
1168			min	-15.711	3-39	-32.005	13-104	-136.287	13-101	-4.015	13-89	-56.872	13-47	-18.79	8-59
1169		5	max	92.538	8-56	20.267	8-58	128.56	13-50	2.379	13-52	20.313	13-104	36.855	13-104
1170			min	-15.711	3-39	-32.005	13-104	-136.287	13-101	-4.015	13-89	-15.01	8-59	-26.36	8-59
1171	M129	1	max	51.561	13-83	83.841	9-49	19.192	13-55	0	13-128	0	13-128	0	13-128
1172			min	-3.573	9-61	-0.476	13-79	-2.753	8-4	0	2	0	2	0	2
1173		2	max	51.561	13-83	81.186	9-49	19.192	13-55	0	13-128	174.108	13-55	4.315	13-79
1174			min	-3.573	9-61	-0.476	13-79	-2.753	8-4	0	2	-24.976	8-4	-748.554	9-49
1175		3	max	110.093	13-101	33.897	3-58	13.795	13-104	1.422	8-52	196.551	13-84	243.917	13-50
1176			min	-164.526	13-50	-37.635	9-46	-15.198	13-47	-0.382	13-50	-82.833	8-59	-778.8	8-52
1177		4	max	3.67	9-61	0.494	13-60	8.278	8-59	0	13-128	111.564	13-84	3.494	13-60
1178			min	-51.501	13-83	-71.148	8-54	-15.774	13-84	0	2	-58.549	8-59	-509.946	8-54
1179		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1180			min	0	2	0	2	0	2	0	2	0	2	0	2
1181	M130	1	max	109.031	9-51	15.227	13-107	86.892	13-108	5.312	13-53	325.966	13-54	7.608	13-108
1182			min	-23.2	3-67	-44.032	13-54	-199.566	13-54	-2.378	8-56	-137.069	13-108	-17.311	13-54
1183		2	max	109.031	9-51	15.227	13-107	86.892	13-108	5.312	13-53	251.129	13-54	10.334	13-63
1184			min	-23.2	3-67	-44.032	13-54	-199.566	13-54	-2.378	8-56	-104.484	13-108	-3.874	13-81
1185		3	max	109.031	9-51	15.227	13-107	86.892	13-108	5.312	13-53	176.292	13-54	19.784	13-62
1186			min	-23.2	3-67	-44.032	13-54	-199.566	13-54	-2.378	8-56	-71.9	13-108	-5.324	13-119
1187		4	max	109.031	9-51	15.227	13-107	86.892	13-108	5.312	13-53	101.455	13-54	32.493	13-58
1188			min	-23.2	3-67	-44.032	13-54	-199.566	13-54	-2.378	8-56	-39.316	13-108	-10.496	13-107
1189		5	max	109.031	9-51	15.227	13-107	86.892	13-108	5.312	13-53	26.618	13-54	48.736	13-54
1190			min	-23.2	3-67	-44.032	13-54	-199.566	13-54	-2.378	8-56	-8.89	13-107	-16.207	13-107
1191	M151	1	max	93.77	8-60	20.392	8-62	129.326	13-50	2.349	13-55	217.175	13-104	10.959	13-50
1192			min	-14.32	3-43	-34.307	13-104	-130.239	13-104	-3.994	13-93	-204.096	13-50	-11.779	13-104
1193		2	max	93.77	8-60	20.392	8-62	129.326	13-50	2.349	13-55	168.335	13-104	8.045	13-81
1194			min	-14.32	3-43	-34.307	13-104	-130.239	13-104	-3.994	13-93	-155.599	13-50	-5.929	13-63
1195		3	max	93.77	8-60	20.392	8-62	129.326	13-50	2.349	13-55	119.495	13-104	13.952	13-104
1196			min	-14.32	3-43	-34.307	13-104	-130.239	13-104	-3.994	13-93	-107.102	13-50	-11.286	8-64
1197		4	max	93.77	8-60	20.392	8-62	129.326	13-50	2.349	13-55	70.655	13-104	26.817	13-104
1198			min	-14.32	3-43	-34.307	13-104	-130.239	13-104	-3.994	13-93	-58.605	13-50	-18.811	8-63
1199		5	max	93.77	8-60	20.392	8-62	129.326	13-50	2.349	13-55	21.816	13-104	39.682	13-104
1200			min	-14.32	3-43	-34.307	13-104	-130.239	13-104	-3.994	13-93	-15.019	8-62	-26.364	8-63
1201	M152	1	max	51.56	13-87	84.008	9-53	19.291	13-58	0	13-128	0	13-128	0	13-128
1202			min	-3.47	3-64	-0.462	13-59	-2.726	8-4	0	2	0	2	0	2
1203		2	max	51.56	13-87	81.353	9-53	19.291	13-58	0	13-128	175.003	13-58	4.187	13-59
1204			min	-3.47	3-64	-0.462	13-59	-2.726	8-4	0	2	-24.73	8-4	-750.071	9-53

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1205		3	max	107.374	13-108	34.24	3-62	13.995	13-104	1.426	8-55	190.709	13-88	244.949	13-54
1206			min	-165.069	13-54	-37.126	9-50	-15.787	13-51	-0.374	13-54	-82.215	8-62	-779.572	8-56
1207		4	max	3.551	3-64	0.483	13-63	8.237	8-63	0	13-128	108.358	13-91	3.415	13-63
1208			min	-51.517	13-87	-71.539	8-57	-15.32	13-91	0	2	-58.256	8-63	-512.711	8-57
1209		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1210			min	0	2	0	2	0	2	0	2	0	2	0	2
1211	M153	1	max	108.137	9-54	13.891	13-112	81.512	13-112	5.104	13-56	321.59	13-58	7.208	13-112
1212			min	-19.547	13-91	-44.114	13-58	-196.508	13-58	-2.446	8-60	-129.652	13-112	-17.082	13-58
1213		2	max	108.137	9-54	13.891	13-112	81.512	13-112	5.104	13-56	247.899	13-58	9.834	13-67
1214			min	-19.547	13-91	-44.114	13-58	-196.508	13-58	-2.446	8-60	-99.085	13-112	-3.155	13-86
1215		3	max	108.137	9-54	13.891	13-112	81.512	13-112	5.104	13-56	174.208	13-58	19.038	13-65
1216			min	-19.547	13-91	-44.114	13-58	-196.508	13-58	-2.446	8-60	-68.518	13-112	-5.423	13-119
1217		4	max	108.137	9-54	13.891	13-112	81.512	13-112	5.104	13-56	100.518	13-58	32.546	13-58
1218			min	-19.547	13-91	-44.114	13-58	-196.508	13-58	-2.446	8-60	-37.951	13-112	-9.333	13-119
1219		5	max	108.137	9-54	13.891	13-112	81.512	13-112	5.104	13-56	26.827	13-58	49.089	13-58
1220			min	-19.547	13-91	-44.114	13-58	-196.508	13-58	-2.446	8-60	-7.529	13-107	-13.806	13-107
1221	M154	1	max	93.846	8-64	20.162	13-54	126.678	13-54	2.608	13-59	203.323	13-108	10.783	13-54
1222			min	-12.804	3-46	-33.471	13-107	-123.919	13-108	-3.876	13-69	-200.624	13-54	-11.043	13-108
1223		2	max	93.846	8-64	20.162	13-54	126.678	13-54	2.608	13-59	156.853	13-108	6.867	13-86
1224			min	-12.804	3-46	-33.471	13-107	-123.919	13-108	-3.876	13-69	-153.12	13-54	-5.504	13-67
1225		3	max	93.846	8-64	20.162	13-54	126.678	13-54	2.608	13-59	110.384	13-108	16.182	13-104
1226			min	-12.804	3-46	-33.471	13-107	-123.919	13-108	-3.876	13-69	-105.616	13-54	-10.985	8-67
1227		4	max	93.846	8-64	20.162	13-54	126.678	13-54	2.608	13-59	65.612	13-107	28.441	13-104
1228			min	-12.804	3-46	-33.471	13-107	-123.919	13-108	-3.876	13-69	-58.112	13-54	-18.332	8-66
1229		5	max	93.846	8-64	20.162	13-54	126.678	13-54	2.608	13-59	22.672	13-104	40.701	13-104
1230			min	-12.804	3-46	-33.471	13-107	-123.919	13-108	-3.876	13-69	-14.775	8-66	-25.824	8-66
1231	M159	1	max	51.462	13-91	83.927	9-57	19.16	13-62	0	13-128	0	13-128	0	13-128
1232			min	-3.348	3-68	-0.449	13-63	-2.699	8-4	0	2	0	2	0	2
1233		2	max	51.462	13-91	81.272	9-57	19.16	13-62	0	13-128	173.816	13-62	4.076	13-63
1234			min	-3.348	3-68	-0.449	13-63	-2.699	8-4	0	2	-24.486	8-4	-749.334	9-57
1235		3	max	100.919	13-112	33.833	3-65	13.914	13-107	1.438	8-59	187.602	13-76	240.649	13-57
1236			min	-161.412	13-57	-36.931	9-53	-16.386	13-54	-0.372	13-58	-80.946	8-66	-783.759	8-60
1237		4	max	3.424	3-68	0.465	13-67	8.094	8-66	0	13-128	105.444	13-76	3.289	13-67
1238			min	-51.425	13-91	-71.905	8-61	-14.908	13-76	0	2	-57.245	8-66	-515.301	8-61
1239		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1240			min	0	2	0	2	0	2	0	2	0	2	0	2
1241	M175	1	max	108.225	9-58	13.071	13-116	77.805	13-116	5.343	13-60	319.886	13-61	6.872	13-116
1242			min	-19.46	13-70	-43.265	13-61	-195.801	13-61	-2.386	8-63	-123.598	13-116	-17.035	13-61
1243		2	max	108.225	9-58	13.071	13-116	77.805	13-116	5.343	13-60	246.46	13-61	8.371	13-70
1244			min	-19.46	13-70	-43.265	13-61	-195.801	13-61	-2.386	8-63	-94.422	13-116	-3.844	13-90
1245		3	max	108.225	9-58	13.071	13-116	77.805	13-116	5.343	13-60	173.035	13-61	17.479	13-66
1246			min	-19.46	13-70	-43.265	13-61	-195.801	13-61	-2.386	8-63	-65.245	13-116	-5.107	13-122
1247		4	max	108.225	9-58	13.071	13-116	77.805	13-116	5.343	13-60	99.609	13-61	31.962	13-62
1248			min	-19.46	13-70	-43.265	13-61	-195.801	13-61	-2.386	8-63	-36.068	13-116	-9.315	13-119
1249		5	max	108.225	9-58	13.071	13-116	77.805	13-116	5.343	13-60	26.298	13-62	48.174	13-62
1250			min	-19.46	13-70	-43.265	13-61	-195.801	13-61	-2.386	8-63	-7.718	13-119	-13.995	13-119
1251	M176	1	max	92.129	8-67	20.307	13-57	126.154	13-61	2.65	13-63	193.379	13-99	10.652	13-58
1252			min	-10.991	3-50	-32.028	13-104	-119.455	13-99	-3.978	13-72	-197.408	13-58	-10.543	13-99
1253		2	max	92.129	8-67	20.307	13-57	126.154	13-61	2.65	13-63	148.584	13-99	7.363	13-90
1254			min	-10.991	3-50	-32.028	13-104	-119.455	13-99	-3.978	13-72	-150.707	13-58	-4.126	13-70
1255		3	max	92.129	8-67	20.307	13-57	126.154	13-61	2.65	13-63	103.788	13-99	16.703	13-104
1256			min	-10.991	3-50	-32.028	13-104	-119.455	13-99	-3.978	13-72	-104.006	13-58	-10.243	8-70
1257		4	max	92.129	8-67	20.307	13-57	126.154	13-61	2.65	13-63	59.902	13-112	28.713	13-104
1258			min	-10.991	3-50	-32.028	13-104	-119.455	13-99	-3.978	13-72	-57.305	13-58	-17.268	8-70
1259		5	max	92.129	8-67	20.307	13-57	126.154	13-61	2.65	13-63	22.724	13-104	40.724	13-104

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1260			min	-10.991	3-50	-32.028	13-104	-119.455	13-99	-3.978	13-72	-14.008	8-69	-24.292	8-70
1261	M177	1	max	51.213	13-94	83.952	8-61	18.762	13-66	0	13-128	0	13-128	0	13-128
1262			min	-2.992	3-71	-0.433	13-67	-2.669	8-4	0	2	0	2	0	2
1263		2	max	51.213	13-94	81.297	8-61	18.762	13-66	0	13-128	170.211	13-66	3.932	13-67
1264			min	-2.992	3-71	-0.433	13-67	-2.669	8-4	0	2	-24.211	8-4	-749.559	8-61
1265		3	max	95.983	13-116	31.588	7-69	13.305	13-107	1.44	8-63	189.747	13-76	240.976	13-61
1266			min	-162.245	13-61	-36.62	9-57	-16.517	13-58	-0.413	13-61	-77.857	8-69	-790.167	8-63
1267		4	max	3.077	3-71	0.452	13-71	7.703	8-69	0	13-128	110.407	13-104	3.197	13-71
1268			min	-51.132	13-94	-71.829	8-65	-15.61	13-104	0	2	-54.48	8-69	-514.762	8-65
1269		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1270			min	0	2	0	2	0	2	0	2	0	2	0	2
1271	M178	1	max	108.704	9-62	12.699	13-119	68.772	13-119	5.476	13-64	322.25	13-65	6.163	13-119
1272			min	-19.849	13-72	-42.848	13-65	-197.859	13-65	-2.313	8-67	-110.228	13-119	-17.008	13-65
1273		2	max	108.704	9-62	12.699	13-119	68.772	13-119	5.476	13-64	248.053	13-65	7.354	13-74
1274			min	-19.849	13-72	-42.848	13-65	-197.859	13-65	-2.313	8-67	-84.438	13-119	-4.484	13-94
1275		3	max	108.704	9-62	12.699	13-119	68.772	13-119	5.476	13-64	173.856	13-65	16.47	13-58
1276			min	-19.849	13-72	-42.848	13-65	-197.859	13-65	-2.313	8-67	-58.649	13-119	-4.295	13-107
1277		4	max	108.704	9-62	12.699	13-119	68.772	13-119	5.476	13-64	99.659	13-65	31.798	13-62
1278			min	-19.849	13-72	-42.848	13-65	-197.859	13-65	-2.313	8-67	-32.86	13-119	-8.616	13-122
1279		5	max	108.704	9-62	12.699	13-119	68.772	13-119	5.476	13-64	25.902	13-62	47.596	13-62
1280			min	-19.849	13-72	-42.848	13-65	-197.859	13-65	-2.313	8-67	-7.206	13-122	-13.107	13-122
1281	M179	1	max	88.037	9-71	20.778	13-61	125.157	13-65	2.293	13-67	192.778	13-103	10.484	13-61
1282			min	-10.381	3-57	-32.816	13-104	-116.364	13-103	-4.219	13-76	-196.211	13-61	-10.599	13-103
1283		2	max	88.037	9-71	20.778	13-61	125.157	13-65	2.293	13-67	149.141	13-103	7.794	13-94
1284			min	-10.381	3-57	-32.816	13-104	-116.364	13-103	-4.219	13-76	-150.004	13-61	-4.082	8-51
1285		3	max	88.037	9-71	20.778	13-61	125.157	13-65	2.293	13-67	105.505	13-103	17.092	13-107
1286			min	-10.381	3-57	-32.816	13-104	-116.364	13-103	-4.219	13-76	-103.798	13-61	-9.693	8-57
1287		4	max	88.037	9-71	20.778	13-61	125.157	13-65	2.293	13-67	61.868	13-103	28.832	13-107
1288			min	-10.381	3-57	-32.816	13-104	-116.364	13-103	-4.219	13-76	-57.592	13-61	-15.945	13-54
1289		5	max	88.037	9-71	20.778	13-61	125.157	13-65	2.293	13-67	22.657	13-107	40.572	13-107
1290			min	-10.381	3-57	-32.816	13-104	-116.364	13-103	-4.219	13-76	-12.894	13-58	-23.151	13-58
1291	M180	1	max	51.504	13-72	84.554	9-64	18.218	13-67	0	13-128	0	13-128	0	13-128
1292			min	-1.931	3-72	-0.425	13-71	-2.627	8-4	0	2	0	2	0	2
1293		2	max	51.504	13-72	81.899	9-64	18.218	13-67	0	13-128	165.271	13-67	3.858	13-71
1294			min	-1.931	3-72	-0.425	13-71	-2.627	8-4	0	2	-23.834	8-4	-755.021	9-64
1295		3	max	87.765	13-119	28.089	7-72	12.571	13-107	1.433	9-66	189.62	13-76	240.367	13-65
1296			min	-162.739	13-65	-36.487	8-61	-16.622	13-61	-0.288	13-61	-71.453	8-72	-791.443	9-67
1297		4	max	2.052	3-72	0.434	13-72	6.934	8-72	0	13-128	113.975	13-104	3.069	13-72
1298			min	-51.544	13-72	-71.313	9-68	-16.115	13-104	0	2	-49.045	8-72	-511.113	9-68
1299		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1300			min	0	2	0	2	0	2	0	2	0	2	0	2
1301	M182	1	max	112.082	8-66	10.774	13-122	52.984	13-122	5.068	13-68	323.142	13-97	4.906	13-122
1302			min	-18.295	13-75	-43.564	13-66	-203.745	13-97	-2.331	8-71	-85.761	13-122	-16.695	13-97
1303		2	max	112.082	8-66	10.774	13-122	52.984	13-122	5.068	13-68	246.738	13-97	7.843	13-54
1304			min	-18.295	13-75	-43.564	13-66	-203.745	13-97	-2.331	8-71	-65.892	13-122	-4.269	13-97
1305		3	max	112.082	8-66	10.774	13-122	52.984	13-122	5.068	13-68	170.781	13-69	19.451	13-61
1306			min	-18.295	13-75	-43.564	13-66	-203.745	13-97	-2.331	8-71	-46.023	13-122	-3.175	13-122
1307		4	max	112.082	8-66	10.774	13-122	52.984	13-122	5.068	13-68	97.803	13-69	34.428	13-65
1308			min	-18.295	13-75	-43.564	13-66	-203.745	13-97	-2.331	8-71	-26.154	13-122	-7.215	13-122
1309		5	max	112.082	8-66	10.774	13-122	52.984	13-122	5.068	13-68	26.958	13-65	50.736	13-65
1310			min	-18.295	13-75	-43.564	13-66	-203.745	13-97	-2.331	8-71	-6.285	13-122	-11.256	13-122
1311	M183	1	max	72.848	9-75	23.39	13-62	122.224	13-97	1.797	13-98	178.388	13-107	9.584	13-65
1312			min	-12.209	3-60	-32.663	13-107	-104.952	13-107	-3.786	13-79	-194.393	13-65	-10.08	13-107
1313		2	max	72.848	9-75	23.39	13-62	122.224	13-97	1.797	13-98	139.031	13-107	6.965	13-97
1314			min	-12.209	3-60	-32.663	13-107	-104.952	13-107	-3.786	13-79	-149.24	13-65	-5.837	13-54

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1315		3	max	72.848	9-75	23.39	13-62	122.224	13-97	1.797	13-98	99.674	13-107	14.418	13-107
1316			min	-12.209	3-60	-32.663	13-107	-104.952	13-107	-3.786	13-79	-104.087	13-65	-12.847	13-58
1317		4	max	72.848	9-75	23.39	13-62	122.224	13-97	1.797	13-98	60.317	13-107	26.667	13-107
1318			min	-12.209	3-60	-32.663	13-107	-104.952	13-107	-3.786	13-79	-58.934	13-65	-20.905	13-58
1319		5	max	72.848	9-75	23.39	13-62	122.224	13-97	1.797	13-98	20.96	13-107	38.916	13-107
1320			min	-12.209	3-60	-32.663	13-107	-104.952	13-107	-3.786	13-79	-16.891	13-58	-28.964	13-58
1321	M186	1	max	55.014	13-76	85.387	9-68	18.173	13-70	0	13-128	0	13-128	0	13-128
1322			min	-1.251	13-33	-0.319	13-73	-2.577	8-9	0	2	0	2	0	2
1323		2	max	55.014	13-76	82.732	9-68	18.173	13-70	0	13-128	164.86	13-70	2.897	13-73
1324			min	-1.251	13-33	-0.319	13-73	-2.577	8-9	0	2	-23.379	8-9	-762.577	9-68
1325		3	max	71.767	13-122	20.589	7-75	11.252	13-107	1.444	9-71	195.859	13-76	221.891	13-65
1326			min	-163.64	13-97	-39.402	8-64	-18.779	13-62	-0.09	3-4	-57.327	8-75	-780.04	9-71
1327		4	max	1.233	13-33	0.412	13-76	5.38	8-75	0	13-128	116.845	13-104	2.914	13-76
1328			min	-55.082	13-76	-68.891	9-72	-16.52	13-104	0	2	-38.052	8-75	-493.987	9-72
1329		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1330			min	0	2	0	2	0	2	0	2	0	2	0	2
1331	M187	1	max	113.946	8-69	6.86	13-122	33.988	13-128	4.351	13-99	323.174	13-73	3.059	13-128
1332			min	-12.675	13-109	-44.85	13-69	-201.87	13-101	-2.27	8-72	-53.234	13-128	-15.873	13-101
1333		2	max	113.946	8-69	6.86	13-122	33.988	13-128	4.351	13-99	249.272	13-73	11.587	13-58
1334			min	-12.675	13-109	-44.85	13-69	-201.87	13-101	-2.27	8-72	-40.489	13-128	-4.771	13-101
1335		3	max	113.946	8-69	6.86	13-122	33.988	13-128	4.351	13-99	175.37	13-73	25.364	13-62
1336			min	-12.675	13-109	-44.85	13-69	-201.87	13-101	-2.27	8-72	-27.743	13-128	-2.896	13-119
1337		4	max	113.946	8-69	6.86	13-122	33.988	13-128	4.351	13-99	101.468	13-73	40.594	13-65
1338			min	-12.675	13-109	-44.85	13-69	-201.87	13-101	-2.27	8-72	-14.997	13-128	-4.979	13-122
1339		5	max	113.946	8-69	6.86	13-122	33.988	13-128	4.351	13-99	31.632	13-66	56.814	13-66
1340			min	-12.675	13-109	-44.85	13-69	-201.87	13-101	-2.27	8-72	-4.102	13-122	-7.552	13-122
1341	M188	1	max	62.721	9-78	26.882	13-62	114.242	13-101	0.895	13-102	119.931	13-122	8.14	13-101
1342			min	-25.686	3-64	-27.957	13-107	-71.418	13-122	-2.855	9-72	-175.703	13-73	-7.522	13-79
1343		2	max	62.721	9-78	26.882	13-62	114.242	13-101	0.895	13-102	93.149	13-122	7.469	13-101
1344			min	-25.686	3-64	-27.957	13-107	-71.418	13-122	-2.855	9-72	-134.325	13-73	-9.417	13-57
1345		3	max	62.721	9-78	26.882	13-62	114.242	13-101	0.895	13-102	66.367	13-122	14.067	13-107
1346			min	-25.686	3-64	-27.957	13-107	-71.418	13-122	-2.855	9-72	-92.946	13-73	-19.012	13-58
1347		4	max	62.721	9-78	26.882	13-62	114.242	13-101	0.895	13-102	40.446	13-107	24.551	13-107
1348			min	-25.686	3-64	-27.957	13-107	-71.418	13-122	-2.855	9-72	-53.929	13-68	-28.62	13-58
1349		5	max	62.721	9-78	26.882	13-62	114.242	13-101	0.895	13-102	17.612	13-107	35.035	13-107
1350			min	-25.686	3-64	-27.957	13-107	-71.418	13-122	-2.855	9-72	-25.42	13-61	-38.457	13-61
1351	M189	1	max	57.382	13-76	81.149	9-71	18.738	13-74	0	13-128	0	13-128	0	13-128
1352			min	-1.222	13-38	0	3-37	-2.524	8-9	0	2	0	2	0	2
1353		2	max	57.382	13-76	78.494	9-71	18.738	13-74	0	13-128	169.986	13-74	0.002	3-37
1354			min	-1.222	13-38	0	3-37	-2.524	8-9	0	2	-22.9	8-9	-724.135	9-71
1355		3	max	48.503	13-122	18.987	9-78	8.531	13-122	2.481	13-76	191.895	13-104	191.207	13-101
1356			min	-158.485	13-101	-45.575	8-68	-22.256	13-62	-0.215	3-9	-46.279	8-48	-746.801	9-72
1357		4	max	1.21	13-38	0.257	13-76	4.906	8-54	0	13-128	113.242	13-107	1.817	13-76
1358			min	-57.293	13-76	-62.016	9-72	-16.011	13-107	0	2	-34.701	8-54	-445.36	9-72
1359		5	max	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128	0	13-128
1360			min	0	2	0	2	0	2	0	2	0	2	0	2
1361	M213	1	max	148.451	13-58	2.762	13-122	23.518	13-51	5.268	13-74	185.348	13-103	0.904	13-45
1362			min	-12.619	3-9	-32.127	13-69	-119.678	13-103	-1.519	8-71	-24.592	13-45	-9.931	13-103
1363		2	max	148.451	13-58	2.762	13-122	23.518	13-51	5.268	13-74	140.468	13-103	9.473	13-61
1364			min	-12.619	3-9	-32.127	13-69	-119.678	13-103	-1.519	8-71	-16.634	13-41	-4.809	13-104
1365		3	max	148.451	13-58	2.762	13-122	23.518	13-51	5.268	13-74	95.589	13-103	20.402	13-65
1366			min	-12.619	3-9	-32.127	13-69	-119.678	13-103	-1.519	8-71	-8.776	13-41	-4.638	13-122
1367		4	max	148.451	13-58	2.762	13-122	23.518	13-51	5.268	13-74	53.777	13-75	32.009	13-65
1368			min	-12.619	3-9	-32.127	13-69	-119.678	13-103	-1.519	8-71	-2.019	13-25	-5.674	13-122
1369		5	max	148.451	13-58	2.762	13-122	23.518	13-51	5.268	13-74	21.023	13-66	43.737	13-66

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1370			min	-12.619	3-9	-32.127	13-69	-119.678	13-103	-1.519	8-71	-4.19	13-122	-6.71	13-122
1371	M214	1	max	14.367	3-9	17.456	13-61	18.041	13-102	2.581	13-57	281.782	8-66	63.416	13-60
1372			min	-138.943	13-58	-27.924	13-107	-44.453	13-84	-3.073	9-71	-1210.151	13-60	-15.987	8-66
1373		2	max	14.367	3-9	17.456	13-61	18.041	13-102	2.581	13-57	280.83	8-66	63.115	13-76
1374			min	-138.943	13-58	-27.924	13-107	-44.453	13-84	-3.073	9-71	-1218.919	13-60	-21.638	8-66
1375		3	max	14.367	3-9	17.456	13-61	18.041	13-102	2.581	13-57	279.878	8-66	68.382	13-76
1376			min	-138.943	13-58	-27.924	13-107	-44.453	13-84	-3.073	9-71	-1227.856	13-59	-27.289	8-66
1377		4	max	14.367	3-9	17.456	13-61	18.041	13-102	2.581	13-57	278.926	8-66	73.649	13-76
1378			min	-138.943	13-58	-27.924	13-107	-44.453	13-84	-3.073	9-71	-1236.954	13-58	-32.94	8-66
1379		5	max	14.367	3-9	17.456	13-61	18.041	13-102	2.581	13-57	277.974	8-66	78.916	13-76
1380			min	-138.943	13-58	-27.924	13-107	-44.453	13-84	-3.073	9-71	-1246.124	13-58	-38.591	8-66

Section Properties: Blue Beams

Section Information:

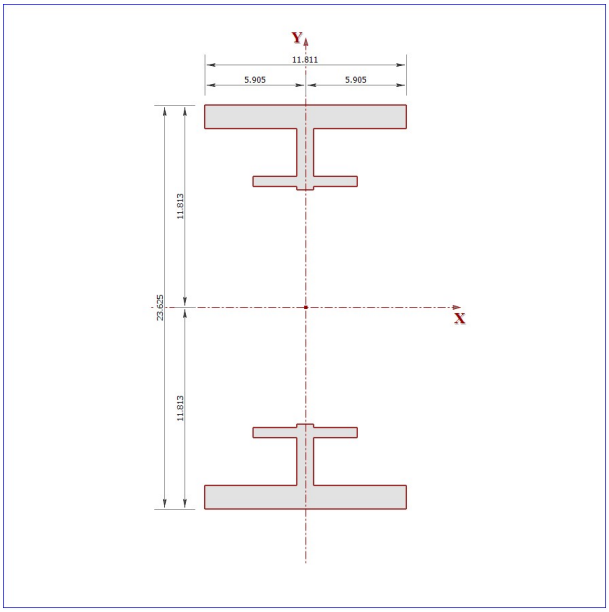
Material Type	=	Hot Rolled Steel
Shape Type	=	Wide Flange
Number of Shapes	=	2

Basic Properties:

Total Width	=	11.811	in
Total Height	=	23.625	in
Centroid, Xo	=	4774.78	in
Centroid, Yo	=	2683.18	in
Shear Center, Xs	=	0.000	in
Shear Center, Ys	=	0.000	in
X-Bar (Right)	=	5.905	in
X-Bar (Left)	=	5.905	in
Y-Bar (Top)	=	11.812	in
Y-Bar (Bot)	=	11.812	in
Flange Thick	=	0.689	in
Web Thick	=	23.625	in

Equivalent Properties:

Area, Ax	=	45.652	in^2
Inertia, Ixx	=	4893.48	in^4
Inertia, Iyy	=	401.26	in^4
Inertia, Ixy	=	0.000	in^4
Sx (Top)	=	414.27	in^3
Sx (Bot)	=	414.27	in^3
Sy (Left)	=	67.949	in^3
Sy (Right)	=	67.949	in^3
rx	=	10.353	in
ry	=	2.965	in
rT	=	6.599	in
Plastic Zx	=	467.46	in^3
Plastic Zy	=	108.57	in^3
Torsional J	=	23.214	in^4
Cw	=	3.239E+006	in^6
Wno	=	67.720	in^2
Sw	=	137.79	in^4
Qf	=	-46.679	in^3
Qw	=	1554.80	in^3



Section Diagram

Section Properties: DBL W24x146

Section Information:

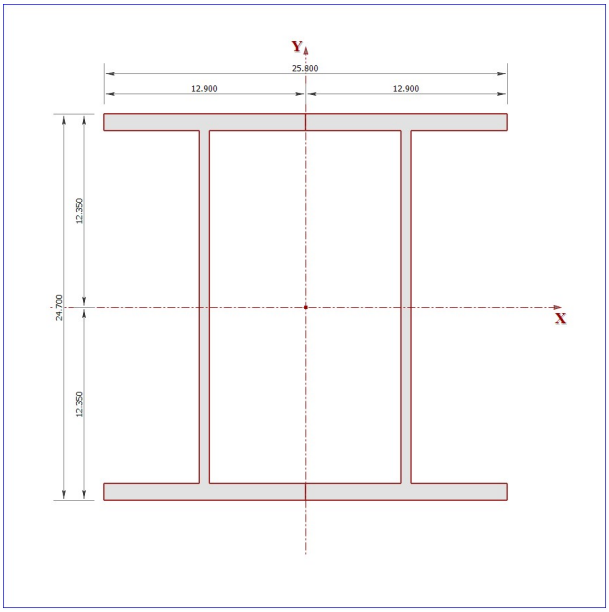
Material Type	=	Hot Rolled Steel
Shape Type	=	Wide Flange
Number of Shapes	=	2

Basic Properties:

Total Width	=	25.800	in
Total Height	=	24.700	in
Centroid, Xo	=	-1.000	in
Centroid, Yo	=	-1.000	in
Shear Center, Xs	=	0.000	in
Shear Center, Ys	=	0.000	in
X-Bar (Right)	=	12.900	in
X-Bar (Left)	=	12.900	in
Y-Bar (Top)	=	12.350	in
Y-Bar (Bot)	=	12.350	in
Flange Thick	=	1.090	in
Web Thick	=	1.300	in

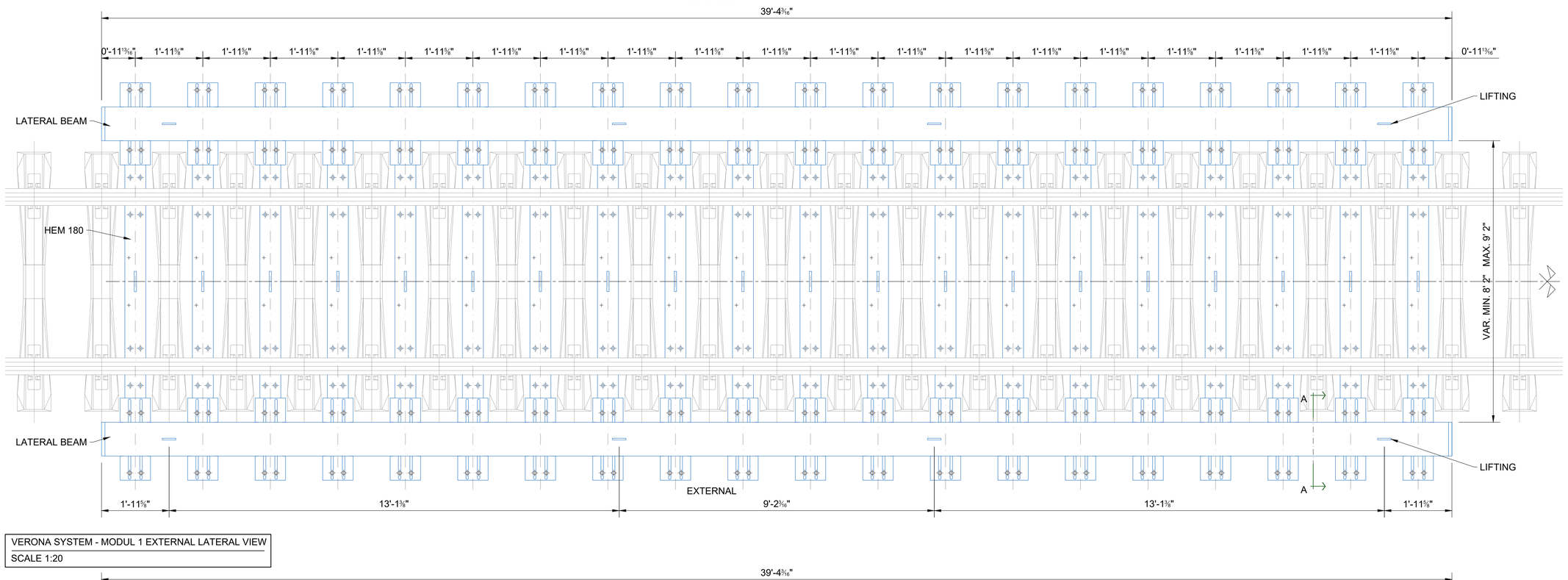
Equivalent Properties:

Area, Ax	=	86.000	in^2
Inertia, Ixx	=	9160.00	in^4
Inertia, Iyy	=	4359.81	in^4
Inertia, Ixy	=	0.000	in^4
Sx (Top)	=	741.70	in^3
Sx (Bot)	=	741.70	in^3
Sy (Left)	=	337.97	in^3
Sy (Right)	=	337.97	in^3
rx	=	10.320	in
ry	=	7.120	in
rT	=	6.877	in
Plastic Zx	=	828.74	in^3
Plastic Zy	=	551.58	in^3
Torsional J	=	26.800	in^4
Cw	=	4.354E+005	in^6
Wno	=	152.29	in^2
Sw	=	1070.64	in^4
Qf	=	157.63	in^3
Qw	=	414.39	in^3

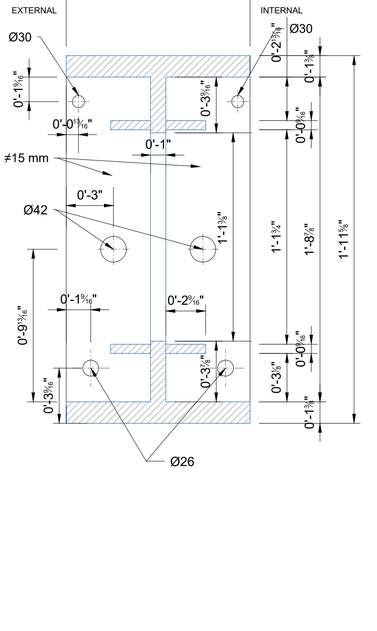


Section Diagram

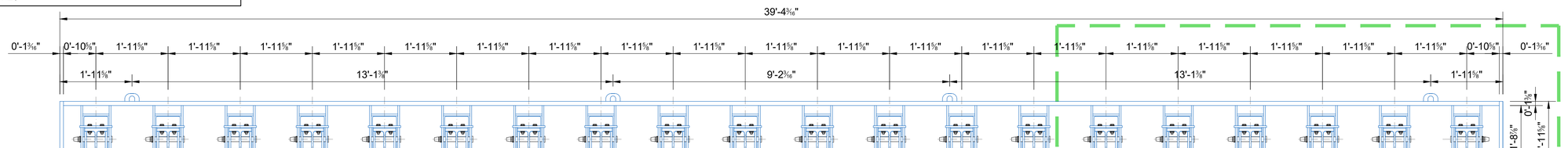
VERONA SYSTEM - MODUL 1 PLAN
SCALE 1:20



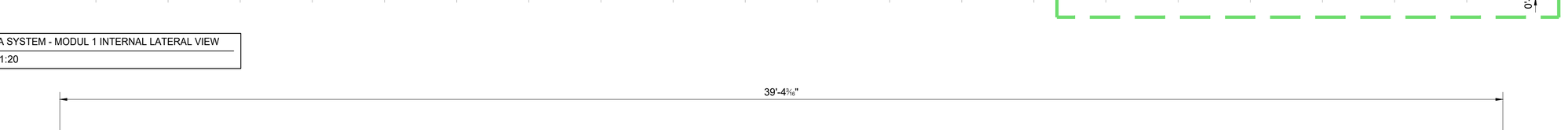
SECTION A-A
SCALE 1:5



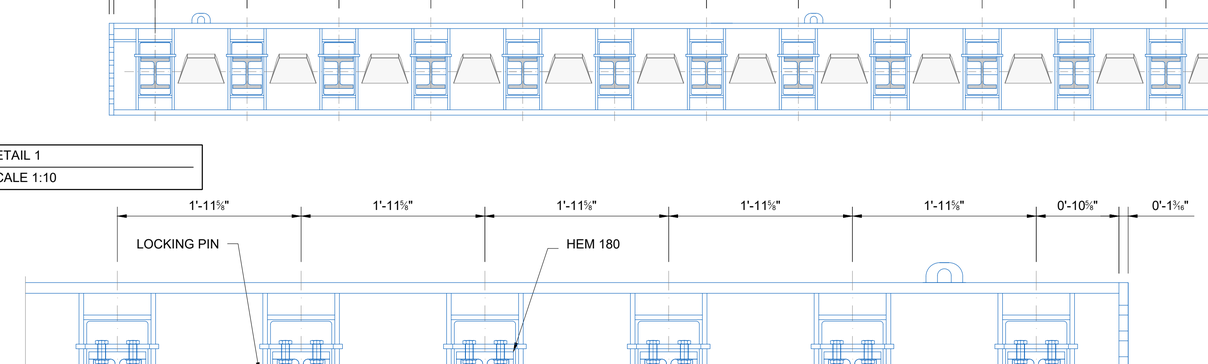
VERONA SYSTEM - MODUL 1 EXTERNAL LATERAL VIEW
SCALE 1:20



VERONA SYSTEM - MODUL 1 INTERNAL LATERAL VIEW
SCALE 1:20



DETAIL 1
SCALE 1:10



MATERIAL DESIGNATION	YIELD STR. (ksi)	TENSILE STR. (ksi)
A709	50	65

DRAWING N.	25	TITLE:	60% DESIGN RESUBMISSION – VERONA SYSTEM		CLIENT: HDR/CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	03rd SETT. 2024	14600 CROSSING – ROAD UNDERPASS	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			VERONA SYSTEM DETAILS	
APPROVED:	op				

60% DESIGN RESUBMISSION – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

INTERNATIONAL PATENT N. P.C.T/ES 2010/070674 ALL DETAIL FOR INFORMATION NO PUBLICATION ALLOWED WITHOUT PETRUCCO SA WRITTEN CONSENT.
ALL THE DETAILS IN THIS DRAWING ARE PROPERTY OF PETRUCCO SA . ALCALA' DE HENARES, MADRID, SPAIN. VERONA SYSTEM IS COVERED BY INTERNATIONAL

APPENDIX B – RISA 3D MODEL REACTIONS FOR SUBSTRUCTURE DESIGN

PILE LOADS @ 7'-5" - 60 mph SPEED, R0m CURVE - Alternate LL - Braking

Loads per AREMA Chapter 15 - Steel Structures *Section 1.3 Loads, forces and stresses*

Axis		DL [kip]	LL + I [kip]	CF [kip]	WL [kip]	LF-Br [kip]	All [kip]	(linear combination, unfactored) Pile location / force direction
Y	Vert	9.0	76	0	3	6	94	All piles / Gravity
Z	Transv	0	0	0	3	0	3	All piles / Positive or negative

Cross references to RISA printouts provided in hyper link

Load description per Table 15-1-10 shown below:

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Loads per AREMA Ch. 8 - Concrete Structures *Section 2.2.4c Load Factor Design Combinations*

Load class correspondence between AREMA Ch. 15 to AREMA Ch. 8 Section 2.2.3 Design loads

Ch.15	DL	LL	I	CF	WL	LF
Ch.8	D	L	I	CF	W+WL	LF

* Lateral force from equipment is considered for axial stresses in members bracing the flanges of stringer only.

The load classes for AREMA Ch. 8 are per the description below:

2.2.3 DESIGN LOADS (2012)

a. *General.*

(1) The following loads and forces shall be considered in the design of railway concrete structures supporting tracks:

D = Dead Load
L = Live Load
I = Impact
CF = Centrifugal Force
E = Earth Pressure
B = Buoyancy
W = Wind Load on Structure
WL = Wind Load on Live Load
LF = Longitudinal Force from Live Load
F = Longitudinal Force due to Friction or Shear Resistance at Expansion Bearings
EQ = Earthquake (Seismic)
SF = Stream Flow Pressure
ICE = Ice Pressure
OF = Other Forces (Rib Shortening, Shrinkage, Temperature and/or Settlement of Supports)

The pile reactions per load class according to AREMA Chapter 8 is shown below:

Load Class		D [kip]	L + I [kip]	CF [kip]	W+WL [kip]	LF [kip]	All [kip]	(linear combination, unfactored) Pile location / force direction
Axis								
Y	Vert	9.0	76	0	3	6	94	All piles / Gravity
Z	Transv	0	0	0	3	0	3	All piles / Positive or negative
X	Long	0	0	0	1	3	3.5	All piles / Positive or negative

The loads for the group loading combinations per Table 8-2-5 from AREMA Ch. 8 Section 2.2.4c are shown below:

Table 8-2-5. Group Loading Combinations – Load Factor Design

Group	Item
I	1.4 (D + 5/3 (L + I) + CF + E + B + SF)
IA	1.8 (D + L + I + CF + E + B + SF)
II	1.4 (D + E + B + SF + W)
III	1.4 (D + L + I + CF + E + B + SF + 0.5W + WL + LF + F)
IV	1.4 (D + L + I + CF + E + B + SF + OF)
V	Group II + 1.4 (OF)
VI	Group III + 1.4 (OF)
VII	1.0 (D + E + B + EQ)
VIII	1.4 (D + L + I + E + B + SF + ICE)
IX	1.2 (D + E + B + SF + W + ICE)

		Group I [kip]	IA [kip]	II [kip]	III [kip]	IV [kip]	V [kip]	VI [kip]	VII [kip]	VIII [kip]	IX [kip]
Axis											
Y	Vert	**190**	153	17	132	119	17	132	9	119	11
Z	Transv	0	0	**4**	**4**	0	**4**	**4**	0	0	0
X	Long	0	0	1	**5**	0	1	**5**	0	0	0

PILE LOADS @ 7'-5" - 60 mph SPEED, R0m CURVE - Alternate LL - Traction

Loads per AREMA Chapter 15 - Steel Structures *Section 1.3 Loads, forces and stresses*

Axis		DL [kip]	LL + I [kip]	CF [kip]	WL [kip]	LF-Tr [kip]	All [kip]	(linear combination, unfactored) Pile location / force direction
Y	Vert	9.0	76	0	3	4	92	All piles / Gravity
Z	Transv	0	0	0	3	0	3	All piles / Positive or negative
X	Long	0	0	0	0.5	4.5	5	All piles / Positive or negative

Cross references to RISA printouts provided in hyper link

Load description per Table 15-1-10 shown below:

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Loads per AREMA Ch. 8 - Concrete Structures *Section 2.2.4c Load Factor Design Combinations*

Load class correspondence between AREMA Ch. 15 to AREMA Ch. 8 Section 2.2.3 Design loads

Ch.15	DL	LL	I	CF	WL	LF
Ch.8	D	L	I	CF	W+WL	LF

The load classes for AREMA Ch. 8 are per the description below:

2.2.3 DESIGN LOADS (2012)

a. *General.*

(1) The following loads and forces shall be considered in the design of railway concrete structures supporting tracks:

D = Dead Load
L = Live Load
I = Impact
CF = Centrifugal Force
E = Earth Pressure
B = Buoyancy
W = Wind Load on Structure
WL = Wind Load on Live Load
LF = Longitudinal Force from Live Load
F = Longitudinal Force due to Friction or Shear Resistance at Expansion Bearings
EQ = Earthquake (Seismic)
SF = Stream Flow Pressure
ICE = Ice Pressure
OF = Other Forces (Rib Shortening, Shrinkage, Temperature and/or Settlement of Supports)

The pile reactions per load class according to AREMA Chapter 8 is shown below:

Load Class		D [kip]	L + I [kip]	CF [kip]	W+WL [kip]	LF [kip]	All [kip]	(linear combination, unfactored) Pile location / force direction
Axis								
Y	Vert	9.0	76.0	0	3.0	4.0	92.0	All piles / Gravity
Z	Transv	0	0	0	3	0	3	All piles / Positive or negative
X	Long	0	0	0	1	4.5	5.0	All piles / Positive or negative

The loads for the group loading combinations per Table 8-2-5 from AREMA Ch. 8 Section 2.2.4c are shown below:

Table 8-2-5. Group Loading Combinations – Load Factor Design

Group	Item
I	1.4 (D + 5/3 (L + I) + CF + E + B + SF)
IA	1.8 (D + L + I + CF + E + B + SF)
II	1.4 (D + E + B + SF + W)
III	1.4 (D + L + I + CF + E + B + SF + 0.5W + WL + LF + F)
IV	1.4 (D + L + I + CF + E + B + SF + OF)
V	Group II + 1.4 (OF)
VI	Group III + 1.4 (OF)
VII	1.0 (D + E + B + EQ)
VIII	1.4 (D + L + I + E + B + SF + ICE)
IX	1.2 (D + E + B + SF + W + ICE)

		Group									
		I	IA	II	III	IV	V	VI	VII	VIII	IX
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]
Y	Vert	**190**	153	17	129	119	17	129	9	119	11
Z	Transv	0	0	**4**	**4**	0	**4**	**4**	0	0	0
X	Long	0	0	1	**7**	0	1	**7**	0	0	0

PILE LOADS @ 7'-5" - 60 mph SPEED, R0m CURVE - Alternate LL - Traction - CWR

Loads per AREMA Chapter 15 - Steel Structures *Section 1.3 Loads, forces and stresses*

Axis		DL [kip]	LL + I [kip]	CF [kip]	WL [kip]	LF-Tr [kip]	All [kip]	(linear combination, unfactored) Pile location / force direction
Y	Vert	9.0	76	0	3	4	92	All piles / Gravity
Z	Transv	0	0	0	3	0	3	All piles / Positive or negative
X	Long	0	0	0	0.5	4.5	5	All piles / Positive or negative

Load description per Table 15-1-10 shown below:

DL = Dead load, Article 1.3.2
LL = Live load, Article 1.3.3
I = Impact, Article 1.3.5
CF = Centrifugal Force, Article 1.3.6
$(LL + I + CF)_{in}$ = Increased live load (+ impact + centrifugal force) as defined in Article 1.3.16
W_L = Wind Force on Loaded Bridge, Article 1.3.7
N = Lateral Force from Equipment, Article 1.3.9
LF = Longitudinal Force, Article 1.3.12
CWR = Forces from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
B_r = Bracing force, Article 1.3.11
CWR_L = Lateral force from Continuous Welded Rail longitudinally anchored, Article 8.3.3.5.2e
W_U= Wind Force on Unloaded Bridge, Article 1.3.8
DF = Derailment load (Q), Article 1.3.10b, plus the forces resulting from the provisions of Article 1.11.4a
OF = Other forces (e.g. Temperature, settlement of supports)
EL = Erection Loads, Article 4.13a. Would include dead load (permanent or temporary), plus any temporary equipment loads, plus any construction live loads

Loads per AREMA Ch. 8 - Concrete Structures *Section 2.2.4c Load Factor Design Combinations*

Load class correspondence between AREMA Ch. 15 to AREMA Ch. 8 Section 2.2.3 Design loads

Ch.15	DL	LL	I	CF	WL	LF
Ch.8	D	L	I	CF	W+WL	LF

The load classes for AREMA Ch. 8 are per the description below:

2.2.3 DESIGN LOADS (2012)

a. *General.*

(1) The following loads and forces shall be considered in the design of railway concrete structures supporting tracks:

D = Dead Load
L = Live Load
I = Impact
CF = Centrifugal Force
E = Earth Pressure
B = Buoyancy
W = Wind Load on Structure
WL = Wind Load on Live Load
LF = Longitudinal Force from Live Load
F = Longitudinal Force due to Friction or Shear Resistance at Expansion Bearings
EQ = Earthquake (Seismic)
SF = Stream Flow Pressure
ICE = Ice Pressure
OF = Other Forces (Rib Shortening, Shrinkage, Temperature and/or Settlement of Supports)

The pile reactions per load class according to AREMA Chapter 8 is shown below:

Load Class		D [kip]	L + I [kip]	CF [kip]	W+WL [kip]	LF [kip]	All [kip]	(linear combination, unfactored) Pile location / force direction
Y	Vert	9.0	76.0	0	3.0	4.0	92.0	All piles / Gravity
Z	Transv	0	0	0	3	0	3	All piles / Positive or negative
X	Long	0	0	0	1	4.5	5.0	All piles / Positive or negative

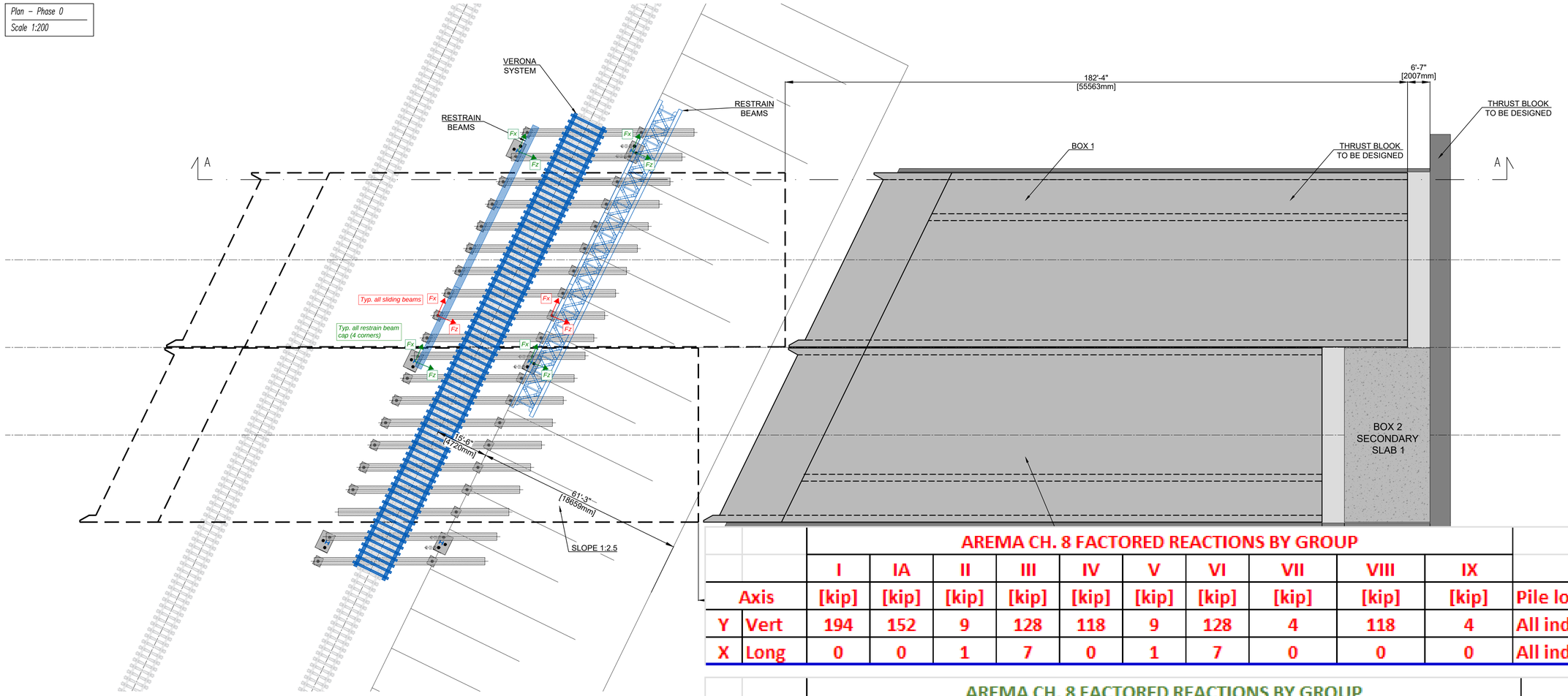
The loads for the group loading combinations per Table 8-2-5 from AREMA Ch. 8 Section 2.2.4c are shown below:

Table 8-2-5. Group Loading Combinations – Load Factor Design

Group	Item
I	1.4 (D + 5/3 (L + I) + CF + E + B + SF)
IA	1.8 (D + L + I + CF + E + B + SF)
II	1.4 (D + E + B + SF + W)
III	1.4 (D + L + I + CF + E + B + SF + 0.5W + WL + LF + F)
IV	1.4 (D + L + I + CF + E + B + SF + OF)
V	Group II + 1.4 (OF)
VI	Group III + 1.4 (OF)
VII	1.0 (D + E + B + EQ)
VIII	1.4 (D + L + I + E + B + SF + ICE)
IX	1.2 (D + E + B + SF + W + ICE)

		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Y	Vert	190	153	17	129	119	17	129	9	119	11	All individual piles / Gravity
X	Long	0	0	1	7	0	1	7	0	0	0	All ind. piles / Positive or negative

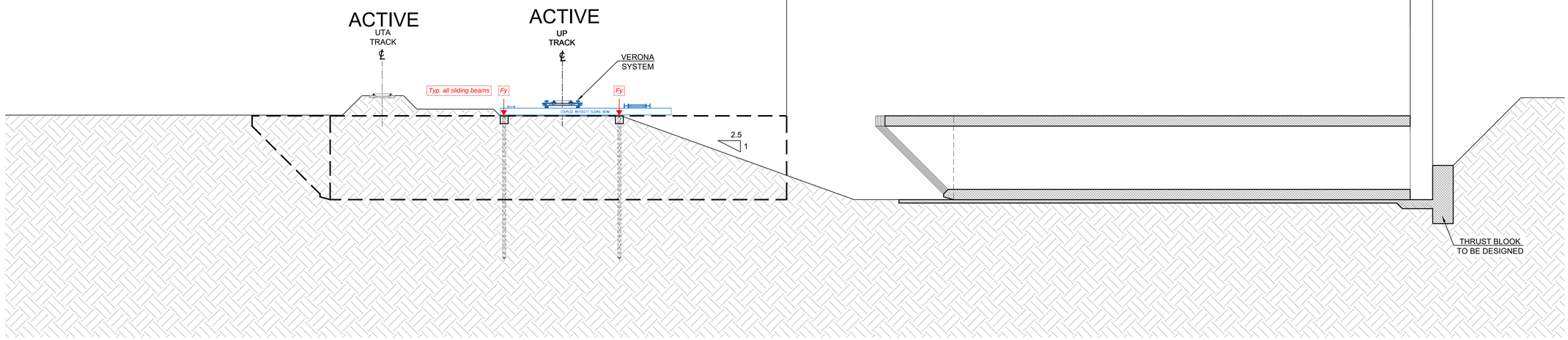
Plan – Phase 0
Scale 1:200



		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Y	Vert	194	152	9	128	118	9	128	4	118	4	All individual piles / Gravity
X	Long	0	0	1	7	0	1	7	0	0	0	All ind. piles / Positive or negative

		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Z	Transv	0	0	46	46	0	46	46	0	0	0	ea 4 corners / Positive or negative

Section A–A – Phase 0
Scale 1:200



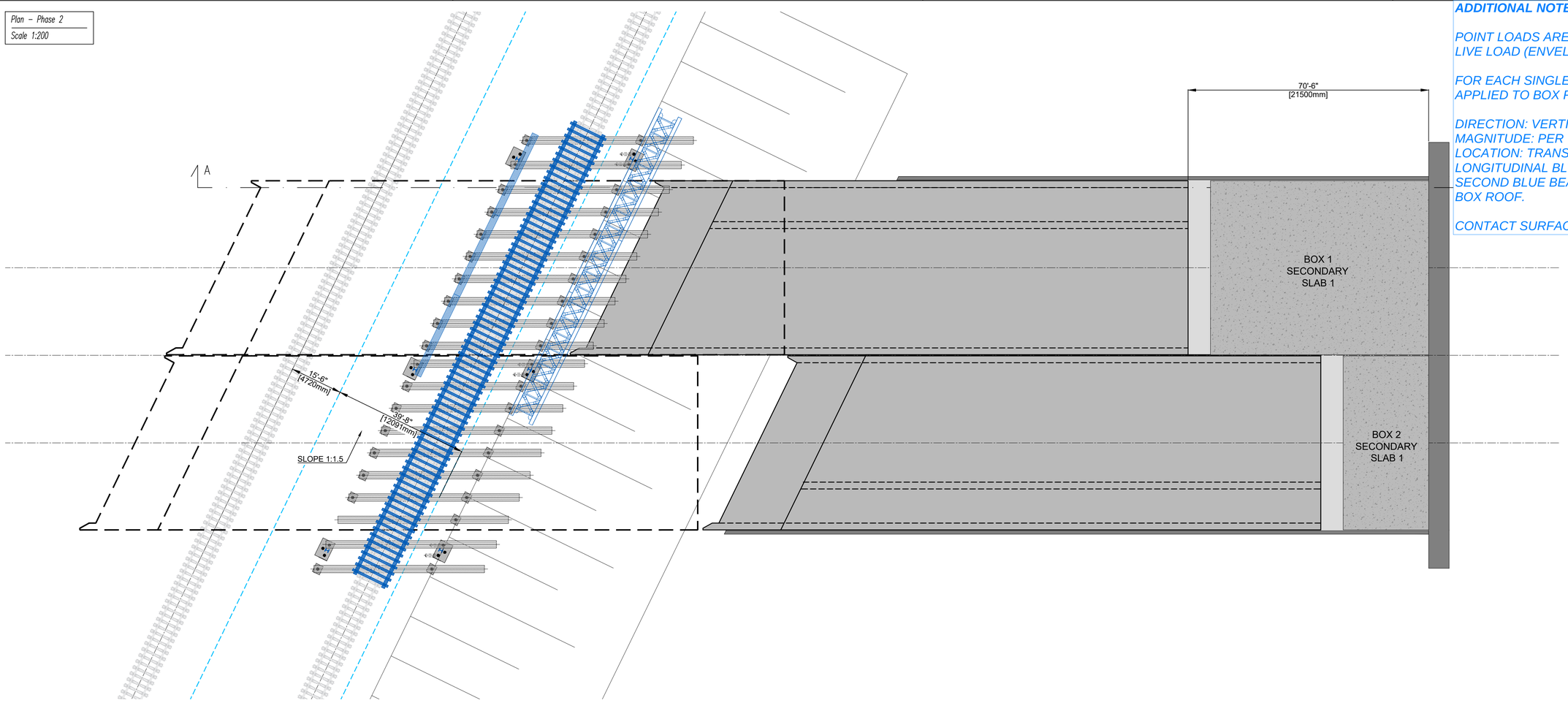
DRAWING N.	1	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	13th MAY 2024	ROAD UNDERPASS OPTION 2C	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	
APPROVED:	op				

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Plan – Phase 2

Scale 1:200



ADDITIONAL NOTES FOR BOX DESIGN (7/29/2024)

POINT LOADS ARE FROM VERONA SYSTEM SW AND ALTERNATE LIVE LOAD (ENVELOPE FROM MOVING LOAD)

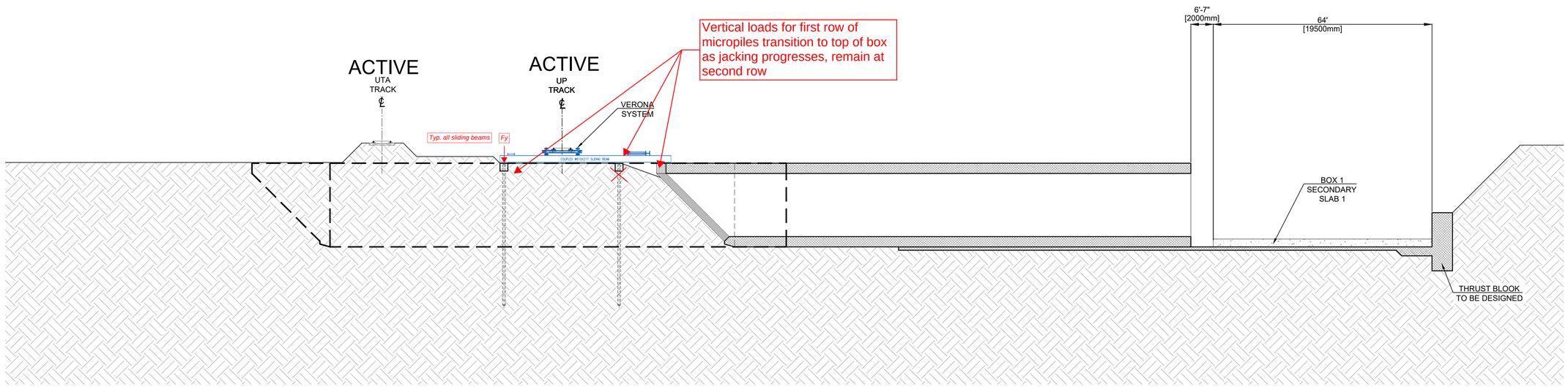
FOR EACH SINGLE MICROPILE CAP (RED VALUES) LOADS ARE APPLIED TO BOX ROOF

DIRECTION: VERTICAL DOWNWARD (FY) ONLY
MAGNITUDE: PER TABLE FOR MICROPILE DESIGN (RED VALUES)
LOCATION: TRANSITION FROM TIP OF TRANSVERSE BEAM TO LONGITUDINAL BLUE BEAM LOCATION. WHEN BOX REACHES SECOND BLUE BEAM, BOTH POINT LOADS ARE APPLIED TO THE BOX ROOF.

CONTACT SURFACE SURFACE: 1 SQ.FT.

Section A–A – Phase 2

Scale 1:200

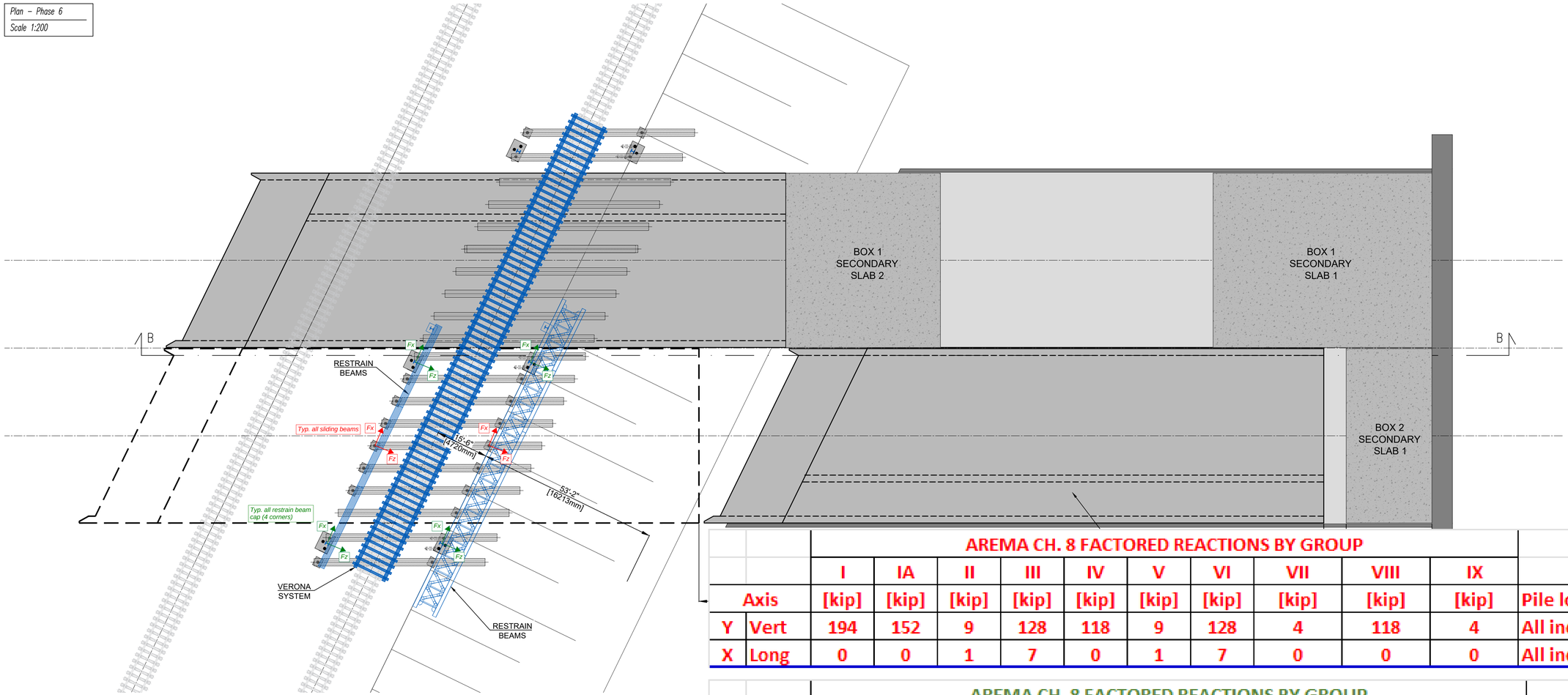


DRAWING N.	3	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE
DESIGNED:	vpo	EMISSION:	13th MAY 2024	
DRAWN:	drf	REVISION:	ROAD UNDERPASS OPTION 2C	
CHECKED:	vpo			
APPROVED:	op		TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

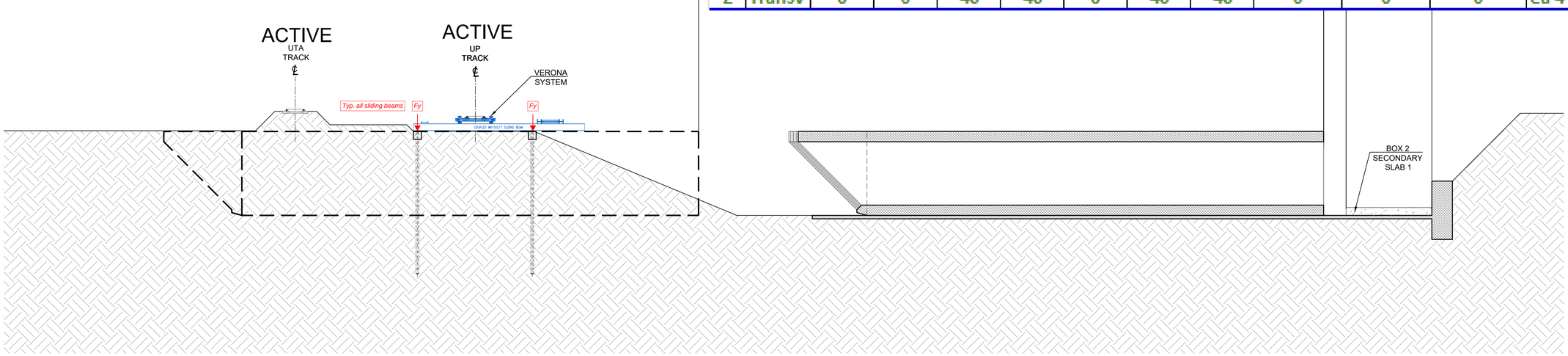
PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

Plan – Phase 6
Scale 1:200



		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Y	Vert	194	152	9	128	118	9	128	4	118	4	All individual piles / Gravity
X	Long	0	0	1	7	0	1	7	0	0	0	All ind. piles / Positive or negative

Section A–A – Phase 6
Scale 1:200

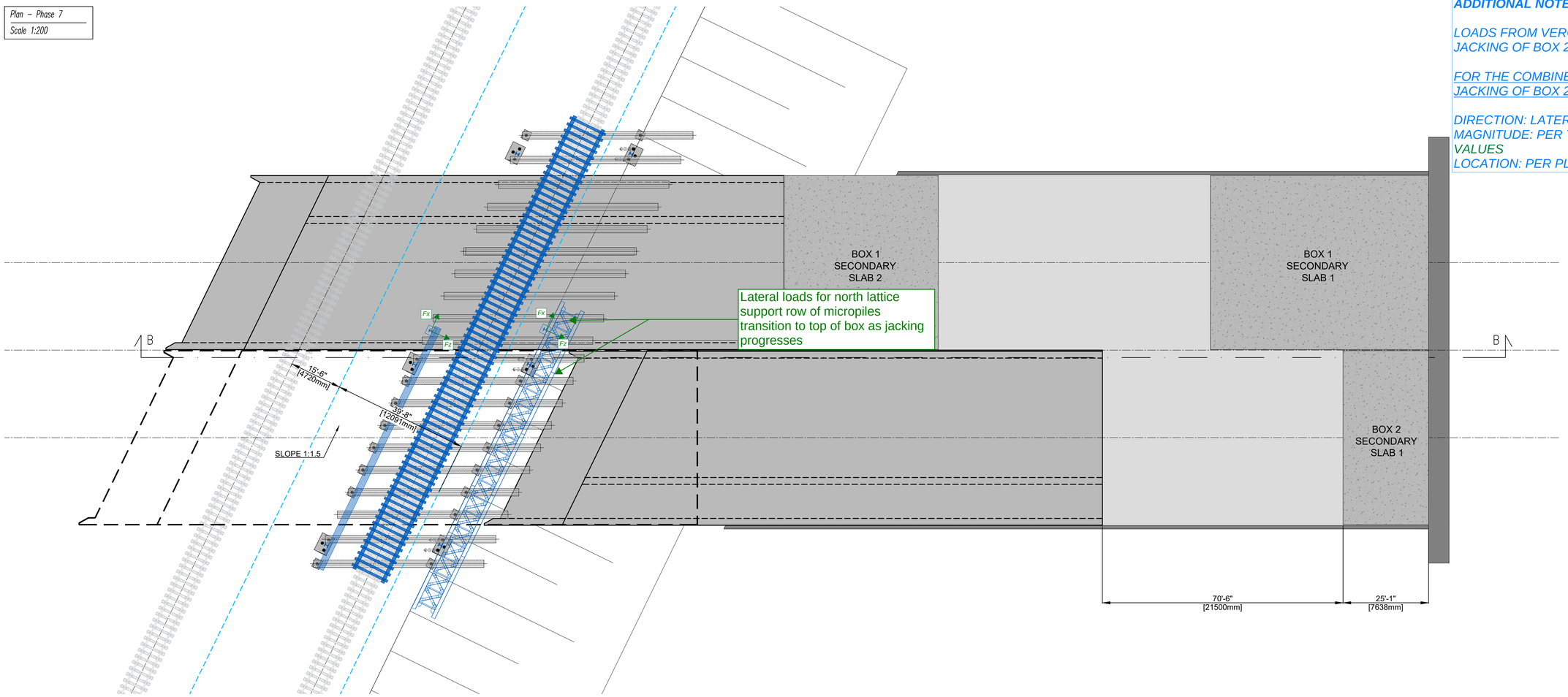


		AREMA CH. 8 FACTORED REACTIONS BY GROUP										
		I	IA	II	III	IV	V	VI	VII	VIII	IX	
Axis		[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	[kip]	Pile location / force direction
Z	Transv	0	0	46	46	0	46	46	0	0	0	ea 4 corners / Positive or negative

DRAWING N.	7	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	13th MAY 2024	ROAD UNDERPASS OPTION 2C	PETRUCCO box jacking systems
DRAWN:	drf	REVISION:		TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	PETRUCCO USA L.L.C. Railroad Box Jacking Systems 1576 DAYTONIA RD. MIAMI BEACH, FI 33141 www.petrucco.com
CHECKED:	vpo				
APPROVED:	qp				

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

Plan – Phase 7
Scale 1:200



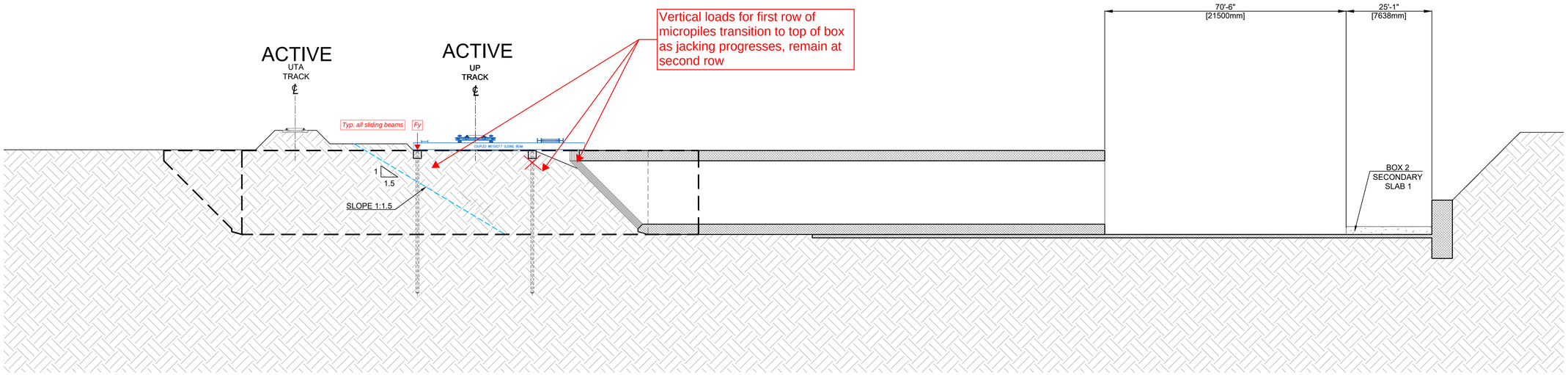
ADDITIONAL NOTES FOR BOX DESIGN (7/29/2024)

LOADS FROM VERONA SYSTEM ON ROOF OF BOX 1 DURING JACKING OF BOX 2 ARE:

FOR THE COMBINED MICROPILE CAP REMOVED DURING JACKING OF BOX 2 (GREEN VALUES)

DIRECTION: LATERAL ONLY (FZ)
MAGNITUDE: PER TABLE FOR MICROPILE DESIGN - GREEN VALUES
LOCATION: PER PLAN ON THIS SHEET.

Section A–A – Phase 7
Scale 1:200



DRAWING N.	8	TITLE:	60% DESIGN – JACKING WORKS	CLIENT: HDR/CITY OF BLUFFDALE	
DESIGNED:	vpo	EMISSION:	13th MAY 2024	ROAD UNDERPASS OPTION 2C	
DRAWN:	drf	REVISION:			
CHECKED:	vpo			TYPOLOGICAL SCHEME FOR BOX JACKING UNDER VERONA SYSTEM	
APPROVED:	op				

60% DESIGN – PATENT TECHNOLOGY – ALL DETAILS ARE PETRUCCO GROUP PROPERTY

PETRUCCO box jacking systems
PETRUCCO USA L.L.C.
Railroad Box Jacking Systems
1576 DAYTONIA RD.
MIAMI BEACH, FI 33141
www.petrucco.com

MCNARY BERGERON & JOHANNESEN ENGINEERED CONSTRUCTION®

CONNECTICUT
44 Pond Road
Old Saybrook, CT 06475
tel 860 388 2267

COLORADO
565 Burbank Street, Suite A
Broomfield, CO 80020
tel 303 450 6900

FLORIDA
10014 N. Dale Mabry Hwy,
Suite 222
Tampa, FL 33618
tel 813 609 4616

www.mcnarybergeron.com

M E M O R A N D U M

DATE: August 30, 2024 **VIA:** Email

TO: Robert Kitteridge, PE

FROM: Alex Belenguer, PE

RE: **"Verona system" temporary bridge - roller support reactions into box**
14600 South UPRR/UTA box jacking
Bluffdale, UT

We have evaluated the reactions from the temporary bridge "Verona system" into the top slab of the boxes during jacking operations.

The reactions have been evaluated for the 3 scenarios below:

Stage 1: First row of micropile removed and transferred (2 rows of rollers engaged).
Stage 2: First row of rollers under the first longitudinal main girder (4 rows of rollers engaged).
Stage 3: Second row of rollers under the first longitudinal main girder (5 rows of rollers engaged).

The reactions include dead load and live load from a Cooper E80 with 40% impact loading and rocking effect. For each scenario, the moving load envelopes have been analyzed to consider maximum individual vertical reactions. Then, point load cases from moving load steps have been analyzed to determine concomitant loads on all rollers. A total of 3 static load cases are provided for each scenario to provide maximum force effect on the box.

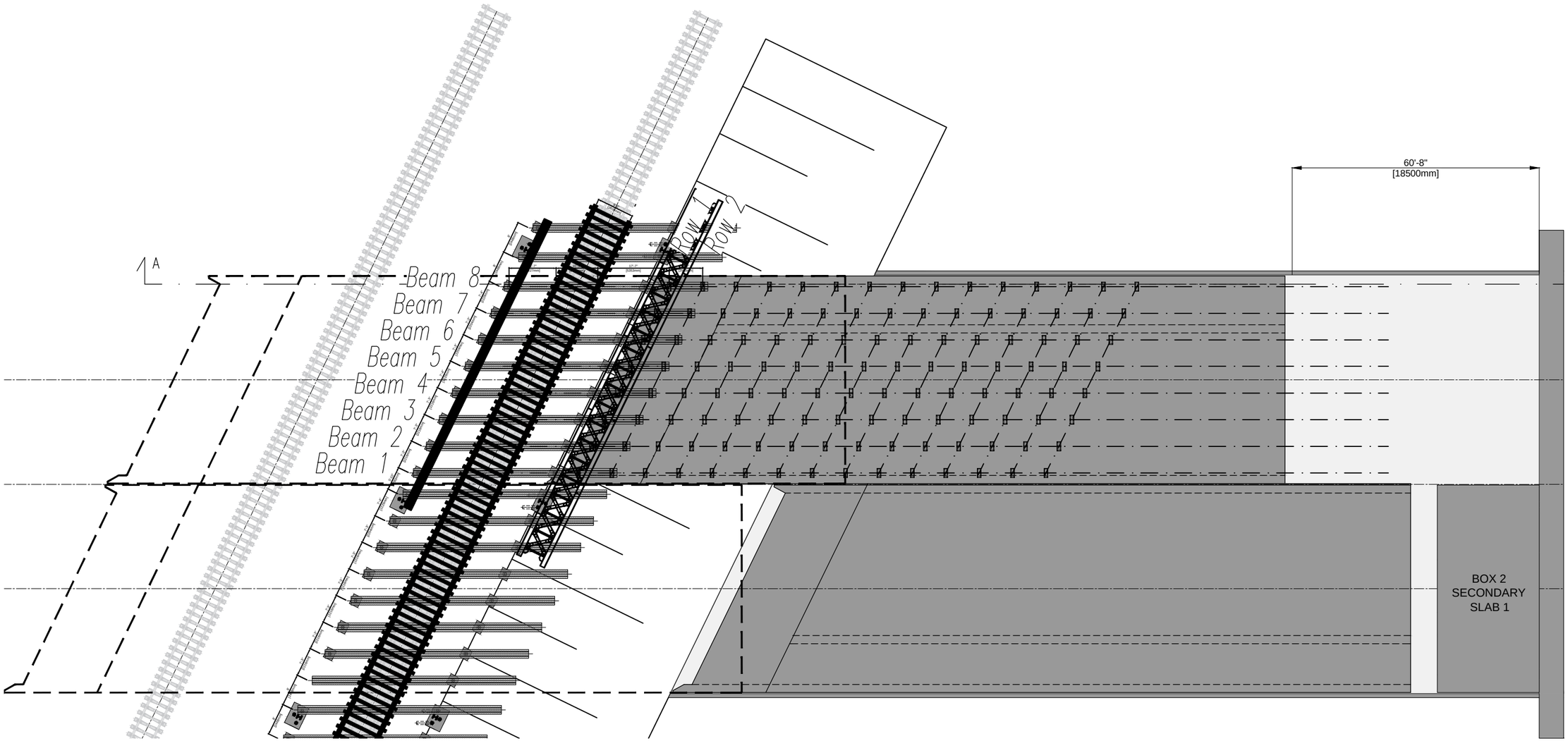
The roller reaction tables attached include both unfactored and factored reactions for each roller under the 8-transverse beams on top of the north box. Loads can be symmetrically assumed for the design of the south box. Beam and roller notation is per pdf and dwg layouts attached.

Please don't hesitate to contact me with any questions.

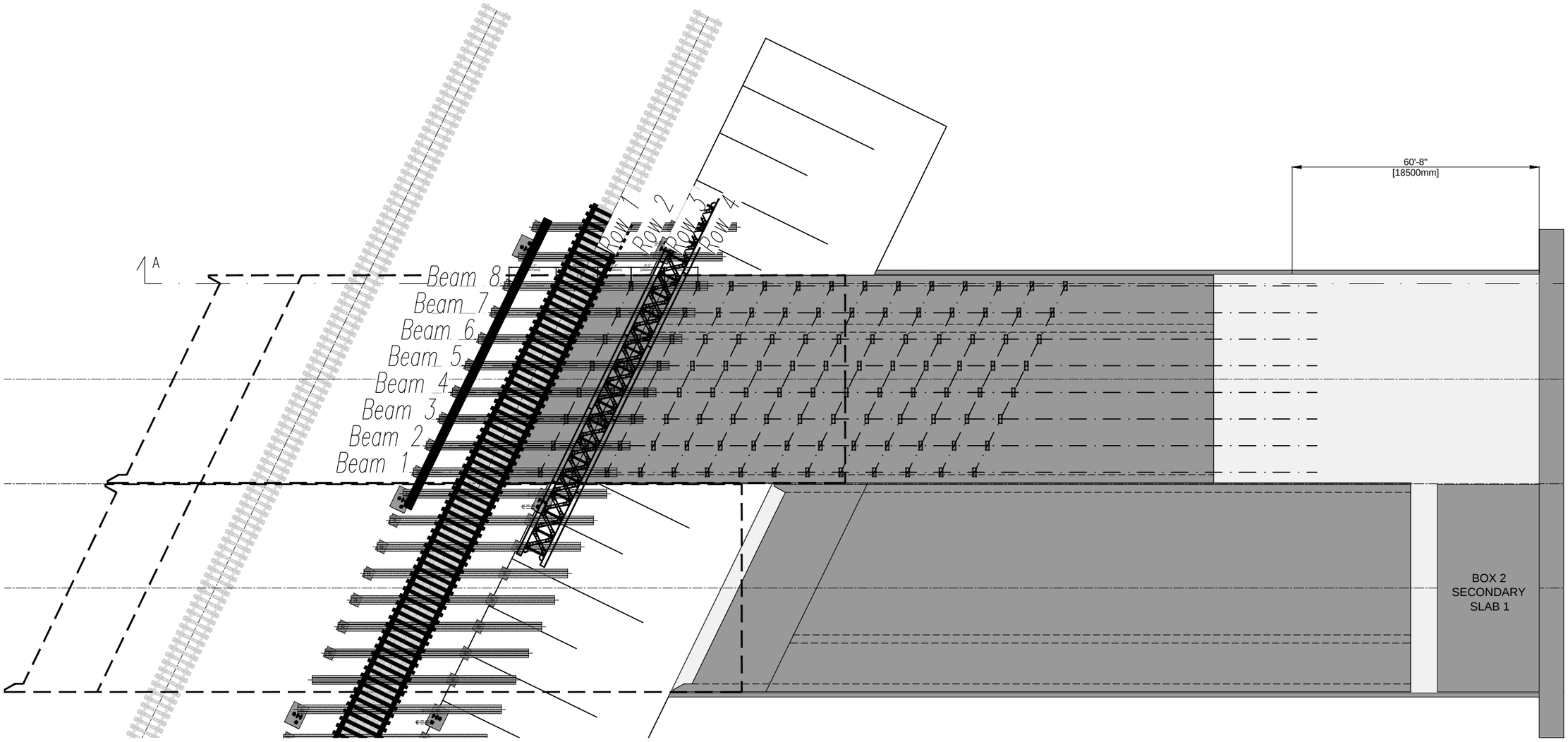
Attachments:

Verona roller reactions - 100pct.pdf
Layout – scenarios.pdf
PUSA_2021_18_BLUFFDALE_100 pct Rollers Grid_rev.00_MBJ_phasing.dwg

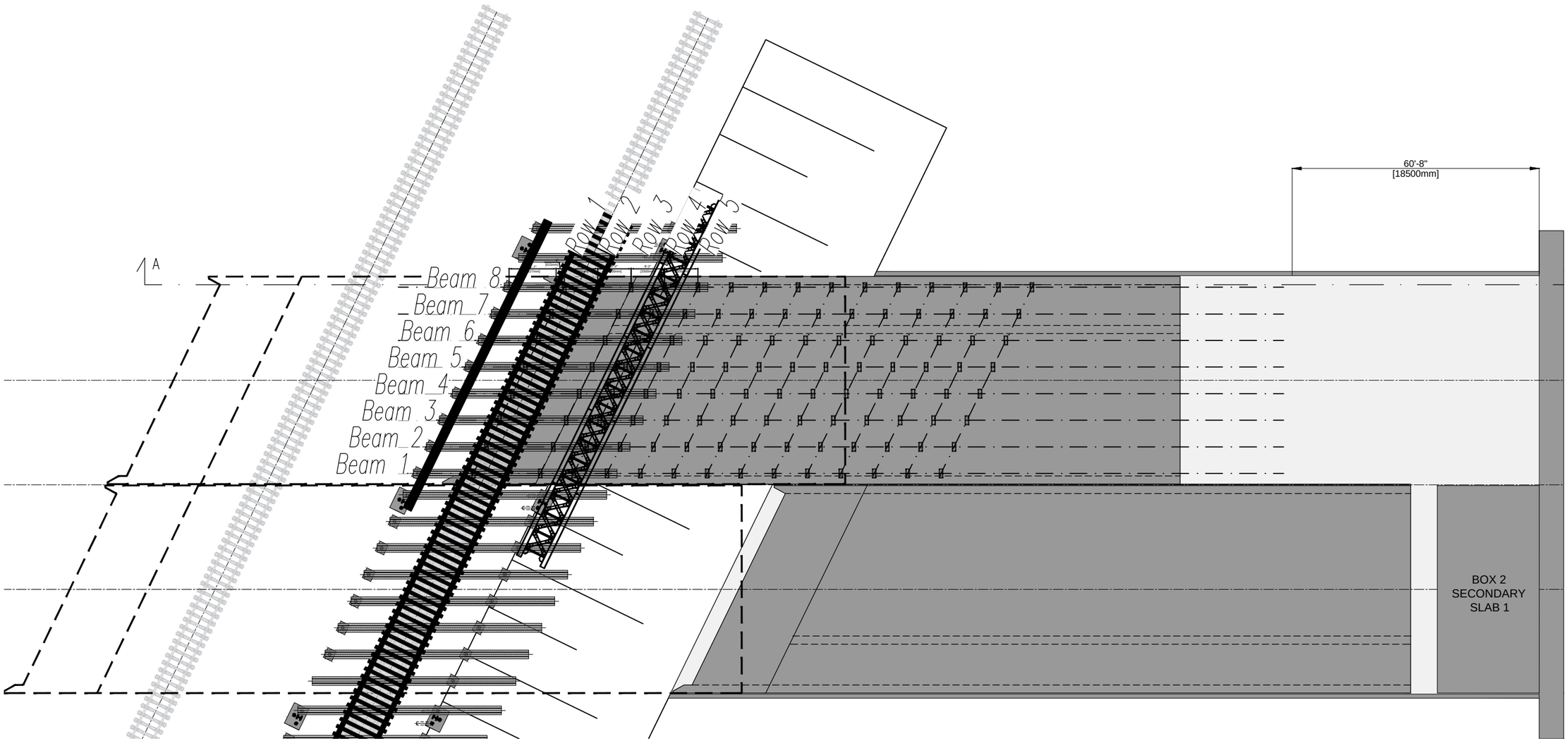
Micropile removal



1st row of rollers under Verona



2nd row of rollers under Verona



Verona Temp. Bridge Roller reactions (first 2 rollers in / micropile removal)

Results for LC 2-38

	Load	1	2	3	4	5	6	7	8
1st row of	DL	3	3	3	3	3	3	3	3
rollers	LL	39	37	39	41	45	50	55	50
2nd row	DL	0	0	0	0	0	0	0	0
of rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	94	91	94	101	108	120	132	120	860
rollers	IA	74	72	75	80	86	94	104	95	
2nd row	I	0	0	0	0	0	0	0	0	
of rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	96	93	97	103	111	122	135	123	

Results for LC 2-54

	Load	1	2	3	4	5	6	7	8
1st row of	DL	3	3	3	3	3	3	3	3
rollers	LL	35	43	50	54	50	43	39	37
2nd row	DL	0	0	0	0	0	0	0	0
of rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	86	104	119	130	121	103	95	90	849
rollers	IA	68	82	94	102	95	82	76	71	
2nd row	I	0	0	0	0	0	0	0	0	
of rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	89	106	122	133	124	106	98	93	

Results for LC 2-58

	Load	1	2	3	4	5	6	7	8
1st row of	DL	3	3	3	3	3	3	3	3
rollers	LL	27	37	43	49	54	51	42	36
2nd row of	DL	0	0	0	0	0	0	0	0
rollers	LL	1	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	67	91	105	119	131	123	103	89	826
rollers	IA	54	72	83	94	103	97	81	70	
2nd row of	I	3	1	0	0	0	0	0	0	
rollers	IA	3	1	0	0	0	0	0	0	
	∑ of Gr I	73	94	108	122	133	125	105	91	

Verona Temp. Bridge Roller reactions (first 4 rollers in / 1st roller under Verona main girder)

Results for LC 2-40

	Load	1	2	3	4	5	6	7	8
1st row of	DL	3	3	3	3	3	3	3	3
rollers	LL	43	38	32	31	33	36	48	67
2nd row	DL	2	2	2	2	2	2	2	2
of rollers	LL	28	23	19	20	21	23	32	44
3rd row of	DL	1	1	1	1	1	1	1	1
rollers	LL	8	4	4	5	6	6	10	13
4th row of	DL	0	0	0	0	0	0	0	0
rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	105	93	78	76	80	89	116	160	798
rollers	IA	83	74	62	61	64	71	92	126	
2nd row	I	68	56	47	48	51	57	76	104	508
of rollers	IA	54	45	38	39	41	45	60	82	
3rd row of	I	19	11	10	13	14	16	23	31	136
rollers	IA	15	9	8	10	11	12	18	24	
4th row of	I	0	0	0	0	0	0	0	0	0
rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	192	160	135	137	145	162	216	295	

Results for LC 2-54

	Load	1	2	3	4	5	6	7	8
1st row of	DL	3	3	3	3	3	3	3	3
rollers	LL	32	36	42	49	48	38	35	43
2nd row	DL	2	2	2	2	2	2	2	2
of rollers	LL	21	23	27	31	29	23	22	28
3rd row of	DL	1	1	1	1	1	1	1	1
rollers	LL	6	6	8	9	7	4	5	8
4th row of	DL	0	0	0	0	0	0	0	0
rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	79	89	101	119	116	93	85	104	786
rollers	IA	63	71	80	94	92	74	68	82	
2nd row	I	51	56	65	76	71	55	53	67	495
of rollers	IA	41	45	51	60	56	44	42	53	
3rd row of	I	15	14	18	21	16	10	13	20	127
rollers	IA	12	12	14	16	13	8	10	15	
4th row of	I	0	0	0	0	0	0	0	0	0
rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	146	159	184	216	203	159	151	190	

Results for LC 2-56

	Load	1	2	3	4	5	6	7	8
1st row of	DL	3	3	3	3	3	3	3	3
rollers	LL	28	34	38	45	50	44	37	43
2nd row of	DL	2	2	2	2	2	2	2	2
rollers	LL	19	22	24	29	31	27	22	28
3rd row of	DL	1	1	1	1	1	1	1	1
rollers	LL	6	6	6	9	8	5	5	8
4th row of	DL	0	0	0	0	0	0	0	0
rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	70	84	92	110	120	107	90	104	777
rollers	IA	56	67	73	87	95	85	72	82	
2nd row of	I	47	53	58	71	75	64	55	67	491
rollers	IA	37	42	46	56	60	51	44	53	
3rd row of	I	15	14	15	21	19	13	12	19	127
rollers	IA	12	11	12	16	15	10	9	15	
4th row of	I	0	0	0	0	0	0	0	0	0
rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	131	151	165	202	215	185	157	190	

Verona Temp. Bridge Roller reactions (first 5 rollers in / 2nd roller under Verona main girder)

Results for LC 2-40

	Load	1	2	3	4	5	6	7	8
1st row of	DL	2	2	2	2	2	2	2	2
rollers	LL	35	32	23	21	22	24	32	50
2nd row	DL	3	3	3	3	3	3	3	3
of rollers	LL	37	30	23	23	24	26	37	57
3rd row of	DL	2	2	2	2	2	2	2	2
rollers	LL	25	18	14	15	16	18	26	39
4th row of	DL	1	1	1	1	1	1	1	1
rollers	LL	8	4	4	5	5	6	9	13
5th row of	DL	0	0	0	0	0	0	0	0
rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	84	77	57	52	55	60	77	120	582
rollers	IA	66	61	45	42	44	48	61	95	
2nd row	I	90	73	57	56	59	65	89	136	625
of rollers	IA	71	58	46	45	48	52	71	107	
3rd row of	I	60	45	36	38	39	43	62	93	415
rollers	IA	47	36	29	30	32	35	49	73	
4th row of	I	19	10	10	12	13	14	23	32	133
rollers	IA	15	8	8	10	10	11	18	25	
5th row of	I	0	0	0	0	0	0	0	0	
rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	252	205	159	158	167	183	251	381	

Results for LC 2-42

	Load	1	2	3	4	5	6	7	8
1st row of	DL	2	2	2	2	2	2	2	2
rollers	LL	39	38	27	21	21	23	29	48
2nd row	DL	3	3	3	3	3	3	3	3
of rollers	LL	42	37	26	21	23	25	33	56
3rd row of	DL	2	2	2	2	2	2	2	2
rollers	LL	28	23	16	14	15	17	23	39
4th row of	DL	1	1	1	1	1	1	1	1
rollers	LL	9	6	3	4	5	6	8	14
5th row of	DL	0	0	0	0	0	0	0	0
rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	95	91	67	51	52	57	72	115	600
rollers	IA	75	72	53	41	42	46	57	90	
2nd row	I	102	89	63	54	57	62	81	133	641
of rollers	IA	81	71	51	43	46	50	64	105	
3rd row of	I	68	56	39	35	38	42	55	93	426
rollers	IA	53	44	31	28	31	34	44	73	
4th row of	I	22	14	9	11	13	14	19	34	135
rollers	IA	17	11	7	9	10	11	15	27	
5th row of	I	0	0	0	0	0	0	0	0	
rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	287	250	178	151	160	176	227	375	

Results for LC 2-51

	Load	1	2	3	4	5	6	7	8
1st row of	DL	2	2	2	2	2	2	2	2
rollers	LL	25	28	34	37	31	22	23	33
2nd row of	DL	3	3	3	3	3	3	3	3
rollers	LL	27	30	37	37	29	22	26	37
3rd row of	DL	2	2	2	2	2	2	2	2
rollers	LL	18	20	25	24	17	14	18	26
4th row of	DL	1	1	1	1	1	1	1	1
rollers	LL	6	6	8	7	4	4	6	9
5th row of	DL	0	0	0	0	0	0	0	0
rollers	LL	0	0	0	0	0	0	0	0

	Group	1	2	3	4	5	6	7	8	∑ of Gr I
1st row of	I	62	69	83	89	74	55	58	81	571
rollers	IA	50	55	65	71	59	44	46	64	
2nd row of	I	67	73	90	91	70	55	64	91	602
rollers	IA	54	59	71	72	56	45	51	72	
3rd row of	I	45	49	60	58	43	36	44	62	396
rollers	IA	36	39	48	46	34	29	35	49	
4th row of	I	15	16	20	16	10	10	15	21	123
rollers	IA	12	13	16	13	8	8	12	17	
5th row of	I	0	0	0	0	0	0	0	0	
rollers	IA	0	0	0	0	0	0	0	0	
	∑ of Gr I	189	207	252	255	197	156	181	255	

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION®

CONNECTICUT
44 Pond Road
Old Saybrook, CT 06475
tel 860 388 2267

COLORADO
565 Burbank Street, Suite A
Broomfield, CO 80020
tel 303 450 6900

FLORIDA
10014 N. Dale Mabry Hwy,
Suite 222
Tampa, FL 33618
tel 813 609 4616

www.mcnarybergeron.com

TEMPORARY WORKS PACKAGE

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

PREPARED FOR: City of Bluffdale
In conjunction with Petrucco USA, LLC

SUBMITTED: 9/20/2024
Revision 2: 5/28/2025
Revision 3: 7/11/2025



TEMPORARY WORKS PACKAGE

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

PREPARED FOR: City of Bluffdale
In conjunction with Petrucco USA, LLC

SUBMITTED: 9/20/2024
Revision 2: 5/28/2025
Revision 3: 7/11/2025

Contents

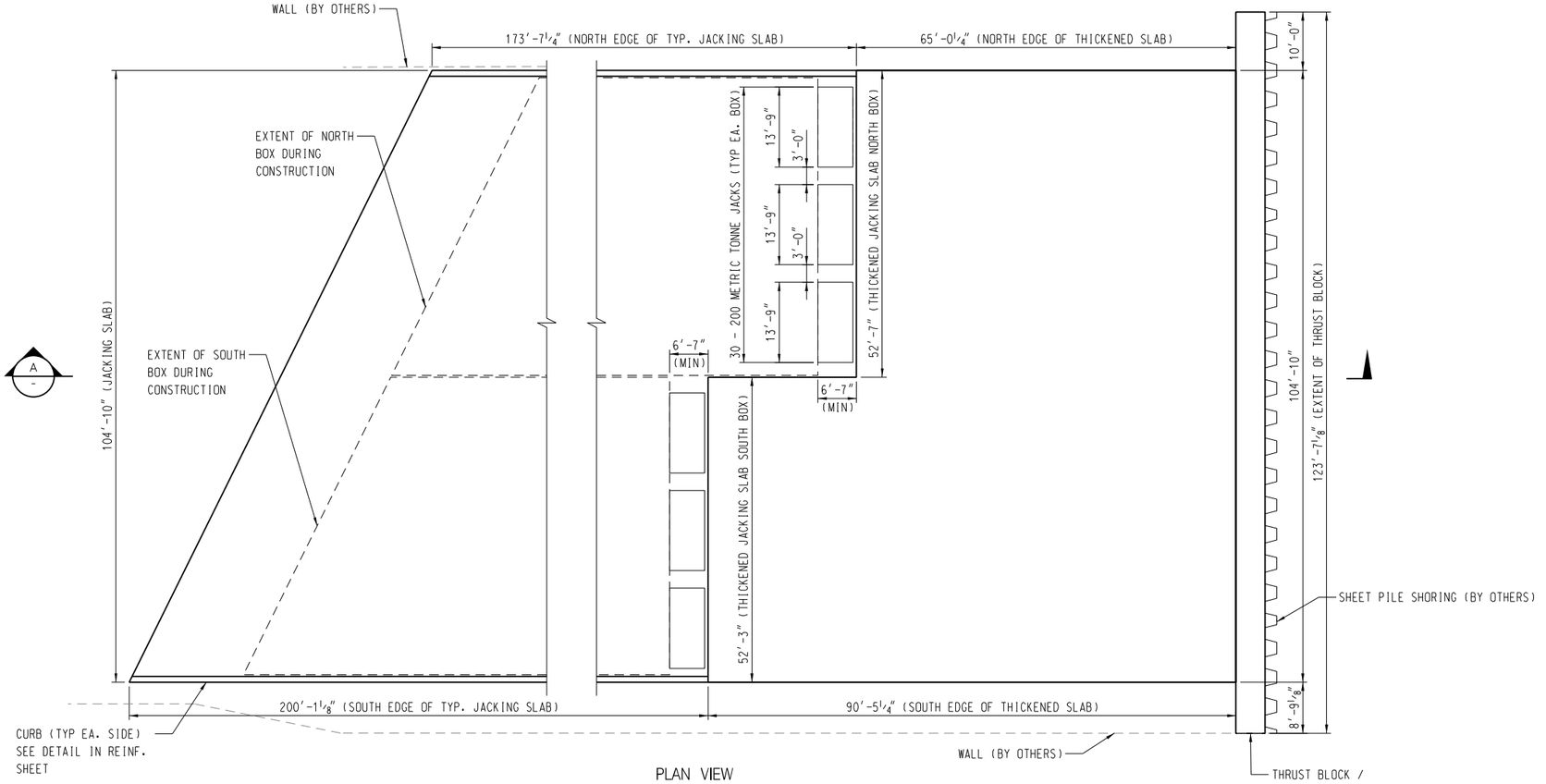
1. SUMMARY 3
2. DRAWINGS 3
3. CALCULATIONS 6

1. SUMMARY

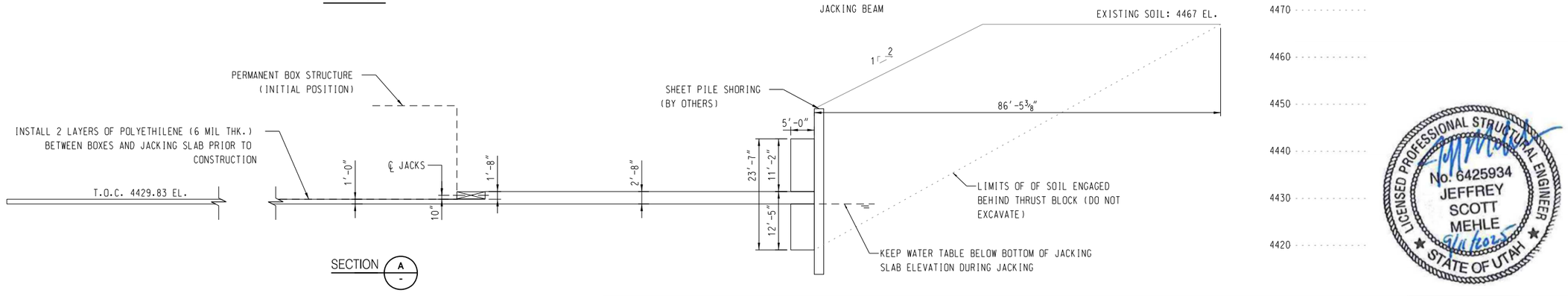
This submittal contains drawings and design calculations for the jacking beam and slab to be used to support the box jacking under the railroad crossing and the jacking installation forces. The beam and slab design are per AASHTO LRFD design specifications. When applicable, AREMA MRE references are also provided.

2. DRAWINGS

NOTES:
1. TOTAL BOX WEIGHT FOR JACKING (EACH, NON-CONCURRENT JACKING) = 10,800 KIPS.
2. MAXIMUM SERVICE JACKING FORCE = 8650 KIPS.
3. THIS ARRANGEMENT TO BE USED IN CONJUNCTION WITH PETRUCCO WORK PLAN.
4. FINISH TOP OF TYP. JACKING SLAB TO A SMOOTH TROWEL FINISH PER FOLLOWING PARAMETERS:
   FLOOR FLATNESS OF FF50 (1/8" DEVIATION ALONG 10 FT ON ANY DIRECTION)
   FLOOR LEVELNESS OF FL25



PLAN VIEW



SECTION A-A

SOIL PROPERTIES PER TECHNICAL MEMORANDUM (BY GERHART COLE)

SOIL EMBANKMENT PROPERTIES ASSUMED:
- SOIL UNIT WEIGHT: 125 PCF
- ANGLE OF INTERNAL FRICTION: 30 DEG

ASSUMED COEFFICIENTS OF FRICTION:
- 0.80 PERMANENT BOX STRUCTURE ON CONCRETE OR SOIL
- 0.57 (MIN) EXISTING SOIL BEHIND THRUST BLOCK ON UNDERLYING SOIL

LICENSED PROFESSIONAL STRUCTURAL ENGINEER
No. 6425934
JEFFREY SCOTT MEHLE
STATE OF UTAH

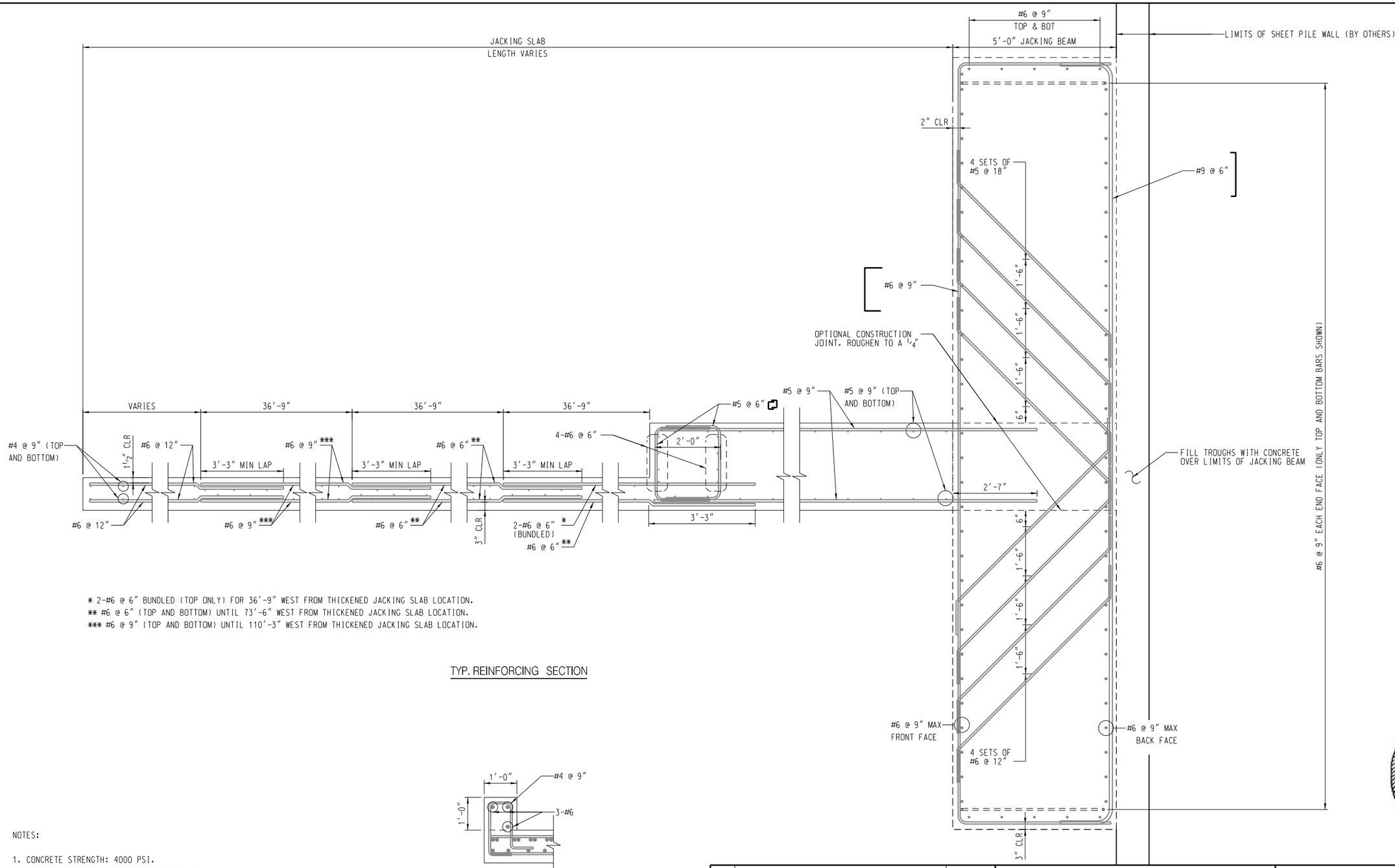
NO.	REVISION	DATE

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION®

TEMPORARY WORKS
PLAN AND ELEVATION

PROJ.:	14600 SOUTH - RAILROAD CROSSING		
CONTRACTOR:	PETRUCCO USA		
	MADE BY: ABG	CHECK BY:	JSM
DATE: 2024-09-20		SHEET:	TW-01

C:\Users\Alex\My Drive\PUSA Bluffdale\5 - CAD\MBJ_BLUFFDALE_TEMP WORKS_100p_REV1.dgn



* 2-#6 @ 6" BUNDLED (TOP ONLY) FOR 36'-9" WEST FROM THICKENED JACKING SLAB LOCATION.
** #6 @ 6" (TOP AND BOTTOM) UNTIL 73'-6" WEST FROM THICKENED JACKING SLAB LOCATION.
*** #6 @ 9" (TOP AND BOTTOM) UNTIL 110'-3" WEST FROM THICKENED JACKING SLAB LOCATION.

TYP. REINFORCING SECTION

CURB DETAIL

NOTES:

1. CONCRETE STRENGTH: 4000 PSI.
2. STEEL REINFORCING: ASTM A615 GRADE 60
3. CLEAR COVER REQUIREMENTS:
   a. 3.0" IF CAST AGAINST EARTH
   b. 2.0" ALL OTHER SURFACES
4. USE CRSI STANDARD HOOK DETAILS UNLESS OTHERWISE SHOWN.

LICENSED PROFESSIONAL STRUCTURAL ENGINEER
No. 6425934
JEFFREY
SCOTT
MEHLE
STATE OF UTAH

NO.	REVISION	DATE

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION

TEMPORARY WORKS
REINFORCEMENT

PROJ.:	14600 SOUTH - RAILROAD CROSSING
CONTRACTOR:	PETRUCCO USA
MADE BY: ABG	CHECK BY: JSM
DATE: 2024-09-20	SHEET: TW-02

C:\Users\Alex\My Drive\PUSA Bluffdale\5 - CAD\MBJ_BLUFFDALE_TEMP WORKS_100p_REV1.dgn

3. CALCULATIONS

1. Design forces for temporary works design

Soil Parameters — Refer to geotechnical report, Test holes 23-TH-08_PZ thru 23-TH-10_PZ

$\gamma := 125\ pcf$ $\phi := 30\ deg$ Geotech Report Table 5: Railroad Undercrossing Box Culvert

$k_0 := 1 - \sin(\phi) = 0.5$ $k_p := \frac{(1+\sin(\phi))}{(1-\sin(\phi))} = 3$ At rest/passive earth pressure coefficient

Friction parameters for box slide

$\mu_{cc} := 0.80$ Concrete on concrete with smooth trowel finish (bond breaking)

$\mu_{csw} := \tan\left(\frac{2 \cdot \phi}{3}\right) = 0.36$ Concrete walls on silty sand (matches Table 3.11.5.3-1 1 AASHTO)

$\mu_{csb} := 0.5$ Bottom slab on stiff clay (matches Table 3.11.5.3-1 AASHTO)

$\mu_{ca} := 0.25$ Concrete on steel with rollers (empircal, conservative)

Box Geometry and weight of elements supported by box during jacking

$q_{rr} := (4 \cdot 200\ plf + 120\ pcf \cdot 27\ ft^2) \cdot 57\ ft = 230\ kip$ Track, ties, ballast weight

$q_{bridge} := 71\ kip \div 2 = 36\ kip$ Temporary bridge (ea. box, RISA mat. take-off)

$Q_l := 0\ kip$ No live load during jacking (box is static under active traffic)

$H := 24.5\ ft$ $B := 51\ ft$ $L := 155\ ft$ Box height, width and length for friction

$\gamma_c := 150\ pcf$ Unit weigth of concrete

$A_{XS} := 465\ ft^2$ Cross sectional area (ea box, no concurrent jacking assumed)

$W_{box} := \gamma_c \cdot A_{XS} \cdot L = 10811\ kip$ Weight of ea. concrete box

Required Jacking force

Friction forces acting on top slab $F_{ts} := \mu_{ca} \cdot (q_{rr} + q_{bridge}) = 66\ kip$ (final pos.)

Friction forces acting on both walls

Initial push $F_{i_w} := 0\ kip$ No wall friction

Final push $F_{f_w} := \mu_{csw} \cdot \frac{1}{2} \cdot k_0 \cdot \gamma \cdot L \cdot H^2 = 1058\ kip$ (Each side)

Friction forces acting on bottom slab

Initial push $F_{i_bs} := \mu_{cc} \cdot W_{box} = 8649\ kip$

Final push $F_{f_bs} := \mu_{csb} \cdot (W_{box} + q_{rr} + q_{bridge}) = 5539\ kip$

Passive earth resistance acting at box tip

$A_c := 3\ ft \cdot B = 153\ ft^2$ Area of bottom slab at box tip (projected)

Final push $F_{f_f} := 50\% \cdot k_p \cdot \left(\frac{\gamma \cdot H}{2}\right) \cdot A_c = 351\ kip$ Empirical

Total jakcing force required

Initial push $F_{i_tot} := 2 \cdot F_{i_w} + F_{i_bs} = 8649\ kip$

Final push $F_{f_tot} := F_{ts} + 2 \cdot F_{f_w} + F_{f_bs} + F_{f_f} = 8073\ kip$

$F_{Sjack} := \max(F_{i_tot}, F_{f_tot}) = 8649\ kip$ Service design jacking force

$F_{Djack} := 1.4 \cdot F_{Sjack} = 12109\ kip$ Factored design jacking force (Group I)

$C_{jack} := 30 \cdot 200\ tonnef = 13228\ kip$ Jacking capacity

$check := \text{if}\left(\frac{C_{jack}}{F_{Sjack}} > 1.5, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $\frac{C_{jack}}{F_{Sjack}} = 1.5$

2. Global stability of slab, Thrust Block, & Embankment

Parameters — Jacking is performed 65' away from thrust block - All block is engaged

Slab dim.	$h_{slab} := 2.67\ ft$	$w_{slab} := 100\ ft$	$L_{slab} := 264\ ft$
Thrust block	$H_{block} := 23.58\ ft$	$w_{block} := 100\ ft$	$L_{jack} := 13.78\ ft$
	$b := 0\ ft$	$c := 0\ ft$	$\phi_{ef} := \phi = 30\ deg$

$k_p := 15$ Coefficient of passive pressure for a 2H:1V sloped backfill AASHTO BDS Figure 3.11.5.4-2

$$P_p := \frac{1}{2} \cdot 0.467 \cdot k_p \cdot \gamma \cdot {H_{block}}^2 \cdot w_{block} = 24343\ kip$$

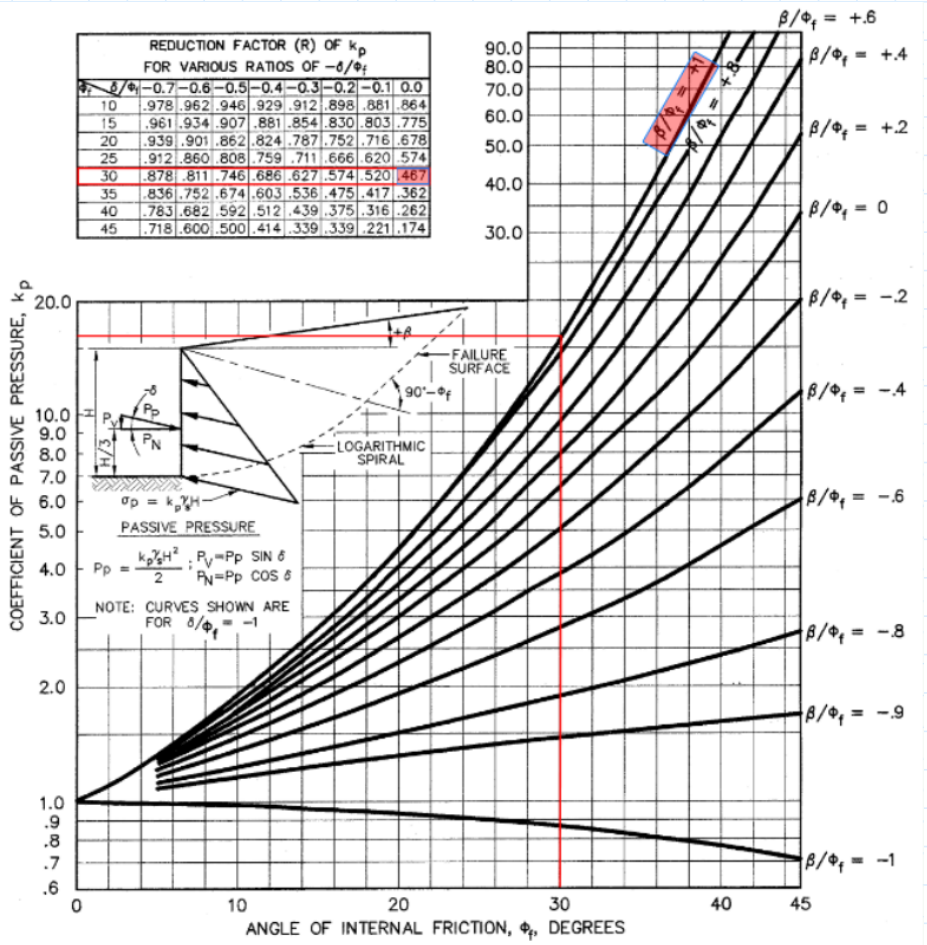
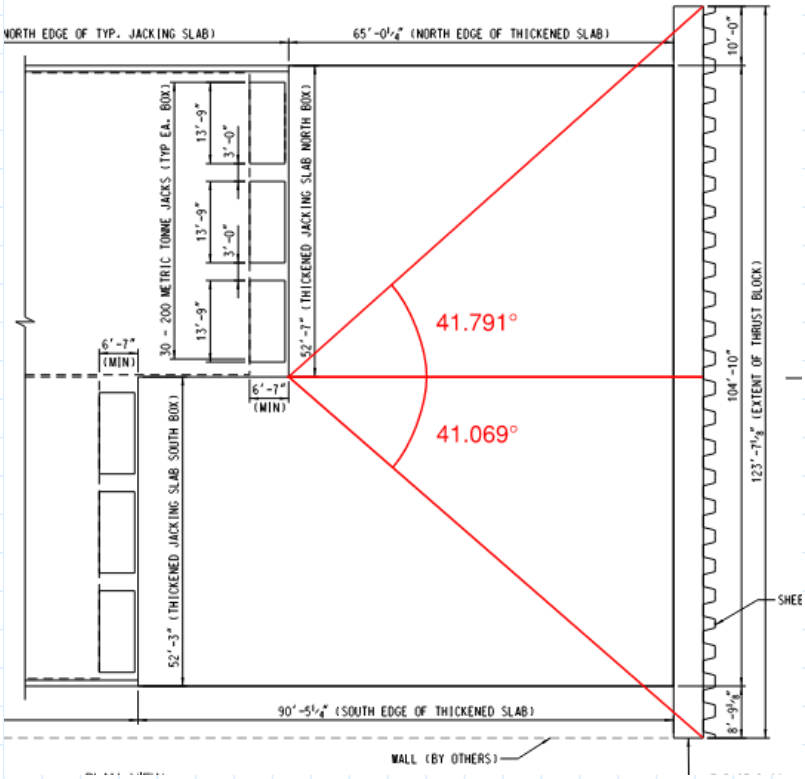


Figure 3.11.5.4-2—Computational Procedures for Passive Earth Pressures for Vertical Wall with Sloping Backfill (U.S. Department of the Navy, 1982a)



Case 1: Initial Jacking (Box On Slab)

$P_{jack1} := F_{i_tot} = 8649\ kip$

$T_{slab1} := \tan\left(\frac{2}{3}\ \phi_{ef}\right) \cdot 150\ pcf \cdot 2.67\ ft \cdot w_{slab} \cdot 65\ ft = 948\ kip$ (No direct jacking against TB)

$F_{soil1} := P_{jack1} - T_{slab1} = 7701\ kip$ (No direct jacking against TB)

$FS_1 := \frac{P_p}{F_{soil1}} = 3.16$ Factor of safety

$check := \text{if}\left(FS_1 \geq 2, \text{“OK”}, \text{“NG”}\right)$ $check = \text{“OK”}$ Ch. 8 Art. 3.5.3

Case 2: Jacking Permanent Box When Clear of the Jacking Slab

Check passive soil resistance

$P_{jack2} := F_{f_tot} = 8073\ \textbf{kip}$

Jacking force is reduced to account for friction on slab and thrust block (conservative)

$T_{slab2} := \tan\left(\frac{2}{3}\,\phi_{ef}\right) \cdot 150\ \textbf{pcf} \cdot 2.67\ \textbf{ft} \cdot w_{slab} \cdot 190\ \textbf{ft} = 2770\ \textbf{kip}$

$F_{TB} := \tan\left(\frac{2}{3}\,\phi_{ef}\right) \cdot 150\ \textbf{pcf} \cdot H_{block} \cdot w_{block} \cdot 6\ \textbf{ft} = 772\ \textbf{kip}$

$F_{soil2} := P_{jack2} - T_{slab2} - F_{TB} = 4531\ \textbf{kip}$

Provide FS >2 for passive soil resistance per AREMA Ch. 8 Part 3.5.3

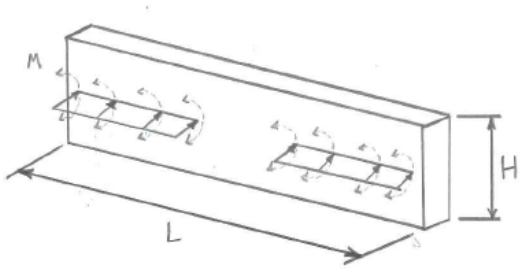
$FS_2 := \frac{P_p}{F_{soil2}} = 5.37$

$check := \textbf{if}\left(FS_2 \geq 2, \text{“OK”}, \text{“NG”}\right)$ $check = \text{“OK”}$ Ch. 8 Art. 3.5.3

3. Thrust Block Vertical Flexural Demand

Concrete and rebar properties $f_c' := 4\ ksi$ $f_y := 60\ ksi$

$L_{block} := w_{block} = 100\ ft$ $LF := 1.4$



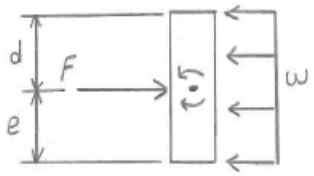
$F_{Djack} = 12109\ kip$

$w := \frac{F_{Djack}}{H_{block} \cdot L_{block}} = 5.1\ ksf$ (Factored)

$w' := w \cdot 1\ ft = 5.1\ klf$ Unit width distributed load

Moment About Jacking Line

Free Body Diagram



$d := \frac{H_{block}}{2} = 11.79\ ft$ $H_{block} = 23.58\ ft$

$M_s := \frac{w' \cdot d^2}{2 \cdot LF} = 255\ kip \cdot ft$ Service

$M_u := LF \cdot M_s = 357\ kip \cdot ft$ Load factor design

Thrust Block Parameters

$d_{block} := 5\ ft$ $b_w := 1\ ft$ Depth, width $cover := 3\ in$ $E_s := 29000\ ksi$

$A_{s_tb} := \frac{1\ in^2}{6\ in} = 2\ in^2 \div ft$ **Use #9 @ 6 in for vertical reinf. (soil side)**

$d_b := 9 \div 8 \cdot in$ Reinforcement parameters

$d := d_{block} - cover - 0.5 \cdot d_b = 56.4\ in$

$E_c := (150)^{1.5} \cdot 33 \cdot \sqrt{f_c'} \cdot \sqrt{psi} = 3834\ ksi$ Article 2.23.4

Nominal Strength (AREMA Ch. 8 Art. 2.32.2)

$\phi := 0.9$ Article 2.30.2

$\rho_b := \frac{0.85^2 \cdot f_c'}{f_y} \cdot \left(\frac{87000\ psi}{87000\ psi + f_y} \right) = 2.9 \cdot 10^{-2}$ $\rho := \frac{A_{s_tb}}{d_{block}} = 2.8 \cdot 10^{-3}$ $\frac{\rho}{\rho_b} = 0.1$ Check OK

$T := A_{s_tb} \cdot b_w \cdot f_y = 120\ kip$ $a := \frac{T}{0.85 \cdot f_c' \cdot b_w} = 2.94\ in$

$M_n := A_{s_tb} \cdot b_w \cdot f_y \cdot \left(d - \frac{a}{2} \right) = 550\ kip \cdot ft$ $\phi \cdot M_n = 495\ kip \cdot ft$

$\text{if}\left(\phi \cdot M_n \geq M_u, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $\frac{M_u}{\phi \cdot M_n} = 0.72$

Check Reinforcing Steel Yielded at ultimate

$\beta := 0.85$ $c_1 := \frac{a}{\beta} = 3.46\ in$ $\varepsilon_t := 0.003 \left(\frac{d - c_1}{c_1} \right) = 0.05$ $\text{if}\left(\varepsilon_t > 0.005, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$

Stress In Reinforcing Steel at (service level stress)

$n := \frac{E_s}{E_c} = 7.56$ $\rho := \frac{A_{s_tb}}{d_{block}} = 2.78 \cdot 10^{-3}$

$k := \sqrt{2 \cdot n \cdot \rho + (n \cdot \rho)^2} - n \cdot \rho = 0.19$ $j := 1 - \frac{k}{3} = 0.94$

$f_s := \frac{M_s}{A_{s_tb} \cdot b_w \cdot j \cdot d} = 28.9\ ksi$ Even if larger than 24 ksi, considered acceptable given temporary nature of jacking works (reduced number of cycles)

$\text{if}\left(f_s \leq 0.6 \cdot f_y, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $\frac{f_s}{0.6 \cdot f_y} = 0.8$

Thrust Block Distr. of Reinforcement (AASHTO 5.7.2.5 and AREMA Ch. 8 Section 2.8)

$\lambda := 1$ $s := 12\ in$

$A_{vMin} := 0.0316 \cdot \lambda \cdot \sqrt{\frac{f_c'}{0.7} \cdot ksi}\ \frac{b_w \cdot s}{f_y \div 0.85} \cdot \frac{1}{ft} = 0.2\ \frac{in^2}{ft}$

$s_{max} := min\left(1.5\ d, 18\ in\right) = 18\ in$

Temperature and Shrinkage (AASHTO 5.10.6 and AREMA Ch. 8 Section 2.12)

$$A_s := \frac{1.30 \cdot d_{block} \cdot H_{block}}{2 \cdot (d_{block} + H_{block}) \cdot f_y} \cdot \frac{ksi}{in} \cdot \frac{in^2}{ft} = 0.54 \ \frac{in^2}{ft}$$

$$A_{sReq} := \max(A_{vMin}, A_s) = 0.54 \ \frac{in^2}{ft}$$ *Controls

$$\frac{A_{sReq}}{d_{block}} = 7.45 \cdot 10^{-4}$$

$$A_v := \frac{0.44 \ in^2}{9 \ in} = 0.59 \ \frac{in^2}{ft}$$

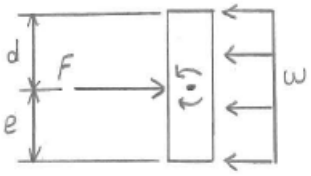
Use #6 @ 9 in ea face, ea direction

$$H_{block} = 23.58 \ ft$$

$$d_{block} = 5 \ ft$$

4. Thrust Block Vertical Shear Demand

Free Body Diagram

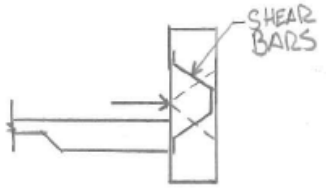


$LF = 1.4$ $\quad V_u := w' \cdot d = 24.15\ kip$

$b_v := 1\ ft$ $\quad d_b := 1.128\ in$ $\quad cover = 3\ in$

$d_e := d_{block} - cover - .5 \cdot d_b = 56.44\ in$

$d_v := \max\left(0.9 \cdot d_e, 0.72 \cdot d_{block}\right) = 50.79\ in$



Shear Capacity (AREMA Ch. 8 Section 2.35)

$\phi := 0.85$ Sect. 2.30.2 $\quad M_u = 356.9\ kip \cdot ft$ $\quad V_u = 24.15\ kip$

$E_s = \left(2.9 \cdot 10^4\right)\ ksi$ $\quad \alpha := 45\ deg$ $\quad f_c' = 4\ ksi$

$v_u := \dfrac{V_u}{\phi \cdot b_v \cdot d_v} = 46.62\ psi$ Factored shear stress per Section 2.35.1 a

Permissible shear stress per 2.35.2 $\quad \rho = 2.78 \cdot 10^{-3}$ Long. reinf.

$v_c := min\left(1.9 \cdot \sqrt{f_c' \cdot psi} + 2500 \cdot \rho \cdot min\left(V_u \cdot \dfrac{d_v}{M_u}, 1\right) psi, 3.5 \cdot \sqrt{f_c' \cdot psi}\right) = 122.16\ psi$

$v_{cmax} := 2 \cdot \sqrt{f_c' \cdot psi} = 126.49\ psi$ Section 2.35.6d Special provisions for slabs

$v_{umax} := 6 \cdot \sqrt{f_c' \cdot psi} = 379.47\ psi$ Section 2.35.6d Special provisions for slabs

Shear reinf. is not required by code. Since it is included as a shear friction reinf., additional capacity is computed below per 2.35.3:

$A_v := 0.31\ \dfrac{in^2}{18\ in} = 0.21\ \dfrac{in^2}{ft}$ **Use 4 sets of #5 @ 18"**

$v_s := \dfrac{A_v \cdot f_y}{b_v \cdot (\sin(\alpha) + \cos(\alpha))} = 60.89\ psi$ Inclined stirrups EQ 2-51

$v_{smax} := 8 \cdot \sqrt{f_c' \cdot psi} = 505.96\ psi$ Section 2.35.3 (e)

$v_c + v_s = 183.05\ psi$

$\dfrac{v_u}{(v_c + v_s)} = 0.25$ Shear Check OK

Shear Friction at optional construction joints (AREMA Ch. 8 Section 2.36)

$\mu := 0.6$ Optional concrete joints below and above slab $\phi = 0.85$

$A_{vf} := \frac{V_u}{\phi \cdot f_y \cdot \mu} = 0.79\ in^2$ Vertical reinf. required to transfer shear at joints.

$A_{vert.prov} := \frac{0.44\ in^2}{9\ in} + \frac{1\ in^2}{6\ in} = 2.59\ \frac{in^2}{ft}$ #6 @ 9" and #9 @ 6" provided, check ok

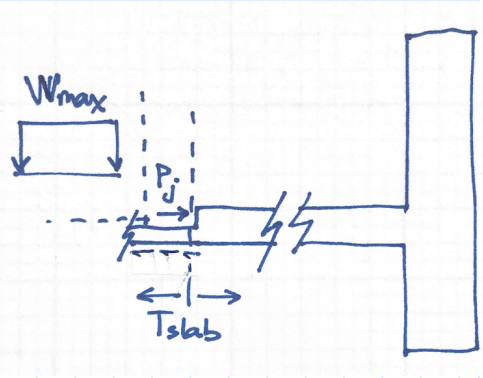
$A_{vf} := \frac{V_u}{\phi \cdot f_y \cdot (\mu \cdot \sin(\alpha) + \cos(\alpha))} = 0.42\ in^2$ Inclined reinf. req'd to transfer shear at joints (without considering long. rebar)

$A_{incl.prov} := 0.31\ \frac{in^2}{18\ in} = 0.21\ \frac{in^2}{ft}$ #5 @ 18" provided, in combination with vert. reinf. considered appropriate

5. Jacking slab longitudinal demand

Jacking Slab Tension Demands at Jacking location

Service tension on slab at initial jacking (includes a reduced friction between slab and soil underneath)



$$t_{slab} := \frac{(\mu_{cc} - 0.25) \cdot F_{Sjack}}{52.25\ ft} = 91.0\ \frac{kip}{ft}$$

Required Slab Reinforcing at jacking location

$$A_s := \frac{t_{slab}}{0.6 \cdot f_y} = 2.53\ \frac{in^2}{ft}$$ Area of long. steel required with a working tension of 60% fy

$A_{bar} := 3 \cdot 0.44\ in^2$ $s := 6\ in$ **Use 2-#6 @ 6" top and #6 @ 6" bottom**

$$A_{sp} := \frac{A_{bar}}{s} = 2.640\ \frac{in^2}{ft}$$ Area of steel provided $A_s \div A_{sp} = 0.96$

$d_{bar} := 0.75\ in$

The rebar demand decreases linearly as the box is jacked out of the footprint of the slab. Additionally, a wider surface of the 1-ft deep slab is engaged as the box is jacked.

Required Slab Reinforcing 36.75ft from thickened slab

The box starts exiting the slab after 16 ft of jacking. Weight on slab is reduced proportionally. The slab behind the box engaged increases at a 45 deg angle (conservative)

$$t_{slab'} := \frac{(175 - (36.75 - 16))\ ft}{175\ ft} \cdot \frac{52.25\ ft}{76.5\ ft} \cdot t_{slab} = 54.8\ kip \div ft$$

$$A_s := \frac{t_{slab'}}{0.6 \cdot f_y} = 1.52\ \frac{in^2}{ft}$$ Area of steel req.

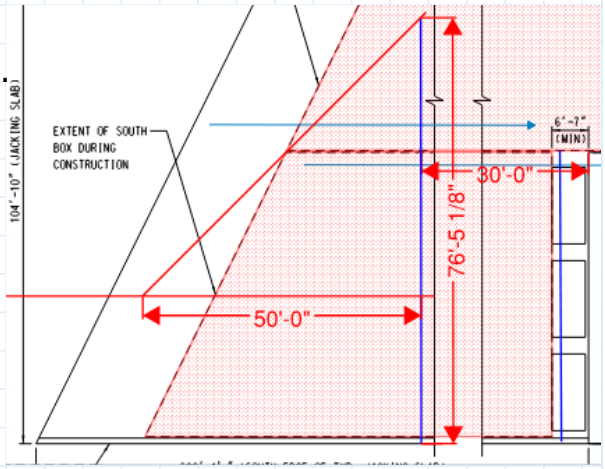
Use #6 @ 6 in top and bottom

$d_{bar} := 0.75\ in$ $A_{bar} := 2 \cdot 0.44\ in^2$

$s := 6\ in$

$A_{sp} := A_{bar} \div s = 1.760\ in^2 \div ft$

Area of steel provided $A_s \div A_{sp} = 0.87$



Required Slab Reinforcing 73.5ft from thickened slab

The box starts exiting the slab after 16 ft of jacking. Weight on slab is reduced proportionally. The slab behind the box engaged increases

$t_{slab'} := \frac{(175 - (73.5 - 16))\ ft}{175\ ft} \cdot \frac{52.25\ ft}{76.5\ ft} \cdot t_{slab} = 41.8\ kip \div ft$ $A_s := \frac{t_{slab'}}{0.6 \cdot f_y} = 1.16\ \frac{in^2}{ft}$

Use #6 @ 9 in top and bottom $A_{bar} := 2 \cdot 0.44\ in^2$ $s := 9\ in$

$d_{bar} := 0.75\ in$ $d_c := cover + 0.5 \cdot d_{bar} = 8.57\ cm$

$A_{sp} := \frac{A_{bar}}{s} = 1.173\ \frac{in^2}{ft}$ Area of steel provided $\frac{A_s}{A_{sp}} = 0.99$

Required Slab Reinforcing 110.25ft from thickened slab

The box starts exiting the slab after 16 ft of jacking. Weight on slab is reduced proportionally. The slab behind the box engaged increases

$t_{slab'} := \frac{(175 - (110.25 - 16))\ ft}{175\ ft} \cdot \frac{52.25\ ft}{76.5\ ft} \cdot t_{slab} = 28.7\ kip \div ft$ $A_s := \frac{t_{slab'}}{0.6 \cdot f_y} = 0.8\ \frac{in^2}{ft}$

Use #6 @ 12 in top and bottom $A_{bar} := 2 \cdot 0.44\ in^2$ $s := 12\ in$

$d_{bar} := 0.75\ in$ $d_c := cover + 0.5 \cdot d_{bar} = 8.57\ cm$

$A_{sp} := \frac{A_{bar}}{s} = 0.880\ \frac{in^2}{ft}$ Area of steel provided $\frac{A_s}{A_{sp}} = 0.91$

6. Jacking slab transverse reinf. design

Min Reinforcement (AASHTO 5.7.2.5) **Controls*

$\lambda := 1$ $s := 9\ in$ $d_{v1} := 9\ in$ $A_{vMin} := 0.0316 \cdot \lambda \cdot \sqrt{\frac{f_c'}{0.7} \cdot ksi}\ \frac{b_w \cdot s}{f_y \div 0.85} \cdot \frac{1}{ft} = 0.12\ \frac{in^2}{ft}$

$s_{max} := min\left(1.5\ d_{v1}, 18\ in\right) = 13.5\ in$

Temperature and Shrinkage (AASHTO 5.10.6)

$h_{slab1} := 1\ ft$ $L_{slab1ft} := 200\ ft$

$A_s := \frac{1.30 \cdot h_{slab1} \cdot L_{slab1ft}}{2 \cdot \left(h_{slab1} + L_{slab1ft}\right) \cdot f_y \div 0.85} \cdot \frac{ksi}{in} \cdot \frac{in^2}{ft} = 0.11\ \frac{in^2}{ft}$

$A_{sReq} := \max\left(A_{vMin}, A_s\right) = 0.12\ \frac{in^2}{ft}$ $A_v := \frac{0.2\ in^2}{9\ in} = 0.3\ \frac{in^2}{ft}$ **Use min #4 @ 9in ea face, ea direction**

7. Thickened slab transverse reinf. design

Min Reinforcement (AASHTO 5.7.2.5)

$\lambda := 1$ $s := 9\ in$ $d_{v1} := 2.42\ ft$ $A_{vMin} := 0.0316 \cdot \lambda \cdot \sqrt{\frac{f_c'}{0.7} \cdot ksi}\ \frac{b_w \cdot s}{f_y \div 0.85} \cdot \frac{1}{ft} = 0.12\ \frac{in^2}{ft}$

$s_{max} := min\left(1.5\ d_{v1}, 18\ in\right) = 18\ in$

Temperature and Shrinkage (AASHTO 5.10.6) **Controls*

$h_{slabT} := 2.67\ ft$ $L_{slabT} := 65\ ft$

$A_s := \frac{1.30 \cdot h_{slabT} \cdot L_{slabT}}{2 \cdot \left(h_{slabT} + L_{slabT}\right) \cdot f_y \div 0.85} \cdot \frac{ksi}{in} \cdot \frac{in^2}{ft} = 0.28\ \frac{in^2}{ft}$

$A_{sReq} := \max\left(A_{vMin}, A_s\right) = 0.28\ \frac{in^2}{ft}$ $A_v := \frac{0.31\ in^2}{9\ in} = 0.41\ \frac{in^2}{ft}$ **Use min #5 @ 9in ea face, ea direction**

8. Thickened Slab Compression demands at Jacking location

Design axial load strength per AREMA Ch. 8 Section 2.33.2

$\phi P_O := 0.70 \cdot 0.85 \cdot f_c' \cdot 52.25\ ft \cdot 2.67\ ft = 47812\ kip$ Only area behind one underpass str.

$F_{Djack} \div \phi P_O = 0.25$ Check OK

$0.70 \cdot 0.85 \cdot f_c' = \left(2.38 \cdot 10^3\right)\ psi$

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION®

CONNECTICUT
44 Pond Road
Old Saybrook, CT 06475
tel 860 388 2267

COLORADO
565 Burbank Street, Suite A
Broomfield, CO 80020
tel 303 450 6900

FLORIDA
10014 N. Dale Mabry Hwy,
Suite 222
Tampa, FL 33618
tel 813 609 4616

www.mcnarybergeron.com

TEMPORARY WORKS PACKAGE
MICROPILE CAP DESIGN

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

PREPARED FOR: City of Bluffdale
In conjunction with Petrucco USA, LLC

SUBMITTED: 10/17/2024
Revision 2: 5/28/2025



TEMPORARY WORKS PACKAGE
MICROPILE CAP DESIGN

14600 SOUTH-RAILROAD CROSSING
BLUFFDALE, UT

PREPARED FOR: City of Bluffdale
In conjunction with Petrucco USA, LLC

SUBMITTED: 10/17/2024
Revision 2: 5/28/2025

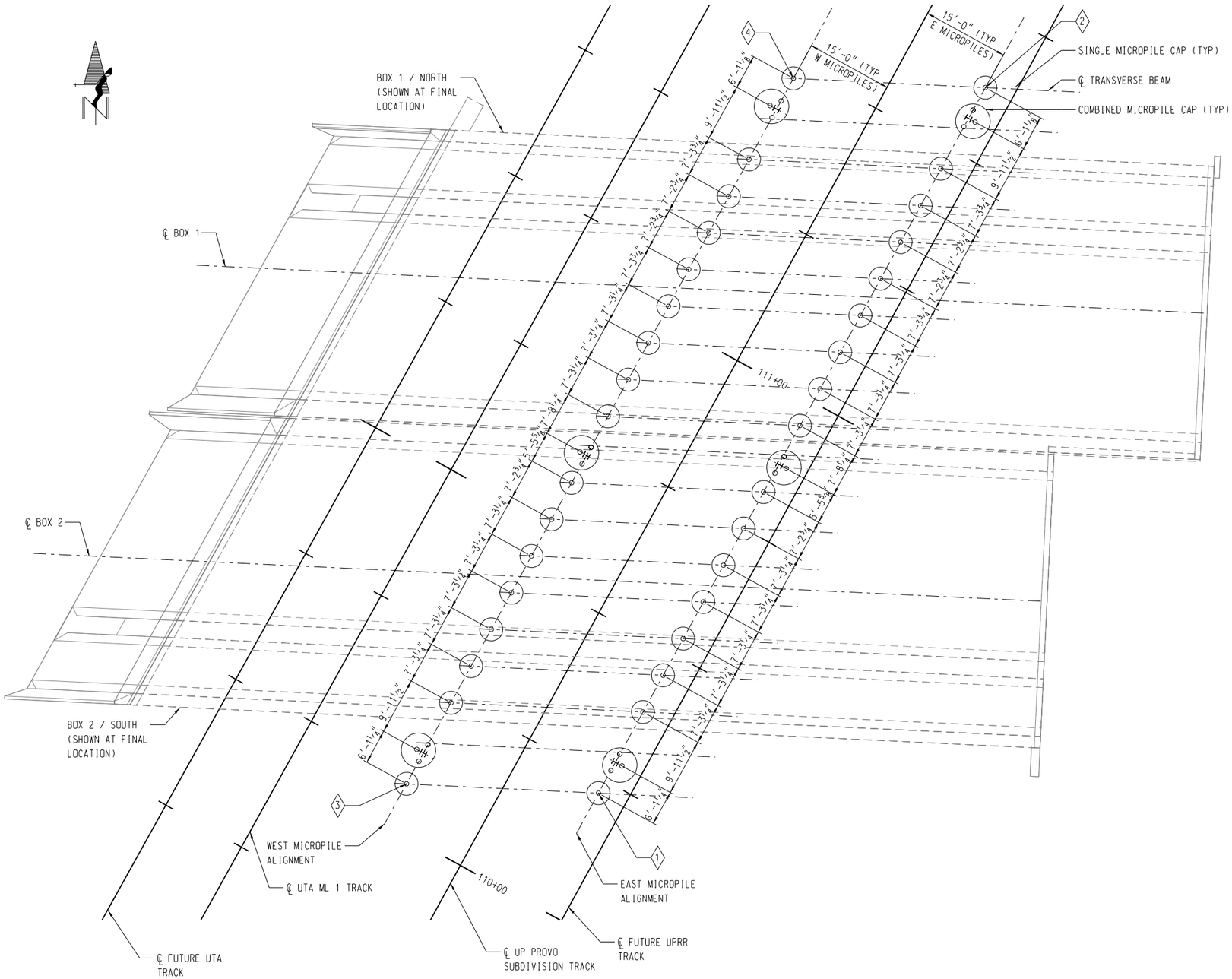
Contents

1. SUMMARY 3
2. DRAWINGS 3
3. CALCULATIONS 6

1. SUMMARY

This submittal contains drawings and design calculations for the concrete micropile cap to support the temporary bridge “Verona system”. The reinforcing concrete elements are design are per AREMA Manual of Railway Engineering.

2. DRAWINGS



MATERIALS

1. CONCRETE: CLASS A f'c = 3,000 PSI
2. REINFORCING STEEL: ASTM A615 GRADE 60

DESIGN LOADS

CONCRETE UNIT WEIGHT: 150 PCF
STEEL UNIT WEIGHT: 490 PCF
LIVE LOAD: COOPER E80 (60 MPH) IN AGREEMENT WITH AREMA MRE

CAP CONSTRUCTION PROCEDURES

1. INSTALL STEEL PIPE CASING FOR SUPPORT OF EXCAVATION (OPTIONAL) (DESIGN BY OTHERS).
2. INSTALL MICROPILES (DESIGN BY OTHERS). SEE MICROPILE CAP DETAILS FOR ELEVATION OF TOP OF MICROPILE AND MINIMUM EMBEDMENT INTO CAP REQUIREMENTS.
3. VERIFY TOP OF BOX ELEVATION AND T.O.R. ELEVATION FOR CONFIRMATION OF TOP OF CAP ELEVATION.
4. PROVIDE REFERENCE OF LOCATION OF MICROPILE AT TOP OF CAP (PROTRUSION) PRIOR TO PLACEMENT OF CONCRETE.
5. INSTALL REINFORCING CAGE AND PLACE CONCRETE PER CAP DETAIL SHEET.

LICENSED PROFESSIONAL STRUCTURAL ENGINEER
No. 6425934
JEFFREY
SCOTT
MEHLE
STATE OF UTAH

1. BEGIN EAST MICROPILE ALIGN.
STA 110+22.548
OFFSET 15.00 RT

2. END EAST MICROPILE ALIGN.
STA 114+62.303
OFFSET 15.00 RT

3. BEGIN WEST MICROPILE ALIGN.
STA 110+07.927
OFFSET 15.00 LT

4. END WEST MICROPILE ALIGN.
STA 114+47.682
OFFSET 15.00 LT

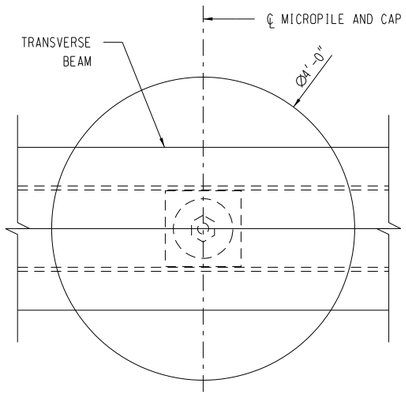
NO.	REVISION	DATE

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION®

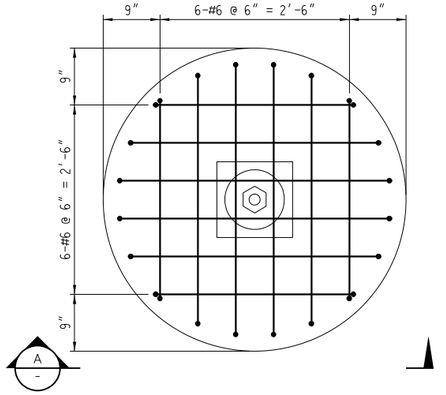
TEMPORARY WORKS
MICROPILE CAP LAYOUT

PROJ.:	14600 SOUTH - RAILROAD CROSSING		
CONTRACTOR:	PETRUCCO USA		
	MADE BY: ABG	CHECK BY: JSM	
DATE: 2024-10-17		SHEET: TW-F-01	

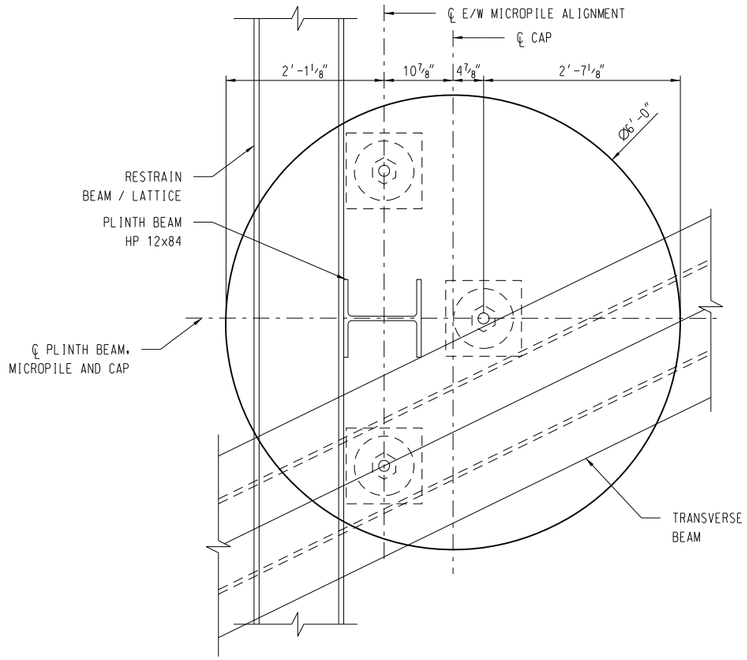
C:\Users\Alex\My Drive\PUSA Bluffdale\5 - CAD\MBJ_BLUFFDALE_MP CAP_100p_REV0.dgn



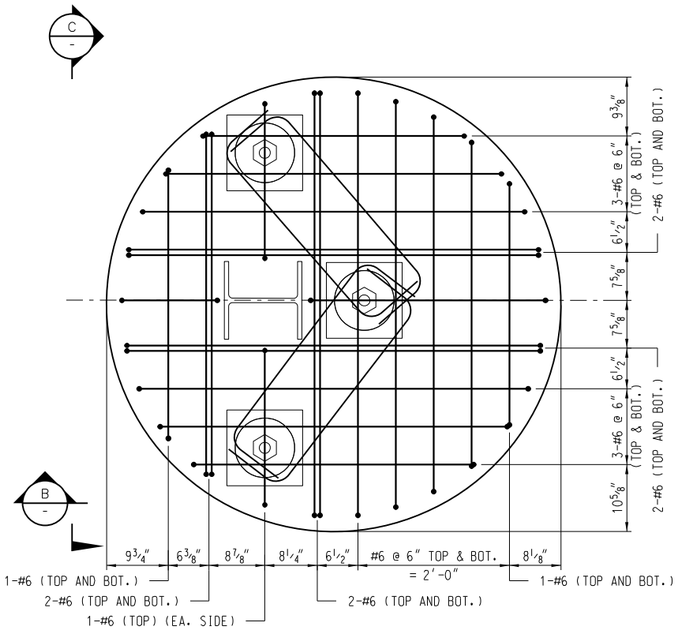
SINGLE MICROPILE CAP - PLAN



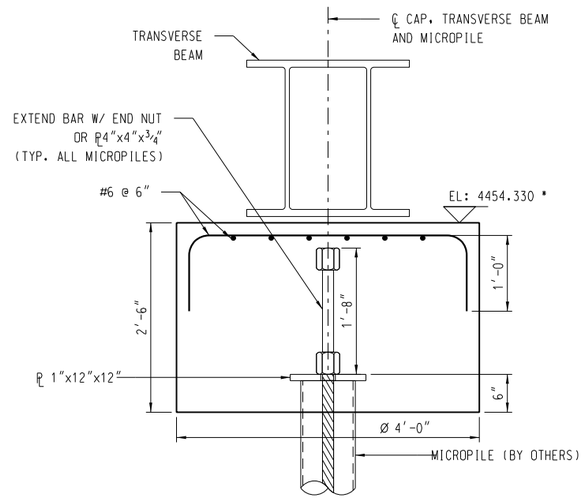
SINGLE MICROPILE CAP - REINFORCEMENT PLAN



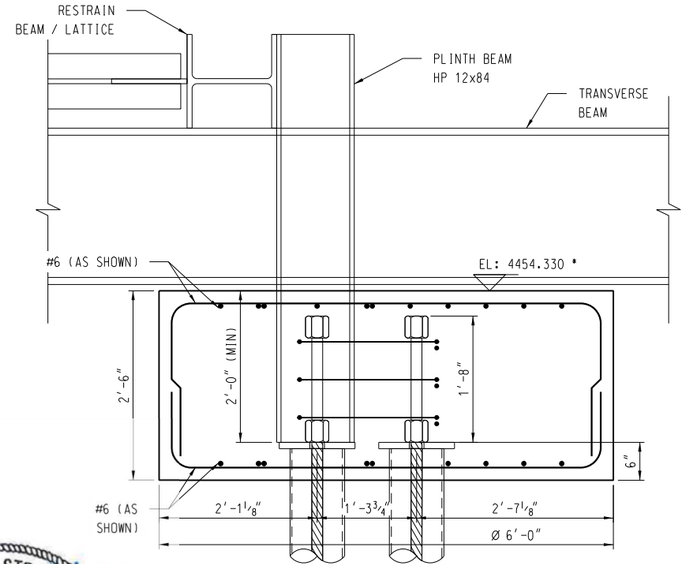
COMBINED MICROPILE CAP - PLAN



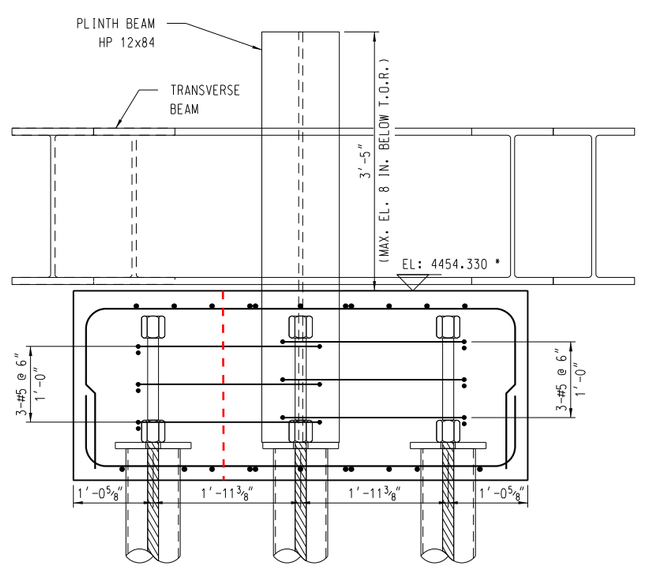
COMBINED MICROPILE CAP - REINFORCEMENT PLAN



SECTION A - REINFORCING



SECTION B - REINFORCING



SECTION C - REINFORCING

NOTES:

* TOP OF CAP ELEVATION COINCIDENT WITH TOP OF BOX. CONTRACTOR TO VERIFY PRIOR PLACEMENT OF CONCRETE.

LICENSED PROFESSIONAL STRUCTURAL ENGINEER
No. 6425934
JEFFREY SCOTT MEHLE
STATE OF UTAH

NO.	REVISION	DATE

MCNARY BERGERON & JOHANNESEN
ENGINEERED CONSTRUCTION®

TEMPORARY WORKS
MICROPILE CAP DETAILS

PROJ.:	14600 SOUTH - RAILROAD CROSSING
CONTRACTOR:	PETRUCCO USA
MADE BY: ABG	CHECK BY: JSM
DATE: 2024-10-17	SHEET: TW-F-02

C:\Users\Alex\My Drive\PUSA Bluffdale\5 - CAD\MBJ_BLUFFDALE_MP CAP_100p_REV0.dgn

3. CALCULATIONS

1. Input parameters

Material properties

$f'_c := 4\ ksi$ Concrete strength $f_y := 60\ ksi$ Rebar yield strength

Design forces

$P_s := 94\ kip$ Service vertical load per Verona system calculations - App. B (under separate cover)

$P_u := 194\ kip$ Factored vertical load per Verona system calculations - App. B (under separate cover)

$V_u := 46\ kip$ Factored shear load per Verona system calculations - App. B (under separate cover)

2. All pile caps - Bearing on concrete

Double W24x146 are placed on top of micropile caps using 300x700x10 mm (11.8"x27.5"x3/8") plywood sheets. Conservatively, assume a reduced contact area of 12"x12" at top of micropile cap (distance between wide flange webs). Connection of micropile cap to micropile is done through a 12"x12"x1" PL.

$A_c := 12\ in \cdot 12\ in = 144\ in^2$ 12"x12" surface contact area

fmax < 1.05 ksi

Allowable service load stress per AREMA Ch. 8 Section 2.26.1 $0.3 \cdot f'_c = 1.2\ ksi$

$f_b := P_s \div A_c = 0.65\ ksi$ $\text{if}\left(f_b \le 0.3 \cdot f'_c, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $f_b \div \left(0.3 \cdot f'_c\right) = 0.54$

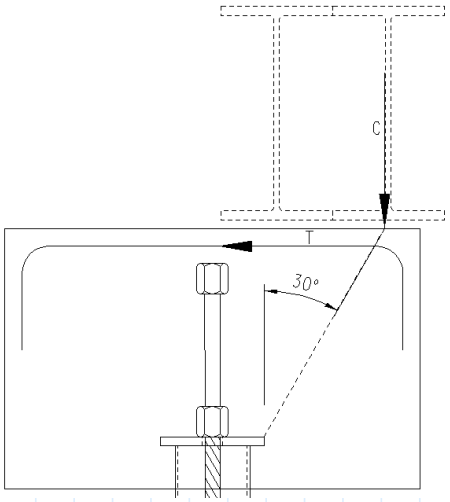
Fb / fmax = 0.62
OK

Design axial load strength per AREMA Ch. 8 Section 2.33.2

$\phi P_O := 0.70 \cdot 0.85 \cdot f'_c \cdot A_c = 343\ kip$

$\text{if}\left(P_u \le \phi P_O, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $P_u \div \phi P_O = 0.57$

3. Single pile cap - Top reinforcement



STM Check based on accidental eccentricty

$C := P_u = 194\ kip$ $T := C \cdot \tan(30\ deg) = 112\ kip$

$A_s := T \div f_y = 1.867\ in^2$

$A_p := 6 \cdot 0.44\ in^2 = 2.64\ in^2$ Provide 6-#6

$\text{if}(A_p \geq A_s, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $A_s \div A_p = 0.707$

Check of reinforcement for service load design per AREMA Ch. 8 Section 2.26.2

$f_{smax} := 24\ ksi$ Max stress limit for 60 ksi rebar per Section 2.26.2 a

Per STM above, using service loads: $C_s := P_s = 94\ kip$ $T_s := C_s \cdot \tan(30\ deg) = 54\ kip$

$f_s := T_s \div A_p = 20.6\ ksi$ $\text{if}(f_s \leq f_{smax}, \text{“OK”}, \text{“NG”}) = \text{“OK”}$ $f_s \div f_{smax} = 0.857$

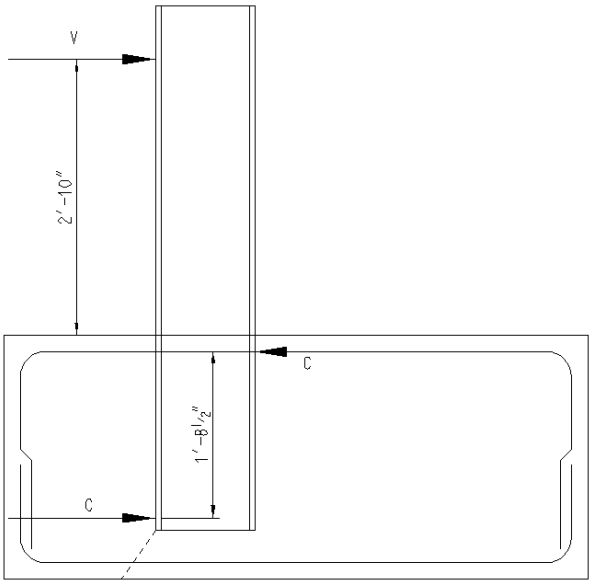
Fatigue limits are not checked due the limited number of cyclic loading during the weeks of box jacking. Ok by inspection.

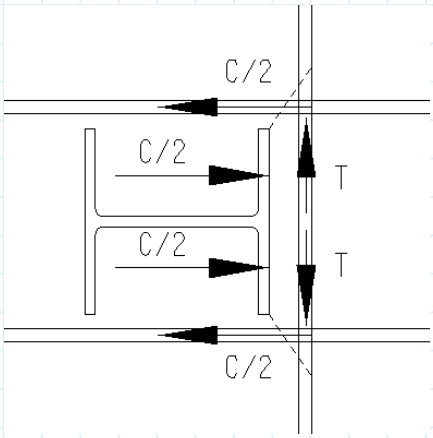
4. Combined pile cap - Top and bottom reinforcement

Using Load Factored Design, forces on rebar and concrete are obtained using a conservative STM based on full fixity of beam on pier cap.

$V_u = 46\ kip$ $e := 34\ in$ $M_u := V_u \cdot e$ Restraint moment at top of pile cap

$d := 20.5\ in$ $C := M_u \div d = 76\ kip$ Design compression force





Nominal Strength (AREMA Ch. 8 Art. 2.32.2)

Assuming all compression at the top of the cap is absorved by longitudinal in-plane rebar (conservative).

$A_p := 4 \cdot 0.44\ in^2 = 1.76\ in^2$ Provide 4-#6 (2 ea. side of beam)

$\phi := 0.9$ Article 2.30.2 $b_w := 12\ in$

$\rho_b := \frac{0.85^2 \cdot f'_c}{f_y} \cdot \left(\frac{87000\ psi}{87000\ psi + f_y} \right) = 0.029$ $\rho := \frac{A_p}{b_w \cdot d} = 0.007$ $\frac{\rho}{\rho_b} = 0.251$ Check OK

$T := A_p \cdot f_y = 105.6\ kip$ $a := \frac{T}{0.85 \cdot f'_c \cdot b_w} = 2.59\ in$

$M_n := A_p \cdot f_y \cdot \left(d - \frac{a}{2} \right) = 169\ kip \cdot ft$ $\phi \cdot M_n = 152.1\ kip \cdot ft$

$\text{if}\left(\phi \cdot M_n \geq M_u, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $M_u \div \left(\phi \cdot M_n\right) = 0.857$

Check of the rebar (out of plane / parallel to flange): $T := C \div 2 = 38\ kip$ Tension assumed equal to C/2 (45 deg strut)

$A_s := T \div f_y = 0.636\ in^2$

$A_p := 2 \cdot 0.44\ in^2 = 0.88\ in^2$ Provide 2-#6

$\text{if}\left(A_p \geq A_s, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $A_s \div A_p = 0.722$

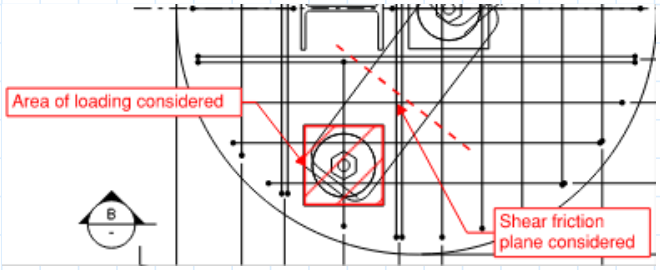
5. Combined pile cap - Shear friction between micropiles

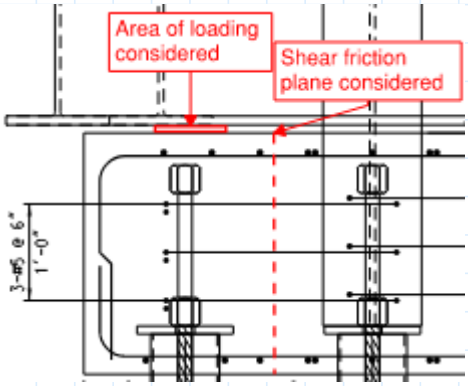
For the engagement of the ensemble of micropiles cast with the micropile cap, a shear friction check per Section 2.35.4 is provided). This assumes full factored vertical load applied over one micropile, and checks that the cap is designed to engage adjacent micropile.

$\mu := 1.4$ friction coefficient for concrete placed monolithically

$A_{vf} := 6 \cdot 0.31\ in^2 + 2 \cdot 4 \cdot 0.44\ in^2 = 5.38\ in^2$ 3 U shaped #5 btw micropiles + 8-#6 (top and bottom rebar in proximity)

$\phi V_{ni} := 0.85 \cdot \mu \cdot \left(A_{vf} \cdot f_y\right) = 384\ kip$ $\text{if}\left(\phi V_{ni} \geq P_u, \text{“OK”}, \text{“NG”}\right) = \text{“OK”}$ $P_u \div \phi V_{ni} = 0.505$





6. All caps - Min Reinforcement (AREMA Ch. 8 Section 2.12)

$As_req := 0.25\ in^2 \div ft$
$s_max := min\left(18\ in, 3 \cdot 30\ in\right) = 18\ in$

Exposed surface (top) of micropile caps uses #6 @ 6" $A_p := \dfrac{0.44\ in^2}{6\ in} = 0.88\ \dfrac{in^2}{ft}$ Check OK