SUBMITTAL FOR:

ORANGE AND ROCKLAND UTILITIES, INC.

PROJECT NO. B0043021
PORT JERVIS FORMER MGP SITE
SOURCE AREA EXCAVATION
PORT JERVIS, NY

EXCAVATION PROTECTION AND SUPPORT WORK PLAN
D-02205-002-B

SUBMITTED TO:
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SUBMITTED BY:

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AUGUST 15, 2012

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1.0 Overview

This submittal is intended to provide general information on the means, methods, and sequence of operations to be completed for the proper installation of the Excavation Protection System (EPS). This work plan is intended to supplement the *Excavation Support & Protection Re-design* (Re-Submittal D-02205-001-A dated August 3, 2012). The EPS task sequence includes but is not limited to the following:

- Delivery / Handling and Storage of Piling Equipment and Materials
- Pre-trenching/Pre-Spudding
- Management of Obstructions (removed by pre-drilling)
- Install Wale system.
- Install PZ-sheeting Sheeting
- Sheeting Installation Contingency Measures (as necessary)

2.0 Equipment & Materials Mobilization

DAC will establish primary access for the crane, as well as a staging area for sheeting pairs prior to driving operations. DAC will mobilize the following materials and equipment in order to properly execute pile driving operations:

Equipment (Reference Appendix A for Specification Sheets):

- 60-ton American crawler crane
- ICE 612 Vibratory Hammer
- ICE I-19 Diesel Impact Hammer

Materials (Reference Appendix B for Specification Sheets):

- (22) PZ-18 40’ L sheets (new)
- (75) PZ-18 40’ L sheets (stock)
- Corner connectors: New (2) PZ-90; PZT-S; (2) PZ-Tee; (2) COLT
- Wales Section Templates Cell # 1 and #2 will be delivered pre-fabricated.
- Associated stiffeners and accessories as detailed on Excavation Support Plan (Attachment A).

DAC will utilize a combination of new (22 pair) and stock (75) PZC-18 sheeting pairs (Cell # 1 – 70 pairs; Cell #2 – 27 pair). DAC stock sheets will be subject to inspection and acceptance by the Ryan Biggs Associates, P.C. such that the interlocks are in suitable condition, without discontinuities that may affect water tightness or the ability to drive vertical / plumb.

Watertight sealant: DAC will accept delivery of 40-foot long PZC-18 sheeting pairs (97 pairs). All PZC-18 sheets will be delivered during transit as seal-welded (common interlock) pairs with pre-applied DeNeef Swellseal. The sheeting pairs will be off-loaded with a rough terrain fork lift or adequately-sized loader with fork attachment and blocked up on dunnage. Pre-sealed sheeting pairs will be securely covered with tarpaulins/polyethylene in order to remain dry until installation. DAC will store all piling onsite in accordance with manufacturer's recommendations.

3.0 Surveying and Monitoring

A New York State licensed surveyor (Thew Associates) will perform the initial layout of the proposed wall alignment and control points provided in the contract drawings. The total scope includes:

- Initial and Progress Support Layout.

- Site Monitoring Plan Aspects(submitted under separate cover):

    - Vibration monitoring – Transmitted under separate submittal P-02205-002-A (July 25, 2012)
    - Deflection Monitoring – DAC will install tiltmeters on the sheetpile wall after the bracing has been installed, and prior to any excavation below elevation 429.5'. This will protect the tiltmeters from any potential damage that may be caused by bracing installation and welding. DAC will perform the routine monitoring and reporting of the tiltmeter data as specified.

4.0 Pre-Trenching/Pre-Spudding

Prior to installation of any sheeting, DAC will pre-trench the entire wall perimeter alignment to a depth of approximately five (5)-feet below ground surface (bgs) or elevation of 436'. DAC will follow with pre-spudding along the alignment to a minimal depth of elevation 396-feet. Pre-trenching/driving will be performed with the vibratory hammer only, using a suitably sized pile or beam from DAC stock. Pre-trenching/spudding will be performed to achieve either of two objectives:

A. Evaluate the expected driving conditions and clear the alignment of the sheetpile by driving through, dislodging, or breaking any obstructions encountered.

B. Create a record map of refusal areas and depths that will require the implementation of additional contingency measures.

5.0 Contingency Measures Prior to Sheetpile Installation

Upon completion of the pre-spudding effort, DAC will attempt to address the remaining refusal areas with the following measures.

1. Excavation / Removal: Where obstructions are identified at depths of 5'-8' below grade, DAC may attempt to excavate and remove the obstruction. Any excavation, breaking, removal or other measures would be performed in consultation with the Engineer. Excavation beyond the 8' depth can also be considered depending on the site conditions and Engineer approval.

2. Pre-Drilling: Where refusal areas are identified at depths >8', DAC may attempt to pre-drill the location in order to loosen, dislodge, break, or otherwise assess the cause of refusal. Pre-drilling (if necessary), will be performed by a subcontracted geotechnical driller. Due to the unknown demand for this service, DAC's proposal assumes all pre-drilling will be performed in one mobilization and includes a maximum of five (5) days of drilling services. DAC's subcontractor Hayward Baker will be mobilized to perform this task.

6.0 Sheeting Installation

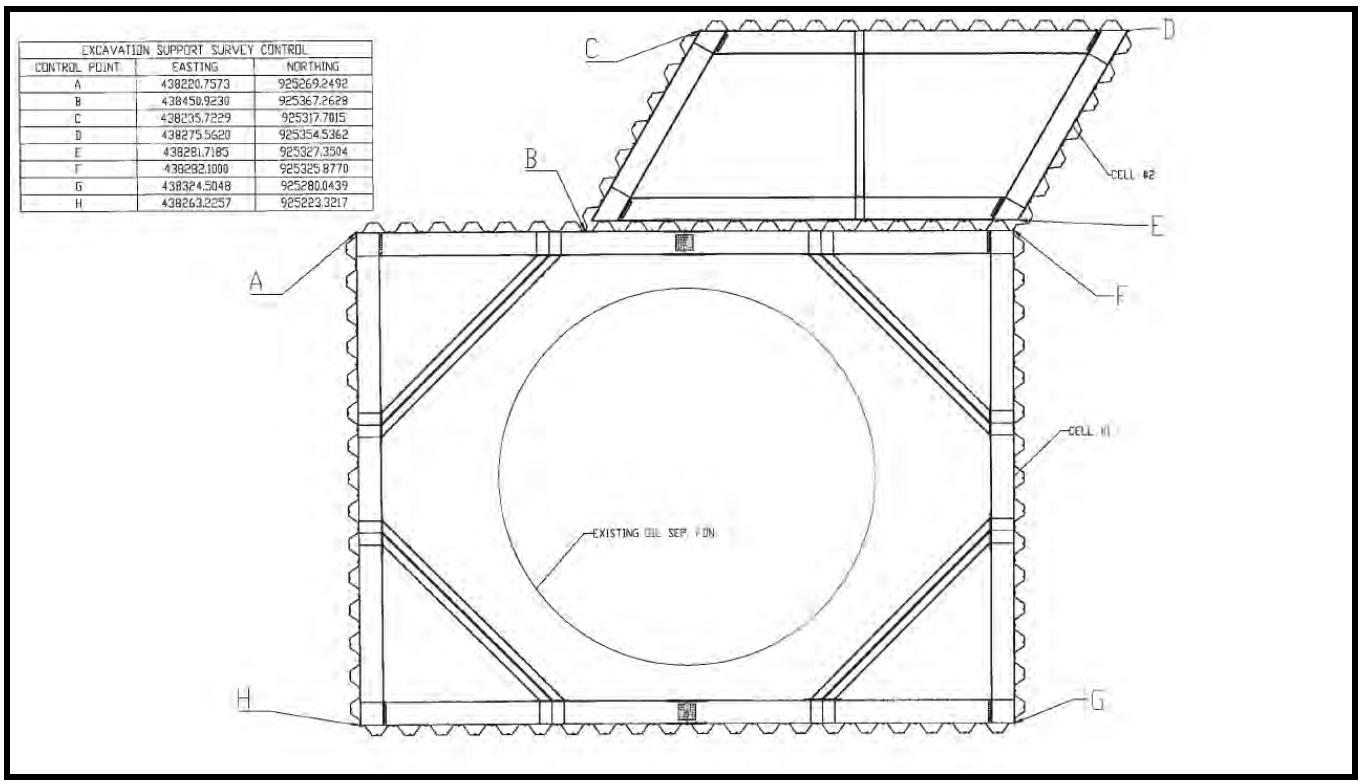
The excavation support system will be installed in conformance with the *Excavation Support & Protection Re-design, Drawings provided in Appendix C,* subject to Engineer Review.

The following driving sequence is planned, Reference Figure 1:

1. Pre-Trench and Pre-Spudding (as necessary) will be completed along the proposed Cell 1 and 2 alignments as discussed in Section 4.0. The wale template section placed in the pre-trench will serve as a guide for installation PZ-18 sheeting. Cell #1 and Cell #2 wale frames will be pre-fabricated in the DAC shop and delivered to the site.
2. Install Cell # 2 main wale template.
3. Install sheeting pairs to form Cell # 2 (from survey Point E working counterclockwise to Point B). Excavate localized deeper pits to install the wale to sheet bracing on 10' centers.
4. Install remaining Cell # 1 Wale Template.
5. Install sheeting to form Cell # 1. Excavate localized deeper pits to install the wale to sheet bracing on 10' centers.
6. Begin the excavation sequence in Cell # 2 to target elevation. The excavation and backfill sequence is described in Section 8.0.

Contingency measures during Sheeting Installation (Section 7.0) will be employed should obstructions be encountered. Excavation support drawings are included in Appendix C for reference.

Figure 1 – Excavation Support Plan View



7.0 Contingency Measures During Sheetpile Installation

Sheetpile will be installed primarily with the vibratory hammer. The impact hammer will be used as a contingency measure only. Where refusal is encountered, DAC may attempt one or more of the following contingency measures. Selection of the actual measure(s) attempted will depend on the site conditions and presumed cause for refusal.

1. Partial extraction and re-driving.
2. Complete extraction, following by additional pre-spudding.
3. Utilization of cutting shoes to protect the pile tips and/or improve penetration.
4. Realignment of the sheeting (as authorized by the Engineer).
5. Impact driving with the diesel hammer (ICE I-19). Note that this contingency should be used as a last resort on a temporary wall. Sheets driven in this manner are prone to damage and can also become permanently 'wedged' such that the sheet cannot be extracted by conventional means.

8.0 Excavation and Backfill Sequence

The excavation of the Holder A area will occur in two phases as detailed in the Holder A construction sequence on Drawing 7. The first phase will be the removal of the overlying soil and structure (if any) to elevation 430 'to facilitate the installation of the excavation support system. The following excavation backfill sequence is proposed:

- Excavate Cell # 2 to target elevation (~416.5') – with EPS fully installed (struts, bracing etc.)
- Backfill Cell # 2 to El. 430,
- Excavate Cell # 1 to target elevation (~ 416.5')
- Backfill Cell #1 to El.430
- Remove TFS structure
- Remove EPS struts, corner and sheeting bracing, extract sheets
- Backfill to final grade

The deeper excavation phase will occur once the sheetpile and bracing systems have been fully installed and the TFS is erected and operational. The same earthwork equipment will be utilized to perform the soil and structure removal during this phase, but the excavation approach will be more methodical due to the presence of the internal bracing system. The excavator will typically be located inside the sheetpile perimeter, excavating and feeding a support excavator that will be located on the 5-feet from top of the excavation 5' loading trucks. DAC will excavate Cell No. 2 to target elevation, backfill cell # 2 to elevation 430' and then move to the excavation of Cell No. 1.

Full depth excavation across a working face will also allow for an opportunity to blend wet and dry soils from various depths. If excavation dewatering and soil blending are not sufficient to achieve the requisite moisture content, DAC will amend the material with Lime Kiln Dust (LKD). LKD will be stored in DAC's on-site silo and can be conveyed to the work area by the loader or discharge auger.

The additional length of the TFS and the dual overhead doors will allow transport vehicles to enter the TFS along the King Street side of the work area, for loading while inside the TFS.
Where excavation equipment must cross over bracing struts or sheetpile, a series of crane mats and earthen ramps will be used to eliminate the pressure on the excavation support system.

In all cases, clean backfill will be placed in the excavations using both the excavator and/or a loader. Since the excavations are relatively small and crowded, the excavator or loader will be used to spread backfill (imported or reusable) in stipulated lifts. Compaction will be performed using either a remote controlled trench roller, or a walk behind dual drum roller.

9.0 Sheetpile Extraction & Decontamination

Sheetpile (and bracing) decontamination will be performed to the extent feasible once the excavation is fully completed, and prior to the placement of any backfill. This will allow for access to most of the bracing and a portion of the sheeting while still in place. All decon water generated during this effort will be collected and managed within the excavation in the same manner as that of impacted groundwater. Any remaining decontamination work will be performed after sheetpile extraction on a temporary staging pad.

Sheetpile extraction will be performed with the 60-ton crane and ICE 612 vibratory hammer. Extracted sheets will be fully decontaminated and then released from the site.

Upon completion of the sheetpile extraction, the vibration monitoring program will be discontinued.

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Appendix A – Equipment Cut Sheets

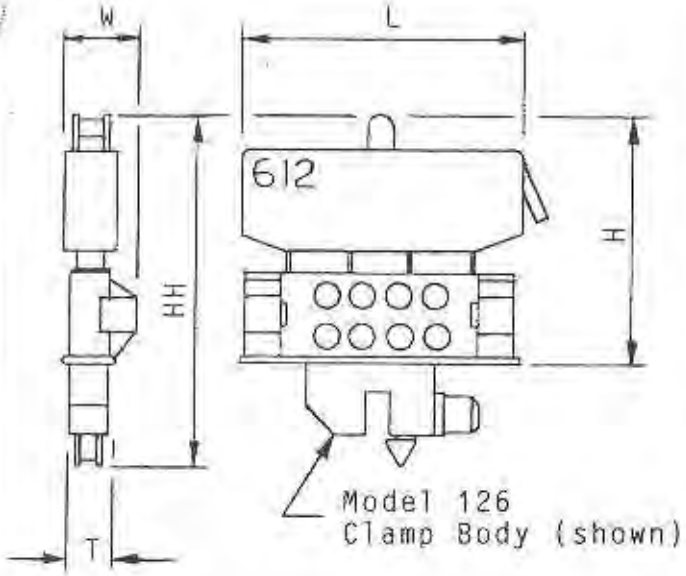
I. GENERAL DESCRIPTION

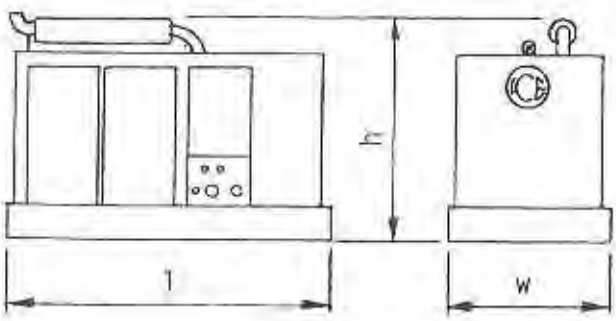
E. REMOTE-CONTROL PENDANT

The vibrator is operated by a hand-held remote control pendant. The pendant has two, two-way switches and an indicator light. One switch (VIBRATOR SWITCH) starts and stops vibration. The other switch (CLAMP SWITCH) closes and opens the hydraulic clamp. The light indicates that adequate clamping pressure exists for vibration to begin. Note: Controls are duplicated on the control panel in case the pendant is damaged. (See pg.III-5, Section E-e)

F. SPECIFICATIONS

1. Constant improvement and engineering progress make it necessary that we reserve the right to make specification changes without notice.





2. MODEL 612 VIBRATOR
(with hydraulic clamp)

Type	Hydraulic
Eccentric Moment	4000 In-lbs.
Frequency	600-1200 VPM
Amplitude	1/2"-1"
Pile Clamping Force	120 Tons
Max. Line Pull for Extraction	40 Tons
Suspended Weight with 126 Clamp	13,700 lbs.
Length [L]	95 in.
Width [W]	28 in.
Throat Width [T]	14 in.
Height with Clamp [HH]	113 in.
Height without clamp [H]	84 in.

3. MODEL 300 POWER UNIT

Type	Diesel
Engine	CAT 3306TA
Horsepower (2200 RPM)	300
Weight	10,800 lbs.
Length [l]	126in.
Width [w]	60 in.
Height [h]	75 in.

DESIGNED TO MEET ANSI B30.5 AND OSHA STANDARDS

AMERICAN

amhoist

700 SERIES
MODEL 7250
CRAWLER CRANE WITH 46HR BOOM

60 Ton

1162 + 1168 60 TON CRAWLER

LIFT RATINGS

With 46HR Angle Chord Boom and "P-P" Counterweight (33,900 Lbs.) (15377 Kgs.)

Boom Length (Feet)	Radius In Feet	Boom Angle Degrees	Side Frames Retracted (Lbs.)	Side Frames Extended (Lbs.)	Ft. From Boom Point	Min. Load Line
40 feet	11	80.1	—	120000	45	6
	12	78.6	—	120000	45	6
	15	74.2	—	107080	44	1
	20	66.6	—	68040	42	3
	25	58.5	—	49530	39	3
	30	49.7	—	38780	36	2
	35	39.5	—	31720	31	2
	40	26.2	—	26740	23	2
50 feet	12	80.9	—	120000	55	6
	15	77.4	—	107020	54	5
	20	71.5	—	67940	53	3
	25	65.3	—	49400	51	3
	30	58.8	—	38650	48	2
	35	51.9	—	31570	45	2
	40	44.2	—	26570	40	2
	50	23.4	—	20010	25	1
60 feet	14	80.5	—	120000	65	6
	15	79.6	—	106940	64	5
	20	74.7	—	67830	63	3
	25	69.6	—	49270	62	3
	30	64.5	—	38510	59	2
	35	59.0	—	31420	57	2
	40	53.3	—	26420	53	2
	50	40.1	—	19880	44	1
	60	21.4	12430	15720	27	1
70 feet	16	80.2	—	95780	74	5
	20	76.9	—	67660	74	3
	25	72.6	—	49080	72	3
	30	68.3	—	38320	70	2
	35	63.8	—	31230	68	2
	40	59.2	—	26220	65	2
	50	49.1	15520	19690	58	1
	60	37.0	12230	15520	47	1
	70	19.8	9940	12670	29	1
80 feet	17	80.7	—	86750	84	4
	20	78.6	—	67550	84	3
	25	74.9	—	48950	83	3
	30	71.1	—	38200	81	2
	35	67.3	—	31100	79	2
	40	63.4	—	26090	77	2
	50	55.0	15390	19570	71	1
	60	45.7	12100	15400	63	1
	70	34.6	9810	12540	51	1
	80	18.5	8130	10450	31	1
90 feet	19	80.5	—	72700	94	4
	20	79.8	—	67370	94	3
	25	76.6	—	48740	93	3
	30	73.3	—	38000	92	2

METRIC

Boom Length (Meters)	Radius In Meters	Boom Angle Degrees	Side Frames Retracted (Kgs.)	Side Frames Extended (Kgs.)	M From Boom Point	Load Line
12.2 meters	3.4	80.1	—	54430	13.7	6
	3.7	78.6	—	54430	13.7	6
	4.6	74.2	—	48570	13.4	1
	6.1	66.6	—	30860	12.8	3
	7.6	58.5	—	22470	11.9	3
	9.1	49.7	—	17590	11.0	2
	10.7	39.5	—	14390	9.4	2
	12.2	26.2	—	12130	7.0	2
15.2 meters	3.7	80.9	—	54430	16.8	6
	4.6	77.4	—	48540	16.5	5
	6.1	71.5	—	30820	16.2	3
	7.6	65.3	—	22410	15.5	3
	9.1	58.8	—	17530	14.6	2
	10.7	51.9	—	14320	13.7	2
	12.2	44.2	—	12050	12.2	2
	15.2	23.4	—	9080	7.6	1
18.3 meters	4.3	80.5	—	54430	19.8	6
	4.6	79.6	—	48510	19.5	5
	6.1	74.7	—	30770	19.2	3
	7.6	69.6	—	22350	18.9	3
	9.1	64.5	—	17470	18.0	2
	10.7	59.0	—	14250	17.4	2
	12.2	53.3	—	11980	16.2	2
	15.2	40.1	—	9020	13.4	1
	18.3	21.4	5640	7130	8.2	1
21.3 meters	4.9	80.2	—	43450	22.6	5
	6.1	76.9	—	30690	22.6	3
	7.6	72.6	—	22260	21.9	3
	9.1	68.3	—	17380	21.3	2
	10.7	63.8	—	14170	20.7	2
	12.2	59.2	—	11890	19.8	2
	15.2	49.1	7040	8930	17.7	1
	18.3	37.0	5550	7040	14.3	1
	21.3	19.8	4510	5750	8.8	1
24.4 meters	5.2	80.7	—	39350	25.6	4
	6.1	78.6	—	30640	25.6	3
	7.6	74.9	—	22200	25.3	3
	9.1	71.1	—	17330	24.7	2
	10.7	67.3	—	14110	24.1	2
	12.2	63.4	—	11830	23.5	2
	15.2	55.0	6980	8880	21.6	1
	18.3	45.7	5490	6990	19.2	1
	21.3	34.6	4450	5690	15.5	1
	24.4	18.5	3690	4740	9.4	1
27.4 meters	5.8	80.5	—	32980	28.7	4
	6.1	79.8	—	30560	28.7	3
	7.6	76.6	—	22110	28.3	3
	9.1	73.3	—	17240	28.0	2

(Continued)

LIFT RATINGS (cont.)

With 46HR Angle Chord Boom and "P-P" Counterweight (33,900 Lbs.) 15377 Kgs.)

Boom Length (Feet)	Radius In Feet	Boom Angle Degrees	Side Frames Retracted (Lbs.)	Side Frames Extended (Lbs.)	Ft. From Boom Point	Min. Load Line
90 feet (cont.)	35	69.9	—	30890	90	2
	40	66.5	20190	25870	88	2
	50	59.4	15170	19360	83	1
	60	51.6	11880	15190	76	1
	70	43.0	9590	12320	67	1
	80	32.5	7910	10230	54	1
	90	17.4	6620	8650	32	1
100 feet	20	80.9	—	67190	104	3
	25	78.0	—	48550	103	3
	30	75.0	—	37810	102	2
	35	72.0	—	30700	100	2
	40	69.0	19990	25670	99	2
	50	62.7	14980	19180	94	1
	60	56.0	11680	15000	88	1
	70	48.8	9390	12130	81	1
	80	40.6	7710	10050	70	1
	90	30.8	6420	8450	57	1
	100	16.5	5410	7200	34	1
110 feet	22	80.6	—	58130	114	3
	25	79.1	—	48330	113	3
	30	76.4	—	37600	112	2
	35	73.7	23580	30480	111	2
	40	71.0	19750	25450	109	2
	50	65.4	14760	18960	105	1
	60	59.5	11460	14790	100	1
	70	53.2	9170	11920	93	1
	80	46.4	7490	9830	85	1
	90	38.7	6190	8230	74	1
	100	29.4	5180	6980	59	1
	110	15.7	4360	5980	35	1
120 feet	23	81.0	—	54310	124	3
	25	80.0	—	48160	124	3
	30	77.5	—	37440	123	2
	35	75.1	23390	30310	121	2
	40	72.6	19560	25270	120	2
	50	67.5	14580	18790	116	1
	60	62.2	11290	14620	112	1
	70	56.7	9000	11750	106	1
	80	50.8	7310	9650	98	1
	90	44.3	6020	8050	89	1
	100	37.0	5000	6800	77	1
	110	28.1	4180	5790	62	1
	120	15.1	3510	4970	37	1
130 feet	25	80.8	—	47950	134	3
	30	78.5	28490	37230	133	2
	35	76.3	23160	30090	132	2
	40	74.0	19330	25050	130	2
	50	69.3	14360	18580	127	1
	60	64.5	11060	14400	123	1
	70	59.6	8770	11530	117	1
	80	54.3	7080	9430	111	1
	90	48.7	5790	7830	103	1
	100	42.5	4770	6580	93	1
	110	35.5	3940	5560	81	1
	120	27.0	3270	4740	64	1
	130	14.5	2710	4060	38	1
140 feet	27	80.6	32600	42950	143	2
	30	79.3	28270	37030	143	2
	35	77.3	22940	29880	142	2
	40	75.2	19110	24840	141	2
	50	70.9	14140	18380	138	1
	60	66.5	10850	14200	134	1
	70	61.9	8560	11320	129	1
	80	57.2	6860	9220	123	1
	90	52.2	5570	7620	116	1
	100	46.8	4560	6370	107	1

METRIC

Boom Length (Meters)	Radius In Meters	Boom Angle Degrees	Side Frames Retracted (Kgs.)	Side Frames Extended (Kgs.)	M From Boom Point	Load Line
27.4 meters (cont.)	10.7	69.9	—	14010	27.4	2
	12.2	66.5	9160	11730	26.8	2
	15.2	59.4	6880	8780	25.3	1
	18.3	51.6	5390	6890	23.2	1
	21.3	43.0	4350	5590	20.4	1
	24.4	32.5	3590	4640	16.5	1
	27.4	17.4	3000	3920	9.8	1
30.5 meters	6.1	80.9	—	30480	31.7	3
	7.6	78.0	—	22020	31.4	3
	9.1	75.0	—	17150	31.1	2
	10.7	72.0	—	13930	30.5	2
	12.2	69.0	9070	11640	30.2	2
	15.2	62.7	6790	8700	28.7	1
	18.3	56.0	5300	6800	26.8	1
	21.3	48.8	4260	5500	24.7	1
	24.4	40.6	3500	4560	21.3	1
	27.4	30.8	2910	3830	17.4	1
	30.5	16.5	2450	3270	10.4	1
33.5 meters	6.7	80.6	—	26370	34.7	3
	7.6	79.1	—	21920	34.4	3
	9.1	76.4	—	17060	34.1	2
	10.7	73.7	10700	13830	33.8	2
	12.2	71.0	8960	11540	33.2	2
	15.2	65.4	6700	8600	32.0	1
	18.3	59.5	5200	6710	30.5	1
	21.3	53.2	4160	5410	28.3	1
	24.4	46.4	3400	4460	25.9	1
	27.4	38.7	2810	3730	22.6	1
	30.5	29.4	2350	3170	18.0	1
	33.5	15.7	1980	2710	10.7	1
36.6 meters	7.0	81.0	—	24640	37.8	3
	7.6	80.0	—	21850	37.8	3
	9.1	77.5	—	16980	37.5	2
	10.7	75.1	10610	13750	36.9	2
	12.2	72.6	8870	11460	36.6	2
	15.2	67.5	6610	8520	35.4	1
	18.3	62.2	5120	6630	34.1	1
	21.3	56.7	4080	5330	32.3	1
	24.4	50.8	3320	4380	29.9	1
	27.4	44.3	2730	3650	27.1	1
	30.5	37.0	2270	3080	23.5	1
	33.5	28.1	1900	2630	18.9	1
	36.6	15.1	1590	2250	11.3	1
39.6 meters	7.6	80.8	—	21750	40.8	3
	9.1	78.5	12920	16890	40.5	2
	10.7	76.3	10510	13650	40.2	2
	12.2	74.0	8770	11360	39.6	2
	15.2	69.3	6510	8430	38.7	1
	18.3	64.5	5020	6530	37.5	1
	21.3	59.6	3980	5230	35.7	1
	24.4	54.3	3210	4280	33.8	1
	27.4	48.7	2630	3550	31.4	1
	30.5	42.5	2160	2980	28.3	1
	33.5	35.5	1790	2520	24.7	1
	36.6	27.0	1480	2150	19.5	1
	39.6	14.5	1230	1840	11.6	1
42.7 meters	8.2	80.6	14790	19480	43.6	2
	9.1	79.3	12820	16800	43.6	2
	10.7	77.3	10410	13550	43.3	2
	12.2	75.2	8670	11270	43.0	2
	15.2	70.9	6410	8340	42.1	1
	18.3	66.5	4920	6440	40.8	1
	21.3	61.9	3880	5130	39.3	1
	24.4	57.2	3110	4180	37.5	1
	27.4	52.2	2530	3460	35.4	1
	30.5	46.8	2070	2890	32.6	1

(Continued)

LIFT RATINGS (cont.)

With 46HR Angle Chord Boom and "P-P" Counterweight (33,900 Lbs.) 15377 Kgs.

Boom Length (Feet)	Radius In Feet	Boom Angle Degrees	Side Frames Retracted (Lbs.)	Side Frames Extended (Lbs.)	Ft. From Boom Point	Min. Load Line
140 feet (cont.)	110	40.9	3730	5350	97	1
	120	34.1	3050	4520	84	1
	130	26.0	2480	3830	67	1
	140	13.9	2010	3160	39	1
150 feet	28	80.8	30800	40590	153	2
	30	80.1	28040	36810	153	2
	35	78.1	22700	29660	152	2
	40	76.2	18870	24610	151	2
	50	72.2	13920	18170	148	1
	60	68.1	10620	13970	145	1
	70	63.9	8330	11100	140	1
	80	59.6	6640	9000	135	1
	90	55.1	5350	7400	128	1
	100	50.3	4330	6140	121	1
	110	45.1	3500	5130	112	1
	120	39.4	2820	4300	101	1
	130	32.9	2250	3540	87	1
	140	25.1	1770	2860	69	1
	150	13.5	1360	2280	40	1
160 feet	30	80.7	27840	36630	163	2
	35	78.9	22500	29470	162	2
	40	77.0	18670	24430	161	2
	50	73.3	13730	17980	159	1
	60	69.6	10430	13790	155	1
	70	65.7	8130	10900	151	1
	80	61.7	6440	8810	146	1
	90	57.5	5150	7210	140	1
	100	53.2	4130	5950	133	1
	110	48.6	3300	4930	125	1
	120	43.6	2610	4080	116	1
	130	38.1	2050	3290	104	1
	140	31.9	1560	2610	90	1
	150	24.3	1160	2030	71	1
	160	13.0	—	1530	41	1

METRIC

Boom Length (Meters)	Radius In Meters	Boom Angle Degrees	Side Frames Retracted (Kgs.)	Side Frames Extended (Kgs.)	M From Boom Point	Load Line
42.7 meters (cont.)	33.5	40.9	1690	2430	29.6	1
	36.6	34.1	1380	2050	25.6	1
	39.6	26.0	1120	1740	20.4	1
	42.7	13.9	910	1430	11.9	1
45.7 meters	8.5	80.8	13970	18410	46.6	2
	9.1	80.1	12720	16700	46.6	2
	10.7	78.1	10300	13450	46.3	2
	12.2	76.2	8560	11160	46.0	2
	15.2	72.2	6310	8240	45.1	1
	18.3	68.1	4820	6340	44.2	1
	21.3	63.9	3780	5030	42.7	1
	24.4	59.6	3010	4080	41.1	1
	27.4	55.1	2430	3360	39.0	1
	30.5	50.3	1960	2790	36.9	1
	33.5	45.1	1590	2330	34.1	1
	36.6	39.4	1280	1950	30.8	1
	39.6	32.9	1020	1610	26.5	1
	42.7	25.1	800	1300	21.0	1
	45.7	13.5	620	1030	12.2	1
48.8 meters	9.1	80.7	12630	16620	49.7	2
	10.7	78.9	10210	13370	49.4	2
	12.2	77.0	8470	11080	49.1	2
	15.2	73.3	6230	8160	48.5	1
	18.3	69.6	4730	6260	47.2	1
	21.3	65.7	3690	4940	46.0	1
	24.4	61.7	2920	4000	44.5	1
	27.4	57.5	2340	3270	42.7	1
	30.5	53.2	1870	2700	40.5	1
	33.5	48.6	1500	2240	38.1	1
	36.6	43.6	1180	1850	35.4	1
	39.6	38.1	930	1490	31.7	1
	42.7	31.9	710	1180	27.4	1
	45.7	24.3	530	920	21.6	1
	48.8	13.0	—	690	12.5	1

7250.44

DUTY CYCLE RATINGS

With 46HR Angle Chord Boom and "K-K-K" Counterweight (25,000 Lbs.) (11340 Kgs.)

Boom Length (Feet)	Radius In Feet	Boom Angle Degrees	Side Frames Retracted	Side Frames Extended	Duty Cycle Ratings			Ft. From Boom Point
					Clamshell	Dragline	Magnet	
40 feet	11	80.1	—	120000	20700	17750	20700	45
	12	78.6	—	120000	20700	17750	20700	45
	15	74.2	—	93760	20700	17750	20700	44
	20	66.6	—	59490	20700	17750	20700	42
	25	58.5	—	43270	20700	17750	20700	39
	30	49.7	—	33800	20700	17750	20700	36
	35	39.5	—	27600	20700	17750	20700	31
	40	26.2	18080	23220	20690	17750	20690	23
50 feet	12	80.9	—	120000	20700	17750	20700	55
	15	77.4	—	93700	20700	17750	20700	54
	20	71.5	—	59380	20700	17750	20700	53
	25	65.3	—	43160	20700	17750	20700	51
	30	58.8	—	33660	20700	17750	20700	48
	35	51.9	21210	27440	20700	17750	20700	45
	40	44.2	17890	23050	20550	17750	20550	40
	50	23.4	13480	17290	15390	17290	15390	25
60 feet	14	80.5	—	105710	20700	17750	20700	65
	15	79.6	—	93620	20700	17750	20700	64
	20	74.7	—	59280	20700	17750	20700	63
	25	69.6	—	43040	20700	17750	20700	62
	30	64.5	25650	33520	20700	17750	20700	59
	35	59.0	21050	27300	20700	17750	20700	57
	40	53.3	17730	22900	20440	17750	20440	53

METRIC

Boom Length (Meters)	Radius In Meters	Boom Angle Degrees	Side Frames Retracted	Side Frames Extended	Duty Cycle Ratings			M From Boom Point
					Clamshell	Dragline	Magnet	
12.2 meters	3.4	80.1	—	54430	9390	8050	20700	13.7
	3.7	78.6	—	54430	9390	8050	20700	13.7
	4.6	74.2	—	42530	9390	8050	20700	13.4
	6.1	66.6	—	26980	9390	8050	20700	12.8
	7.6	58.5	—	19630	9390	8050	20700	11.9
	9.1	49.7	—	15330	9390	8050	20700	11.0
	10.7	39.5	—	12520	9390	8050	20700	9.4
	12.2	26.2	8200	10530	9380	8050	20690	7.0
15.2 meters	3.7	80.9	—	54430	9390	8050	20700	16.8
	4.6	77.4	—	42500	9390	8050	20700	16.5
	6.1	71.5	—	26930	9390	8050	20700	16.2
	7.6	65.3	—	19580	9390	8050	20700	15.5
	9.1	58.8	—	15270	9390	8050	20700	14.6
	10.7	51.9	9620	12450	9390	8050	20700	13.7
	12.2	44.2	8110	10460	9320	8050	20550	12.2
	15.2	23.4	6110	7840	6980	7840	15390	7.6
18.3 meters	4.3	80.5	—	47950	9390	8050	20700	19.8
	4.6	79.6	—	42470	9390	8050	20700	19.5
	6.1	74.7	—	26890	9390	8050	20700	19.2
	7.6	69.6	—	19520	9390	8050	20700	18.9
	9.1	64.5	11630	15200	9390	8050	20700	18.0
	10.7	59.0	9550	12380	9390	8050	20700	17.4
	12.2	53.3	8040	10390	9270	8050	20440	16.2

(Continued)

DUTY CYCLE RATINGS (cont.)

With 46HR Angle Chord Boom and "K-K-K" Counterweight (25,000 Lbs.) (11340 Kgs.)

Boom Length (Feet)	Radius In Feet	Boom Angle Degrees	Side Frames Retracted	Side Frames Extended	Duty Cycle Ratings			Ft. From Boom Point
					Clamshell	Dragline	Magnet	
60 feet	50	40.1	13340	17160	15280	17160	15280	44
	60	21.4	10480	13500	12020	13500	12020	27
70 feet	16	80.2	—	83880	20700	17750	20700	74
	20	76.9	—	59110	20700	17750	20700	74
	25	72.6	—	42870	20700	17750	20700	72
	30	68.3	25450	33340	20700	17750	20700	70
	35	63.8	20840	27110	20700	17750	20700	68
	40	59.2	17520	22710	20280	17750	20280	65
	50	49.1	13140	16980	15110	16980	15110	58
	60	37.0	10270	13310	11850	13310	11850	47
	70	19.8	8290	10800	9610	10800	9610	29
80 feet	17	80.7	—	75850	20700	17750	20700	84
	20	78.6	—	59000	20700	17750	20700	84
	25	74.9	32160	42750	20700	17750	20700	83
	30	71.1	25310	33210	20700	17750	20700	81
	35	67.3	20700	26970	20700	17750	20700	79
	40	63.4	17380	22570	20170	17750	20170	77
	50	55.0	13010	16850	14990	16850	14990	71
	60	45.7	10140	13190	11730	13190	11730	63
	70	34.6	8150	10670	9500	10670	9500	51
	80	18.5	6700	8840	7870	8840	7870	31
90 feet	19	80.5	—	63610	20700	—	20700	94
	20	79.8	—	58820	20700	—	20700	94
	25	76.6	31940	42560	20700	—	20700	93
	30	73.3	25080	33010	20700	—	20700	92
	35	69.9	20470	26770	20700	—	20700	90
	40	66.5	17250	22460	19990	—	19990	88
	50	59.4	12790	16640	14810	—	14810	83
	60	51.6	9930	12980	11550	—	11550	76
	70	43.0	7930	10460	9300	—	9300	67
	80	32.5	6470	8620	7670	—	7670	54
	90	17.4	5350	7220	—	—	—	32
100 feet	20	80.9	42850	58640	20700	—	20700	104
	25	78.0	31740	42380	20700	—	20700	103
	30	75.0	24880	32820	20700	—	20700	102
	35	72.0	20270	26570	20700	—	20700	100
	40	69.0	17070	22280	19830	—	19830	99
	50	62.7	12600	16460	14650	—	14650	94
	60	56.0	9730	12790	11370	—	11370	88
	70	48.8	7740	10260	9130	—	9130	81
	80	40.6	6280	8430	7500	—	7500	70
	90	30.8	5160	7030	6250	—	6250	57
	100	16.5	4270	5930	5280	—	5280	34
110 feet	22	80.6	37350	50650	20700	—	20700	114
	25	79.1	31520	42180	20700	—	20700	113
	30	76.4	24650	32610	20700	—	20700	112
	35	73.7	20030	26360	20700	—	20700	111
	40	71.0	16840	22070	19640	—	19640	109
	50	65.4	12370	16250	14450	—	14450	105
	60	59.5	9510	12580	11190	—	11190	100
	70	53.2	7520	10050	8940	—	8940	93
	80	46.4	6050	8210	7300	—	7300	85
	90	38.7	4920	6800	6050	—	6050	74
	100	29.4	4050	5710	5080	—	5080	59
	110	15.7	3330	4830	4290	—	4290	35
120 feet	23	81.0	34960	47270	20700	—	20700	124
	25	80.0	31340	42020	20700	—	20700	124
	30	77.5	24480	32450	20700	—	20700	123
	35	75.1	19850	26180	20700	—	20700	121
	40	72.6	16670	21910	19490	—	19490	120
	50	67.5	12200	16070	14300	—	14300	116
	60	62.2	9330	12400	11030	—	11030	112
	70	56.7	7340	9880	8780	—	8780	106
	80	50.8	5870	8040	7140	—	7140	98
	90	44.3	4750	6630	5890	—	5890	89
	100	37.0	3860	5530	4910	—	4910	77
	110	28.1	3150	4640	4130	—	4130	62
	120	15.1	2570	3930	3490	—	3490	37

METRIC

Boom Length (Meters)	Radius In Meters	Boom Angle Degrees	Side Frames Retracted	Side Frames Extended	Duty Cycle Ratings			M From Boom Point
					Clamshell	Dragline	Magnet	
18.3 meters	15.2	40.1	6050	7780	6930	7780	15280	13.4
	18.3	21.4	4750	6120	5450	6120	12020	8.2
21.3 meters	4.9	80.2	—	38050	9390	8050	20700	22.6
	6.1	76.9	—	26810	9390	8050	20700	22.6
	7.6	72.6	—	19450	9390	8050	20700	21.9
	9.1	68.3	11540	15120	9390	8050	20700	21.3
	10.7	63.8	9450	12300	9390	8050	20700	20.7
	12.2	59.2	7950	10300	9200	8050	20280	19.8
	15.2	49.1	5960	7700	6850	7700	15110	17.7
	18.3	37.0	4660	6040	5380	6040	11850	14.3
	21.3	19.8	3760	4900	4360	4900	9610	8.8
24.4 meters	5.2	80.7	—	34410	9390	8050	20700	25.6
	6.1	78.6	—	26760	9390	8050	20700	25.6
	7.6	74.9	14590	19390	9390	8050	20700	25.3
	9.1	71.1	11480	15060	9390	8050	20700	24.7
	10.7	67.3	9390	12230	9390	8050	20700	24.1
	12.2	63.4	7880	10240	9150	8050	20170	23.5
	15.2	55.0	5900	7640	6800	7640	14990	21.6
	18.3	45.7	4600	5980	5320	5980	11730	19.2
	21.3	34.6	3700	4840	4310	4840	9500	15.5
	24.4	18.5	3040	4010	3570	4010	7870	9.4
27.4 meters	5.8	80.5	—	28850	9390	—	20700	28.7
	6.1	79.8	—	26680	9390	—	20700	28.7
	7.6	76.6	14490	19310	9390	—	20700	28.3
	9.1	73.3	11380	14970	9390	—	20700	28.0
	10.7	69.9	9290	12140	9390	—	20700	27.4
	12.2	66.5	7820	10190	9070	—	19990	26.8
	15.2	59.4	5800	7550	6720	—	14810	25.3
	18.3	51.6	4500	5890	5240	—	11550	23.2
	21.3	43.0	3600	4740	4220	—	9300	20.4
	24.4	32.5	2930	3910	3480	—	7670	16.5
	27.4	17.4	2430	3270	—	—	—	9.8
30.5 meters	6.1	80.9	19440	26600	9390	—	20700	31.7
	7.6	78.0	14400	19220	9390	—	20700	31.4
	9.1	75.0	11290	14890	9390	—	20700	31.1
	10.7	72.0	9190	12050	9390	—	20700	30.5
	12.2	69.0	7740	10110	8990	—	19830	30.2
	15.2	62.7	5720	7470	6650	—	14650	28.7
	18.3	56.0	4410	5800	5160	—	11370	26.8
	21.3	48.8	3510	4650	4140	—	9130	24.7
	24.4	40.6	2850	3820	3400	—	7500	21.3
	27.4	30.8	2340	3190	2840	—	6250	17.4
	30.5	16.5	1940	2690	2400	—	5280	10.4
33.5 meters	6.7	80.6	16940	22970	9390	—	20700	34.7
	7.6	79.1	14300	19130	9390	—	20700	34.4
	9.1	76.4	11180	14790	9390	—	20700	34.1
	10.7	73.7	9090	11960	9390	—	20700	33.8
	12.2	71.0	7640	10010	8910	—	19640	33.2
	15.2	65.4	5610	7370	6550	—	14450	32.0
	18.3	59.5	4310	5710	5080	—	11190	30.5
	21.3	53.2	3410	4560	4060	—	8940	28.3
	24.4	46.4	2740	3720	3310	—	7300	25.9
	27.4	38.7	2230	3080	2740	—	6050	22.6
	30.5	29.4	1840	2590	2300	—	5080	18.0
	33.5	15.7	1510	2190	1950	—	4290	10.7
36.6 meters	7.0	81.0	15860	21440	9390	—	20700	37.8
	7.6	80.0	14220	19060	9390	—	20700	37.8
	9.1	77.5	11100	14720	9390	—	20700	37.5
	10.7	75.1	9000	11880	9390	—	20700	36.9
	12.2	72.6	7560	9940	8840	—	19490	36.6
	15.2	67.5	5530	7290	6490	—	14300	35.4
	18.3	62.2	4230	5620	5000	—	11030	34.1
	21.3	56.7	3330	4480	3980	—	8780	32.3
	24.4	50.8	2660	3650	3240	—	7140	29.9
	27.4	44.3	2150	3010	2670	—	5890	27.1
	30.5	37.0	1750	2510	2230	—	4910	23.5
	33.5	28.1	1430	2100	1870	—	4130	18.9
	36.6	15.1	1170	1780	1580	—	3490	11.3

CRANE RATING DATA

Load ratings are in pounds (kilograms) and do not exceed 75% of tipping with crane standing level on firm uniformly supporting surface. Clamshell, dragline, and magnet ratings are in accordance with recommended industry standards and should not exceed the rating shown. Safe loads depend on ground conditions, boom length, radius of operation, and proper handling, all of which must be taken into consideration by user. Retractable A-frame must be in fully raised position for all ratings.

Blocks, slings, buckets, and other load carrying devices are considered part of the load.

Lifting is approved only in those areas for which ratings are shown in the rating chart. Ratings in shaded areas are based on structural limitations rather than stability.

"Radius in feet (meters)" is the horizontal distance at crane base level from center pin to a vertical line through the center of gravity of the suspended load.

Main load line is 7/8 inch (2.2 cm) diameter with minimum breaking strength of 79,600 pounds (36106 kilograms).

Boom suspension line is 3/4 inch (1.9 cm) diameter with minimum breaking strength of 58,800 pounds (26671 kilograms). Boom suspension pendants are 1-1/4 inch (3.2 cm) diameter with minimum breaking strength of 172,800 pounds (78382 kilograms).

Maximum boom length is 160 feet (48.8 meters) for lift service, 120 feet (36.6 meters) for clamshell, and 80 feet (24.4 meters) for dragline or magnet. Boom lengths and ratings available in 5 foot (1.5 meter) increments.

Designed and rated to comply with ANSI Code B30.5.

NOTE: Maximum dragline ratings are increased to 19,500 pounds (8845 kilograms) and maximum clamshell and magnet ratings are increased to 22,750 pounds (10319 kilograms) with the following optional engines and converters:

GM-8V-71-N engine with three stage torque converter, Cummins NT-855-C250 engine with three stage torque converter, Caterpillar 3306(T) engine with three stage torque converter.

46HR BOOM COMPOSITION

Boom Length		20 Ft. (6.1 M) 46SHR Inner	10 Ft. (3.0 M) 46HR Center	20 Ft. (6.1 M) 46HR Center	40 Ft. (12.2 M) 46HR Center	20 Ft. (6.1 M) 46HR Outer
Ft.	M					
40	12.2	1	—	—	—	1
50	15.2	1	1	—	—	1
60	18.3	1	—	1	—	1
70	21.3	1	1	1	—	1
80	24.4	1	—	—	1	1
90	27.4	1	1	—	1	1
100	30.5	1	—	1	1	1
110	33.5	1	1	1	1	1
120	36.6	1	—	—	2	1
130	39.6	1	1	—	2	1
140	42.7	1	—	1	2	1
150	45.7	1	1	1	2	1
160	48.8	1	—	—	3	1

BOOM AND JIB ERECTION*

Boom Length Ft.	Jib Length
160	30' of No. 9 Jib
155	40' of No. 9 Jib
150	50' of No. 9 Jib

*self-erecting over the rear with "P-P" Counterweight

METRIC

Boom Length M	Jib Length
48.8	9.1 m of No. 9 Jib
47.2	12.2 m of No. 9 Jib
45.7	15.2 m of No. 9 Jib

LOAD HOISTING DATA*

Maximum Lifting Capacity In Pounds	Minimum Parts of Load Line	Maximum Hoisting Distance		
		RH Drum Controlled Load Lowering Ft.	LH Drum Controlled Load Lowering Ft.	LH Drum Controlled Load Lowering Ft.
120,000	6	133	84	102
113,700	5	160	101	122
90,970	4	200	126	153
68,230	3	267	168	204
45,480	2	401	252	306
22,740	1	803	505	612

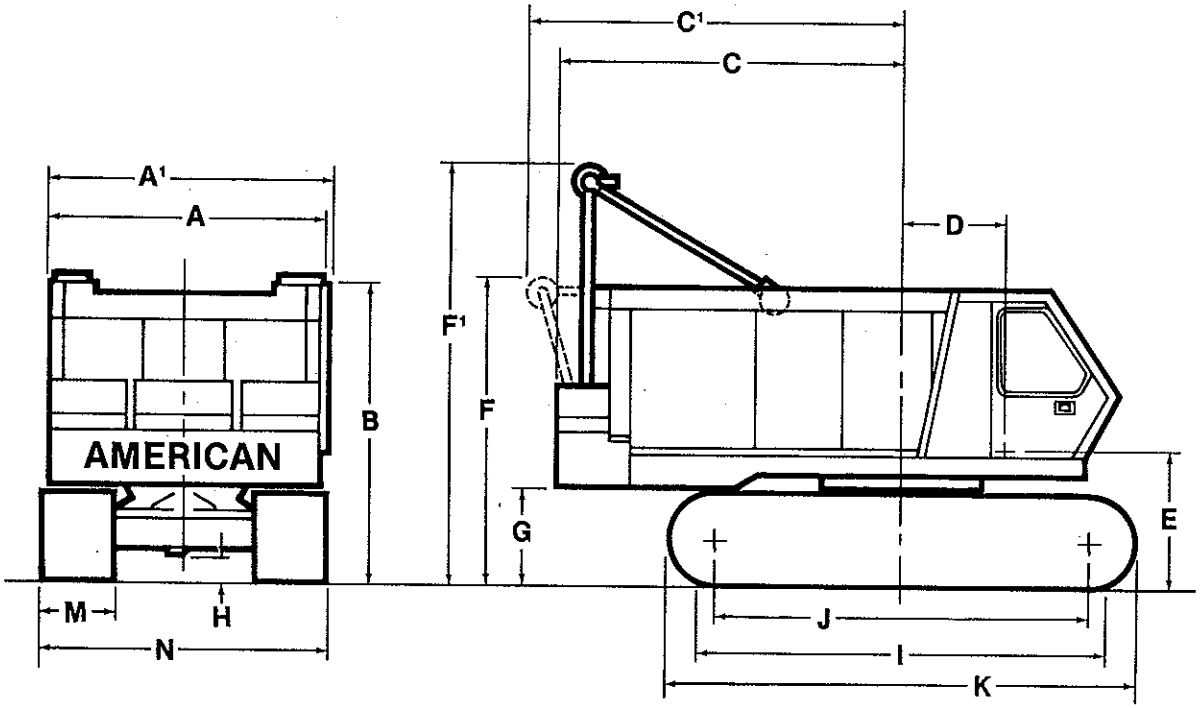
*Based on 7/8" EIPS rope.

METRIC

Maximum Lifting Capacity In Pounds	Minimum Parts of Load Line	Maximum Hoisting Distance		
		RH Drum Controlled Load Lowering M	LH Drum Controlled Load Lowering M	LH Drum Controlled Load Lowering M
36576	6	40	26	31
34659	5	49	31	37
27727	4	61	38	47
20796	3	81	51	62
13862	2	122	77	93
6931	1	245	154	186

*Based on 2.2 cm EIPS rope.

MODEL 7250 GENERAL DIMENSIONS



DIMENSIONS

		Ft.	M
A	Width of cab	10'6"	3.19
A¹	Width of machinery cab plus operator's cab	10'11"	3.31
B	Height over cab	11'7-3/8"	3.54
C	Tailswing	13'11"	4.22
C¹	Tailswing with A-frame retracted	16'9-1/2"	5.11
D	Center of pivot to center of crane boom foot	4'1-1/2"	1.25
E	Ground to center of crane boom foot	5'4-3/8"	1.63
F	Height over A-frame, retracted	12'0"	3.65
F¹	Height over A-frame, raised	20'5"	6.21
G	Ground to bottom of counterweight	3'9"	1.14
H	Minimum ground clearance under crawler base	13"	.33
I	Crawler bearing length	15'2"	4.62
J	Center to center crawler tumblers	14'0"	4.26
K	Overall length of crawlers	17'6"	5.33
M	Width of tread shoes (Standard)	33"	.83
M¹	Width of tread shoes (Optional)	38" or 44"	.96 or 1.12
N	Overall width over crawlers 33" (.8 m) shoes (Extended)	14'4"	4.36
N	Overall width over crawlers 33" (.8 m) shoes (Retracted)	11'0"	3.35
N¹	Overall width over crawlers 38" (.9 m) shoes (Extended)	14'9"	4.49
N¹	Overall width over crawlers 38" (.9 m) shoes (Retracted)	11'5"	3.48
N²	Overall width over crawlers 44" (1.1 m) shoes (Extended)	15'3"	4.65

PERFORMANCE

TRAVEL SPEED	0.9 MPH	1.45 KmPH
HYDROSTATIC SWING	0-3.25 RPM	0-3.25 RPM
FRICTION SWING	3 RPM	3 RPM
SINGLE LINE SPEED:		
Crane Hoist	165 FPM	50.3 MPM
Dragline	157 FPM	47.8 MPM
Magnet	198 FPM	60.3 MPM
Third Drum (Standard Travel)	185 FPM	56.4 MPM
Third Drum (Independent Travel)	115 FPM	35.0 MPM
SINGLE LINE PULL:		
Crane Hoist	29,600 lbs. SLP	13426 kgs.
Dragline	31,400 lbs. SLP	14243 kgs.
Magnet	24,800 lbs. SLP	11249 kgs.
Third Drum (Standard Travel)	10,000 lbs. SLP	4536 kgs.
Third Drum (Independent Travel)	16,000 lbs. SLP	7258 kgs.

Performance figures are based on machine equipped with standard engine.

NOTE: In accordance with varying material situations and the Company's policy of constant product improvement these specifications are subject to change without notice and without incurring responsibility to units previously sold.

WEIGHTS

7250 lifting crane with "P-P" counterweight and basic 40 ft. (12.2 m) 46HR boom:

33" shoes (83.82 cm)	38" shoes (96.5 cm)	44" shoes (111.7 cm)
131,490 lbs. (59644 kgs.)	133,405 lbs. (60512 kgs.)	135,715 lbs. (61560 kgs.)

	Lbs.	Kgs.
"P-P" counterweight	33,900	15377
Crane boom outer	2,210	1002
Crane boom inner	1,750	794
Telescopic boom stops	350	159
Axle extensions (4)	1,200	544
Torque tubes (2)	800	363
Crawler side frame w/33" (83.82 cm) shoes (2)	32,000	14515
Crawler axles (2)	5,800	2631
Crawler carbody	9,500	4309

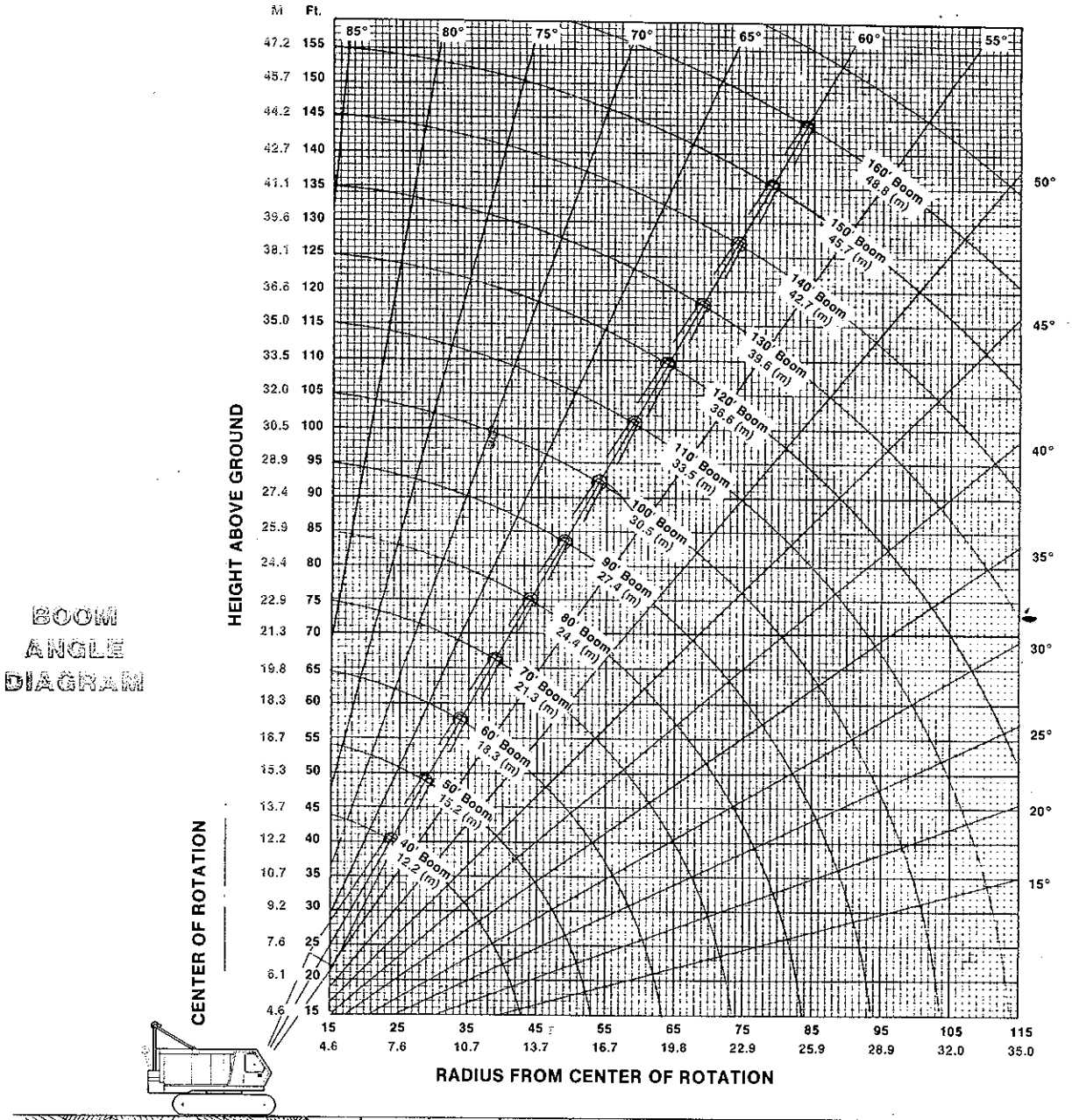
GROUND PRESSURES:

Lift crane with 40 ft. (12.2 m) basic boom and "P-P" counterweight.

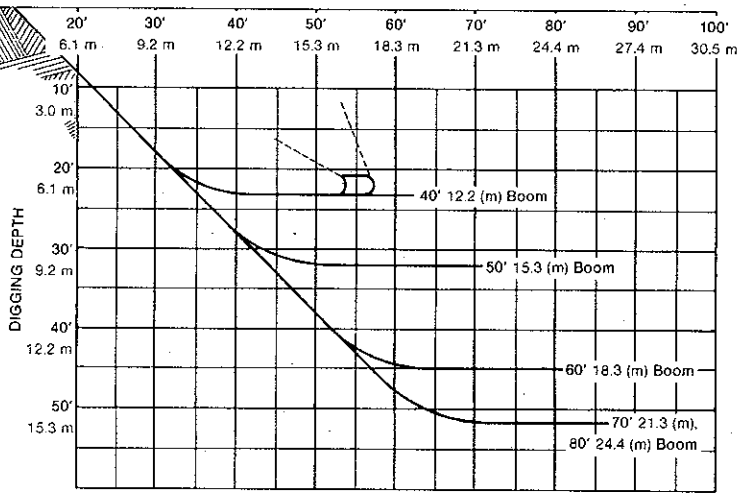
33" shoes (83.82 cm)	38" shoes (96.5 cm)	44" shoes (111.7 cm)
10.7 PSI	9.5 PSI	8.3 PSI

MODEL 7250 WORKING RANGES

BOOM ANGLE DIAGRAM



DRAGLINE DIGGING DEPTH (with dragline lagging)



Your AMERICAN distributor is with you...all the way.

Service is his middle name. He knows AMERICAN equipment inside and out...what it will do...the options available. This can help you match your equipment to your needs, and that's important.

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Closely supporting him is the AMERICAN district representative in your area, plus a team of home-office specialists...in application engineering, sales, and service. All are deeply committed to one goal—serving you.

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AMERICAN® CONSTRUCTION EQUIPMENT GROUP

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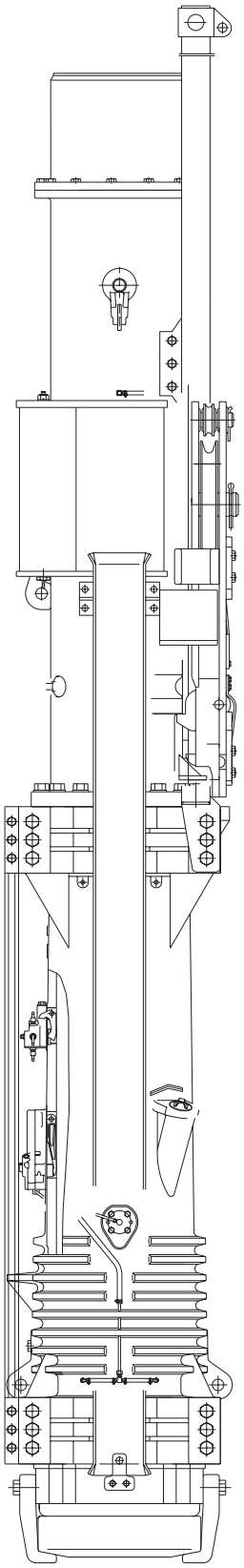
63 S. Robert Street, St. Paul, Minn. 55107

AN EQUAL OPPORTUNITY EMPLOYER

SOLD & SERVICED BY...

Model I-19

ICE Impact-Atomization Diesel Pile Hammers



Simple • Reliable • Low Cost

- Time-proven design
- Impact-atomization fuel system
- Remote variable fuel pump
- Automatic lubrication to upper and lower cylinders
- Equipped with USA box lead guides
- Uses standard ICE drive caps
- Optional hydraulic tripping device
- Alcohol additive tank for winter operation
- Swinging, fixed and sliding lead set-ups available in 16 and 8 ft. sections
- Four models of light to heavy-duty lead spotters for precise pile positioning

Working Specifications

Ram weight	4,015 lbs (1820 kg)
Rated energy	43,225 ft-lbs (58,605 Nm)
Minimum energy	21,510 ft-lbs (29,164 Nm)
Maximum stroke	12.14 ft (3.70 m)
Stroke at rated energy	10.77 ft (3.28m)
Speed (blows per minute)	35-53

Weights

Hammer with USA lead guides	9,800 lbs (4445 kg)
Drive cap base (DCB-1)	1,095 lbs (497 kg)
Striker plate	450 lbs (204 kg)
Cushion material	51 lbs (23 kg)
Typical pile insert (DCH-1)	690 lbs (313 kg)
Typical operating weight	12,086 lbs (5482 kg)

Capacities (adequate for normal day)

Diesel fuel tank	9.9 gal (37.5 l)
Lube oil tank	2.6 gal (10.0 l)
Ether tank	0.3 gal (1.2 l)

Dimensions of hammer

Length	15.4 ft (4700 mm)
Length with trip guides	19.4 ft (5930 mm)
Length with extension	17.4 ft (5300 mm)
Diameter of anvil	17.3 in (440 mm)
Overall width	19.1 in (710 mm)
Width for box leads	26.0 in (660 mm)
Overall depth	29.3 in (745 mm)
Centerline to rear	14.8 in (375 mm)
Centerline to front	14.6 in (370 mm)

Model I-19

Impact-Atomization Diesel Pile Hammers

ICE I-19 DIESEL PILE HAMMER BEARING CHART

This chart is based on the Gates formula given below and is provided as a convenience only for those applications where this formula is specified. The Gates formula has been recommended for use by the U.S. DOT Federal Highway Administration. The formula calculates ultimate pile capacity. The FHWA recommends using a factor of safety of 3.5 with the Gates formula. ICE has no preference for this formula over any other.

Ultimate pile bearing (tons) = 1/2(1.75*(E)^1/2*log(10N)-100) where E=Hammer energy (ft-lbs) and N=Hammer blows per inch at final penetration.

Blows per Min.	Ram Stroke (feet)	Hammer Energy (ft-lbs)	Pile Set (Blows per inch) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
35	11.5	46,128	194	228	251	269	284	297	308	317	326	334	341	347	353	359	364	369	374	378	382
36	10.8	43,536	188	220	242	260	275	287	297	307	315	323	330	336	342	347	352	357	362	366	370
37	10.2	41,151	181	212	234	252	266	278	288	297	305	312	319	325	331	336	341	346	350	354	358
38	9.7	38,952	175	205	227	243	257	269	279	287	295	303	309	315	321	326	331	335	339	344	347
39	9.2	36,920	169	198	219	236	249	260	270	279	286	293	300	305	311	316	321	325	329	333	337
40	8.7	35,039	163	192	212	228	241	252	262	270	278	284	291	296	302	306	311	315	319	323	327
41	8.3	33,293	158	186	206	221	234	245	254	262	269	276	282	288	293	297	302	306	310	314	317
42	7.9	31,671	153	180	199	215	227	237	246	254	261	268	274	279	284	289	293	297	301	305	308
43	7.5	30,160	148	174	193	208	220	230	239	247	254	260	266	271	276	281	285	289	293	296	300
44	7.2	28,752	143	169	188	202	214	224	232	240	247	253	258	264	268	273	277	281	285	288	291
45	6.8	27,436	139	164	182	196	208	217	226	233	240	246	251	256	261	265	269	273	277	280	283
46	6.5	26,205	134	159	177	191	202	211	220	227	233	239	245	249	254	258	262	266	269	273	276
47	6.2	25,052	130	155	172	185	196	206	214	221	227	233	238	243	247	251	255	259	262	266	269
48	6.0	23,970	126	150	167	180	191	200	208	215	221	227	232	236	241	245	249	252	256	259	262
49	5.7	22,954	122	146	162	175	186	195	202	209	215	221	226	230	235	238	242	246	249	252	255
50	5.5	21,998	119	142	158	170	181	189	197	204	210	215	220	224	229	232	236	239	243	246	249
51	5.3	21,098	115	138	154	166	176	185	192	198	204	209	214	219	223	227	230	233	237	240	242
52	5.0	20,249	112	134	149	162	171	180	187	193	199	204	209	213	217	221	224	228	231	234	237
53	4.8	19,448	109	130	145	157	167	175	182	188	194	199	204	208	212	216	219	222	225	228	231

CAUTION: Driving at ten blows per inch is considered practical refusal. Driving in excess of ten blows per inch for more than six inches of driving or driving in excess of 20 blows per inch at all is considered improper use and will void the hammer warranty.

LEADS/SPOTTERS

ICE manufactures leads with 20", 26" 32" and 36" guide rails for all ICE and other pile hammers. Standard components are available in 8' increments for swinging, fixed and sliding lead setups. Two designs are available to provide the most cost-effective configuration for every job. **Four models of spotters** and **three spotter power unit sizes** are available.

DRIVE CAPS

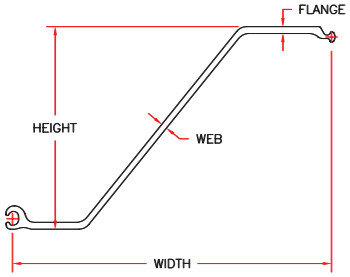
ICE offers a drive cap base/insert system for all ICE lead sizes as well as for pipe leads. Drive cap inserts are available for practically any pile type and size. The ICE drive cap system: maintains pile top position under the hammer, protects the hammer from peak stresses,minimizes pile top deformation, and transmits maximum force to pile.

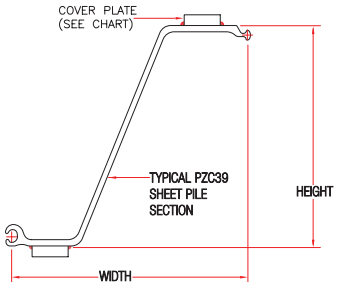
INTERNATIONAL CONSTRUCTION EQUIPMENT, INC.

Corporate offices:
301 Warehouse Drive, Matthews NC 28104
Phones: 704 821-8200, 888 ICEUSA1 (423-8721)
Fax: 704 821-8201
www.iceusa.com **e-mail:** sales@iceusa.com

Appendix B – Materials Specification Cut Sheets

Z Pile Profile





Cover Plated Z Profiles

Section	Width+	Height+	Web Thick-ness+	Flange Thick-ness+	Weight		Moment of Inertia		Section Modulus		Nominal Coating Area*
	in.	in.	in.	in.	lb / lft	lb / ft²	in⁴	in⁴ / wft	in³	in³ / wft	ft² / lft
	mm	mm	mm	mm	kg / lm	kg / m²	cm⁴	cm⁴ / wm	cm³	cm³ / wm	m² / lm
PZC 13	**27.88**	**12.56**	**0.375**	**0.375**	**50.4**	**21.7**	**353.0**	**152.0**	**56.2**	**24.2**	**5.60**
	708	**319**	**9.5**	**9.5**	**75.1**	**106.0**	**14,690**	**20,760**	**920**	**1,300**	**1.71**
PZC 14	27.88	12.60	0.420	0.420	55.0	23.7	381.6	164.3	60.5	26.0	5.60
	708	320	10.7	10.7	81.8	115.5	15,890	22,440	990	1,400	1.71
PZC 18	**25.00**	**15.25**	**0.375**	**0.375**	**50.4**	**24.2**	**532.2**	**255.5**	**69.8**	**33.5**	**5.60**
	635	**387**	**9.5**	**9.5**	**75.1**	**118.2**	**22,150**	**34,890**	**1,145**	**1,800**	**1.71**
PZC 19	25.00	15.30	0.420	0.420	55.0	26.4	576.3	276.6	75.3	36.1	5.60
	635	388	10.7	10.7	81.8	128.8	23,990	37,780	1,235	1,945	1.71
PZC 25	27.88	17.66	0.485	0.560	69.4	29.9	938.7	404.1	106.3	45.7	6.15
	708	449	12.3	14.2	103.3	145.9	39,070	55,190	1,740	2,455	1.87
PZC 26	**27.88**	**17.70**	**0.525**	**0.600**	**73.9**	**31.8**	**994.3**	**428.1**	**112.4**	**48.4**	**6.15**
	708	**450**	**13.3**	**15.2**	**110.0**	**155.4**	**41,390**	**58,460**	**1,840**	**2,600**	**1.87**
PZC 28	27.88	17.75	0.570	0.645	79.0	34.0	1,057	455.1	119.1	51.3	6.15
	708	451	14.5	16.4	117.6	166.1	44,000	62,150	1,950	2,755	1.87
PZC 37	22.50	21.02	0.488	0.563	69.6	37.1	1,349	719.6	128.4	68.5	6.15
	572	534	12.4	14.3	103.6	181.2	56,160	98,270	2,100	3,680	1.87
PZC 39	**22.50**	**21.05**	**0.525**	**0.600**	**74.0**	**39.5**	**1,429**	**762.1**	**135.6**	**72.3**	**6.15**
	572	**535**	**13.3**	**15.2**	**110.2**	**192.8**	**59,480**	**104,100**	**2,220**	**3,890**	**1.87**
PZC 41	22.50	21.09	0.561	0.636	78.4	41.8	1,507	803.6	142.7	76.1	6.15
	572	536	14.2	16.2	116.6	204.1	62,720	109,700	2,340	4,090	1.87

Available Grades: ASTM A572 Gr. 50 and 60, A588 and A690
+Values stated are nominal
*Both sides of sheet: excludes socket interior and ball interlock

PZC™ is a trademark of Gerdau

Section	Normal Width	Plate Size	Per Single Section				Per Unit of Wall			
			Area	Weight	Total Surface Area	Nominal Coating Area*	Weight		Moment of Inertia	Section Modulus
							Full Length Plates	Half Length Plates		
	in.	in.	in²	lb / ft	ft² / lin ft	ft² / lin ft	lb / ft²	lb / ft²	in⁴ / ft	in³ / ft
	mm	mm	mm²	kg / m	m² / m	m² / m	kg / m²	kg / m²	cm⁴ / m	cm³ / m
PZC 46-CP (PZC39)	**22.5**	**3 x 0.500**	**24.76**	**84.2**	**6.82**	**6.32**	**44.9**	**42.1**	**947.8**	**86.0**
	572	76 x 13	159.8	125.2	2.08	1.93	219.3	205.6	129,400	4,630
PZC 48-CP (PZC39)	**22.5**	**3 x 0.625**	**25.51**	**86.7**	**6.86**	**6.36**	**46.3**	**42.9**	**997.0**	**89.4**
	572	76 x 16	164.6	129	2.09	1.94	226.1	209.5	136,100	4,810
PZC 50-CP (PZC39)	**22.5**	**3 x 0.8125**	**26.64**	**90.6**	**6.92**	**6.42**	**48.3**	**43.9**	**1,073.0**	**94.6**
	572	76 x 21	171.9	134.8	2.11	1.96	235.9	214.4	146,400	5,090

Available Grades: ASTM A572 Gr. 50
*Excludes socket interior and ball interlock
Filet weld should be sized to adequately resist design loads and should be continuous and all around.
Cover plate length depends upon moment curve. Best economy is obtained when plate length is limited to area of high moment.

LBFoster
Piling

SSP Rental

Rent PZC™ Sheet Pile

- Low initial cost
- Stocking locations throughout the US
- Interlocks warranted to be continuous and reasonably free-sliding when threaded
- Contractor preferred ball & socket interlocks
- Wider, lighter, stronger PZC sheet pile maximizes job site efficiency
- Why *buy* when you can **RENT**?

"...we elected to rent the required 800 tons in lieu of bu ing due to availability within the project time frame as well as a much smaller initial investment."

"...the quality of piling supplied as well as the delivery coordination was outstanding as we are accustomed to receiving from L.B. Foster."

"...we found the sheet pile reconditioning process to be fair and within project budget."

"When temporary sheets are required Kissick Construction will look to L.B. Foster as our supplier of choice."

KISSICK CONSTRUCTION
KANSAS CITY, MISSOURI

Bill Berry Jr.
Director of Deep Foundations
Kissick Construction

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LBFoster
Piling

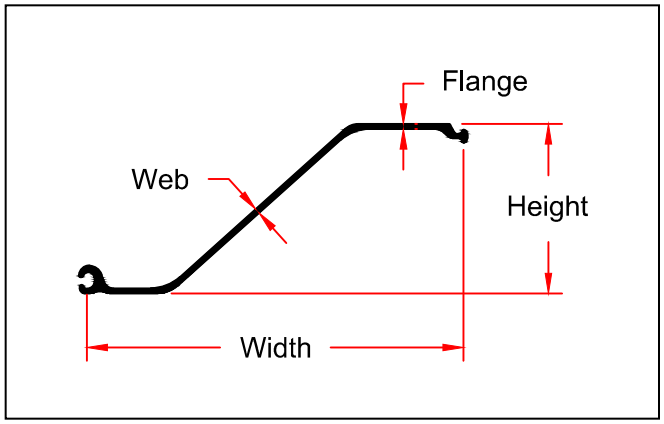
PZC™ 13

WIDER - LIGHTER - STRONGER

Hot Rolled

Domestically Produced

Ball & Socket Sheet Pile



Available Grades: ASTM A572 Gr. 50 and 60, A588 and A690

The innovative PZC series of steel sheet piling is manufactured to be wider, lighter and stronger than the traditional PZ piling.

PZC sheet piling is made wider than PZ sections to maximize jobsite production in setting and driving. They are lighter than PZ piling to minimize the required amount of steel needed for project installation. And PZC sections are stronger per pound than PZ sections in both section modulus and moment of inertia.

PZC 13 compared to the currently produced PZ 22:

- 27% wider laying dimension
- 36% stronger per pound

Dimensions and Properties

Section	Width	Height	Web Thickness	Flange Thickness	Weight		Moment of Inertia		Section Modulus		Nominal Coating Area
	in.	in.	in.	in.	lb / lft	lb / ft²	in⁴	in⁴ / wft	in³	in³ / wft	ft² / lft
	mm	mm	mm	mm	kg / lm	kg / m²	cm⁴	cm⁴ / wm	cm³	cm³ / wm	m² / lm
PZC 13	**27.88**	**12.56**	**0.375**	**0.375**	**50.4**	**21.7**	**353.0**	**152.0**	**56.2**	**24.2**	**5.60**
	708	319	9.5	9.5	75.1	106.0	14,690	20,760	920	1,300	1.71
PZC 14	27.88	12.60	0.420	0.420	55.0	23.7	381.6	164.3	60.5	26.0	5.60
	708	320	10.7	10.7	81.8	115.5	15,890	20,440	990	1,400	1.71

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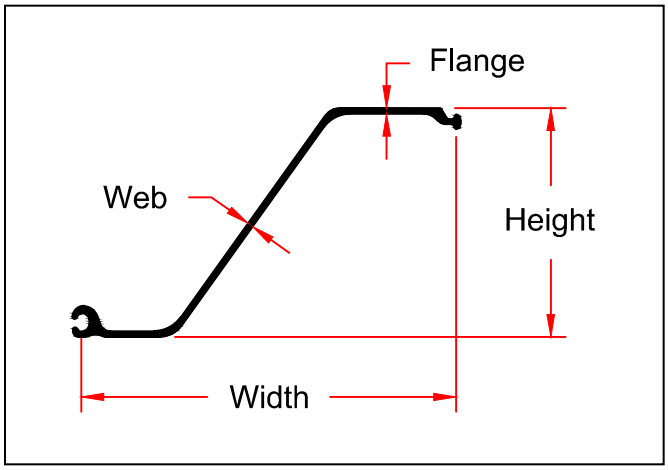
LBFoster
Piling

PZC™ 18

WIDER - LIGHTER - STRONGER

Hot Rolled
Domestically Produced
Ball & Socket Sheet Pile



Available Grades: ASTM A572 Gr. 50 and 60, A588 and A690

The innovative PZC series of steel sheet piling is manufactured to be wider, lighter and stronger than the traditional PZ piling.

PZC sheet piling is made wider than PZ sections to maximize jobsite production in setting and driving. They are lighter than PZ piling to minimize the required amount of steel needed for project installation. And PZC sections are stronger per pound than PZ sections in both section modulus and moment of inertia.

PZC 18 compared to the currently produced PZ 27:

- 39% wider laying dimension
- 24% stronger per pound

Dimensions and Properties

Section	Width	Height	Web Thickness	Flange Thickness	Weight		Moment of Inertia		Section Modulus		Nominal Coating Area
	in.	in.	in.	in.	lb / lft	lb / ft²	in⁴	in⁴ / wft	in³	in³ / wft	ft² / lft
	mm	mm	mm	mm	kg / lm	kg / m²	cm⁴	cm⁴ / wm	cm³	cm³ / wm	m² / lm
PZC 18	**25.00**	**15.25**	**0.375**	**0.375**	**50.4**	**24.2**	**532.2**	**255.5**	**69.8**	**33.5**	**5.60**
	635	**387**	**9.5**	**9.5**	**75.1**	**118.2**	**22,150**	**34,890**	**1,145**	**1,800**	**1.71**
PZC 19	25.00	15.30	0.420	0.420	55.0	26.4	576.3	276.6	75.3	36.1	5.60
	635	388	10.7	10.7	81.8	128.8	23,990	37,780	1,235	1,945	1.71

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LBFoster
Piling

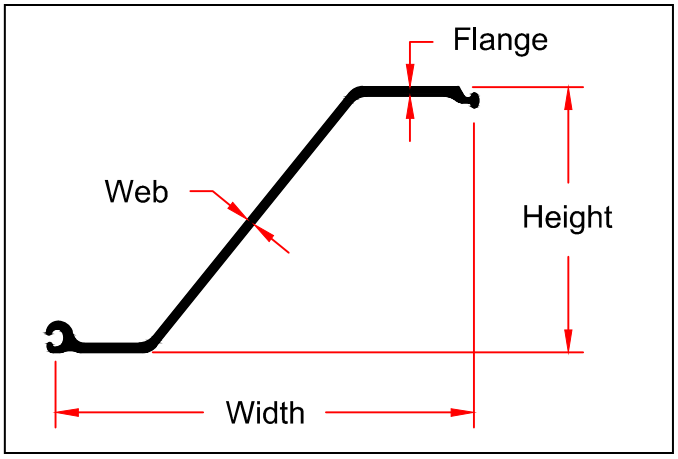
PZC™ 26

WIDER - LIGHTER - STRONGER

Hot Rolled

Domestically Produced

Ball & Socket Sheet Pile



Available Grades: ASTM A572 Gr. 50 and 60, A588 and A690

The innovative PZC series of steel sheet piling is manufactured to be wider, lighter and stronger than the traditional PZ piling.

PZC sheet piling is made wider than PZ sections to maximize jobsite production in setting and driving. They are lighter than PZ piling to minimize the required amount of steel needed for project installation. And PZC sections are stronger per pound than PZ sections in both section modulus and moment of inertia.

PZC 26 compared to the currently produced PZ 35:

- 23% wider laying dimension
- 11% stronger per pound

Dimensions and Properties

Section	Width	Height	Web Thickness	Flange Thickness	Weight		Moment of Inertia		Section Modulus		Nominal Coating Area
	in.	in.	in.	in.	lb / lft	lb / ft²	in⁴	in⁴ / wft	in³	in³ / wft	ft² / lft
	mm	mm	mm	mm	kg / lm	kg / m²	cm⁴	cm⁴ / wm	cm³	cm³ / wm	m² / lm
PZC 25	27.88	17.66	0.485	0.560	69.4	29.9	938.7	404.1	106.3	45.7	6.15
	708	449	12.3	14.2	103.3	145.9	39,070	55,190	1,740	2,455	1.87
PZC 26	**27.88**	**17.70**	**0.525**	**0.600**	**73.9**	**31.8**	**994.3**	**428.1**	**112.4**	**48.4**	**6.15**
	708	**450**	**13.3**	**15.2**	**110.0**	**155.4**	**41,390**	**58,460**	**1,840**	**2,600**	**1.87**
PZC 28	27.88	17.75	0.570	0.645	79.0	34.0	1,057	455.1	119.1	51.3	6.15
	708	451	14.5	16.4	117.6	166.1	44,000	62,150	1,950	2,755	1.87

(800) 848-6249
www.lbfoster.com

LBFoster
Piling

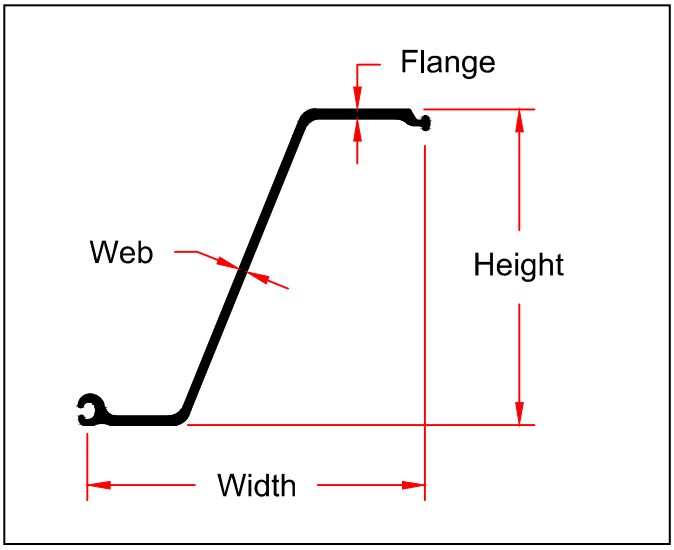
PZC™ 39

WIDER - LIGHTER - STRONGER

Hot Rolled

Domestically Produced

Ball & Socket Sheet Pile



Available Grades: ASTM A572 Gr. 50 and 60, A588 and A690

The innovative PZC series of steel sheet piling is manufactured to be wider, lighter and stronger than the traditional PZ piling.

PZC sheet piling is made wider than PZ sections to maximize jobsite production in setting and driving. They are lighter than PZ piling to minimize the required amount of steel needed for project installation. And PZC sections are stronger per pound than PZ sections in both section modulus and moment of inertia.

PZC 39 compared to the currently produced PZ 40:

- 13% wider laying dimension
- 19% stronger per pound

Dimensions and Properties

Section	Width	Height	Web Thickness	Flange Thickness	Weight		Moment of Inertia		Section Modulus		Nominal Coating Area
	in.	in.	in.	in.	lb / lft	lb / ft²	in⁴	in⁴ / wft	in³	in³ / wft	ft² / lft
	mm	mm	mm	mm	kg / lm	kg / m²	cm⁴	cm⁴ / wm	cm³	cm³ / wm	m² / lm
PZC 37	22.50	21.02	0.488	0.563	69.6	37.1	1,349	719.6	128.4	68.5	6.15
	572	534	12.4	14.3	103.6	181.2	56,160	98,270	2,100	3,680	1.87
PZC 39	**22.50**	**21.05**	**0.525**	**0.600**	**74.0**	**39.5**	**1,429**	**762.1**	**135.6**	**72.3**	**6.15**
	572	**535**	**13.3**	**15.2**	**110.2**	**192.8**	**59,480**	**104,100**	**2,220**	**3,890**	**1.87**
PZC 41	22.50	21.09	0.561	0.636	78.4	41.8	1,507	803.6	142.7	76.1	6.15
	572	536	14.2	16.2	116.6	204.1	62,720	109,700	2,340	4,090	1.87

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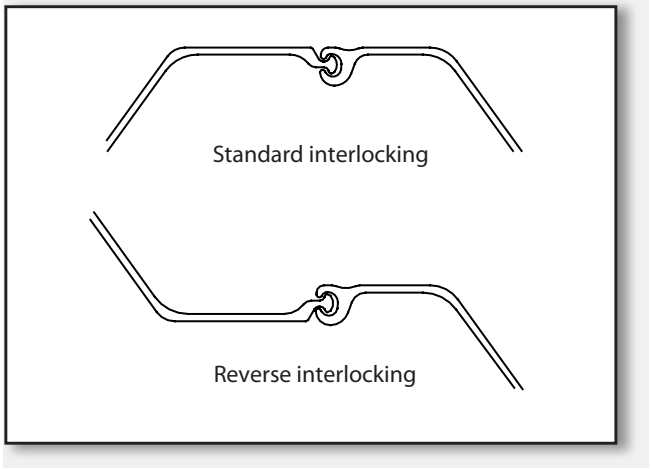
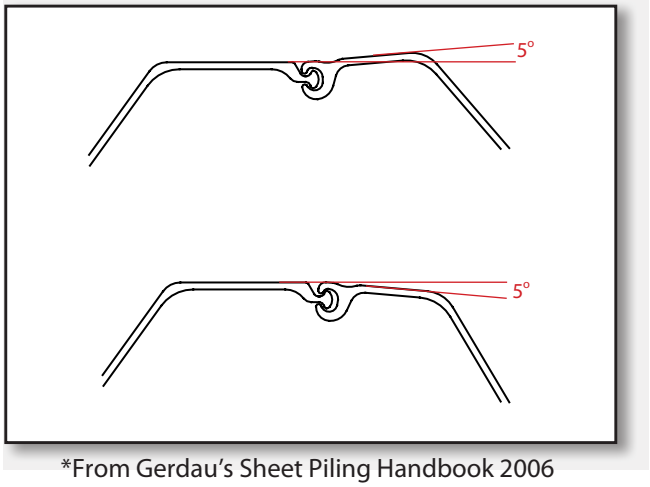
www.lbfoster.com

Z-Profile Interlock

All Gerdau Z-pile sections can be interlocked with each other. As such, the ball and socket interlocks can be installed with using either the standard or reverse position. This adds to greater ease of use and flexibility at the job site. Normal setting width of pairs can be altered to accommodate job site conditions through increasing or decreasing the laying width at the interlocks.

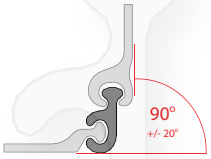
*Z-pile: Gerdau does not publish a swing value for Z-sections. As a "rule of thumb" it might be assumed that a 40 foot length would obtain a swing of up to 5 degrees.



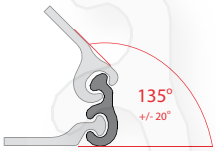


*From Gerdau's Sheet Piling Handbook 2006

Extruded Z-Profile Connectors

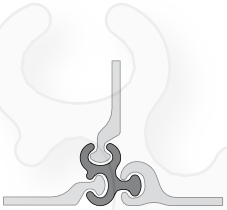


PZ 90



Cobra

PZ Tee

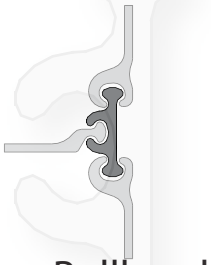


PZT-S

Colt

Note: all interlocks can be placed in reverse position with extruded connectors.

Joker



Bullhead

L.B. Foster can also provide special fabricated corners and tees when the job requires them.

LBFoster
Piling

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Colt

For 45° Corners (+/- 40°) with PZ/PZC (ball & socket) sheet piles

Installation

1. Please review the proper interlocking examples that are listed.
2. Thread the connector into the interlock while the sheet pile is out of the ground.
3. Adjust the connector to the appropriate position.
4. Tack or spot-weld the connector in place. Typically, a ~250mm (~10") weld attaching the connector to the sheet pile to the top is sufficient.
5. Drive/extract the sheet pile (with the connector attached) as you would normally.

Properties

Steel grade:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Weight:	~ 6.84 lb / ft

Colt

45° Eckverbindung
Für PZ und PZC (Ball and Socket)

Einsatzgebiet
45° Eckverbindungen

Eigenschaften

Stahlgüten:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Gewicht:	~10,2 kg/m

Colt

Unión angular de 45º
Para PZ y PZC (Ball and Socket)

Ámbito de aplicaciones
Uniones angulares de 45º

Propiedades

Calidades de acero:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~10,2 kg/m

Colt

Raccord à 45°
Pour PZ- et PZC (Ball + Socket)

Domaines d'emploi
Domaines d'emploi
Raccords à 45°

Caractéristiques

Nuances d'acier:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Poids:	~10,2 kg/m

Colt

Connessione per angolo a 45 °
Per PZ e PZC (maschio e femmina)

Campo di applicazione
Connessioni per angolo a 45°

Caratteristiche

Qualità dell'acciaio:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~10,2 kg/m

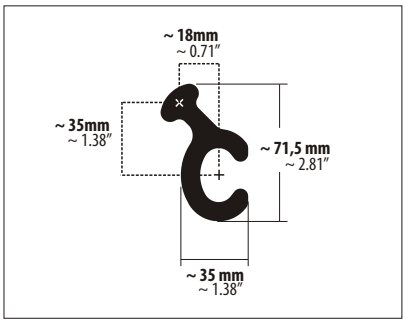
Colt

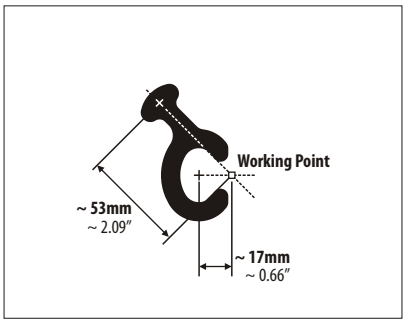
Угловой соединительный элемент 45°
Для PZ и PZC (шар и гнездо)

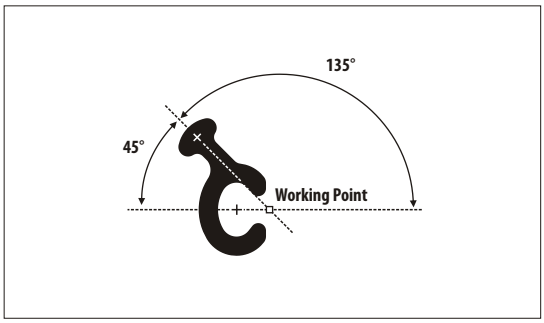
Область применения
Угловые соединительные элементы 45°

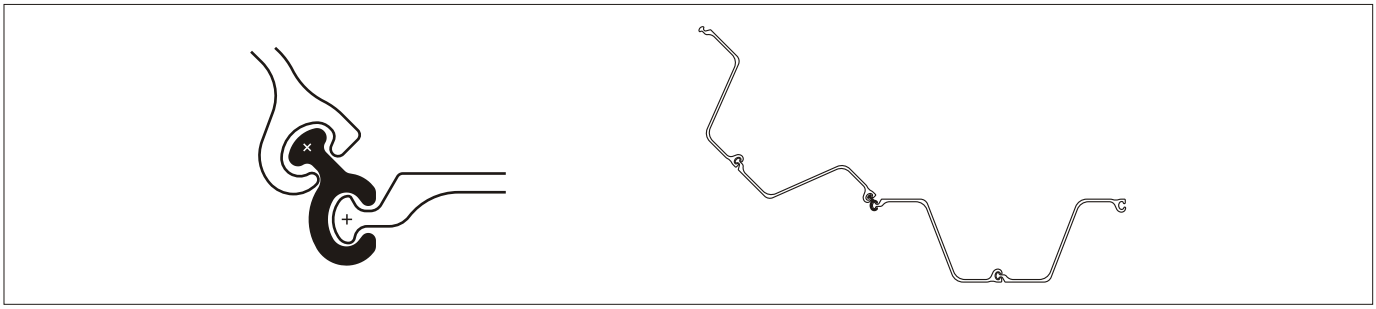
Параметры

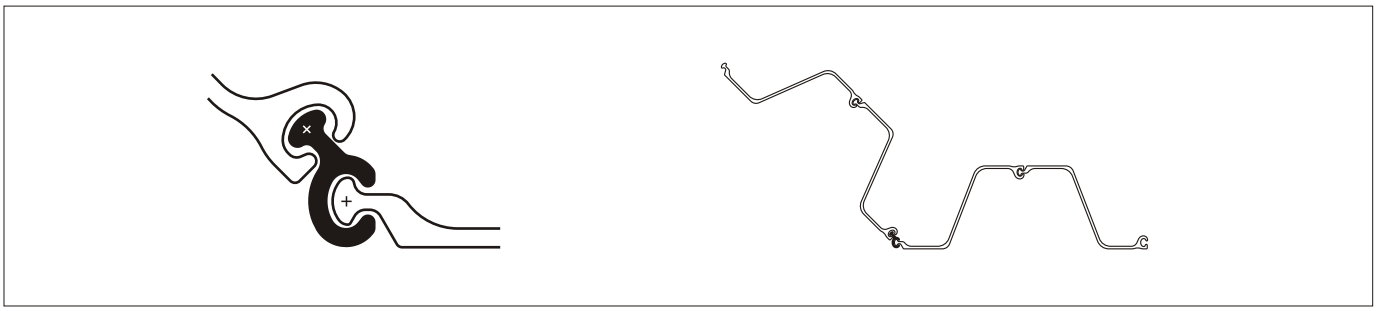
Качество стали:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Вес:	~10,2 кг/м

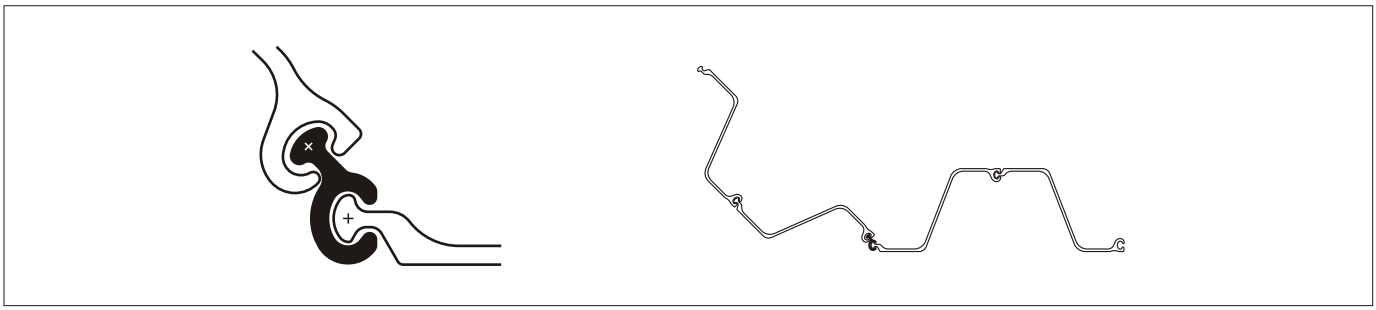

~ 18mm
~ 0.71″
~ 35mm
~ 1.38″
~ 71,5 mm
~ 2.81″
~ 35 mm
~ 1.38″

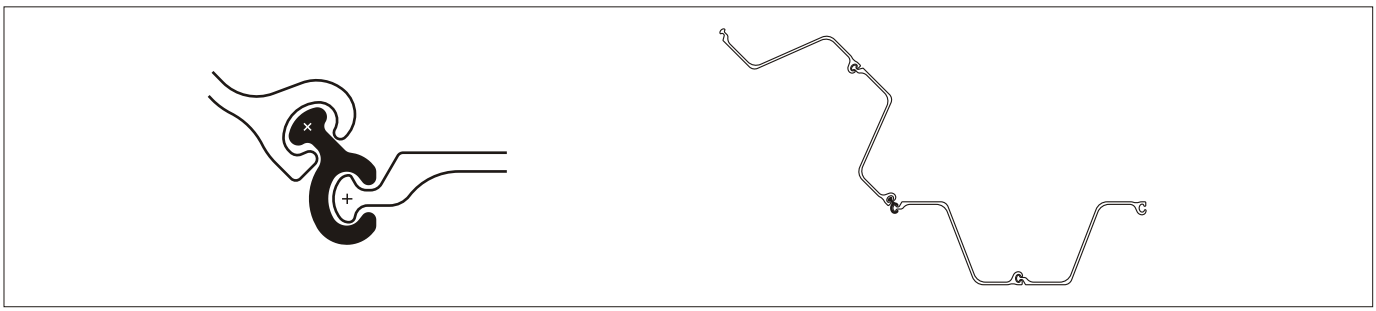

Working Point
~ 53mm
~ 2.09″
~ 17mm
~ 0.66″

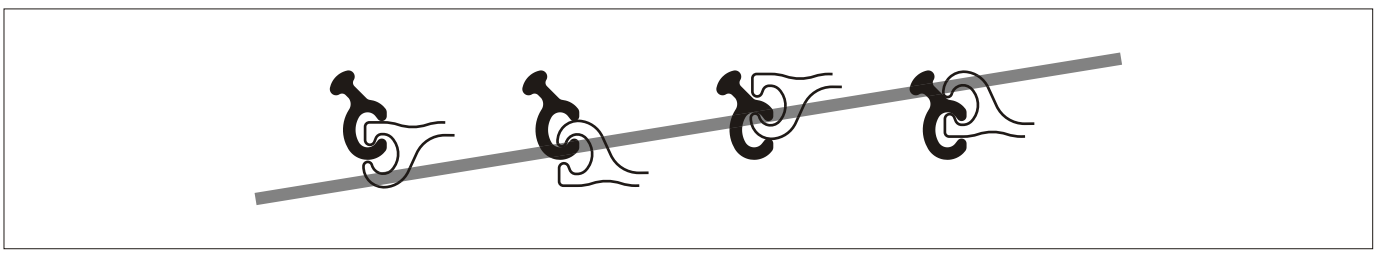

135°
45°
Working Point











PZ 90

For 90° Corners (+/- 40°) with PZ/PZC (ball & socket) sheet piles

Installation

1. Please review the proper interlocking examples that are listed.
2. Thread the connector into the interlock while the sheet pile is out of the ground.
3. Adjust the connector to the appropriate position.
4. Tack or spot-weld the connector in place. Typically, a ~250mm (~10") weld attaching the connector to the sheet pile to the top is sufficient.
5. Drive/extract the sheet pile (with the connector attached) as you would normally.

Properties

Steel grade:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Weight:	~ 7.21 / ~ 7.51 lb / ft

PZ 90

90° Eckverbindung
Für PZ und PZC (Ball and Socket)

Einsatzgebiet
90° Eckverbindungen

Eigenschaften

Stahlgüten:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Gewicht:	~10,9 / ~11,2 kg/m

PZ 90

Unión angular de 90º
Para PZ y PZC (Ball and Socket)

Ámbito de aplicaciones
Uniones angulares de 90º

Propiedades

Calidades de acero:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~10,9 / ~11,2 kg/m

PZ 90

Raccord d'angle (90°)
Pour PZ- et PZC (Ball + Socket)

Domaines d'emploi
Raccordement permettant un angle de 90°
(variation possible de +/- 20°)

Caractéristiques

Nuances d'acier:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Poids:	~10,9 / ~11,2 kg/m

PZ 90

Connessione per angolo a 90 °
Per PZ e PZC (maschio e femmina)

Campo di applicazione
Connessioni per angolo a 90°

Caratteristiche

Qualità dell'acciaio:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~10,9 / ~11,2 kg/m

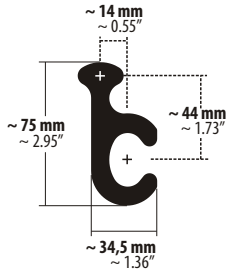
PZ 90

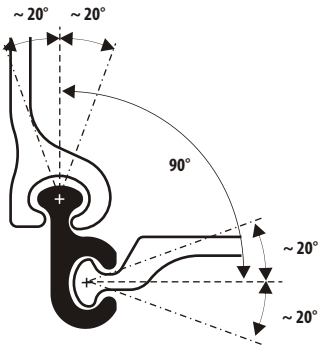
90° угловой соединительный элемент
Для PZ и PZC (шар и гнездо)

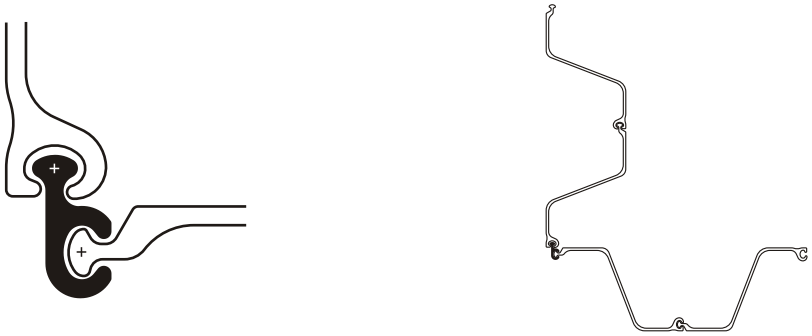
Область применения
Уловые соединительные элементы 90°

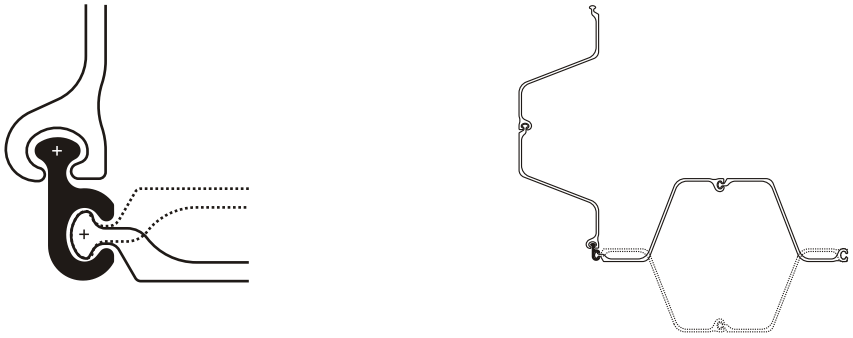
Параметры

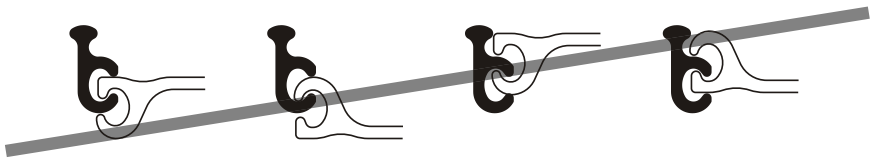
Качество стали:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Вес:	~10,9 / ~11,2 кг/м


~ 14 mm
~ 0.55"
~ 75 mm
~ 2.95"
~ 44 mm
~ 1.73"
~ 34,5 mm
~ 1.36"


~ 20°
~ 20°
90°
~ 20°
~ 20°







PZT-S (CBF)

For T-corners,
90° corners (+/- 40°)
with PZ/PZC (ball & socket) sheet piles

Installation
1. Please review the proper interlocking examples that are listed.
2. Thread the connector into the interlock while the sheet pile is out of the ground.
3. Adjust the connector to the appropriate position.
4. Tack or spot-weld the connector in place. Typically, a ~250mm (~10") weld attaching the connector to the sheet pile to the top is sufficient.
5. Drive/extract the sheet pile (with the connector attached) as you would normally.

Properties

Steel grade:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Weight:	~ 9.66 lb / ft

PZT-S (CBF)

T-Verbindung,
90° Eckverbindung
Für PZ und PZC (Ball and Socket)

Einsatzgebiet
Verbinden von drei Spundwänden

Eigenschaften

Stahlgüten:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Gewicht:	~14,4 kg/m

PZT-S (CBF)

Unión en T,
unión angular de 90º
Para PZ y PZC (Ball and Socket)

Ámbito de aplicaciones
Unión de tres tablestacas

Propiedades

Calidades de acero:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~14,4 kg/m

PZT-S (CBF)

Raccord en T,
raccord d'angle (90°)
Pour PZ et PZC (Ball + Socket)

Domaines d'emploi
Raccordement de trois palplanches

Caractéristiques

Nuances d'acier:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Poids:	~14,4 kg/m

PZT-S (CBF)

Connessione a T,
connessione per angolo a 90°
Per PZ e PZC (maschio e femmina)

Campo di applicazione
Connessione di tre palancole

Caratteristiche

Qualità dell'acciaio:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~14,4 kg/m

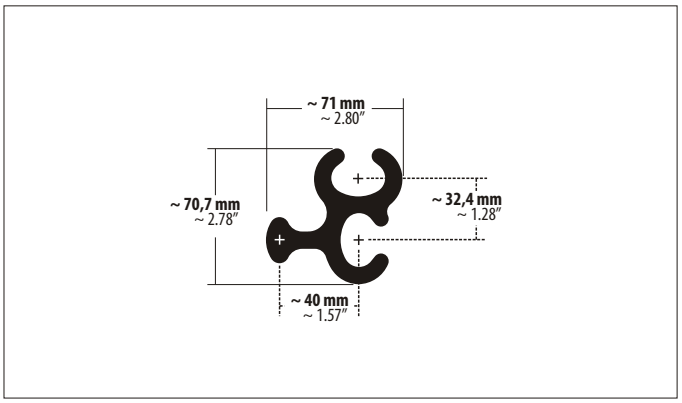
PZT-S (CBF)

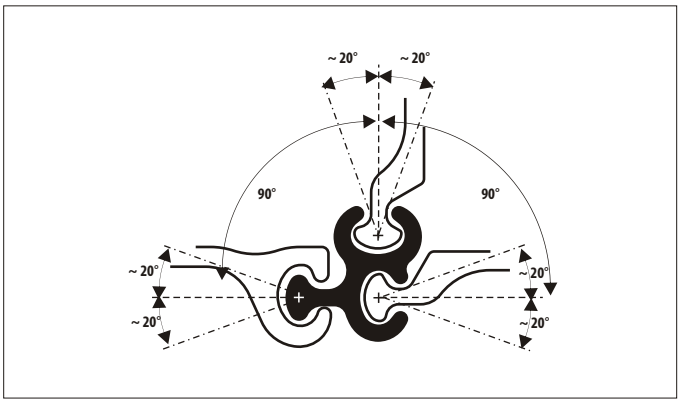
Т-образное соединение,
угловой соединительный элемент 90°
Для PZ и PZC (шар и гнездо)

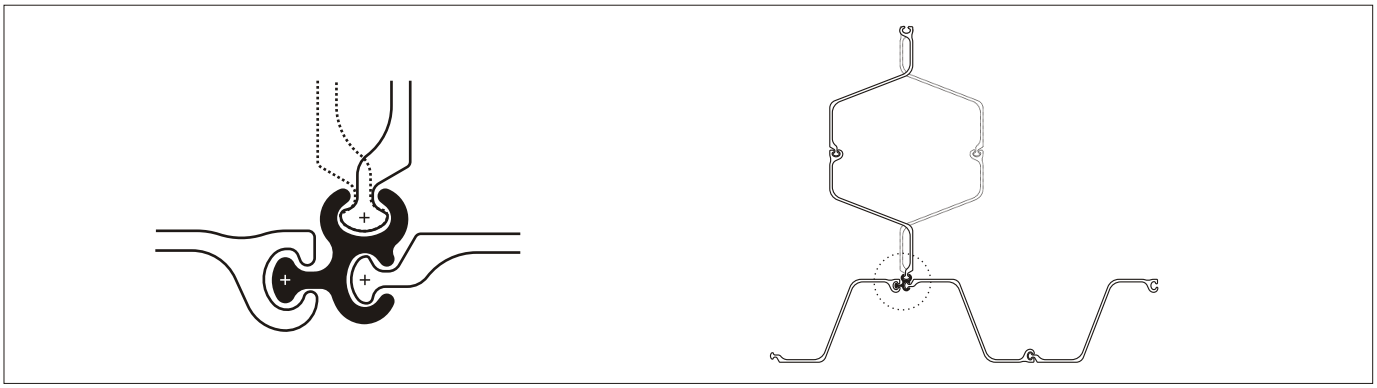
Область применения
Соединение трех шпунтовых стенок

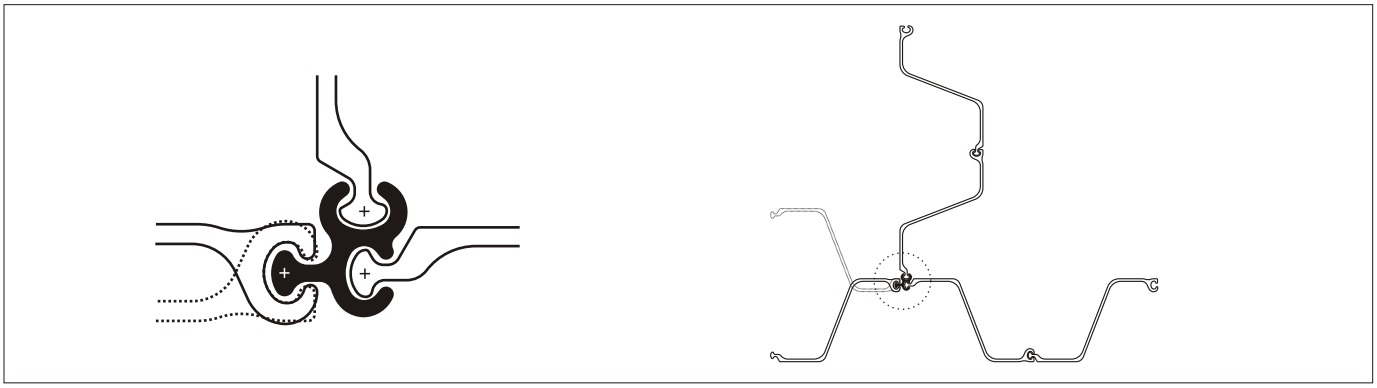
Параметры

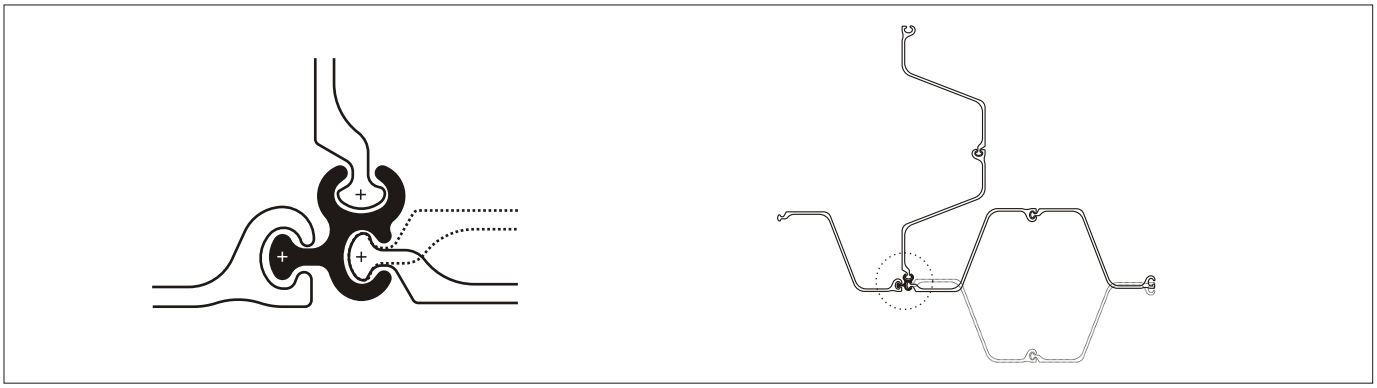
Качество стали:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Вес:	~14,4 кг/м

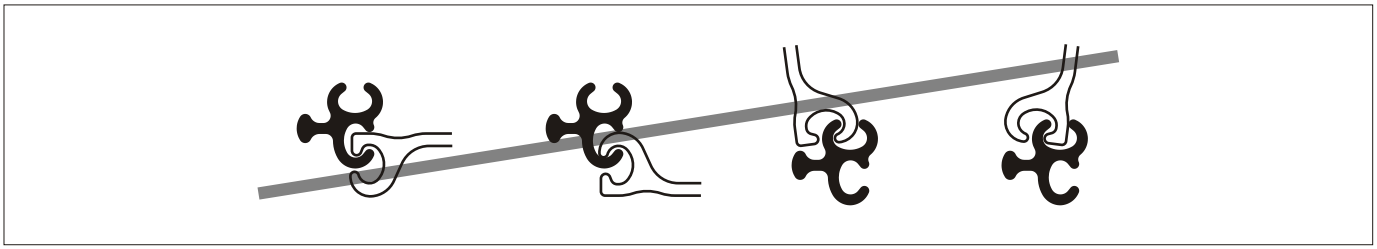

~ 71 mm
~ 2.80″
~ 70,7 mm
~ 2.78″
~ 32,4 mm
~ 1.28″
~ 40 mm
~ 1.57″


~ 20°
~ 20°
90°
90°
~ 20°
~ 20°
~ 20°
~ 20°









PZ Tee

For T-corners,
90° corners (+/- 40°)
with PZ/PZC (ball & socket) sheet piles

Installation
1. Please review the proper interlocking examples that are listed.
2. Thread the connector into the interlock while the sheet pile is out of the ground.
3. Adjust the connector to the appropriate position.
4. Tack or spot-weld the connector in place. Typically, a ~250mm (~10") weld attaching the connector to the sheet pile to the top is sufficient.
5. Drive/extract the sheet pile (with the connector attached) as you would normally.

Properties

Steel grade:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Weight:	~ 8.99 lb / ft

PZ Tee

T-Verbindung,
90° Eckverbindung
Für PZ und PZC (Ball and Socket)

Einsatzgebiet
Verbinden von drei Spundwänden

Eigenschaften

Stahlgüten:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Gewicht:	~13,4 kg/m

PZ Tee

Unión en T,
unión angular de 90º
Para PZ y PZC (Ball and Socket)

Ámbito de aplicaciones
Unión de tres tablestacas

Propiedades

Calidades de acero:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~13,4 kg/m

PZ Tee

Raccord en T,
raccord d'angle (90°)
Pour PZ et PZC (Ball + Socket)

Domaines d'emploi
Raccordement de trois palplanches

Caractéristiques

Nuances d'acier:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Poids:	~13,4 kg/m

PZ Tee

Connessione a T,
connessione per angolo a 90°
Per PZ e PZC (maschio e femmina)

Campo di applicazione
Connessione di tre palancole

Caratteristiche

Qualità dell'acciaio:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Peso:	~13,4 kg/m

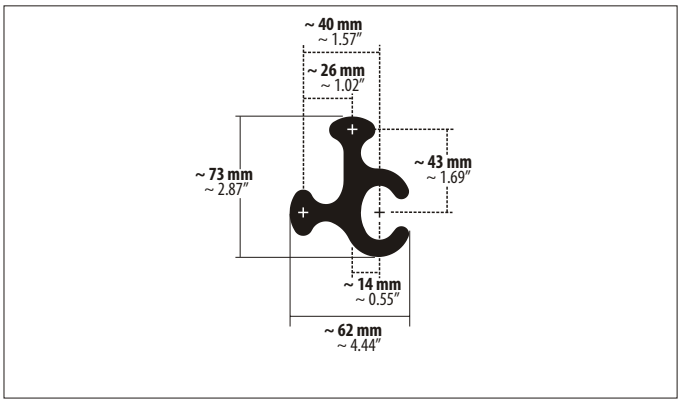
PZ Tee

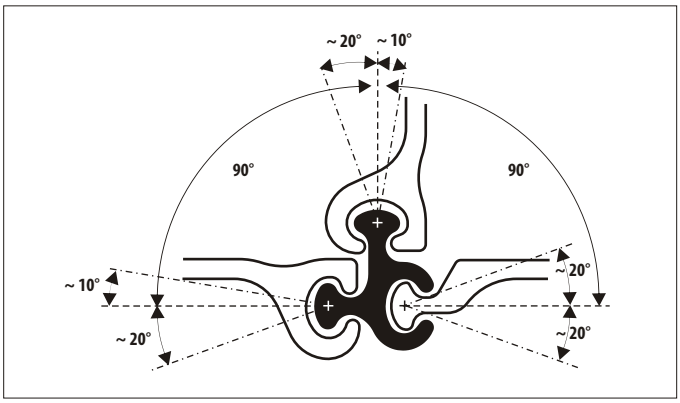
Т-образное соединение,
угловой соединительный элемент 90°
Для PZ и PZC (шар и гнездо)

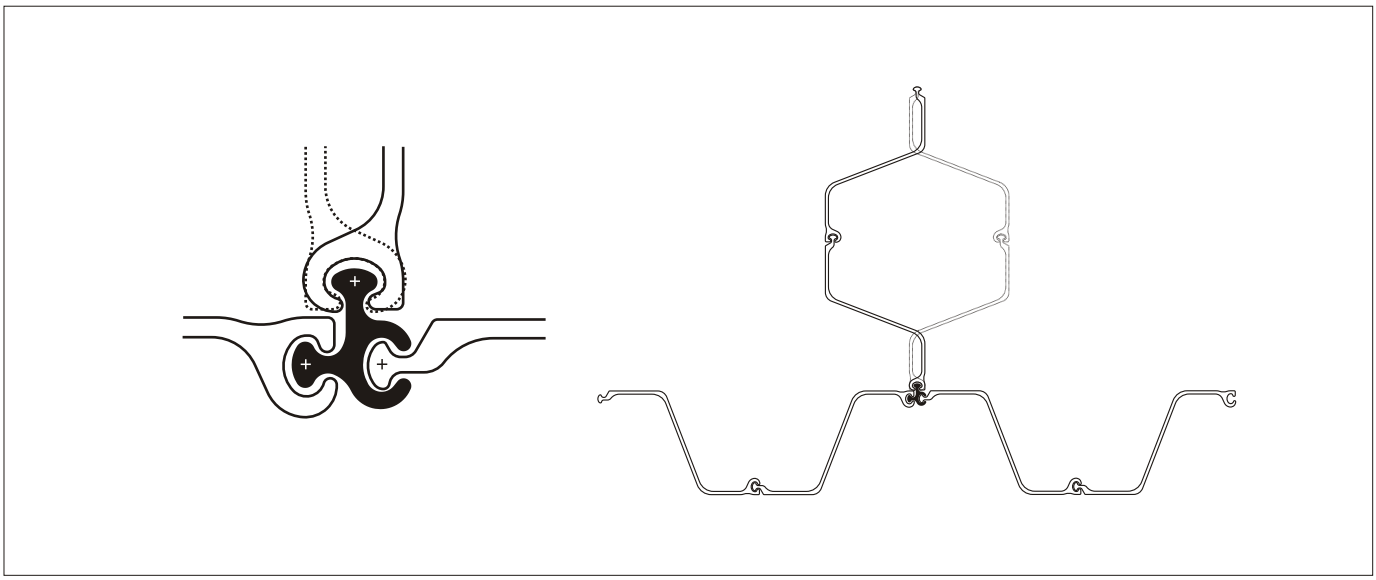
Область применения
Соединение трех шпунтовых стенок

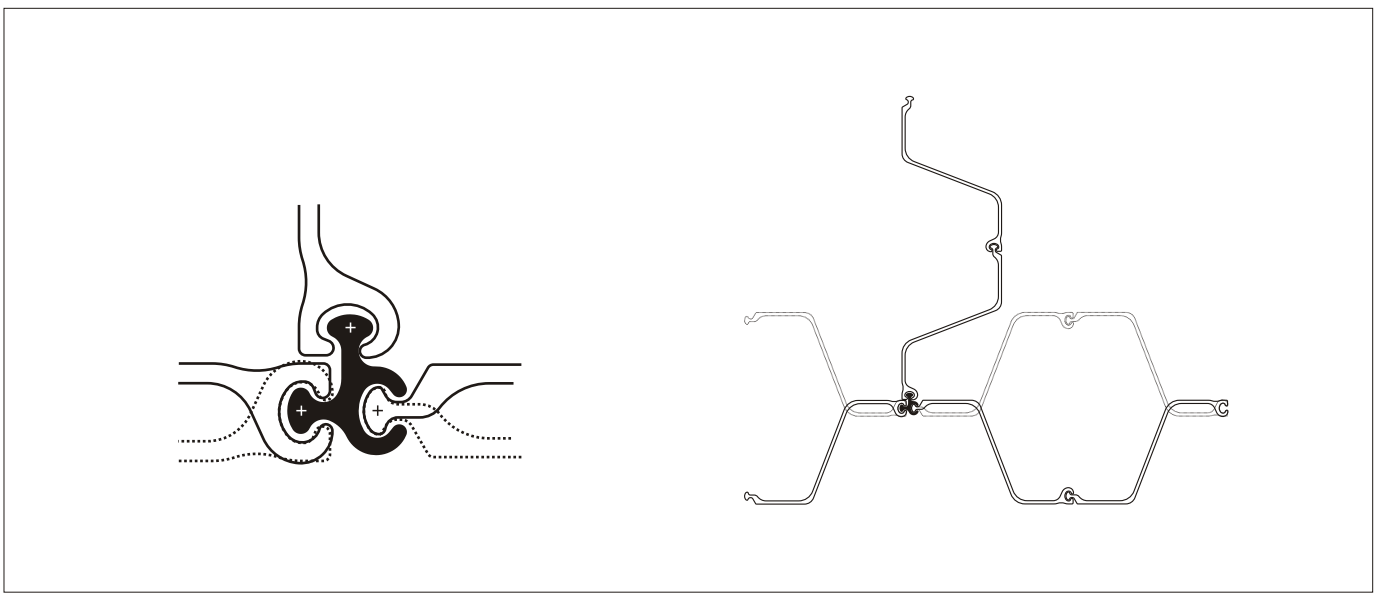
Параметры

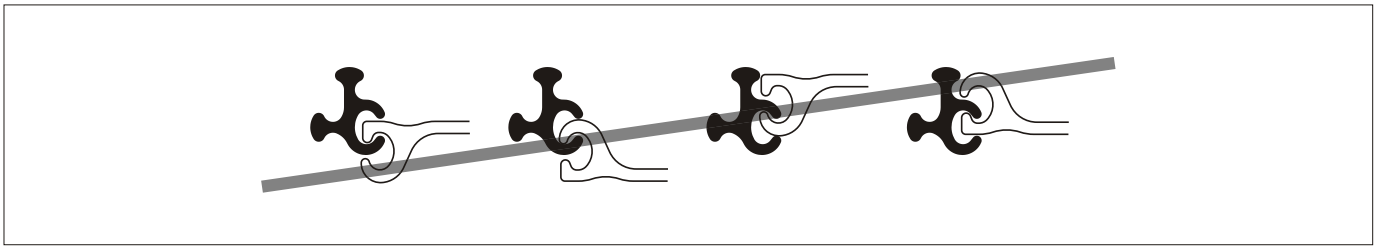
Качество стали:	S355GP, S430GP
	ASTM A572 Gr. 50/60
	ASTM A690 MARINER™ Steel
Вес:	~13,4 кг/м


~ 40 mm
~ 1.57″
~ 26 mm
~ 1.02″
~ 73 mm
~ 2.87″
~ 43 mm
~ 1.69″
~ 14 mm
~ 0.55″
~ 62 mm
~ 4.44″


~ 20°
~ 10°
90°
90°
~ 10°
~ 20°
~ 20°
~ 20°







de neef®
CONSTRUCTION CHEMICALS, INC.

TECHNICAL INFORMATION
WATERSTOPS

PRODUCT NAME
SWELLSEAL® WA
Gungrade Polyurethane Waterstop

MANUFACTURER
De Neef Construction Chemicals, Inc.
5610 Brystone Drive
Houston, TX 77041
1(800) 732-0166

PRODUCT DESCRIPTION
SWELLSEAL® WA is a single component hydrophilic mastic, designed for sealing smooth to very irregular construction joints and pipe penetrations. **SWELLSEAL® WA** is supplied in cartridge or sausage. Material cures and swells in the presence of moisture or water. Curing time is dependent on temperature and humidity, i.e. curing time will decrease if temperature and RH are higher. **SWELLSEAL® WA** will become firm in 24-36 hours. Performance is not affected by the curing time.

TYPICAL PROPERTIES

Property	Value	Test Standard
Solids	100%	
Uncured		
Viscosity	Paste	
Density (at 20°C, 68°F)	Approx. 90 lbs/cu.ft.	ASTM D 3574 95
Slump in vertical applications	1/8 inch	
Hand dry (at 68°F and 60% rel. humidity)	10 hr	
Flash Point	> 266 °F	ASTM D 93
Cured (7 days at 25°C (77°F) 1cm thick)		
Elongation at break	Approx. 625%	ASTM D 3574 95
Tensile strength	Approx. 312 psi	ASTM D-412
Resistance to hydrostatic pressure	>330 feet of head	DNCC
Swelling capacity in contact with water	200%	DNCC

Appearance
During application: pasty, Cured: rubbery; Color: Grey

APPROPRIATE APPLICATIONS
- Sealing of rough and smooth construction joints of cast in-place or precast concrete in wet and underwater applications.
- Sealing joints between pre-cast segments in wet or underwater applications (e.g. manholes, box culverts, cable ducts and pipes)
- Sealing of the joints between sheet piles.
- Used to secure **Deneef Hydrophilic Waterstops** to rough surfaces.

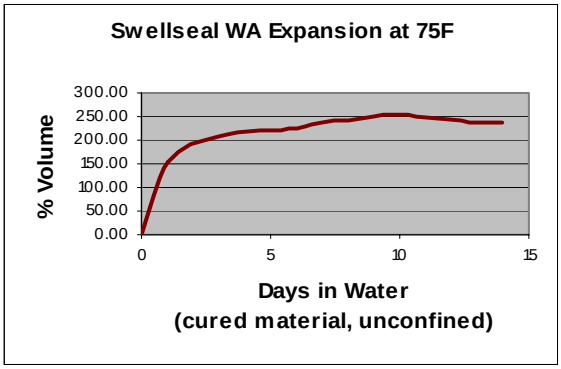
ADVANTAGES
- Solvent free
- Due to its special formulation, **SWELLSEAL® WA** can be applied to wet surfaces or in underwater applications.
- **SWELLSEAL® WA** adheres to concrete, PVC, HDPE, steel, and fibreglass
- In contact with water **SWELLSEAL® WA** will expand to more than 200% of its original cured volume.
- Flexible system, which adapts to the irregular surfaces
- Easy application with standard caulking guns
- Durable cured material will exceed the life of the structure.
- Good chemical resistance **(*)**.
- Resistant to petroleum products, greases, mineral and vegetable oils

(*) For Chemical resistance contact the Technical Service Department @ 800-732-0166

Consumption

The consumption of **SWELLSEAL®® WA** per linear foot depends on the quality of the surface of the concrete.

	Width (of the joint)	Consumption
Cartridges 10.5 oz.	1/4 inch	25 – 35 ft.
	5/16 inch	12 – 15 ft.
	3/8 inch	approx. 10 ft.
Sausages 20 oz.	1/4 inch	50 – 70 ft.
	5/16 inch	24 – 30 ft.
	3/8 inch	approx. 20 ft.



SWELLSEAL® WA 200% Expansion

PACKAGING

10.5 oz. cartridge	20 oz. sausage
12 per carton 6 lbs. net	12 per carton 24 lbs. net
1 pallet = 105 cartons 630 lbs.	1 pallet = 60 cartons 1500 lbs.
Weight per cartridge: 1.2 lbs. gross 1.1 lbs. net	Weight per sausage: 2.2 lbs. gross 2.0 lbs. net

LIMITATIONS

- **SWELLSEAL® WA** must be fully confined to perform properly. When used in precast or joints, minimum concrete cover is 3" on all sides.
- **SWELLSEAL® WA** is not suitable for surface applications.
- Uncured material may expand much greater than 200% if unconfined, and will expand preferentially in the direction of least resistance.
- Applied at temperatures below 40ºF, the material will take approximately 10 to 15 days to cure.

SURFACE PREPARATION

Refer to DeNeef Surface Preparation Guidelines for more details.

INSTALLATION PROCEDURES

SWELLSEAL® WA should be applied onto a dust-free concrete surface. The surface can be rough or smooth, moist or dry.

Application Method for 10.5 oz. Cartridges: Break the moisture proofing aluminum foil on the top of the cartridge and remove the plug from the bottom. Screw on the nozzle and cut diagonally at the appropriate position. Place the cartridge into the caulking gun.

For 20oz. Sausages: Put the sausage in the empty tube of the bulk caulking gun and cut 1/8 inch off the top of the sausage. Close the tube and install the nozzle. Nozzles are supplied with the appropriate opening. **SWELLSEAL® WA** must be applied in an uninterrupted band (minimum 3/8 inch wide and thick), gunned in the middle of the joint or precast element. Concrete cover should be at least 3 inches on all sides, in order to avoid cracks from the pressure of material swelling. If **SWELLSEAL® WA** is to be installed under water or during heavy rain the concrete operation should begin within 2 hours of application to provide confinement for the material or premature swelling may result lowering the effectiveness of the material.

STORAGE & HANDLING

Store in dry area for up to 12 months from date of production at temperatures between 40°F and 85°F for best performance. See shelf life details on the material packaging.

PRECAUTIONS

Always use protective clothing, gloves and goggles consistent with OSHA regulations during use. Avoid eye and skin contact. Do not ingest. Refer to Material Safety Data Sheet for detailed safety precautions.

SAFETY INFORMATION

In the event of an EMERGENCY call: CHEM-TREC 800-424-9300.

WARRANTY INFORMATION

De Neef Construction Chemicals, Inc. products are warranted under the policy set forth under the WARRANTY section of the DeNeef Construction Chemicals Inc., product catalog. Warranty information can also be obtained via the DeNeef Construction Chemicals Inc. website at www.deneef.com, or by calling 713-896-0123 or toll free at 1-800-732-0166.

Rev. 09/2009

Appendix C – Sheeting Plan and Section Details

(Notes, Drawings, Sheeting and Wale Calculations)

DESIGN NOTES, SKETCHES, & CALCULATIONS

PORT JERVIS FORMER MGP SITE EPS

TABLE OF CONTENTS:

Submitted to:
D.A. Collins Construction
269 Ballard Road
Wilton, NY 12831
518-664-9855

Submitted by:
Ryan-Biggs Associates, P.C.
257 Ushers Road
Clifton Park, New York 12065
518-406-5506

RYAN-BIGGS Project 10259

Submitted: July 12, 2012

07-12-12

ADDITIONAL DESIGN NOTES & CALCULATIONS

PORT JERVIS FORMER MGP SITE EPS

TABLE OF CONTENTS:

Submitted to:
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269 Ballard Road
Wilton, NY 12831
518-664-9855

Submitted by:
Ryan-Biggs Associates, P.C.
257 Ushers Road
Clifton Park, New York 12065
518-406-5506

RYAN-BIGGS Project 10259

Submitted: August 2, 2012

Ryan-Biggs Associates, P.C.
257 Ushers Road
Clifton Park, New York 12065
518) 406-5506
FAX (518) 406-5514

JOB NO:	10259	**DATE:** 08/02/12	**PAGE:**	NT1
PROJECT:	Port Jervis EPS		**BY:**	MGY
SUBJECT:	Notes			

GENERAL NOTES:

1. All dimensions to, of, and in proposed structures shall be verified by D.A. Collins (Contractor).

2. Do not change size nor spacing of structural elements.

3. Details shown are typical; similar details apply to similar conditions unless otherwise indicated.

4. These Sketches do not include necessary components for construction safety. Contractor shall be solely responsible for construction safety.

5. Contractor shall determine exact location of existing utilities before commencing work. Contractor agrees to be fully responsible for any and all damages which might be occasioned by failure to exactly locate and preserve existing utilities.

6. Contractor shall notify Ryan-Biggs Associates, P.C. (Ryan-Biggs) in writing of all proposed deviations or substitutions from dimensions, materials, or equipment shown on Sketches and make only those deviations or substitutions accepted by Ryan-Biggs.

7. Do not scale Sketches. Contractor shall notify Ryan-Biggs of any discrepancies in dimensions between these Sketches and the Contract Documents.

8. These sketches have been prepared in U.S. customary units.

9. Datum for elevations shown on these Sketches is the same as on the Contract Documents.

PRESUMPTIVE DESIGN PARAMETER NOTES:

1. Design soil weights and pressures are based on Coulomb earth pressure theory derived from geotechnical information on the Contract Drawings and geotechnical information in Project Manual.

2. Design surcharge loads and hydrostatic loads are based on applicable notes herein.

3. Do not excavate or dewater below Elevation 416.5 feet under any circumstances.

EPS NOTES:

1. Do not hang, support, or attach any equipment or other loads from/to sheet piles, wales, brackets, or struts.

2. Contractor is responsible for coordinating exact wale lengths with actual sheet pile widths and corner sheet details, and for coordinating exact excavation dimensions with proposed pit dimensions. Deviations of plus or minus 6 inches in overall clear distances between inside faces of sheeting from dimensions shown on these Sketches are acceptable.

3 Ryan-Biggs is not responsible for dewatering of EPS and for avoiding water-induced problems.

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257 Ushers Road
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518) 406-5506
FAX (518) 406-5514

JOB NO:	10259	**DATE:** 08/02/12	**PAGE:**	NT2
PROJECT:	Port Jervis EPS		**BY:**	MGY
SUBJECT:	Notes			

OUTBOARD SOIL ELEVATION CONTROL NOTES:

1. During all phases of EPS work, the top-of-soil elevation within a 20-foot offset distance from the back face of main and side wale sheet piles, shall be maintained at or below elevation 436 feet.

SHEET PILE (SHEETING) NOTES:

1. Sheet piles shall be PZC-18, ASTM A 572, Grade 50.

2. Sheet piles shall be in new or like new condition subject to review by Ryan-Biggs.

3. Sheets shall be interlocked with adjacent sheets in accordance with the sheeting manufacturer's standard details and procedures.

4. Sheeting at each excavation corner shall use fully-interlocking corner piles or joker sheets.

5. Top of sheeting elevations shall be kept as low as practical.

6. Sheeting shall be driven to the toe elevation indicated on the drawings. Consult with and inform Ryan-Biggs of the final sheeting embedment elevations if refusal of sheeting is achieved before reaching toe elevation.

7. The Contract Documents seem to indicate the existing soil could be dense and may contain cobbles and boulders. Contractor should anticipate difficult driving conditions. Ryan-Biggs is not responsible for difficult driving conditions which may be encountered.

STRUCTURAL STEEL NOTES:

1. Welds shall be made using E 70 electrodes and comply with the American Welding Society, AWS D1.1. "Structural Welding Code - Steel". Welds shall be full length unless noted otherwise. Each welds may be field welds (field weld symbols not all shown for clarity).

2. All structural steel shall be in new or satisfactory condition, subject to acceptance by Ryan-Biggs.

3. W shapes shall be ASTM A992.

4. Wale components may contain one bolted splice as detailed herein. Wale splice plates (webs and flanges) shall be ASTM A572, Grade 50.

5. Rolled steel plates and angles shall be ASTM A 36 unless specifically noted otherwise.

6. Main component sizes are shown on Sketches. Alternate component sizes may be used based on written acceptance by Ryan-Biggs.

7. Each individual HP strut and corner brace shall be a single piece without splices.

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JOB NO: 10259	**DATE:** 08/02/12	**PAGE:** NT3
PROJECT: Port Jervis EPS		**BY:** MGY
SUBJECT: Notes		

MAIN WALE SURCHARGE CONTROL NOTES:

1. Do not stockpile soil around the perimeter of the EPS as indicated in OUTBOARD SOIL ELEVATION CONTROL NOTES, unless accepted in writing by Ryan-Biggs.

2. Use of construction equipment (for the purposes of these notes, normal construction equipment shall mean excavators, dump trucks, etc., with the gross vehicle weight of any single piece limited to approximately 40 tons) around perimeter of the EPS shall be limited as follows:

   a. Crane outriggers or crane crawlers are not permitted within 20 feet of any section of the sheeting during any stage of excavation or work.

   b. Other construction equipment is not recommended within 5 feet of any section of the sheeting during the bulk excavation. During the final wedge of soil excavation adjacent to the sheeting, a single piece of equipment is permitted to be adjacent to the sheets provided crane mats are used to distribute crawler or axle loads.

EPS CONSTRUCTION SEQUENCE:

1. Excavate soil within EPS to Elevation 430.00 feet.

2. Place fabricated wale frame in excavated area and use as template to drive sheeting to toe elevation.

3. Excavate localized “pits” as needed to fully install sheeting brackets.

4. Excavate remaining soil to target removal elevation.

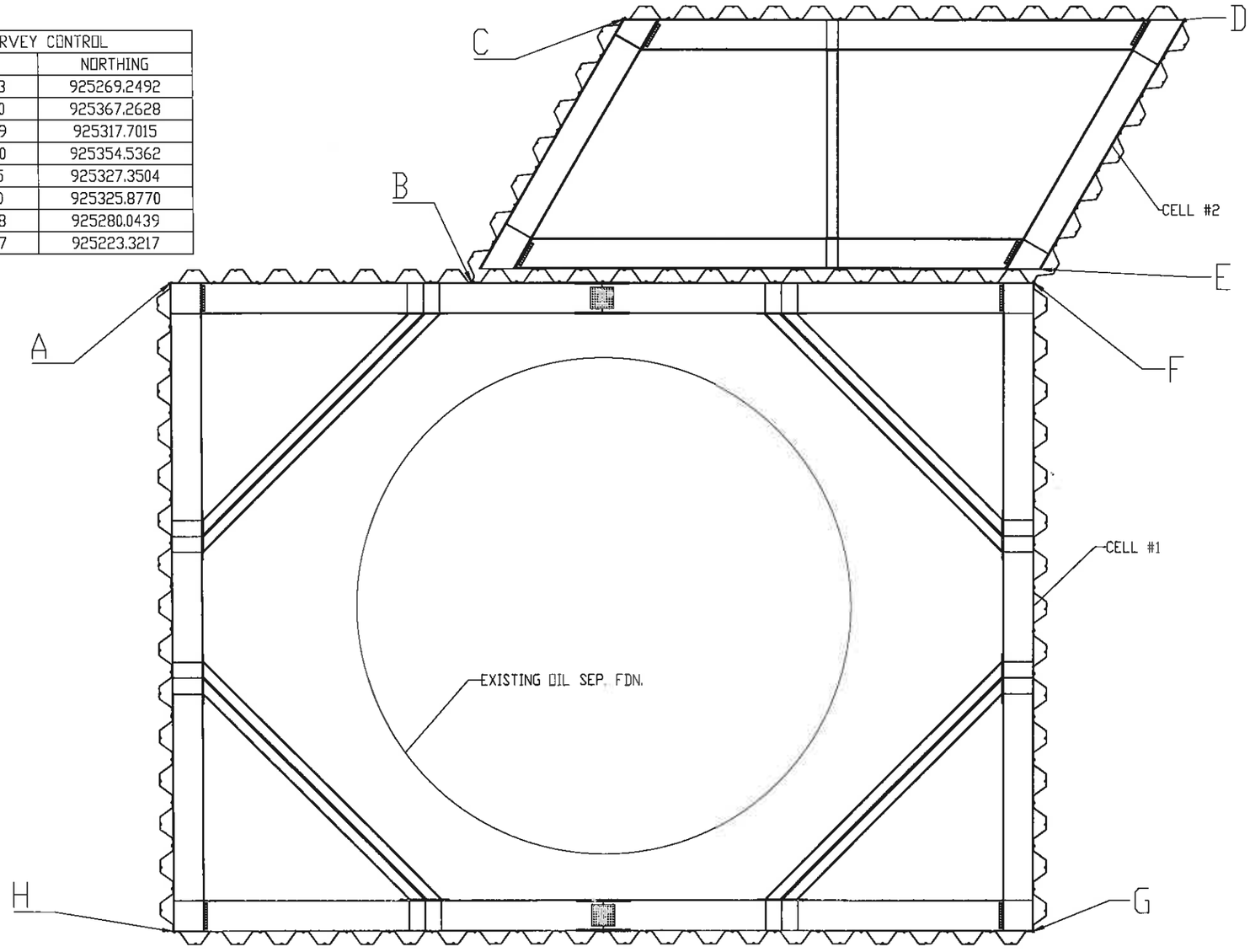
5. Complete Contract Work.

6. Backfill EPS up to Elevation 430.00 feet. Remove internal bracing components.

7. Backfill the remainder of the EPS.

8. Repeat Steps 1 through 7 for other Cell.

EXCAVATION SUPPORT SURVEY CONTROL		
CONTROL POINT	EASTING	NORTHING
A	438220.7573	925269.2492
B	438450.9230	925367.2628
C	438235.7229	925317.7015
D	438275.5620	925354.5362
E	438281.7185	925327.3504
F	438282.1000	925325.8770
G	438324.5048	925280.0439
H	438263.2257	925223.3217



PLAN VIEW CELL#1 AND CELL#2

SCALE: 1:6

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PREPARED BY: D.A. COLLINS ENVIRONMENTAL SERVICES, LLC

269 BALLARD ROAD
WILTON, NY 12831

P: (518) 664-9855
F: (518) 664-0925

PROFESSIONAL ENGINEER

STATE OF NEW YORK * MATTHEW G. YERKEY * 84009 * LICENSED PROFESSIONAL ENGINEER

APPROVAL

EXCAVATION SUPPORT PLAN CELL#1 AND CELL#2

PROJECT: PORT JERVIS FORMER MGP SITE

CONTRACTOR: D.A. COLLINS ENVIRONMENTAL SERVICES, LLC

FABRICATOR: D.A. COLLINS CONSTRUCTION CO., INC. FABRICATION DIVISION

TITLE:

DRAWN BY: JDM	CHECKED BY:	DATE: 7/11/12
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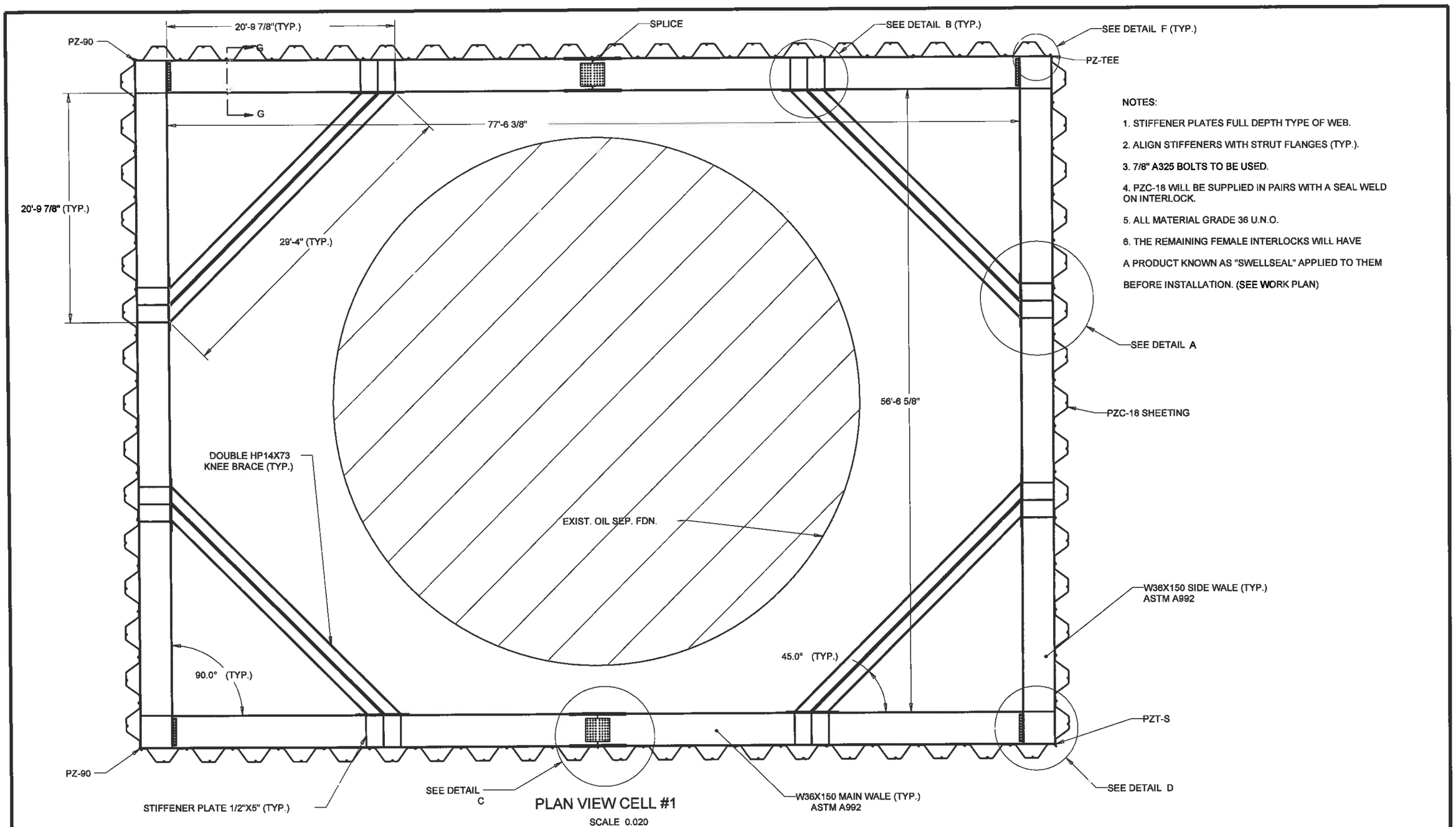

PLAN VIEW CELL #1

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NOTES:

1. STIFFENER PLATES FULL DEPTH TYPE OF WEB.
2. ALIGN STIFFENERS WITH STRUT FLANGES (TYP.).
3. 7/8" A325 BOLTS TO BE USED.
4. PZC-18 WILL BE SUPPLIED IN PAIRS WITH A SEAL WELD ON INTERLOCK.
5. ALL MATERIAL GRADE 36 U.N.O.
6. THE REMAINING FEMALE INTERLOCKS WILL HAVE A PRODUCT KNOWN AS "SWELLSEAL" APPLIED TO THEM BEFORE INSTALLATION. (SEE WORK PLAN)

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APPR.
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PREPARED BY:

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PROFESSIONAL ENGINEER

APPROVAL

EXCAVATION SUPPORT PLAN CELL-1

PROJECT: PORT JERVIS FORMER MGP SITE

CONTRACTOR: D.A. COLLINS ENVIRONMENTAL SERVICES LLC

FABRICATOR: D.A. COLLINS CONSTRUCTION CO., INC.
FABRICATION DIVISION
269 BALLARD ROAD
WILTON, NY 12831

TITLE:

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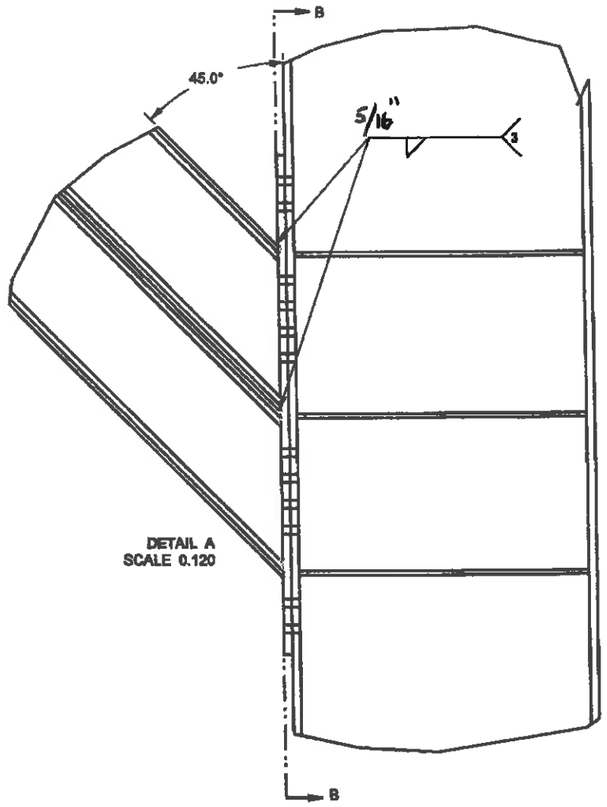

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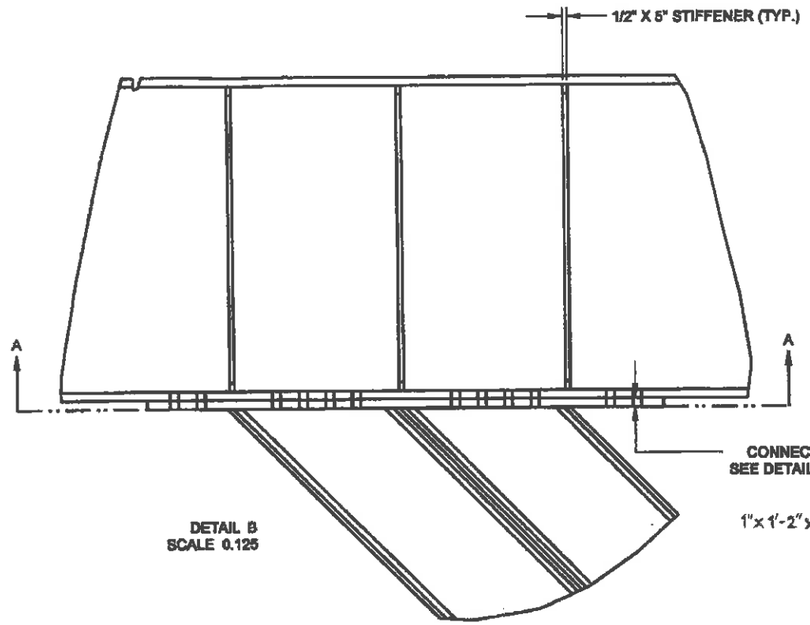


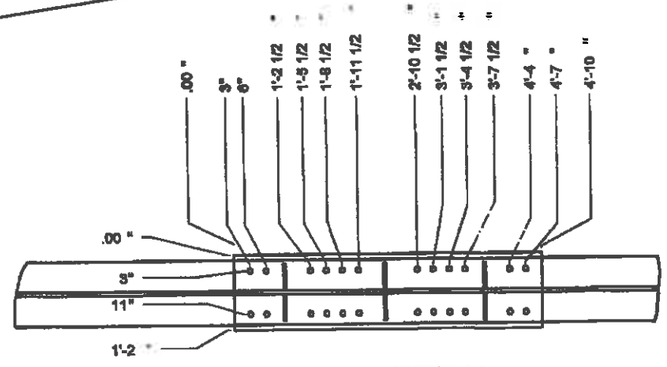
DETAIL B
SCALE 0.125

1"x 1'-2"x 4'-10"

NOTES:

1. 7/8" A325 BOLTS AT ALL CONNECTIONS.

2. TWO ROWS OF 12 BOLTS FOR WALE TO KNEE BRACE CONNECTION.



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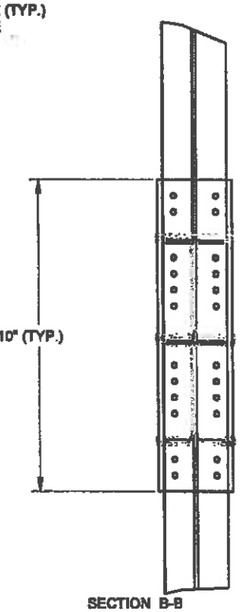

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WALE CONNECTION DETAIL

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PROFESSIONAL ENGINEER

APPROVAL

SUPPORT BRACE CONNECTION DETAIL
CELL #1

PROJECT:	PORT JERVIS FORMER MGP SITE
CONTRACTOR:	D.A. COLLINS ENVIRONMENTAL SERVICES LLC
FABRICATOR:	D.A. COLLINS CONSTRUCTION CO., INC. FABRICATION DIVISION 269 BALLARD ROAD WILTON, NY 12831
TITLE:	

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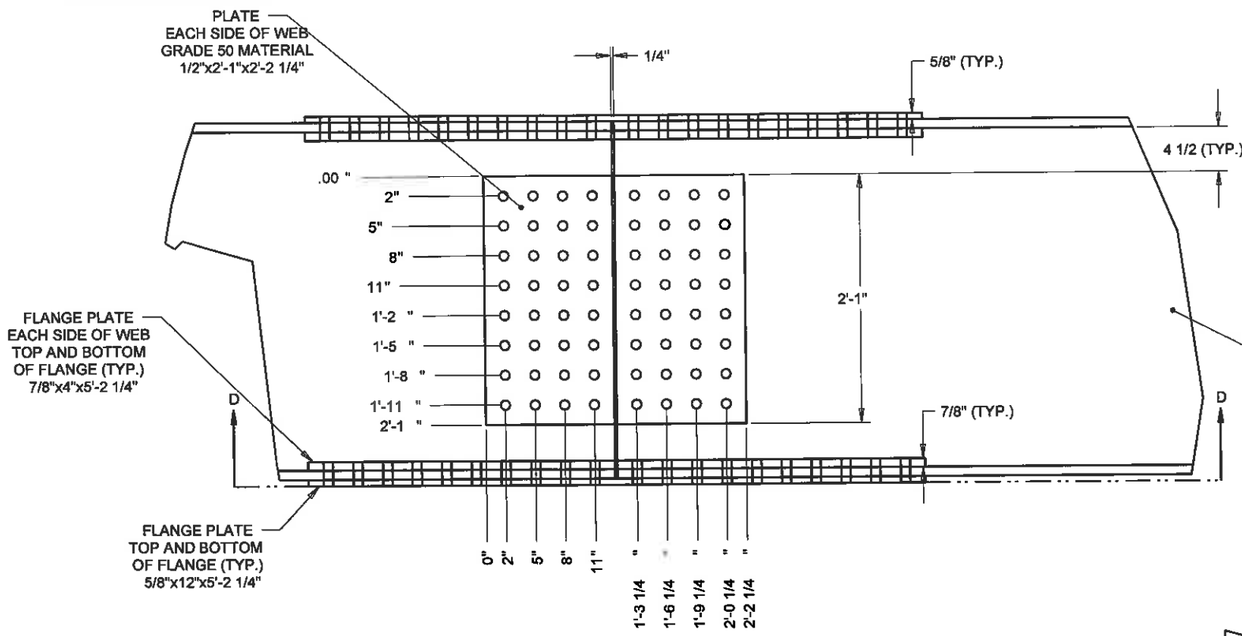

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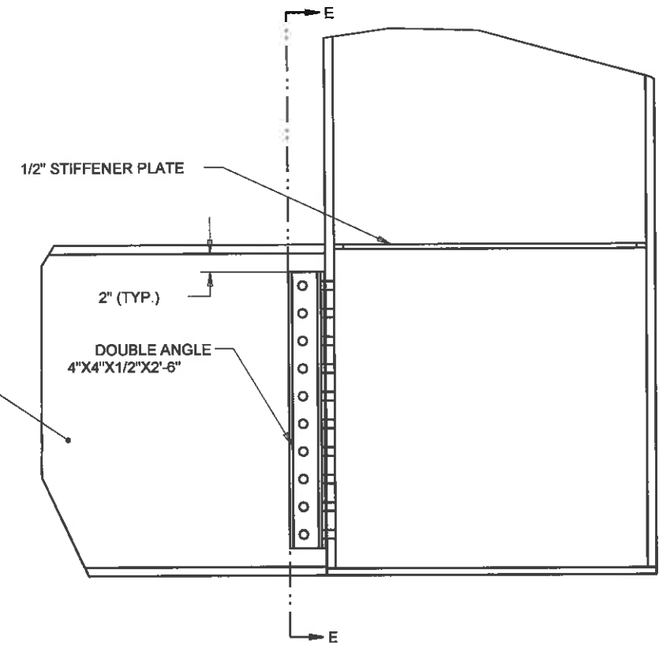

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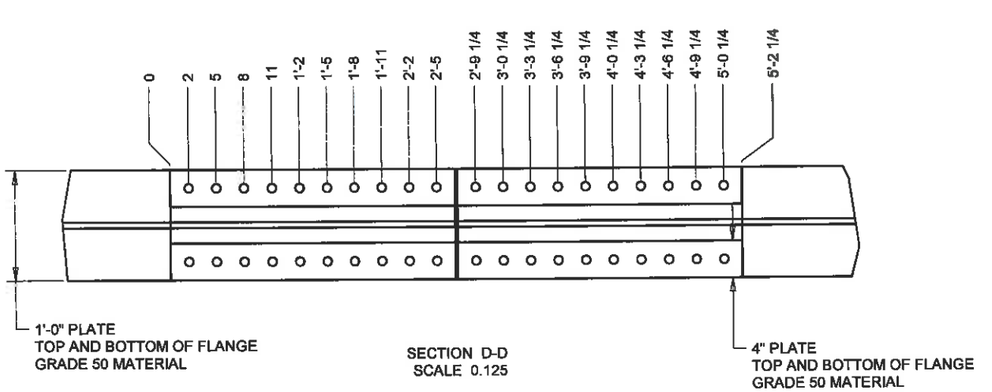

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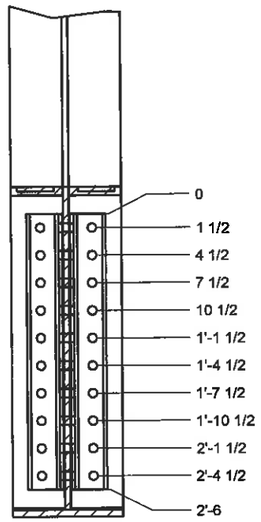

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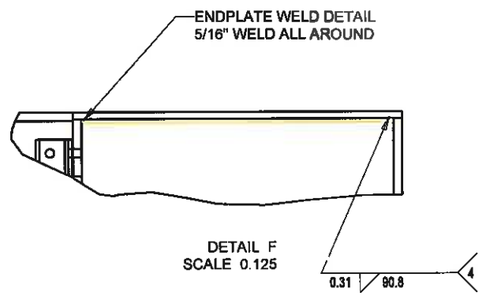

DETAIL F
SCALE 0.125

WALE CONNECTION DETAIL

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APPR.
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PREPARED BY:

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MATTHEW G. YERKEY
84009
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PROFESSIONAL ENGINEER

APPROVAL

SUPPORT BRACE CONNECTION DETAIL CELL #1

PROJECT:	PORT JERVIS FORMER MGP SITE
CONTRACTOR:	D.A. COLLINS ENVIRONMENTAL SERVICES LLC
FABRICATOR:	D.A. COLLINS CONSTRUCTION CO., INC. FABRICATION DIVISION 269 BALLARD ROAD WILTON, NY 12831
TITLE:	

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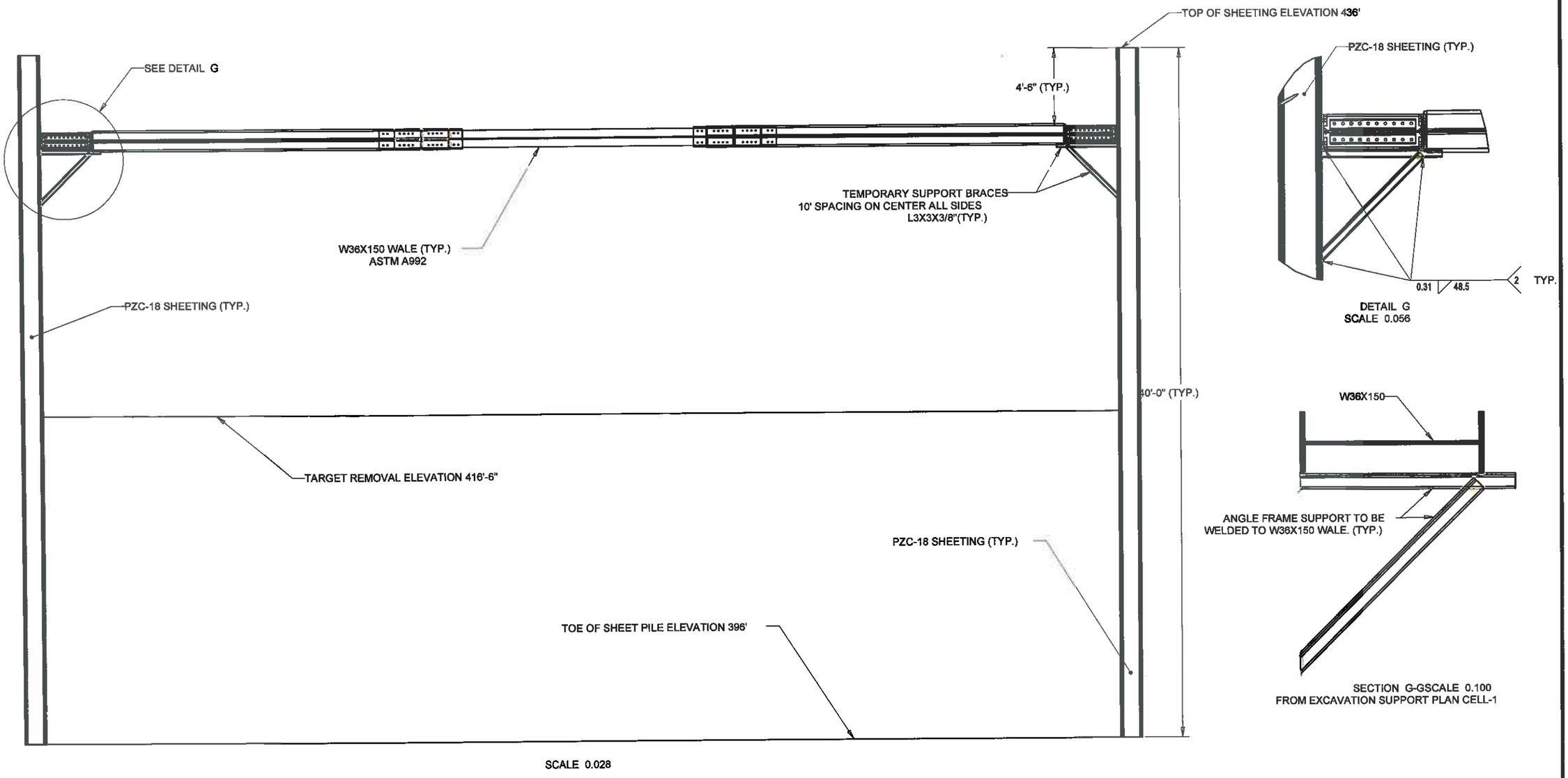

CROSS-SECTION VIEW

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APPR.
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CROSS-SECTION CELL #1

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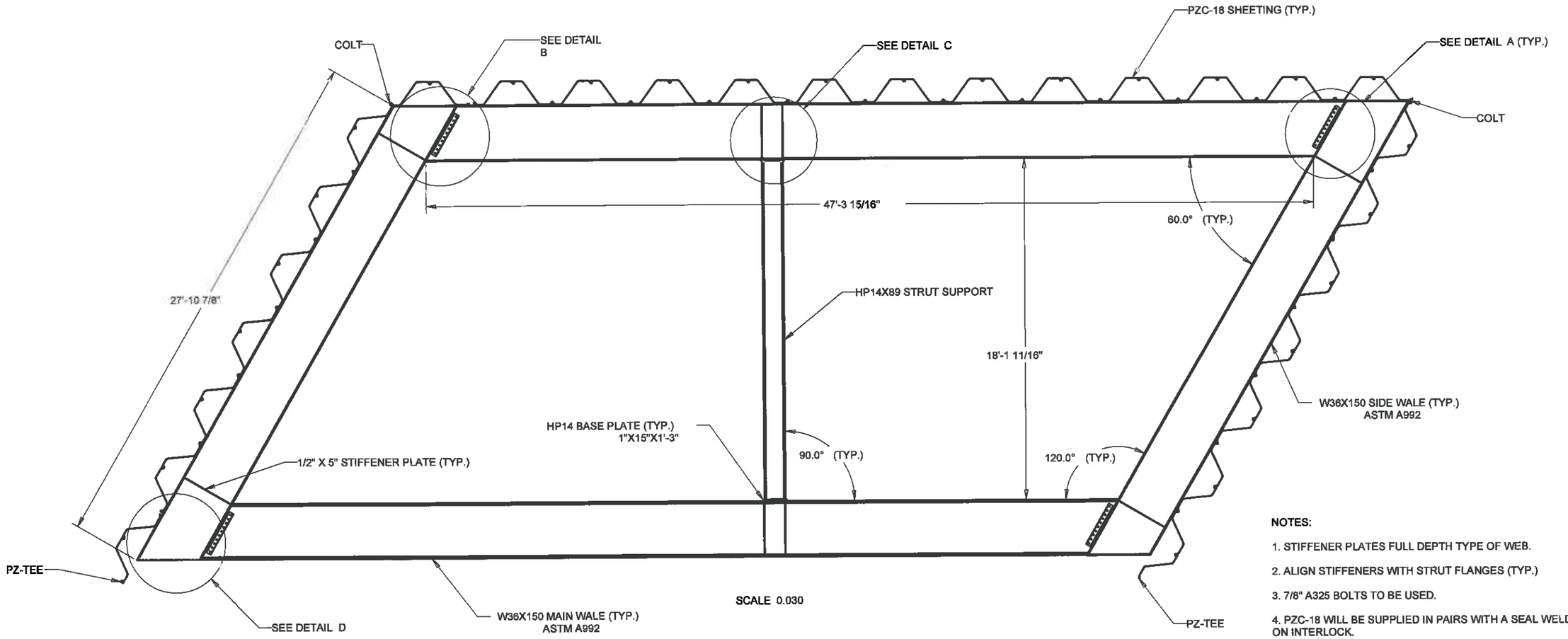
TITLE:			
DRAWN BY: JDM	CHECKED BY:	DATE:	7/11/12
SCALE: AS SHOWN	DRG. NO.	SHEET	5 OF 8



SCALE 0.030

PLAN VIEW CELL #2

NOTES:

1. STIFFENER PLATES FULL DEPTH TYPE OF WEB.
2. ALIGN STIFFENERS WITH STRUT FLANGES (TYP.)
3. 7/8" A325 BOLTS TO BE USED.
4. PZC-18 WILL BE SUPPLIED IN PAIRS WITH A SEAL WELD ON INTERLOCK.
5. ALL MATERIAL GRADE 36 U.N.O.
6. THE REMAINING FEMALE INTERLOCKS WILL HAVE A PRODUCT KNOWN AS "SWELLSEAL" APPLIED TO THEM BEFORE INSTALLATION. (SEE WORK PLAN)

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APPR.
1					
2					
3					
4					
5					

PREPARED BY:

D.A. COLLINS ENVIRONMENTAL SERVICES, LLC

269 BALLARD ROAD
WILTON, NY 12831

P: (518) 664-9855
F: (518) 664-0925

STATE OF NEW YORK * MATTHEW G. YERKEY * 84009 * LICENSED PROFESSIONAL ENGINEER

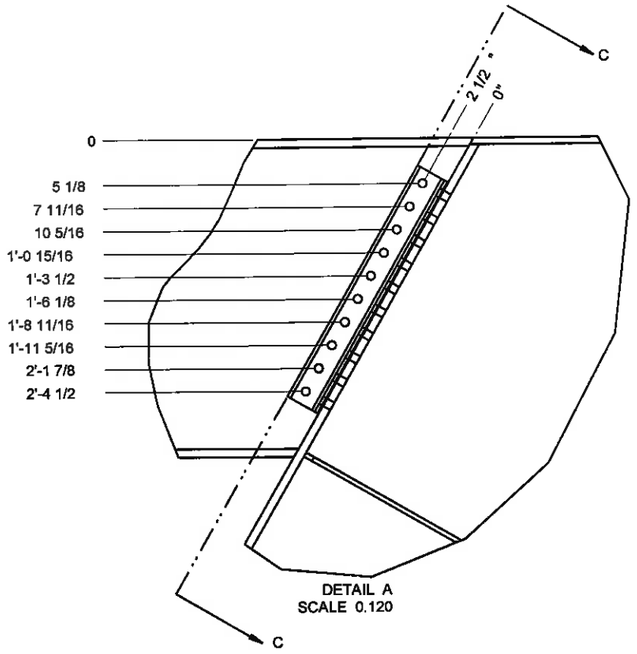
PROFESSIONAL ENGINEER

APPROVAL

EXCAVATION SUPPORT PLAN CELL-2

PROJECT:	PORT JERVIS FORMER MGP SITE
CONTRACTOR:	D.A. COLLINS ENVIRONMENTAL SERVICES LLC
FABRICATOR:	D.A. COLLINS CONSTRUCTION CO., INC. FABRICATION DIVISION 269 BALLARD ROAD WILTON, NY 12831
TITLE:	

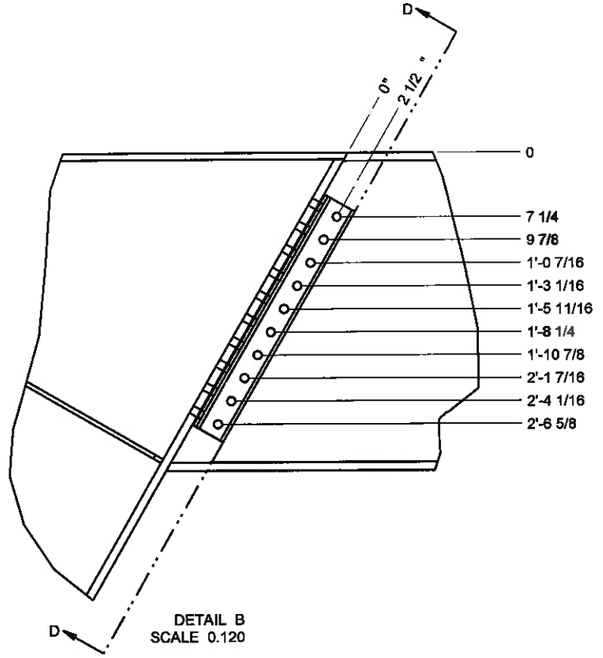
DRAWN BY: JDM	CHECKED BY:	DATE:	7/11/12
SCALE: AS SHOWN	DRG. NO.	SHEET	6 OF 8



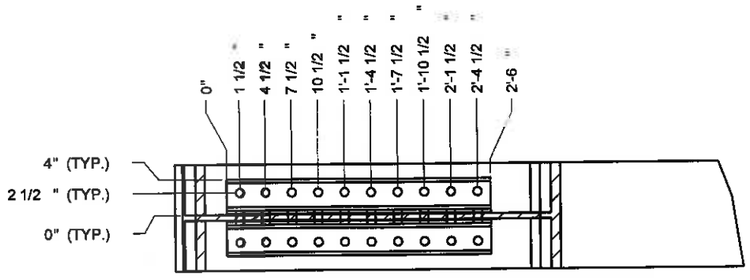
DETAIL A
SCALE 0.120

NOTES:

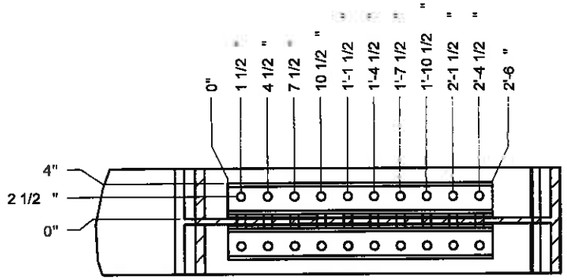
1. ANGLE 4"x4"x1/2"-2'-6" LONG TYPICAL ALL FOUR LOCATIONS.



DETAIL B
SCALE 0.120



SECTION C-C
SCALE 0.120



SECTION D-D
SCALE 0.120

CONNECTION DETAIL

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APPR.
1					
2					
3					
4					
5					

PREPARED BY:

D.A. COLLINS ENVIRONMENTAL SERVICES, LLC

269 BALLARD ROAD
WILTON, NY 12831

P: (518) 664-9855
F: (518) 664-0925

STATE OF NEW YORK * MATTHEW G. YERKEY * 84009 * LICENSED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER

APPROVAL

CONNECTION DETAIL CELL-2

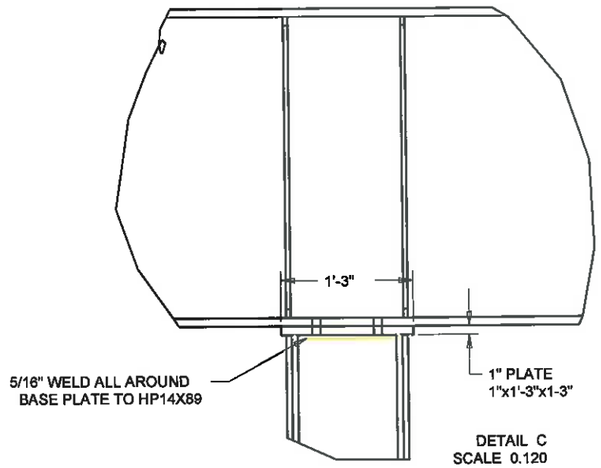
PROJECT: PORT JERVIS FORMER MGP SITE

CONTRACTOR: D.A. COLLINS ENVIRONMENTAL SERVICES LLC

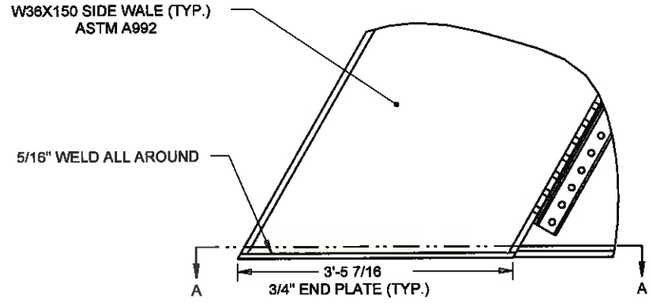
FABRICATOR: D.A. COLLINS CONSTRUCTION CO., INC.
FABRICATION DIVISION
269 BALLARD ROAD
WILTON, NY 12831

TITLE:

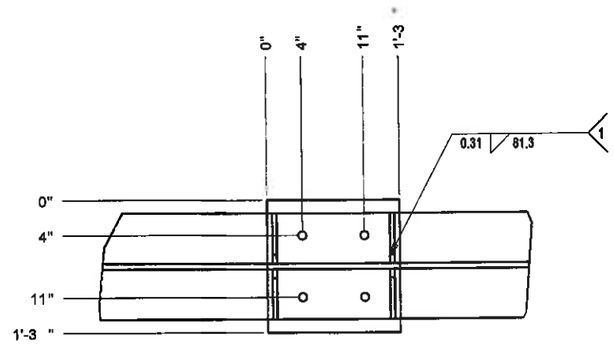
DRAWN BY: JDM	CHECKED BY:	DATE: 7/11/12
SCALE: AS SHOWN	DRG. NO.	SHEET 7 OF 8



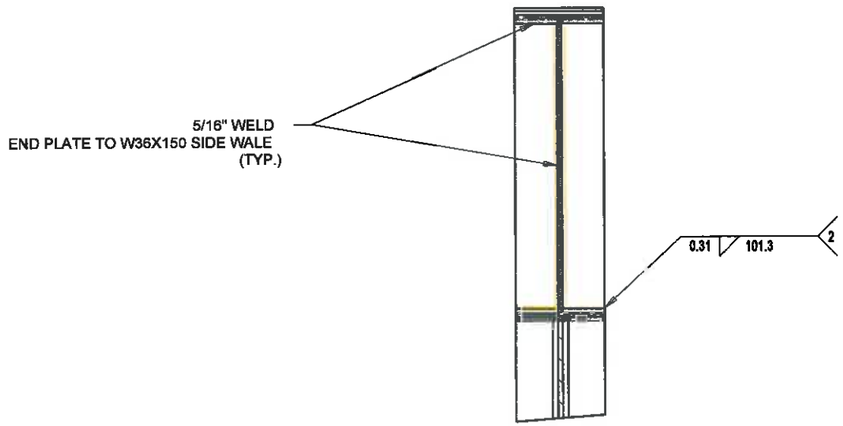
DETAIL C
SCALE 0.120



DETAIL D
SCALE 0.090



SCALE 0.120



SECTION A-A
SCALE 0.100

CONNECTION/END PLATE DETAIL

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APPR.
1					
2					
3					
4					
5					

PREPARED BY:

D.A. COLLINS ENVIRONMENTAL SERVICES, LLC

269 BALLARD ROAD
WILTON, NY 12831

P: (518) 664-9855
F: (518) 664-0925

STATE OF NEW YORK
MATTHEW G. YERKEY
84009
LICENSED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER

APPROVAL

CONNECTION DETAIL CELL-2

PROJECT: PORT JERVIS FORMER MGP SITE

CONTRACTOR: D.A. COLLINS ENVIRONMENTAL SERVICES LLC

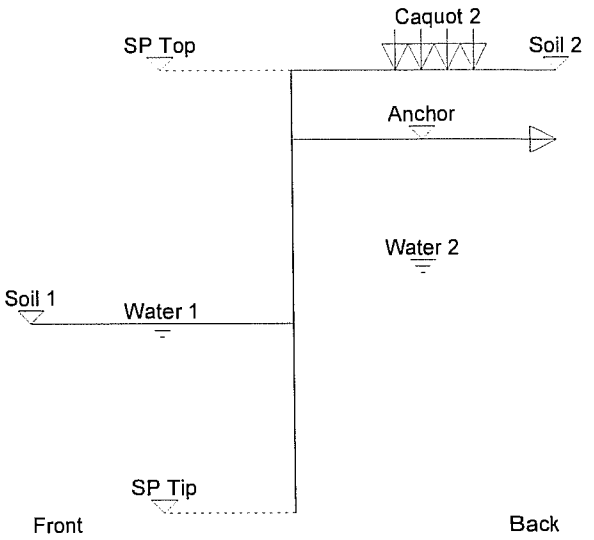
FABRICATOR: D.A. COLLINS CONSTRUCTION CO., INC.
FABRICATION DIVISION
269 BALLARD ROAD
WILTON, NY 12831

TITLE:

DRAWN BY: JDM	CHECKED BY:	DATE: 08/02/12
SCALE: AS SHOWN	DRG. NO.	SHEET 8 OF 8

Geodata

	Unit
Sheet Pile Top Level [ft]	0.000
Sheet Pile Tip Level [ft]	34.915
Soil Level in Front [ft]	20.000
Soil Level behind [ft]	0.000
Anchorlevel [ft]	5.500
Water Level in Front [ft]	20.000
Water Level behind [ft]	15.000
Soil Surface Inclination in Front [Deg]	0.000
Soil Surface Inclination behind [Deg]	0.000
Caquot Surcharge in Front [kip/ft2]	0.000
Caquot Surcharge behind [kip/ft2]	0.500
Anchor Inclination [Deg]	0.000
Earth Support	Free



Soil Layers

Layers in Front

	Layer Tip [ft]	Density Moist [kip/ft3]	Density Submerged [kip/ft3]	Kph	Phi [Deg]	Delta [Deg]	Cohesion [kip/ft2]
Layer 1	35.000	0.125	0.062	2.670	0.000	0.000	0.000
Layer 2	100.000	0.120	0.057	2.400	0.000	0.000	0.000

Layers behind

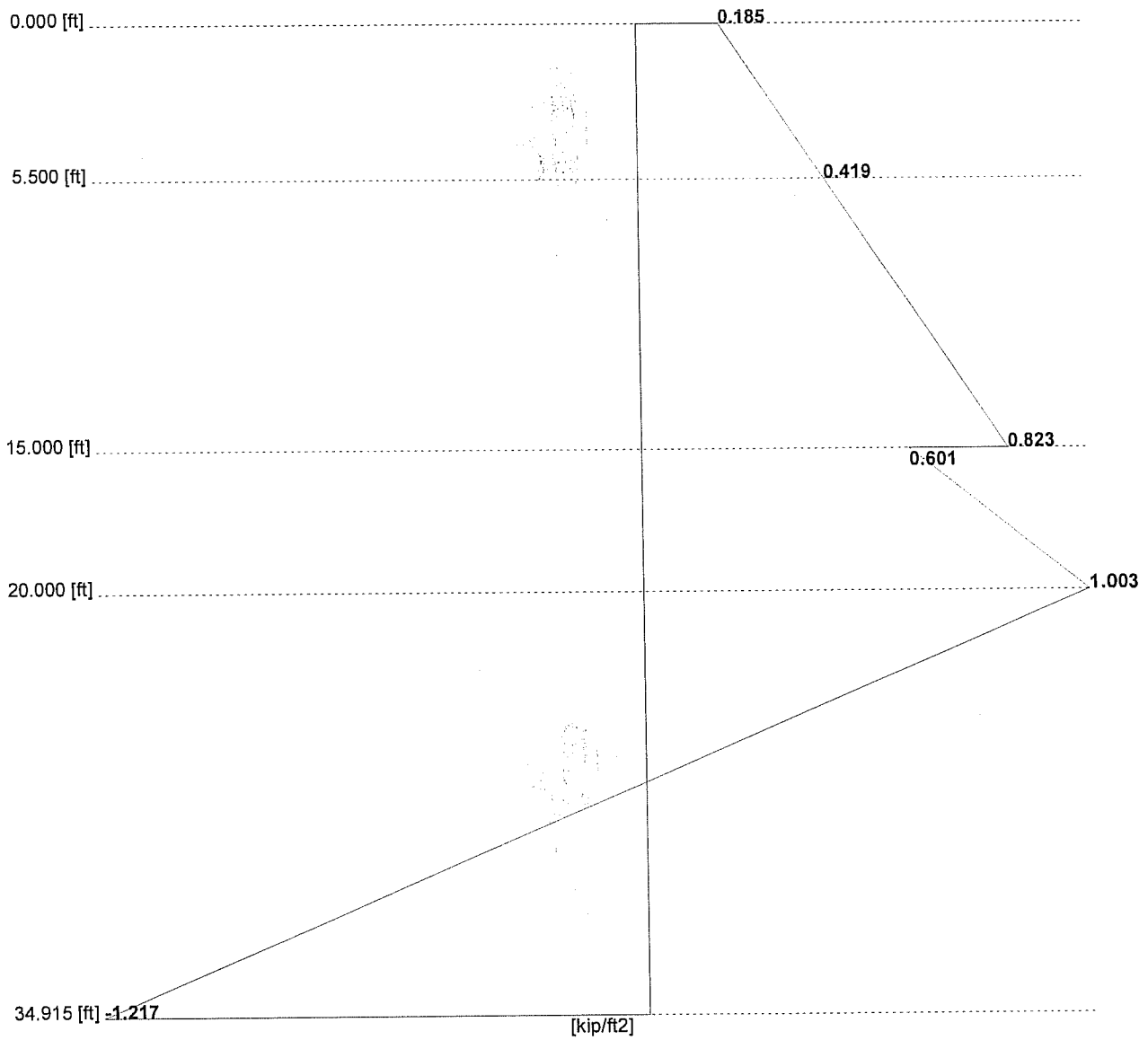
	Layer Tip [ft]	Density Moist [kip/ft3]	Density Submerged [kip/ft3]	Kph	Phi [Deg]	Delta [Deg]	Cohesion [kip/ft2]
Layer 1	15.000	0.115	0.052	0.370	0.000	0.000	0.000
Layer 2	35.000	0.125	0.062	0.270	0.000	0.000	0.000
Layer 3	100.000	0.120	0.057	0.330	0.000	0.000	0.000

All Values

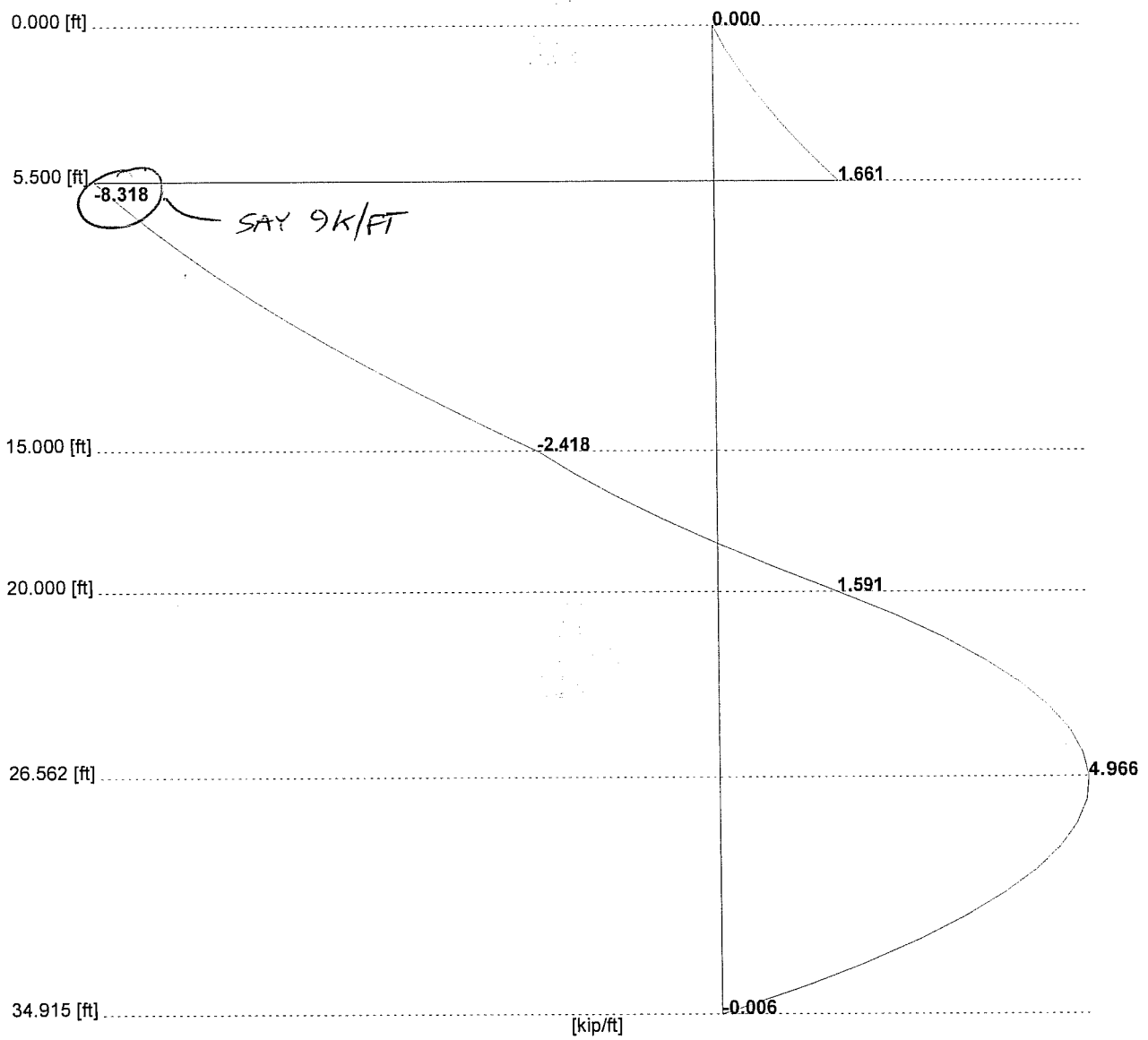
Depth [ft]	Deflection [ft]	Rotation [Rad]	Cross Force [kip/ft]	Moment [kipft/ft]	Total Pressure [kip/ft2]	Earth Pressure in Front [kip/ft2]	behind [kip/ft2]	Water Pressure [kip/ft2]	Userdefined Pressure [kip/ft2]
0.000	0.051	-0.009	0.000	0.000	0.185	0.000	0.185	0.000	0.000
0.820	0.043	-0.009	0.166	0.066	0.220	0.000	0.220	0.000	0.000
0.820	0.043	-0.009	0.166	0.066	0.220	0.000	0.220	0.000	0.000
1.640	0.036	-0.009	0.361	0.280	0.255	0.000	0.255	0.000	0.000
1.640	0.036	-0.009	0.361	0.280	0.255	0.000	0.255	0.000	0.000
2.461	0.028	-0.009	0.584	0.666	0.290	0.000	0.290	0.000	0.000
2.461	0.028	-0.009	0.584	0.666	0.290	0.000	0.290	0.000	0.000
3.281	0.020	-0.009	0.836	1.246	0.325	0.000	0.325	0.000	0.000
3.281	0.020	-0.009	0.836	1.246	0.325	0.000	0.325	0.000	0.000
4.101	0.013	-0.009	1.117	2.045	0.359	0.000	0.359	0.000	0.000
4.101	0.013	-0.009	1.117	2.045	0.359	0.000	0.359	0.000	0.000
4.921	0.005	-0.009	1.426	3.085	0.394	0.000	0.394	0.000	0.000
4.921	0.005	-0.009	1.426	3.085	0.394	0.000	0.394	0.000	0.000
5.500	0.000	-0.009	1.661	3.978	0.419	0.000	0.419	0.000	0.000
5.500	0.000	-0.009	-8.318	3.978	0.419	0.000	0.419	0.000	0.000
6.320	-0.008	-0.009	-7.960	-2.700	0.454	0.000	0.454	0.000	0.000
6.320	-0.008	-0.009	-7.960	-2.700	0.454	0.000	0.454	0.000	0.000
7.140	-0.015	-0.009	-7.574	-9.073	0.489	0.000	0.489	0.000	0.000
7.140	-0.015	-0.009	-7.574	-9.073	0.489	0.000	0.489	0.000	0.000
7.961	-0.023	-0.009	-7.158	-15.116	0.524	0.000	0.524	0.000	0.000
7.961	-0.023	-0.009	-7.158	-15.116	0.524	0.000	0.524	0.000	0.000
8.781	-0.030	-0.009	-6.715	-20.808	0.559	0.000	0.559	0.000	0.000
8.781	-0.030	-0.009	-6.715	-20.808	0.559	0.000	0.559	0.000	0.000
9.601	-0.037	-0.008	-6.242	-26.123	0.594	0.000	0.594	0.000	0.000
9.601	-0.037	-0.008	-6.242	-26.123	0.594	0.000	0.594	0.000	0.000
10.421	-0.043	-0.008	-5.741	-31.040	0.628	0.000	0.628	0.000	0.000
10.421	-0.043	-0.008	-5.741	-31.040	0.628	0.000	0.628	0.000	0.000
11.242	-0.050	-0.007	-5.211	-35.533	0.663	0.000	0.663	0.000	0.000
11.242	-0.050	-0.007	-5.211	-35.533	0.663	0.000	0.663	0.000	0.000
12.062	-0.055	-0.007	-4.653	-39.581	0.698	0.000	0.698	0.000	0.000
12.062	-0.055	-0.007	-4.653	-39.581	0.698	0.000	0.698	0.000	0.000
12.882	-0.061	-0.006	-4.066	-43.158	0.733	0.000	0.733	0.000	0.000
12.882	-0.061	-0.006	-4.066	-43.158	0.733	0.000	0.733	0.000	0.000
13.702	-0.065	-0.005	-3.450	-46.242	0.768	0.000	0.768	0.000	0.000
13.702	-0.065	-0.005	-3.450	-46.242	0.768	0.000	0.768	0.000	0.000
14.522	-0.070	-0.005	-2.806	-48.810	0.803	0.000	0.803	0.000	0.000
14.522	-0.070	-0.005	-2.806	-48.810	0.803	0.000	0.803	0.000	0.000
15.000	-0.072	-0.004	-2.418	-50.058	0.823	0.000	0.823	0.000	0.000
15.000	-0.072	-0.004	-2.418	-50.058	0.601	0.000	0.601	0.000	0.000
15.820	-0.075	-0.003	-1.898	-51.831	0.667	0.000	0.614	0.052	0.000
15.820	-0.075	-0.003	-1.898	-51.831	0.667	0.000	0.614	0.052	0.000
16.640	-0.077	-0.003	-1.324	-53.156	0.733	0.000	0.628	0.104	0.000
16.640	-0.077	-0.003	-1.324	-53.156	0.733	0.000	0.628	0.104	0.000
17.461	-0.079	-0.002	-0.696	-53.989	0.799	0.000	0.642	0.157	0.000
17.461	-0.079	-0.002	-0.696	-53.989	0.799	0.000	0.642	0.157	0.000
18.281	-0.080	-0.001	-0.014	-54.284	0.864	0.000	0.656	0.209	0.000
18.281	-0.080	-0.001	-0.014	-54.284	0.864	0.000	0.656	0.209	0.000
19.101	-0.081	0.000	0.722	-53.997	0.930	0.000	0.669	0.261	0.000
19.101	-0.081	0.000	0.722	-53.997	0.930	0.000	0.669	0.261	0.000
19.921	-0.080	0.001	1.512	-53.084	0.996	0.000	0.683	0.313	0.000
19.921	-0.080	0.001	1.512	-53.084	0.996	0.000	0.683	0.313	0.000
20.000	-0.080	0.001	1.591	-52.962	1.003	0.000	0.684	0.318	0.000
20.000	-0.080	0.001	1.591	-52.962	1.003	0.000	0.684	0.318	0.000
20.820	-0.079	0.002	2.363	-51.334	0.881	-0.136	0.698	0.318	0.000
20.820	-0.079	0.002	2.363	-51.334	0.881	-0.136	0.698	0.318	0.000
21.640	-0.078	0.002	3.035	-49.113	0.759	-0.272	0.712	0.318	0.000
21.640	-0.078	0.002	3.035	-49.113	0.759	-0.272	0.712	0.318	0.000
22.461	-0.076	0.003	3.607	-46.382	0.636	-0.407	0.726	0.318	0.000
22.461	-0.076	0.003	3.607	-46.382	0.636	-0.407	0.726	0.318	0.000
23.281	-0.073	0.004	4.079	-43.223	0.514	-0.543	0.739	0.318	0.000
23.281	-0.073	0.004	4.079	-43.223	0.514	-0.543	0.739	0.318	0.000
24.101	-0.069	0.004	4.451	-39.718	0.392	-0.679	0.753	0.318	0.000
24.101	-0.069	0.004	4.451	-39.718	0.392	-0.679	0.753	0.318	0.000
24.921	-0.066	0.005	4.723	-35.948	0.270	-0.815	0.767	0.318	0.000

Depth [ft]	Deflection [ft]	Rotation [Rad]	Cross Force [kip/ft]	Moment [kipft/ft]	Total Pressure [kip/ft2]	Earth Pressure in Front [kip/ft2]	behind [kip/ft2]	Water Pressure [kip/ft2]	Userdefined Pressure [kip/ft2]
24.921	-0.066	0.005	4.723	-35.948	0.270	-0.815	0.767	0.318	0.000
25.742	-0.061	0.006	4.895	-31.997	0.148	-0.950	0.781	0.318	0.000
25.742	-0.061	0.006	4.895	-31.997	0.148	-0.950	0.781	0.318	0.000
26.562	-0.056	0.006	4.966	-27.946	0.026	-1.086	0.794	0.318	0.000
26.562	-0.056	0.006	4.966	-27.946	0.026	-1.086	0.794	0.318	0.000
27.382	-0.051	0.006	4.938	-23.878	-0.096	-1.222	0.808	0.318	0.000
27.382	-0.051	0.006	4.938	-23.878	-0.096	-1.222	0.808	0.318	0.000
28.202	-0.046	0.007	4.809	-19.873	-0.218	-1.358	0.822	0.318	0.000
28.202	-0.046	0.007	4.809	-19.873	-0.218	-1.358	0.822	0.318	0.000
29.022	-0.040	0.007	4.580	-16.016	-0.340	-1.494	0.835	0.318	0.000
29.022	-0.040	0.007	4.580	-16.016	-0.340	-1.494	0.835	0.318	0.000
29.843	-0.034	0.007	4.252	-12.387	-0.462	-1.629	0.849	0.318	0.000
29.843	-0.034	0.007	4.252	-12.387	-0.462	-1.629	0.849	0.318	0.000
30.663	-0.028	0.007	3.823	-9.069	-0.584	-1.765	0.863	0.318	0.000
30.663	-0.028	0.007	3.823	-9.069	-0.584	-1.765	0.863	0.318	0.000
31.483	-0.022	0.008	3.294	-6.143	-0.706	-1.901	0.877	0.318	0.000
31.483	-0.022	0.008	3.294	-6.143	-0.706	-1.901	0.877	0.318	0.000
32.303	-0.016	0.008	2.664	-3.693	-0.828	-2.037	0.890	0.318	0.000
32.303	-0.016	0.008	2.664	-3.693	-0.828	-2.037	0.890	0.318	0.000
33.123	-0.010	0.008	1.935	-1.800	-0.950	-2.172	0.904	0.318	0.000
33.123	-0.010	0.008	1.935	-1.800	-0.950	-2.172	0.904	0.318	0.000
33.944	-0.003	0.008	1.106	-0.546	-1.072	-2.308	0.918	0.318	0.000
33.944	-0.003	0.008	1.106	-0.546	-1.072	-2.308	0.918	0.318	0.000
34.764	0.003	0.008	0.176	-0.013	-1.194	-2.444	0.932	0.318	0.000
34.764	0.003	0.008	0.176	-0.013	-1.194	-2.444	0.932	0.318	0.000
34.915	0.004	0.008	-0.006	0.000	-1.217	-2.469	0.934	0.318	0.000

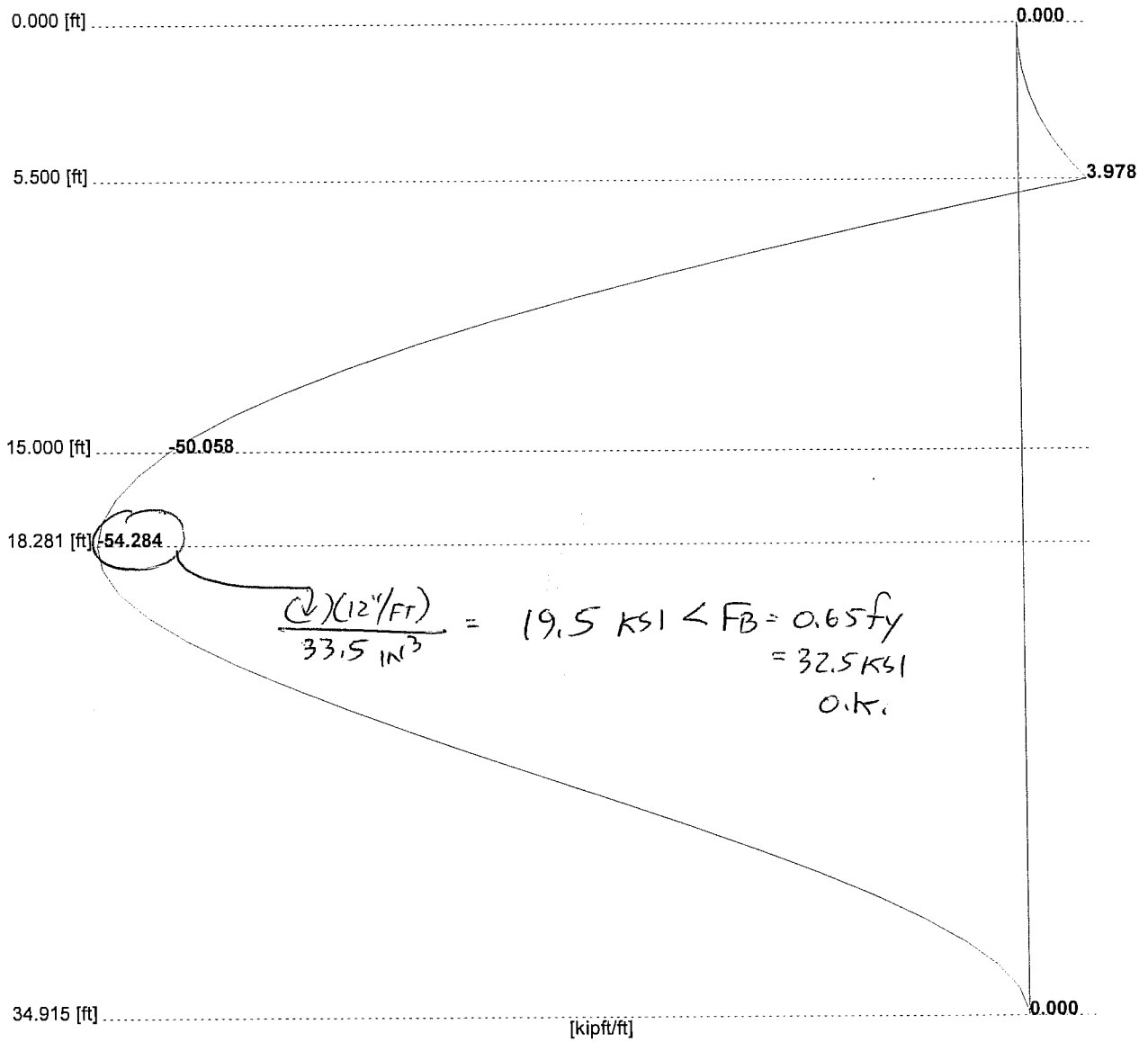
Total Pressure Diagram



Cross Force Diagram

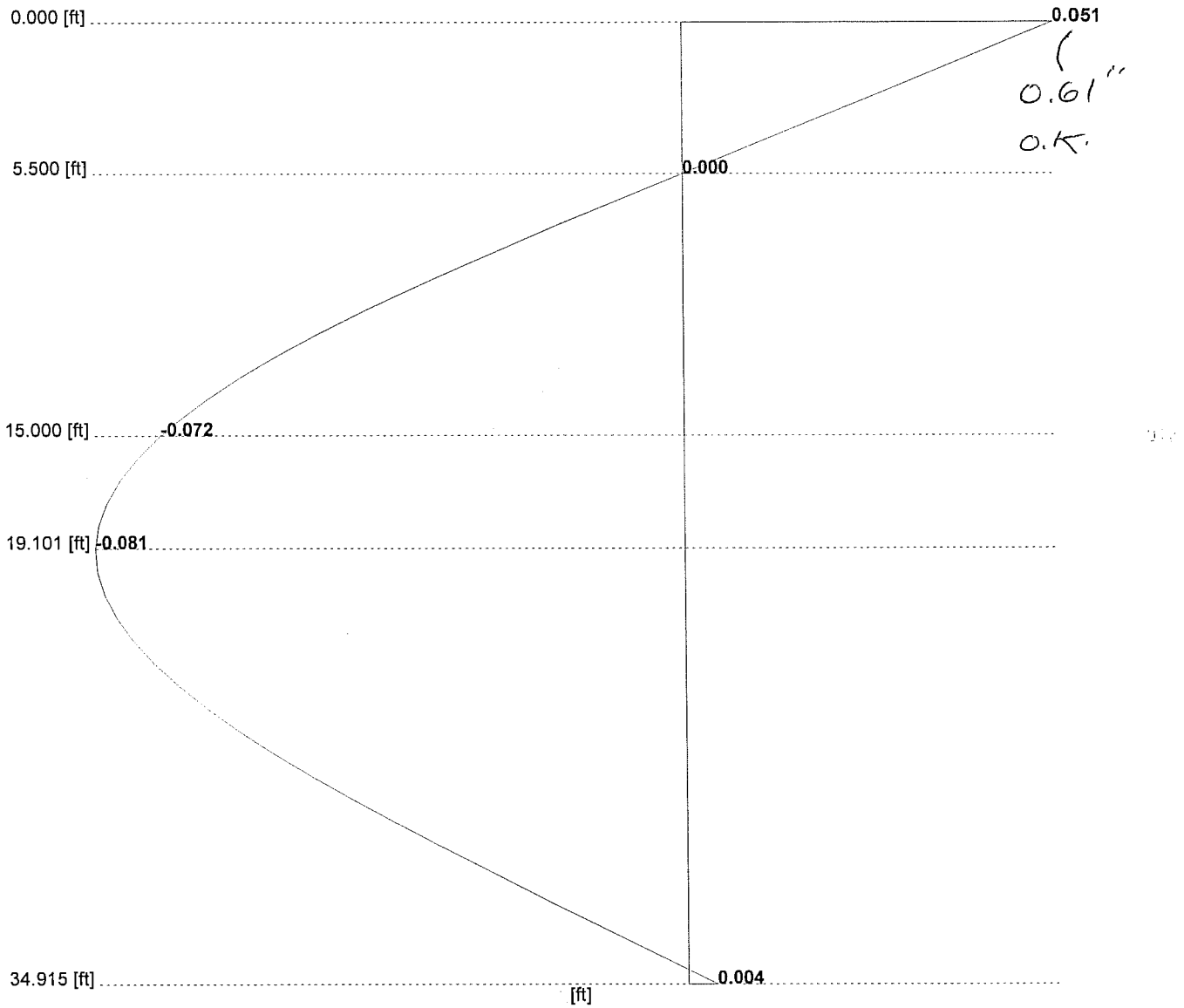


Moment Diagram



$\frac{(54.284)(12"/FT)}{33.5\ IN^3} = 19.5\ KSI < F_B = 0.65 f_y = 32.5\ KSI$ O.K.

Deflection Diagram



0.61"
O.K.

Pile Check

		Depth [ft]
Name	AZ18	
Inertia [in4/ft]	250.439	
Modulus [in3/ft]	33.480	
Area [in2/ft]	7.087	
Mass [lbs/ft2]	24.189	
Steel Grade [lb/in2]	50000.000	
Minimal Moment [kipft/ft]	-54.284	18.281
Maxmimal Moment [kipft/ft]	3.978	5.500
Normal Forces at Max. Moment [kip/ft]	0.000	18.281
Normal Forces at Min. Moment [kip/ft]	0.000	5.500
Deflection at Min. Moment [ft]	-0.080	18.281
Deflection at Max. Moment [ft]	0.000	5.500
Min. Stress at Min. Moment [lb/in2]	-19455.725	18.281
Max. Stress at Min. Moment [lb/in2]	19455.725	18.281
Min. Stress at Max. Moment [lb/in2]	-1425.733	5.500
Max. Stress at Max. Moment [lb/in2]	1425.733	5.500
Safety > Req. Safety = 1.500	2.570	
Sheet Pile Top Level [ft]	0.000	
Sheet Pile Tip Level [ft]	34.915	
Sheet Pile Length [ft]	34.915	
Included OverLength [ft]	0.000	
Vertical Equilibrium [kip/ft]	0.000	

≈ PZC18

= PG 75 HANDCHECK = 19.5 KSI

JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W1

PROJECT: PORT JERVIS EPS

SUBJECT: MAIN WALE

RYAN-BIGGS

CONSIDER DESIGN OF TOP TIER, MAIN WALE

RECALL FROM PG 6S, $w = 9$ KIPS/FT

LET SPAN = ℄ TO ℄ OF SIDE WALE = 80.5'

USE W36X150 ASTM A992, $A = 44.2\ IN^2$

$S_x = 504\ IN^3$ $I_x = 9040\ IN^4$ $r_x = 14.3\ IN$

$S_y = 45.1\ IN^3$ $I_y = 270\ IN^4$ $r_y = 2.47\ IN$

WALE HAS COMBINED STRESSES FROM HORIZONTAL EARTH PRESSURE, VERTICAL SELF WT, & AXIAL COMPRESSION FROM WALE REACTION

SHEAR

$V_{MAX} = 178$ KIPS (PG W5)

$f_v = V/A = (\downarrow) \div (35.9'')(0.625'') = 7.9$ KSI

$F_v = 0.4 f_y = 0.4 \cdot 50KSI = 20$ KSI $> (\downarrow)$ ∴ SHEAR O.K.

HORIZONTAL BENDING:

$M_x = 977$ FT-KIPS (PG W4)

$f_{bx} = M/S_x = (12''/FT)(\downarrow) \div 504\ IN^3 = 23.3$ KSI

CONTINUED...

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JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W2

PROJECT: PORT JERVIS EPS

SUBJECT: TOP TIER MAINWALE

RYAN-BIGGS

BRACKETS TO SUPPORT SELF WT & BRACE FLANGE WILL BE POSITIONED @ 10 FT O.C.

FROM AISC 9TH PG 2-95 $L_c = 10.5' > (\downarrow)$

$\therefore F_{Bx} = 0.66 f_y = 0.66 \cdot 50 KSI = 33 KSI$

VERTICAL BENDING

$W_{SELF} = (150\ lb/FT)_{SELF} + (50\ lb/FT)_{MISC\ SOIL/WATER} = SAY\ 0.2\ K/FT$

$M_y = \frac{1}{10} wl^2 = \frac{1}{10} (\downarrow)(10)^2 = 2\ FT\text{-}KIPS$

$f_{by} = M_y / S_y = (12"/FT)(\downarrow) \div 45.1\ IN^3 = 0.5\ KSI$

FOR WEAK AXIS BENDING $F_{By} = 0.75 f_y = 37.5\ KSI$

COMPRESSION FROM STRUT REACTION

$P = 318K$ (318K → ↑ 318K @ 45°)

$f_a = P/A = (\downarrow) \div 44.2\ IN^2 = 7.2\ KSI$

$Kl/r = (1.0)(39.5')(12"/FT) \div (14.3IN) = 33$

$Kl/r = (1.0)(10')(12"/FT) \div (2.47\ IN) = 49$

$F_A = 25.1\ KSI$ AISC 13TH PG 4-319

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JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W 3

PROJECT: PORT JERVIS EPS

SUBJECT: MAIN WALE

RYAN-BIGGS

$$F'_{ex} = \frac{\pi^2 E}{FS(KL/r)^2} = \frac{\pi^2 \cdot 29{,}000\,KSI}{1.91\,(33)^2} = 137.1\ KSI$$

$$F'_{ey} = \frac{\pi^2 \cdot 29{,}000\,KSI}{1.91\,(49)^2} = 62.2\ KSI$$

INTERACTION

1) $$\frac{f_a}{F_A} + \frac{C_{mx} f_{bx}}{(1 - f_a/F'_{ex})F_{bx}} + \frac{C_{my} f_{by}}{(1 - f_a/F'_{ey})(F_{by})} \overset{?}{\leq} 1.0$$

$$\frac{7.2\ KSI}{25.1\ KSI} + \frac{(0.85)(23.3\,KSI)}{(1 - 7.2\,KSI/137.1\,KSI)33\,KSI} + \frac{(0.85)(0.5\ KSI)}{(1 - 7.2\ KSI/62.2\ KSI)(37.5\,KSI)}$$

$= 0.93 < 1.0 \therefore$ O.K.

2) $$\frac{f_a}{0.6\,f_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} = \frac{7.2\ KSI}{(0.6)(50KSI)} + \frac{23.3\ KSI}{33\ KSI} + \frac{0.5\ KSI}{37.5\ KSI}$$

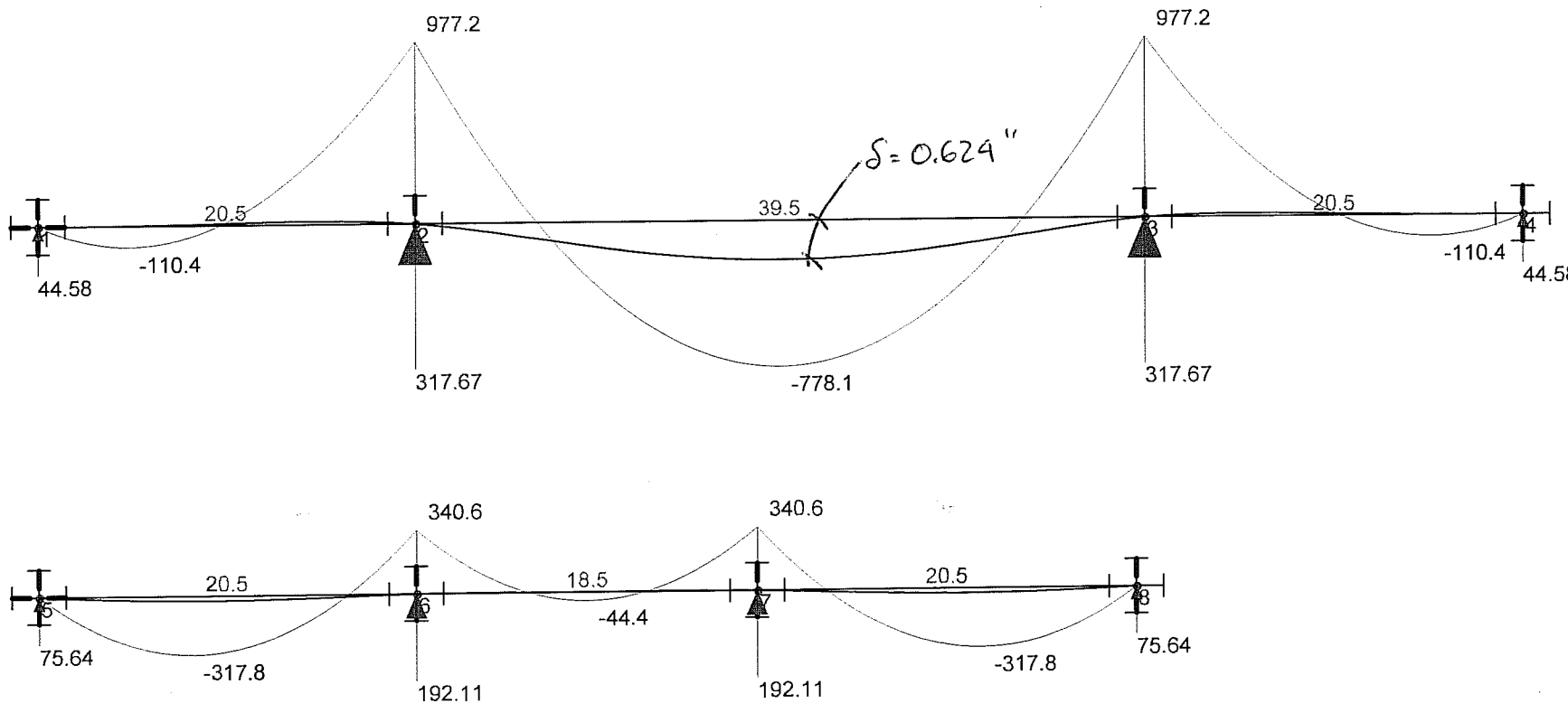
$= 0.96 < 1.0 \therefore$ O.K.

DEFLECTION

$$\delta = \frac{5wl^4}{384\,EI} = \frac{5\left(\frac{K/FT}{12''/FT}\right)[\quad'(12''/FT)]^4}{384 \times 29{,}000\,KSI \times \quad IN^4} = 0.624\ INCHES$$

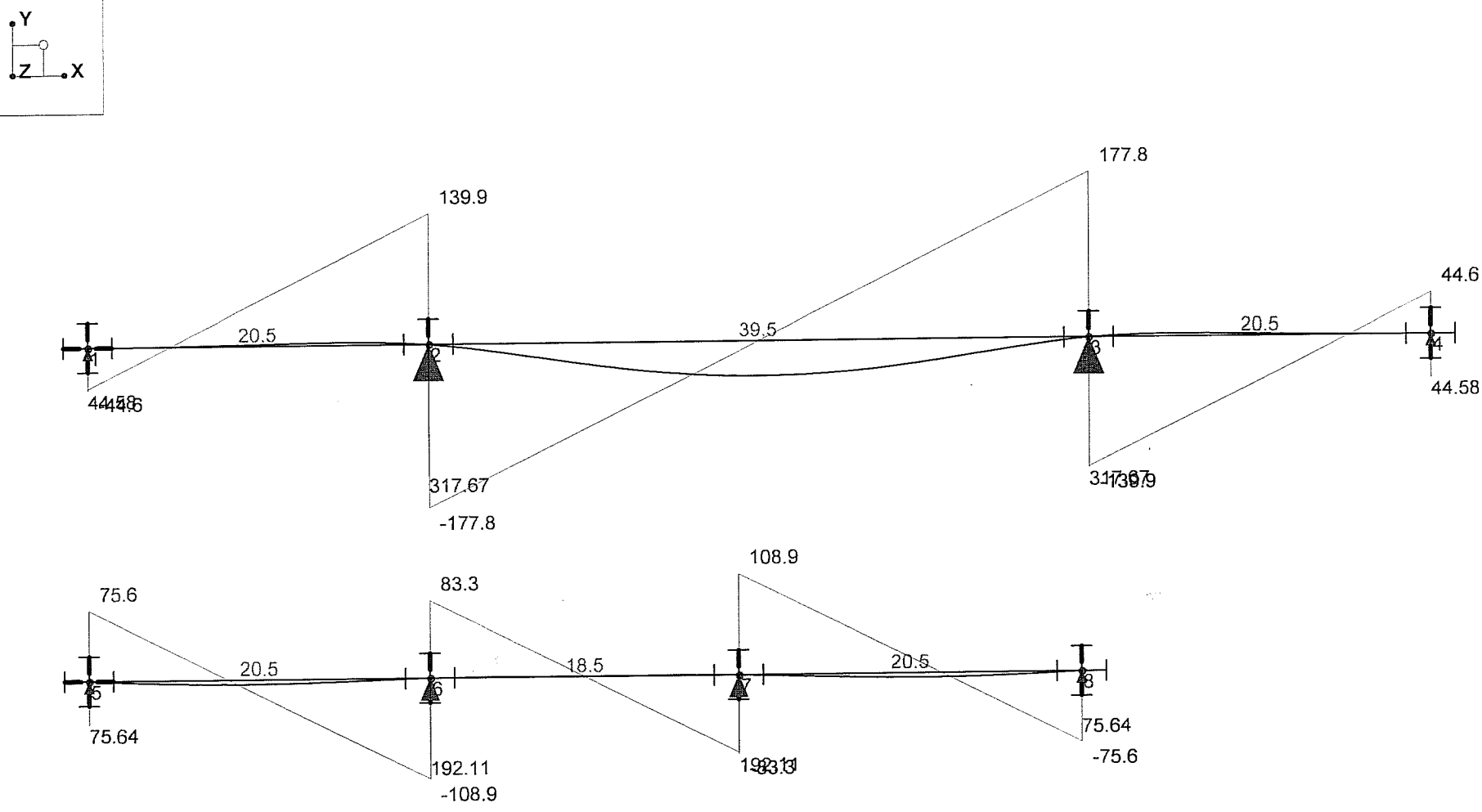
$\frac{l}{760}$

O.K.



Member Length (ft) Displayed
Results for LC 1,
Member z Bending Moments (k-ft)
Y-direction Reaction units are k and k-ft

Ryan-Biggs Associates, P.C.	Port Jervis EPS	SK - 1
mgy		July 10, 2012 at 7:12 AM
10259		Simple Wale.r3d



Member Length (ft) Displayed
Results for LC 1,
Member y Shear Forces (k)
Y-direction Reaction units are k and k-ft

Ryan-Biggs Associates, P.C.	Port Jervis EPS	SK - 2
mgy		July 10, 2012 at 7:13 AM
10259		Simple Wale.r3d

JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W6

PROJECT: PORT JERVIS EPS

SUBJECT: SIDE WALE

RYAN-BIGGS

PGS W1-W3 CHECKED MAIN WALE

SIDE WALE HAS SMALLER Lub, LESS MOMENT & SHEAR
BUT THE SAME SECTION DESIGNATION

∴ W36 x 150 FOR SIDEWALE O.K. BY INSPECTION

CONNECT SIDE WALE TO MAIN WALE w/ BOLTS

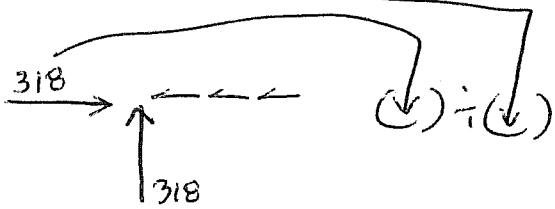
7/8" A325 10 ROWS JL 4x4x1/2

P_{ALLOW} = 325K (AISC 14TH PG 10-26)

O.K. BY INSPECTION

CONNECT STRUT TO WALE w/ BOLTS

2 ROWS OF 12 = 24 BOLTS



(↓) ÷ (↓) = 13.3K/BOLT < 14.4 K (AISC 13TH
16.2K (14TH)

O.K.

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JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W7

PROJECT: PORT JERVIS EPS

SUBJECT: STRUT

RYAN-BIGGS

PROVIDE STRUTS TO REDUCE SPAN OF MAIN WALES

USE HP14×89 A572 GR 50

FROM PG W2 MAX P= SAY 450 KIPS ÷ 2 STRUTS = 225K/STRUT

CLEAR DISTANCE BETWEEN MAIN WALES = 27. FT

$\frac{Kl}{r} = (1.0)(12"/FT)(27') \div 3.53" = 92 < C_c$ (BY INSP.)

$F_A = 16.1$ KSI

$f_a = P/A = 225\ K \div 26.1\ IN^2 = 8.6$ KSI

STRUT MUST SUPPORT ITS OWN SELF WEIGHT AS IT SPANS ACCROSS EXC.

$M_{SELF\ WT} = \frac{1}{8} wl^2 = \frac{1}{8}(0.089\ K/FT + 0.041\ K/FT)(27')^2(12"/FT) = 143$ IN-K

CONSIDER DEFLECTION

$\delta = \frac{5wl^4}{384EI} = \frac{5\left(\frac{0.13\ K/FT}{12"/FT}\right)(27' \times 12"/FT)^4}{384 \cdot 29{,}000\ KSI \cdot 326\ IN^4} = 0.16"$ (I_{yy})

$M_{PINCHING} = P \cdot \delta = (225\ K)(0.16") = 37$ IN-K

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RYAN-BIGGS

Σ MOMENT = $\overset{\text{SELF}}{143\ \text{IN-K}} + \overset{\text{PINCH}}{37\ \text{IN-K}} = 180\ \text{IN-K}$

$f_b = M/S_y = (\checkmark) \div 44.3\ \text{IN}^3 = 4.1\ \text{KSI}$

F_B (WEAK AXIS) $= 0.75 \cdot f_y = 0.75 \cdot 50\text{KSI} = 37.5\ \text{KSI}$

$F_e' = 12\pi^2 E / 23 \cdot \frac{kl}{r}^2 = 12\pi^2 \cdot 29{,}000\text{KSI} / (23)(92)^2 = 17.6\ \text{KSI}$

USE INTERACTION EQUATIONS

$$\frac{f_a}{F_A} + \frac{C_m f_b}{(1 - f_a/F_e')(F_B)} < 1.0$$

$$\frac{8.6\ \text{KSI}}{16.1\ \text{KSI}} + \frac{(1.0)(4.1\ \text{KSI})}{(1 - 8.6\ \text{KSI}/17.6\ \text{KSI})(37.5\ \text{KSI})} = 0.75 < 1.0 \therefore \text{O.K.}$$

$$\frac{f_a}{0.6\ f_y} + \frac{f_b}{F_B}$$

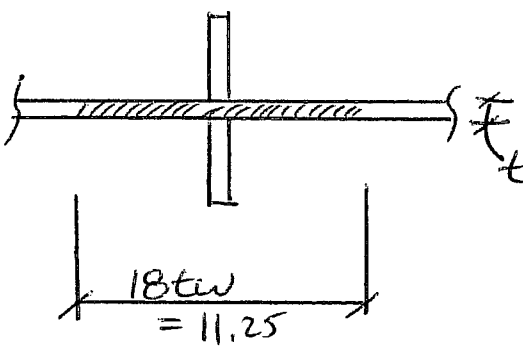
$$\frac{8.6\ \text{KSI}}{(0.6)(50\ \text{KSI})} + \frac{4.1\ \text{KSI}}{37.5\ \text{KSI}} = 0.40 < 1.0 \therefore \text{O.K.}$$

RYAN-BIGGS

CONSIDER DESIGN OF WALE STIFFENERS
REF AASHTO § 10.34.6.1

USE 1/2" x 5" STIFFENER ON EACH SIDE OF WEB

$$t_{MIN} = \frac{b'}{12}\sqrt{\frac{f_y}{33{,}000}} = \frac{5}{12}\sqrt{\frac{36{,}000\,PSI}{33{,}000}} = 0.43 < 1/2" \text{ PROVIDED} \quad \therefore \text{O.K.}$$



$A = (2)(5")(1/2") = 5\ in^2$
$+ (11.25")(0.625") = 7\ in^2$
$12.0\ in^2$

$$I = \frac{1}{12}(10.75")(0.625")^3 + \frac{1}{12}(0.5")(10.625")^3 = 50.2\ in^4$$

$$r = \sqrt{\frac{I}{A}} = 2.05\ in$$

$$Kl/r = (0.85)(35") \div r = 15 \text{ VERY LOW}$$

(0.85 ← FULLY WELDED STIFFR)

$F_A = 21$ KSI

← TREATED ALL AS GRADE 36 FOR SIMPLICITY ALTHOUGH GR50 WEB WILL INCREASE CAPACITY

$f_a = P/A = 318\ KIPS \div (3)(12.0)\ in^2 = 8.9\ KSI < F_A \quad \therefore$ O.K.

(3 ← TRIPLE STIFFENER @ EA STRUT END)

$$\text{WELD}: 3(0.3)(70KSI)\left(\frac{1}{\sqrt{2}}\right)\left(\frac{5}{16}\right)(2\text{SIDES})(2\text{LINES})(33") = 1836\ KIPS$$

O.K.

RYAN-BIGGS

CONSIDER DESIGN OF TOP TIER, MAIN WALE AUXILIARY CELL

RECALL FROM PG 65, $w = 9$ KIPS/FT

LET SPAN = ↑ 23.7' ↑ 16.7' ↑

USE W36x150 ASTM A992, $A = 44.2\ IN^2$

$S_x = 504\ IN^3$ $I_x = 9040\ IN^4$ $r_x = 14.3\ IN$

$S_y = 45.1\ IN^3$ $I_y = 270\ IN^4$ $r_y = 2.47\ IN$

WALE HAS COMBINED STRESSES FROM HORIZONTAL EARTH PRESSURE, VERTICAL SELF WT, & AXIAL COMPRESSION FROM WALE REACTION

SHEAR

$V_{MAX} = 162$ KIPS (PG W14)

$f_v = V/A = (\downarrow) \div (35.9'')(0.625'') = 7.2$ KSI

$F_v = 0.4 f_y = 0.4 \cdot 50 KSI = 20$ KSI $> (\downarrow)$ ∴ SHEAR O.K.

HORIZONTAL BENDING:

$M_x = 762$ FT-KIPS (PG W13)

$f_{bx} = M/S_x = (12''/FT)(\downarrow) \div 504\ IN^3 = 18.2$ KSI

CONTINUED...

RYAN-BIGGS

BRACKETS TO SUPPORT SELF WT & BRACE FLANGE WILL BE POSITIONED @ 2-95 FT O.C.

FROM AISC 9TH PG $L_c = 10.5' > (\downarrow)$

$\therefore F_{Bx} = 0.66 f_y = 0.66 \cdot 50\,KSI = 33\,KSI$

VERTICAL BENDING

$w_{SELF} = (150\,lb/FT)_{SELF} + (50\,lb/FT)_{MISC\ SOIL/WATER} = SAY\ 0.20\ K/FT$

$M_y = \frac{1}{10} w l^2 = \frac{1}{10} (\downarrow)(10)^2 = 2$ FT-KIPS

$f_{by} = M_y / S_y = (12''/FT)(\downarrow) \div 45.1\,IN^3 = 0.5\,KSI$

FOR WEAK AXIS BENDING $F_{By} = 0.75 f_y = 37.5\,KSI$

COMPRESSION FROM SIDE WALE REACTION

$P = \frac{1}{2} w l = \frac{1}{2}(9\ K/FT)(28') = 126$ KIPS

$f_a = P/A = (\downarrow) \div 44.2\,IN^2 = 2.9\,KSI$

$Kl/r = (1.0)(24')(12''/FT) \div (14.3\,IN) = 20$

$Kl/r = (1.0)(10')(12''/FT) \div (2.47\,IN) = 49$

$F_A = 25.1\,KSI$

JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W12

PROJECT: PORT JERVIS EPS

SUBJECT: MAIN WALE AUXILIARY CELL

RYAN-BIGGS

$$F'_{ex} = \frac{\pi^2 E}{FS(kl/r)^2} = \frac{\pi^2 \cdot 29000\,KSI}{1.91(20)^2} = 373\,KSI$$

$$F'_{ey} = = \frac{\pi^2 \cdot 29000\,KSI}{1.91(49)^2} = 62.2\,KSI$$

INTERACTION

1) $$\frac{fa}{FA} + \frac{Cmx\,fbx}{(1 - fa/F'ex)Fbx} + \frac{Cmy\,fby}{(1 - fa/F'ey)(Fby)} \overset{?}{\leq} 1.0$$

$$\frac{2.9\,KSI}{25.1\,KSI} + \frac{(1.0)(18.2\,KSI)}{(1 - 2.9KSI/373\,KSI)33KSI} + \frac{(1.0)(0.5\,KSI)}{(1 - 2.9KSI/62.2KSI)(37.5\,KSI)}$$

$= 0.69 < 1.0 \therefore$ O.K.

2) $$\frac{fa}{0.6fy} + \frac{fbx}{Fbx} + \frac{fby}{FBY} = \frac{2.9\,KSI}{(0.6)(50KSI)} + \frac{18.2\,KSI}{33\,KSI} + \frac{0.5\,KSI}{37.5\,KSI}$$

$= 0.66 < 1.0 \therefore$ O.K.

DEFLECTION

$$\delta = \frac{5wl^4}{384\,EI} = \frac{5\left(\frac{K/FT}{12"/FT}\right)\left(\quad'\right)(12"/FT)\Big]^4}{384 \cdot 29000KSI \cdot \quad IN^4} = 0.388\ \text{INCHES}$$

$\frac{l}{947}$ O.K.

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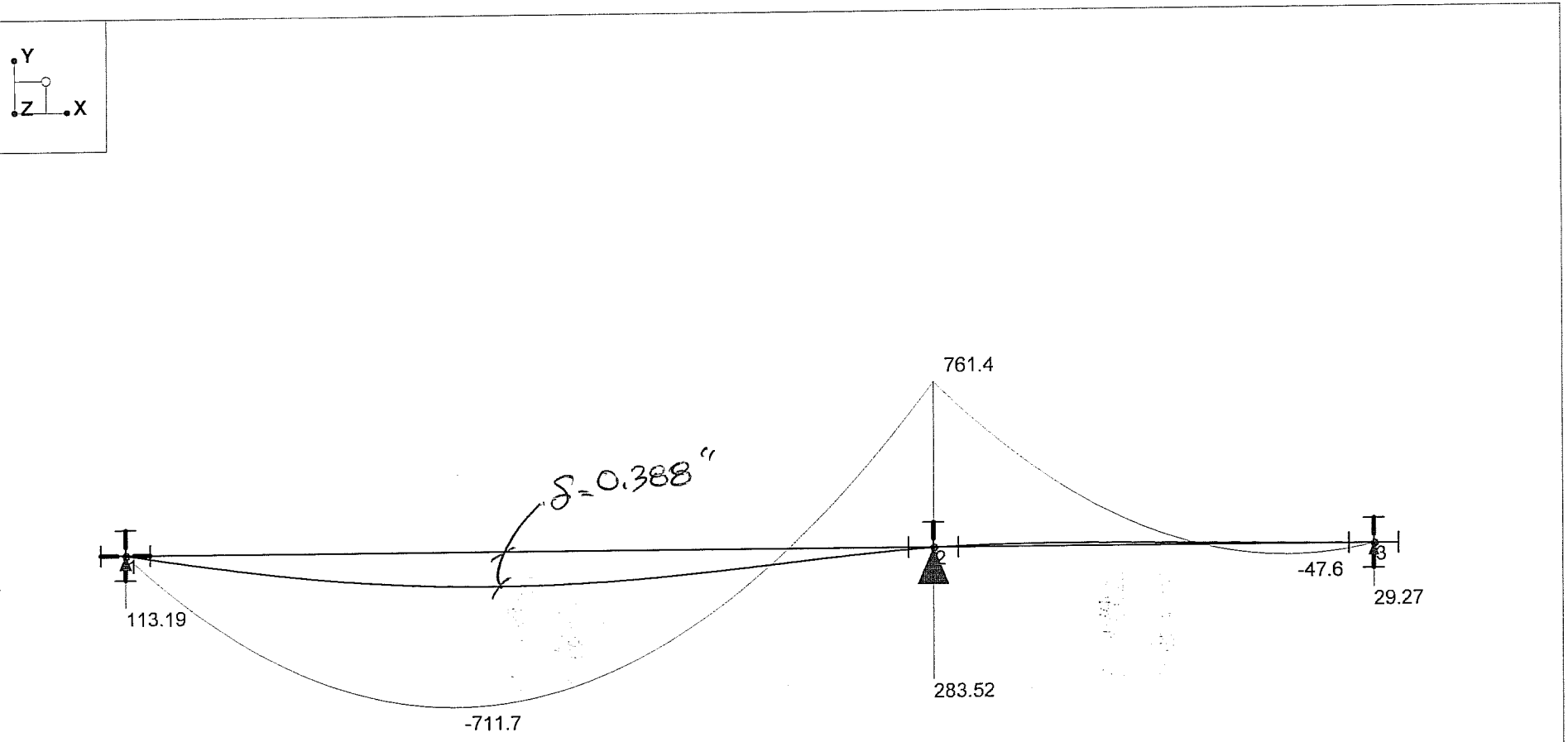
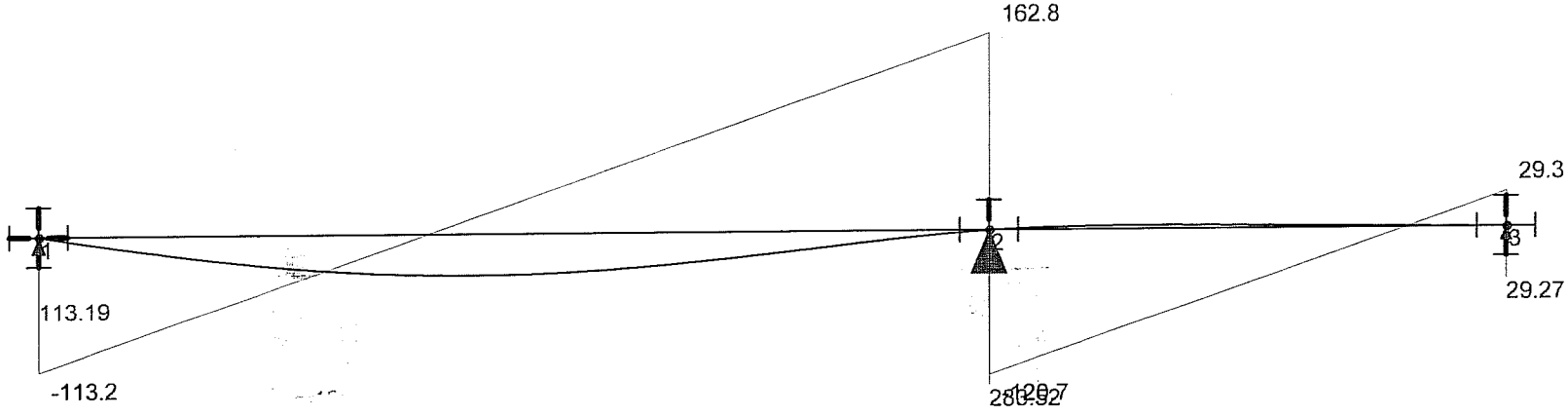


Results for LC 1,
Member z Bending Moments (k-ft)
Y-direction Reaction units are k and k-ft

Ryan-Biggs Associates, P.C.	Port Jervis EPS	E
mgy		July 10, 2012 at 10:27 AM 12
10259		Cell BSimple Wale.r3d



Results for LC 1,
Member y Shear Forces (k)
Y-direction Reaction units are k and k-ft

Ryan-Biggs Associates, P.C.		
mgy	Port Jervis EPS	July 10, 2012 at 10:27 AM
10259		Cell BSimple Wale.r3d

RYAN-BIGGS

CONSIDER DESIGN OF TOP TIER, SIDE WALE

RECALL FROM PG 65, $w = 9$ KIPS/FT

LET SPAN = 25'

USE W36X150 ASTM A992, $A = 44.2\ in^2$

$S_x = 504\ in^3$ $I_x = 9040\ in^4$ $r_x = 14.3$ IN

$S_y = 45.1\ in^3$ $I_y = 270\ in^4$ $r_y = 2.47$ IN

WALE HAS COMBINED STRESSES FROM HORIZONTAL EARTH PRESSURE, VERTICAL SELF WT, & AXIAL COMPRESSION FROM WALE REACTION

SHEAR

$V_{MAX} = \frac{1}{2}(9K/FT)(28') = 126\ K$

$f_v = V/A = (\downarrow) \div (35.9" \pm)(0.625") = 5.6$ KSI

$F_v = 0.4 f_y = 0.4 \cdot 50 KSI = 20\ KSI > (\downarrow)$ ∴ SHEAR O.K.

HORIZONTAL BENDING:

$M_x = \frac{1}{8}(9K/FT)(28')^2 = 882$ FT-K

$f_{bx} = M/S_x = (12"/FT)(\downarrow) \div 504\ in^3 = 21$ KSI

CONTINUED...

JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W16

PROJECT: PORT JERVIS EPS

SUBJECT: TIER SIDE WALE AUXILIARY CELL

RYAN-BIGGS

BRACKETS TO SUPPORT SELF WT & BRACE FLANGE WILL BE POSITIONED @ 10 FT O.C.

FROM AISC 9TH PG 2-95 $L_c = 10.5' > (\downarrow)$

$\therefore F_{Bx} = 0.66 f_y = 0.66 \cdot 50 KSI = 33 KSI$

VERTICAL BENDING

$w_{SELF} = (150\ lb/FT)_{SELF} + (50\ lb/FT)_{MISC\ SOIL/WATER} = SAY\ 0.2\ K/FT$

$M_y = \frac{1}{10} w l^2 = \frac{1}{10} (\downarrow)(10)^2 = 2\ FT\text{-}KIPS$

$f_{by} = M_y / S_y = (12"/FT)(\downarrow) \div 45.1\ IN^3 = 0.5\ KSI$

FOR WEAK AXIS BENDING $F_{By} = 0.75 f_y = 37.5 KSI$

COMPRESSION FROM MAIN WALE REACTION

$P = 114K$ @ W13

$f_a = P/A = (\downarrow) \div 49.2\ IN^2 = 2.6\ KSI$

$Kl/r = (1.0)(28')(12"/FT) \div (14.9\ IN) = 24$

$Kl/r = (1.0)(10')(12"/FT) \div (2.47\ IN) = 49$

$F_A = 25.1\ KSI$

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RYAN-BIGGS

$$F'_{ex} = \frac{\pi^2 E}{FS(KL/r)^2} = \frac{\pi^2 \cdot 29{,}000\,KSI}{1.91(24)^2} = 259\ KSI$$

$$F'_{ey} = = \frac{\pi^2 \cdot 29{,}000\,KSI}{1.91(49)^2} = 62.2\ KSI$$

INTERACTION

1) $$\frac{fa}{FA} + \frac{Cmx\,fbx}{(1 - fa/F'ex)FBx} + \frac{Cmy\,fby}{(1 - fa/F'ey)(FBy)} \overset{?}{\leq} 1.0$$

$$\frac{2.6\ KSI}{25.1\ KSI} + \frac{(1.0)(21\ KSI)}{(1 - 2.6KSI/259\,KSI)33KSI} + \frac{(1.0)(0.5\,KSI)}{(1 - 2.6KSI/62.2KSI)(37.5\,KSI)}$$

$= 0.76 < 1.0 \therefore$ O.K.

2) $$\frac{fa}{0.6fy} + \frac{fbx}{FBx} + \frac{fby}{FBY} = \frac{2.6\ KSI}{(0.6)(50KSI)} + \frac{21\ KSI}{33\ KSI} + \frac{0.5\ KSI}{37.5\ KSI}$$

$= 0.74 < 1.0 \therefore$ O.K.

DEFLECTION

$$\delta = \frac{5wl^4}{384\,EI} = \frac{5\left(\frac{9\ K/FT}{12"/FT}\right)\left[(28')(12"/FT)\right]^4}{384 \cdot 29{,}000KSI \cdot 9040\ IN^4} = 0.475\ INCHES$$

$\frac{l}{708}$

O.K.

JOB NO.: 10259 BY: MGY DATE: JUNE 2012 PAGE: W18

PROJECT: PORT JERVIS EPS

SUBJECT: STRUT AUXILIARY CELL

RYAN-BIGGS

PROVIDE STRUTS TO REDUCE SPAN OF MAIN WALES

USE HP14 x 89 A572 GR 50

FROM PG-W13 MAX P = SAY 284 KIPS

CLEAR DISTANCE BETWEEN MAIN WALES = 19±FT

$\frac{Kl}{r} = (1.0)(12"/FT)(19') \div 3.53" = 65 < C_c$ (BY INSP.)

$F_A = 22.0$ KSI

$f_a = P/A = 284\ K \div 26.1\ IN^2 = 10.9$ KSI

STRUT MUST SUPPORT ITS OWN SELF WEIGHT AS IT SPANS ACCROSS EXC.

$M_{SELF\ WT} = \frac{1}{8} w l^2 = \frac{1}{8}(0.089\ K/FT + 0.041\ K/FT)(19')^2(12"/FT) = 71$ IN-K

CONSIDER DEFLECTION

$\delta = \frac{5wl^4}{384EI} = \frac{5\left(\frac{0.13\ K/FT}{12"/FT}\right)(19' \times 12"/FT)^4}{384 \cdot 29{,}000\ KSI \cdot 326\ IN^4} = 0.040"$

(I_{yy})

$M_{PINCHING} = P \cdot \delta = (284\ K)(0.040") = 12$ IN-K

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RYAN-BIGGS

Σ MOMENT = $\overset{\text{SELF}}{71}$ IN-K + $\overset{\text{PINCH}}{12}$ IN-K = 83 IN-K

$f_b = M/S_y = (\downarrow) \div 44.3\ in^3 = 1.9$ KSI

F_B (WEAK AXIS) $= 0.75 \cdot f_y = 0.75 \cdot 50 KSI = 37.5$ KSI

$F_e' = 12\pi^2 E / 23 \cdot \frac{kl}{r}^2 = 12\pi^2 \cdot 29000 KSI / (23)(65)^2 = 36$ KSI

USE INTERACTION EQUATIONS

$$\frac{f_a}{F_A} + \frac{C_m f_b}{(1 - f_a/F_e')(F_B)} < 1.0$$

$$\frac{10.9\ KSI}{22\ KSI} + \frac{(1.0)(1.9\ KSI)}{(1 - 10.9\ KSI/36\ KSI)(37.5 KSI)} = 0.57 < 1.0 \therefore OK.$$

$$\frac{f_a}{0.6 f_y} + \frac{f_b}{F_B}$$

$$\frac{10.9\ KSI}{(0.6)(50 KSI)} + \frac{1.9\ KSI}{37.5\ KSI} = 0.41 < 1.0 \therefore OK.$$

JOB NO.: _____ BY: MGY DATE: _____ PAGE: W20

PROJECT: _____

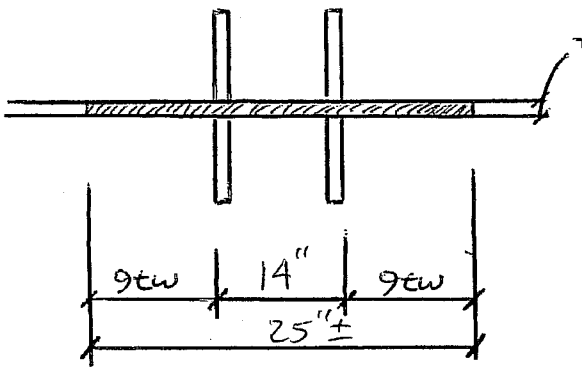
SUBJECT: TRANSFER BEAM STIFFENERS

RYAN-BIGGS

CONSIDER DESIGN OF TRANSFER BEAM STIFFENERS
REF AASHTO § 10.34.6.1

USE ½" x 5" STIFFENER ON EACH SIDE OF WEB

$t_{MIN} = \frac{b'}{12}\sqrt{\frac{f_y}{33{,}000}} = \frac{5}{12}\sqrt{\frac{36{,}000\ KSI}{33{,}000}} = 0.435" < ½$ IN. PROVIDED



$A = (25")(0.625") = 15.6\ IN^2$
$+ 4(½")(5") = 10\ IN^2$
$25.6\ IN^2$

$I = \frac{1}{12}(24")(0.625)^3 + 2\left(\frac{1}{12}(½")(5 + 0.625 + 5)^3\right) = 100.4\ IN^4$

$r = \sqrt{I/A} = \sqrt{100.4\ IN^4 / 25.6\ IN^2} = 1.98$ INCHES

FULLY WELDED STIFFENER

$Kl/r = (0.85)(35") \div (\downarrow) = 15$

$FA = 21$ KSI

TREAT ALL AS GR36 FOR SIMPLICITY ALTHOUGH GR50 WEB WILL INCREASE CAPACITY SLIGHTLY.

$f_a = P/A = 284\ K \div 25.6\ IN^2 = 11.1$ KSI $< (\downarrow)$ ∴ O.K.

WELD $0.928\ K/IN/16 \times (2)(4)(5)(33") = 1225K >$ O.K.

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RYAN-BIGGS

CONSIDER FULL MOMENT SPLICE OF W36x150 ASTM A992

DEVELOP FLANGE → 12" x 0.94" → $A = 11.28_{IN}^2$

USE 5/8" x 12" TOP PL & (2)(7/8")4"

$7.5_{IN}^2 + 7_{IN}^2 = 14.5_{IN}^2 > \downarrow$ ∴ O.K.

7% DIFF < 10% ∴ O.K.

FLANGE FORCE = $(11.28_{IN}^2)(0.66)(50KSI) = 372$ KIPS

BOLTS = (↓) ÷ (2 ROWS)(DOUBLE SHEAR)(14.4 K/BOLT AISC 13TH)

6.5 BOLTS → USE 8 ROWS OF BOLTS MINIMUM

WEB = $(35.9")(0.625") = 22.44_{IN}^2$

USE $(1/2")(25")(2) = 25_{IN}^2 > \downarrow$ ∴ OK.

MOMENT FROM WEB

$1/6(0.625")(\approx 34")^2(0.66)(50KSI) = 3974$ IN-K

MOMENT FROM e → $(6\,5/8")(54\ K) = 358$ IN-K

↑ FROM ↗

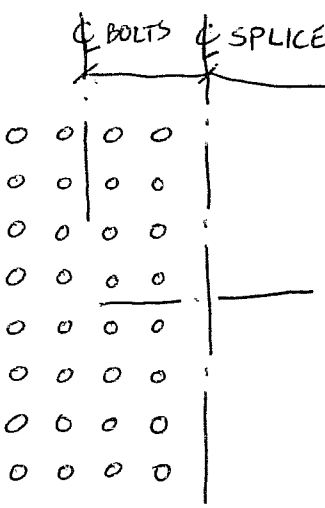
$\Sigma\ 4332$ IN-K

JOB NO.: 10259 BY: MGY DATE: JULY 2012 PAGE: W22

PROJECT: PORT JERVIS EPS

SUBJECT: WALE SPLICE

RYAN-BIGGS

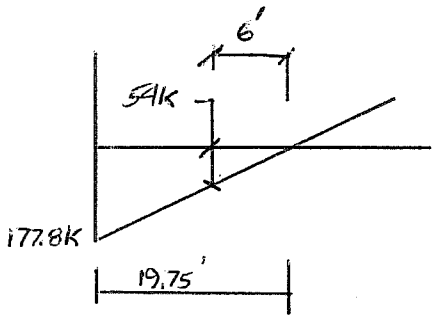


$e = 1/8" + 2" + 3" + 1\frac{1}{2}" = 6\frac{5}{8}"$

$I = (2)(8)(1\frac{1}{2}"^2 + 4\frac{1}{2}"^2) = 360\ IN^2$

$+ (2)(4)(1\frac{1}{2}"^2 + 4\frac{1}{2}"^2 + 7\frac{1}{2}"^2 + 10\frac{1}{2}"^2) = 1512\ IN^2$

$\Sigma\ 1872\ IN^2$



$V_{Y_1} = V/Q = 54K \div 32\ BOLTS = 1.69\ K/BOLT$

$V_{Y2} = MC/I = (4332\ IN\text{-}K)(4\frac{1}{2}") \div 1872\ IN^2 = 10.41\ K/BOLT$

$V_{X1} = MC/I = (4332\ IN\text{-}K)(10\frac{1}{2}") \div 1872\ IN^2 = 24.30\ K/BOLT$

$V_R = \sqrt{(1.69\ K + 10.41\ K)^2 + 24.30\ K^2} = 27.14\ K/BOLT \div 2\ PLANES = 13.6\ K$

BOLT BRG ON WEB $V_{ALLOW} = (59.7K)(0.625") = 37.3K >$ ∴ O.K.

$V_{ALLOW} = 14.4\ K >$ ∴ O.K. AISC 13TH

$I = \frac{2}{12}(\frac{1}{2})(25")^3 + 2(\frac{1}{12}(12")(\frac{5}{8}")^3 + (12")(\frac{5}{8}")(18.26")^2 + 2(\frac{1}{12}(8")(\frac{7}{8}")^3 + (8")(\frac{7}{8}")(16.57")^2)$

$= 10149\ IN^4$

$S_x = 10149 / (35.9"/2 + 5/8")$

$= 546\ IN^3$ SPLICE vs $504\ IN^3$ W36x150 ✓ O.K.

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