



CONSTRUCTION LEADERS

LETTER OF TRANSMITTAL	
DATE: <b>February 20, 2015</b>	PCL JOB NO: <b>5515002</b>
ATTN: <b>Chris Barker</b>	TRANSMITTAL NO: <b>012</b>

To: **State of Vermont Agency of Transportation**  
 One National Life Drive  
 Montpelier, VT 05633-5001  
 (802) 828-0053

Re: Hartford Lateral Slide  
 Project No.: IM 091-2(79)  
 Contract ID.: 12A132

County: Windsor

PCL FILE NO: 5515002-6.1

WE ARE SENDING  Attached \_\_\_\_\_ Under separate cover via   **Email & SP**   the following:  
 \_\_\_\_\_ Shop drawings \_\_\_\_\_ Prints \_\_\_\_\_  Plans \_\_\_\_\_ Samples \_\_\_\_\_  Specifications  
 \_\_\_\_\_ Copy of Letter \_\_\_\_\_ Change Order \_\_\_\_\_  Other

COPIES	SPEC.	REVISION	DESCRIPTION
1	900.630 900.640 900.645	1	<b>Micropiles – Procedures, Equipment &amp; Material Specs, Qualifications</b>

TRANSMITTED for as checked below:

For approval \_\_\_\_\_ Approved as submitted \_\_\_\_\_ Resubmit   1   Copies for approval  
 \_\_\_\_\_ For your use \_\_\_\_\_ Approved as noted \_\_\_\_\_ Submit \_\_\_\_\_ Copies for distribution  
 \_\_\_\_\_ As requested \_\_\_\_\_ Returned for corrections \_\_\_\_\_ Return \_\_\_\_\_ Corrected prints  
 \_\_\_\_\_ For review and comment

**Remarks:**

The attached submittal has been revised per the Agency’s comments dated 2/18/2015. This submittal supersedes all information previously submitted under submittal number 006.

In regards to the Agency’s comment relating to the laboratory not being AMRL accredited, please see the explanation provided on the sheet titled Grout Mix Design, Mill Certs and Sample Grout Breaks.

Please return an email of this approved submittal to Erich Heymann ([ewheymann@pcl.com](mailto:ewheymann@pcl.com)) and Jeremy Mackling ([jmackling@pcl.com](mailto:jmackling@pcl.com)).

We request the review and return of this submittal within 7 days. Installation of the micropile is required early in the project and is critical to the construction schedule. Please advise if this request cannot be met so we can plan accordingly.

By: **Erich Heymann**, Project Engineer

COPY TO: Project Files



**CONSTRUCTION LEADERS**

**SUBMITTAL NO. : 006.1**  
**Micropiles**

<b>Item No.</b>	<b>Specification</b>	<b>Description</b>
1	900.630 900.640 900.645	Micropiles – Procedures, Equipment & Material Specs, Qualifications

***PROJECT:***  
**HARTFORD LATERAL SLIDE**  
**PROJECT NO.: IM 091-2(79)**  
**CONTRACT ID.: 12A132**

***OWNER:***  
**STATE OF VERMONT AGENCY OF TRANSPORTATION**

***ENGINEER OF RECORD:***  
**STATE OF VERMONT AGENCY OF TRANSPORTATION**

***CONTRACTOR:***  
**PCL CIVIL CONSTRUCTORS, INC.**

**FEBRUARY 20, 2015**

**Hayward Baker Inc.**  
New England Area Office  
9 Whipple Street, Unit 1  
Cumberland, RI 02864  
Tel: (401) 334-2565  
Fax: (401) 334-3337



February 4, 2015

**Revised February 19, 2015**

Mr. Jeremy Mackling  
PCL Civil Constructors, Inc.  
3810 Northdale Blvd Ste 200  
Tampa, FL 33624

Re: Hartford IM 091-2 (79)  
Bridge improvement project  
Hartford, Vermont  
Micropile Submittal

Dear Mr. Mackling,

Hayward Baker, Inc. (HBI) is pleased to provide our micropile re-submittal for the aforementioned site in Hartford, VT. The piles will be installed in accordance with the plans and specifications as per State of Vermont Agency of Transportation dwg. Sheet 100 of 166 attached.

The following information is included in this submission:

- Micropile drawing and numbering plan
- Klemm rig data sheets
- Grout Pump equipment data sheets
- **Revised Pile installation procedure**
- **Revised Sample minipile log sheet**
- **Revised Proposed Grout mix and previous grout break reports**
- Mill Test reports for Type I/II cement.
- Cut sheets for the proposed bar material and centralizers.
- Material certifications for core steel will be supplied upon receipt and prior to installation.
- Qualifications

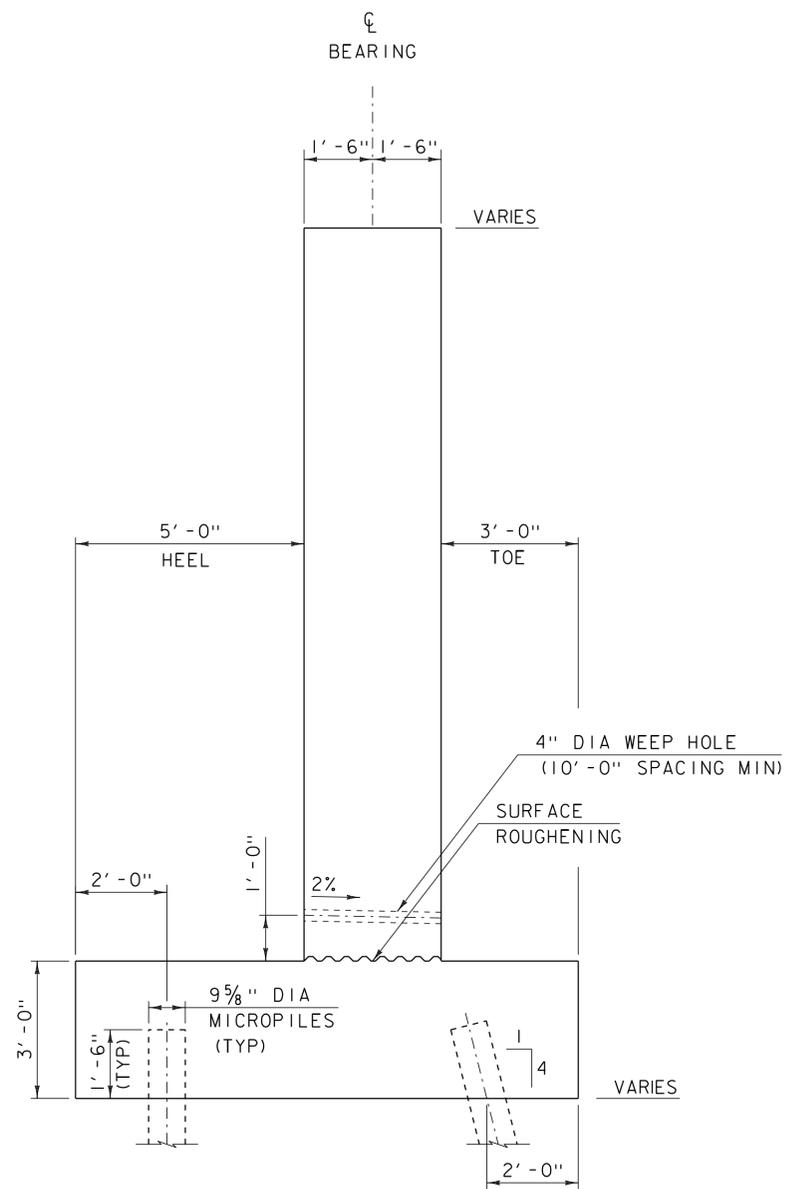
Should you have any questions regarding the information contained herein please don't hesitate to contact me at 401.334.2565.

Very truly yours,

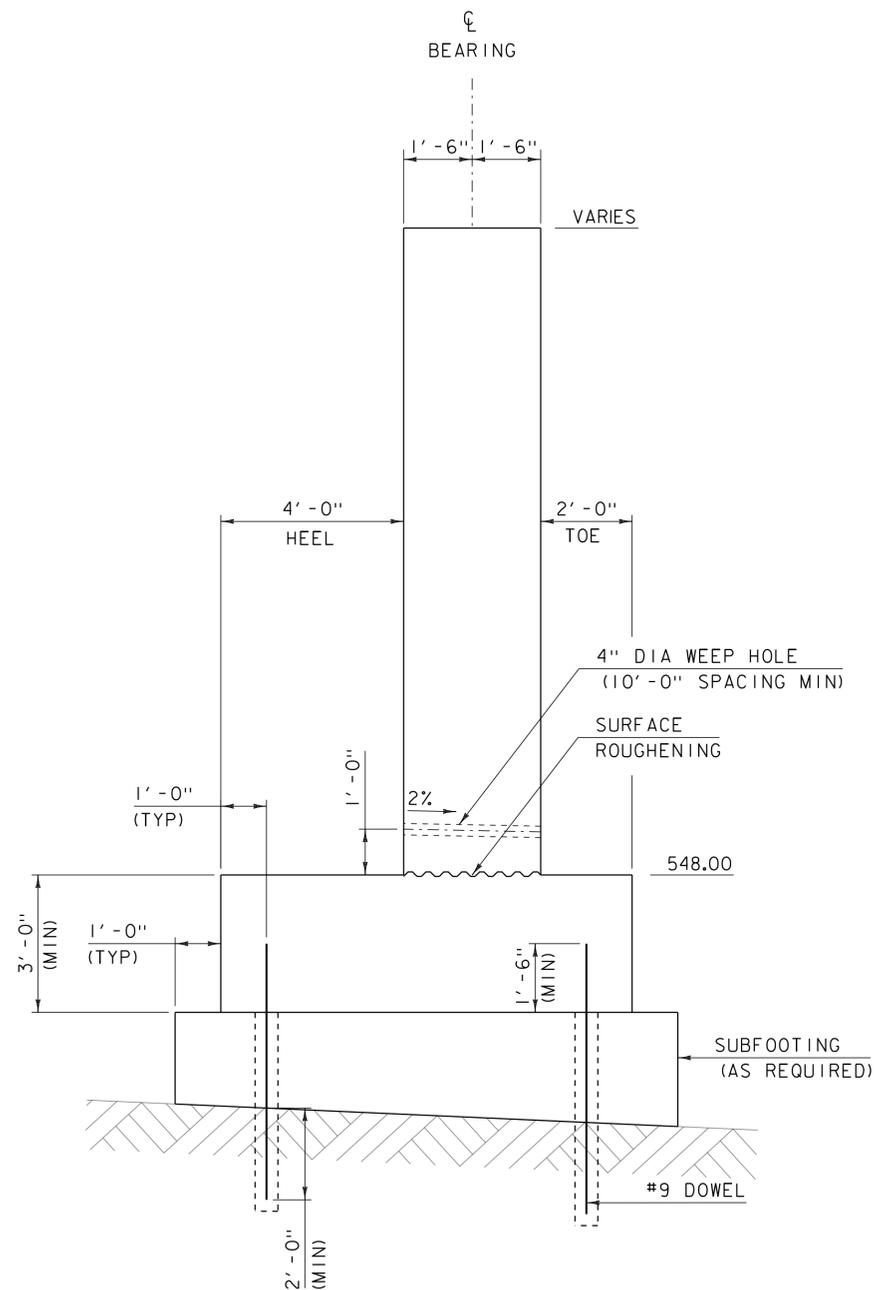
HAYWARD BAKER, INC.

Richard K. Wilhelmsen  
Division Manager

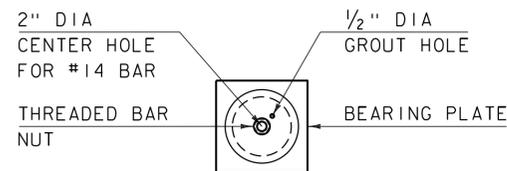




**ABUTMENT 1-3 TYPICAL**  
SCALE: 1/2" = 1'-0"

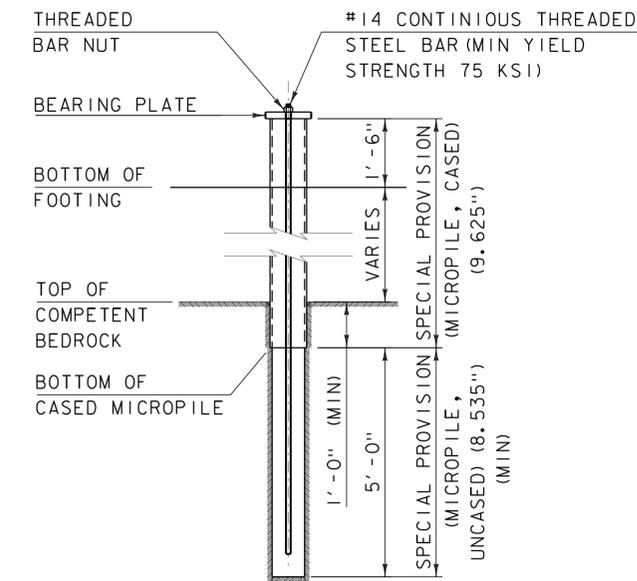


**ABUTMENT 4 TYPICAL**  
SCALE: 1/2" = 1'-0"

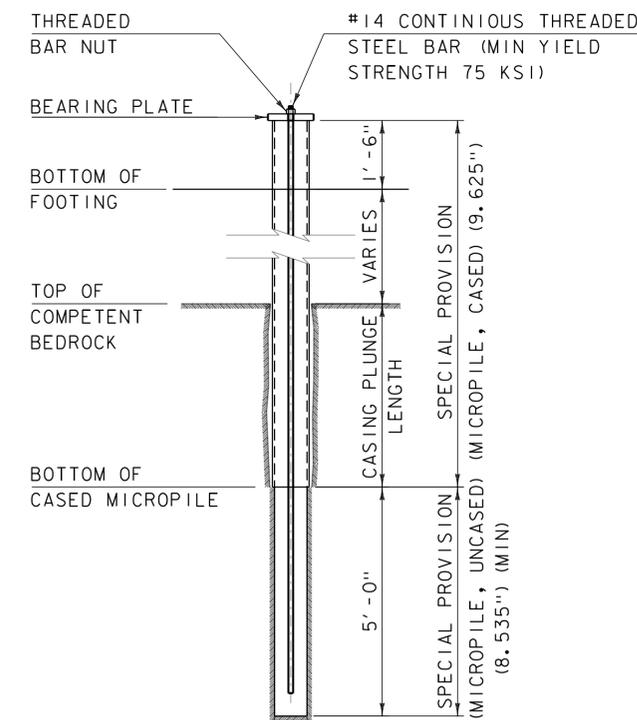


**MICROPILE PLAN**  
SCALE: 1" = 1'-0"

	PILE TYPE	CASING PLUNGE LENGTH IN COMPETENT ROCK	CASING SEATED INTO COMPETENT ROCK	BEARING PLATE SIZE
ABUT 1	FRONT ROW (BATTERED)	3.0 FT	N/A	1 3/4" X 1' X 1'
	BACK ROW (PLUMB)	N/A	1 FT	
ABUT 2	FRONT ROW (BATTERED)	4.5 FT	N/A	1 3/4" X 1'1" X 1'1"
	BACK ROW (PLUMB)	N/A	1 FT	
ABUT 3	FRONT ROW (BATTERED)	4.0 FT	N/A	1 3/4" X 1' X 1'
	BACK ROW (PLUMB)	N/A	1 FT	

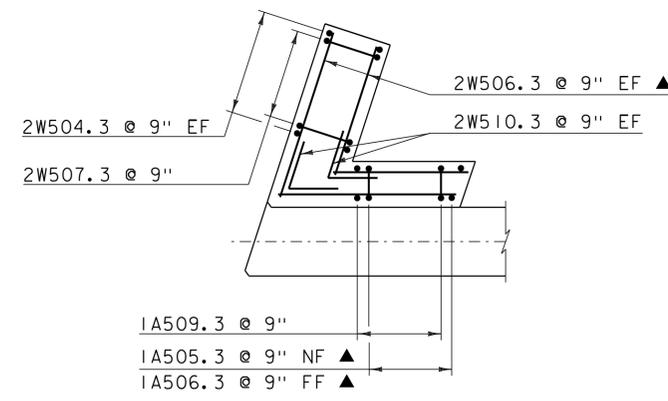


**PLUMB MICROPILE ELEVATION**  
SCALE: 1/2" = 1'-0"



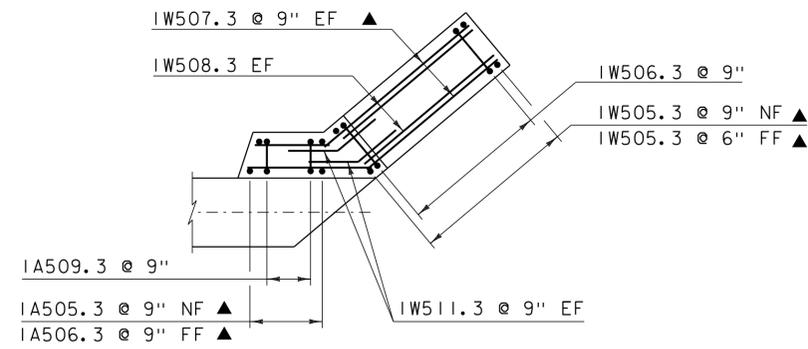
**BATTERED MICROPILE ELEVATION**  
SCALE: 1/2" = 1'-0"

PROJECT NAME: HARTFORD  
PROJECT NUMBER: IM 09I-2(79)  
FILE NAME: sl2al32sub\_abl.dgn  
PROJECT LEADER: K. HIGGINS  
DESIGNED BY: G. LAROCHE  
ABUTMENT TYPICALS  
PLOT DATE: 15-DEC-2014  
DRAWN BY: J. SALVATORI  
CHECKED BY: W. LAMMER  
SHEET 100 OF 166



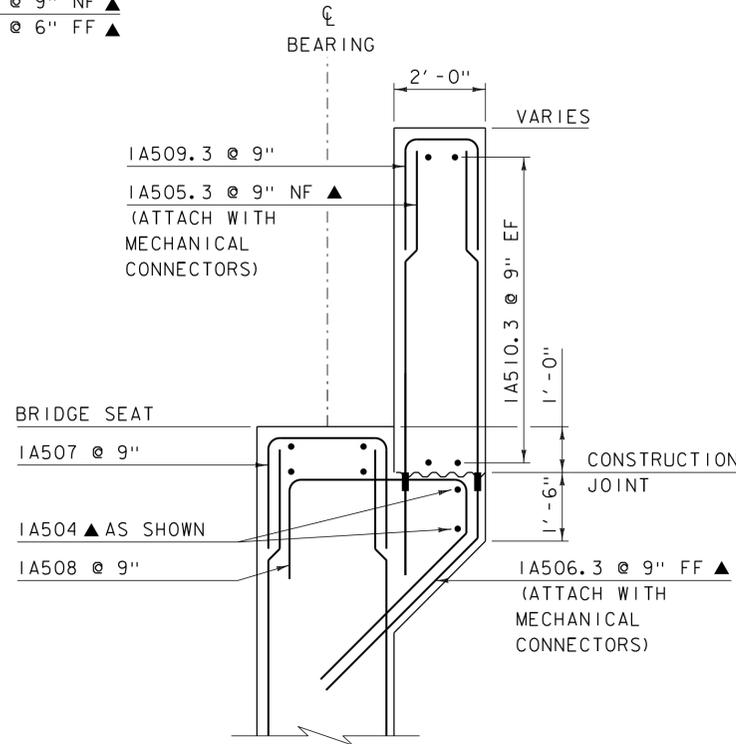
**WINGWALL 2 CORNER DETAIL  
ABOVE BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



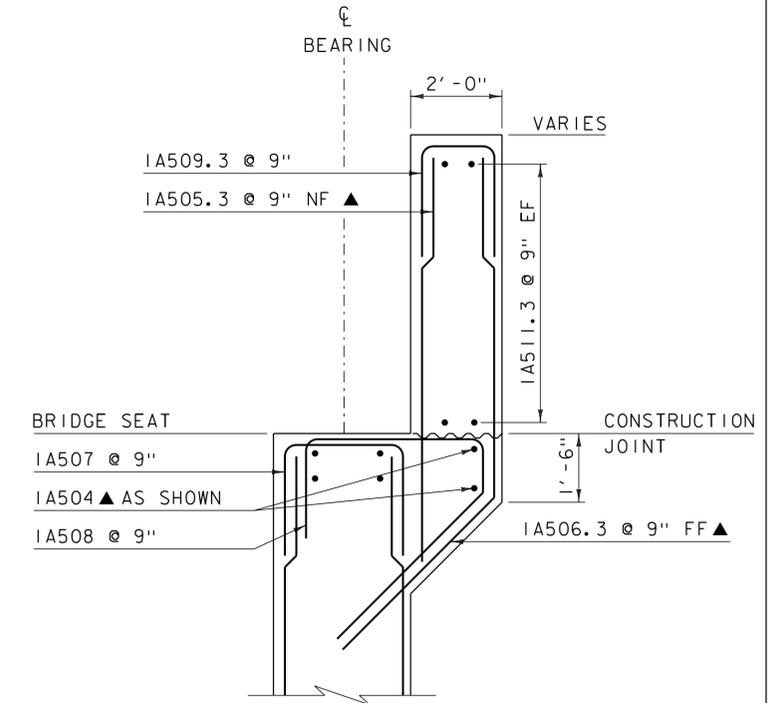
**WINGWALL 1 CORNER DETAIL  
ABOVE BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



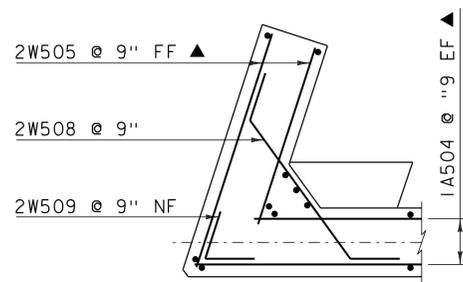
**ABUTMENT 1 CHEEK WALL  
REINFORCING @ WW 1**

SCALE: 1/2" = 1'-0"



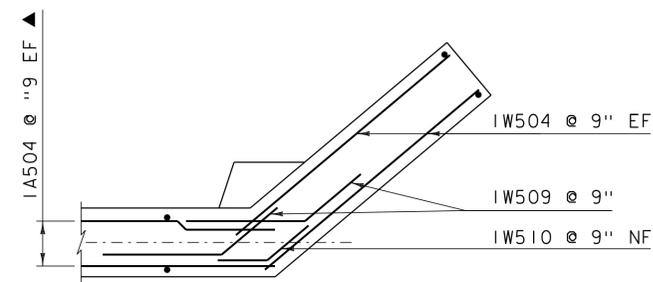
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REINFORCING @ WW 2**

SCALE: 1/4" = 1'-0"



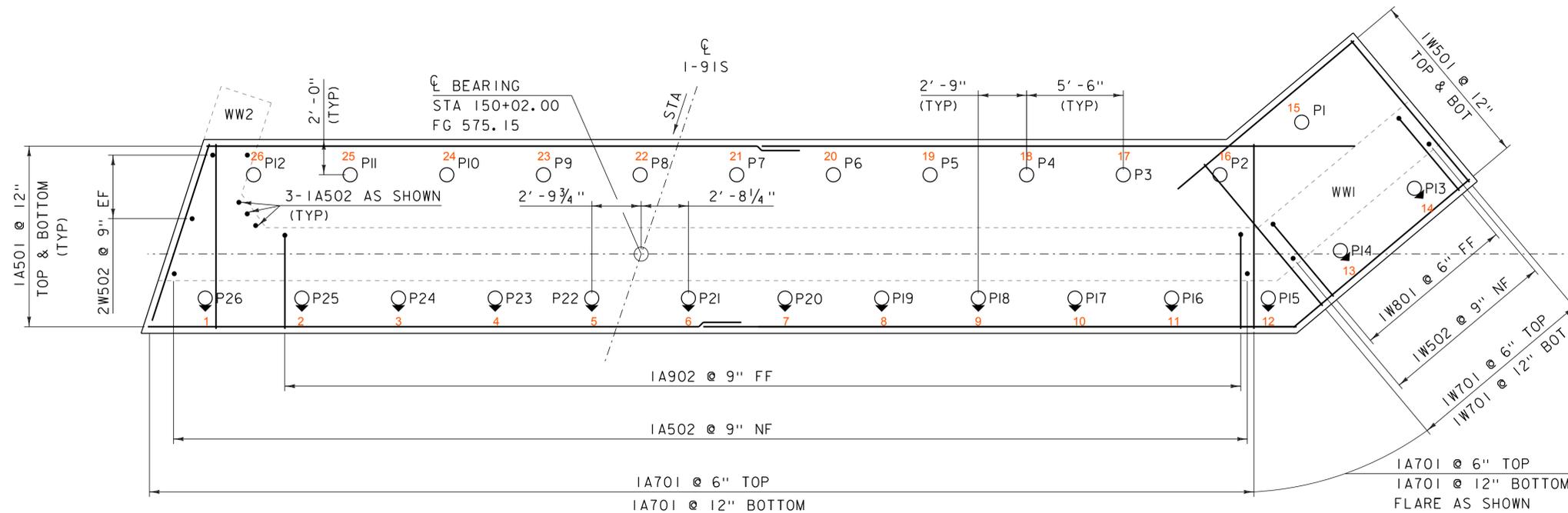
**WINGWALL 2 CORNER DETAIL  
BELOW BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



**WINGWALL 1 CORNER DETAIL  
BELOW BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



**ABUTMENT 1 FOOTING PLAN**

SCALE: 1/4" = 1'-0"

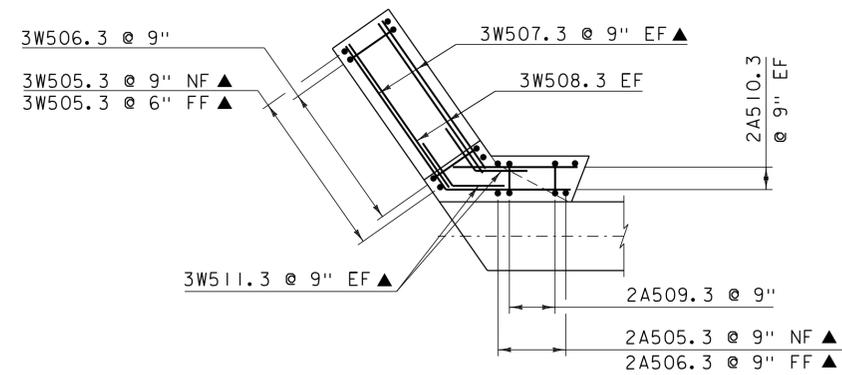
**NOTE:**

- NF = NEAR FACE
- FF = FAR FACE
- EF = EACH FACE
- ▲ = CUT TO FIT IN FIELD
- = MECHANICAL CONNECTOR
- 3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
- 2'-2" LAP FOR #5 BAR
- 2'-7" LAP FOR #6 BAR
- 3'-5" LAP FOR #7 BAR
- 4'-6" LAP FOR #8 BAR

PROJECT NAME: HARFORD  
PROJECT NUMBER: IM 091-2(79)

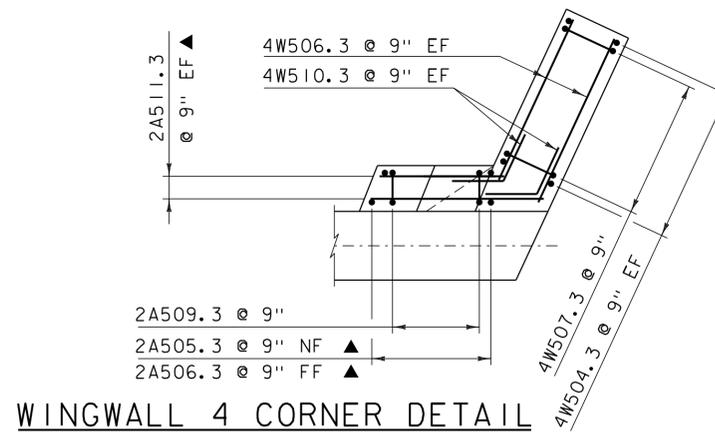
FILE NAME: sl2al32sub\_abl.dgn  
PROJECT LEADER: K. HIGGINS  
DESIGNED BY: G. LAROCHE  
ABUTMENT 1 FOOTING

PLOT DATE: 15-DEC-2014  
DRAWN BY: J. SALVATORI  
CHECKED BY: G. LAROCHE  
SHEET 102 OF 166



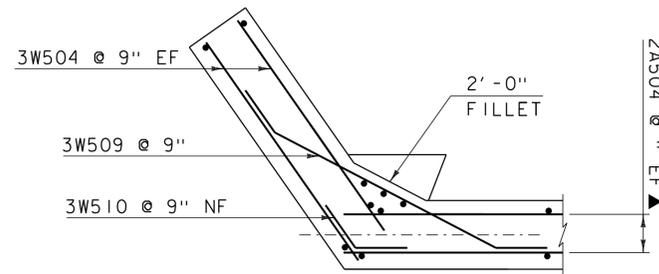
**WINGWALL 3 CORNER DETAIL  
ABOVE BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



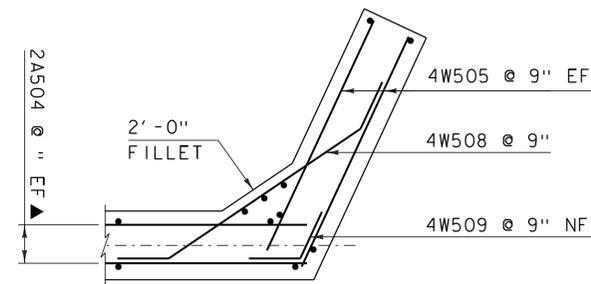
**WINGWALL 4 CORNER DETAIL  
ABOVE BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



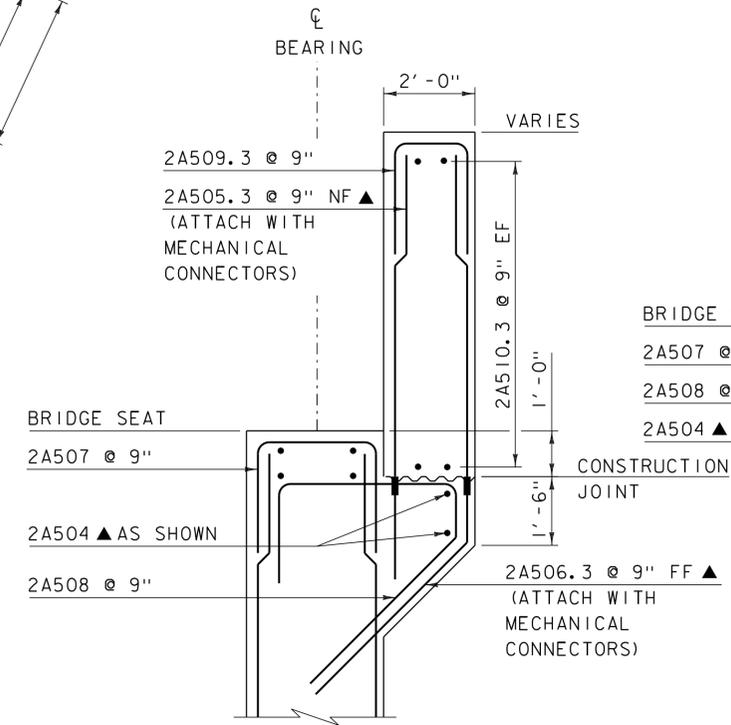
**WINGWALL 3 CORNER DETAIL  
BELOW BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



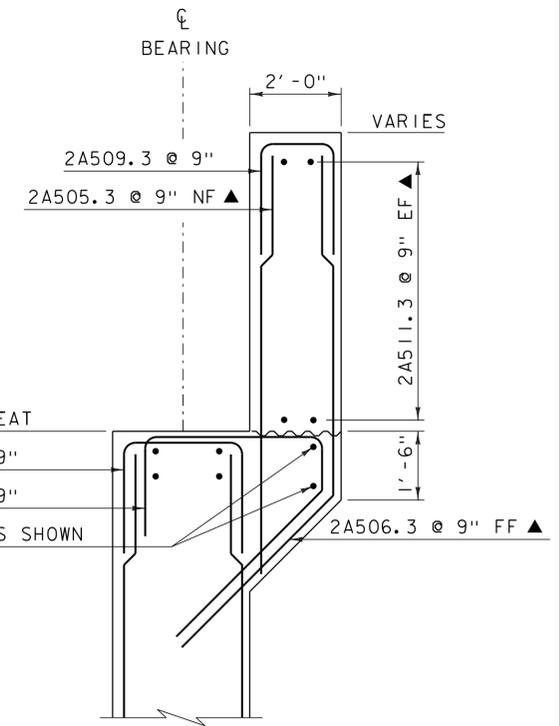
**WINGWALL 4 CORNER DETAIL  
BELOW BRIDGE SEAT**

SCALE: 1/4" = 1'-0"



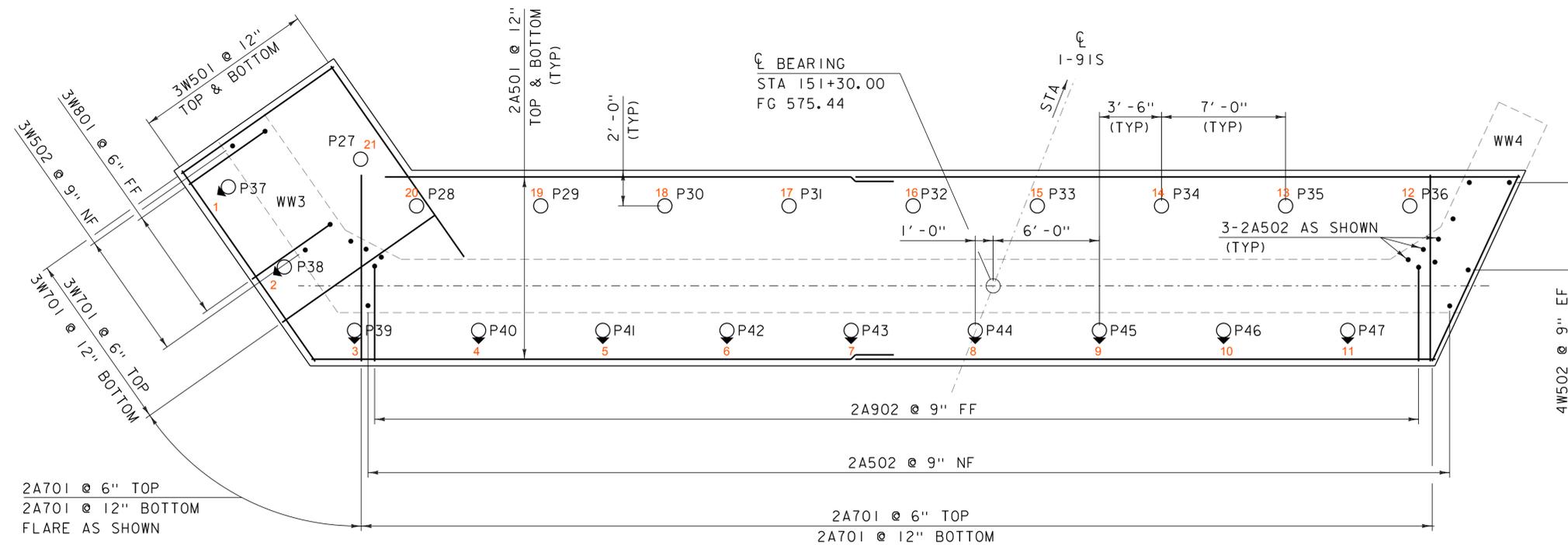
**ABUTMENT 2 CHEEK WALL  
REINFORCING @ WW3**

SCALE: 1/4" = 1'-0"



**ABUTMENT 2 CHEEK WALL  
REINFORCING @ WW4**

SCALE: 1/4" = 1'-0"



**ABUTMENT 2  
FOOTING PLAN**

SCALE: 1/4" = 1'-0"

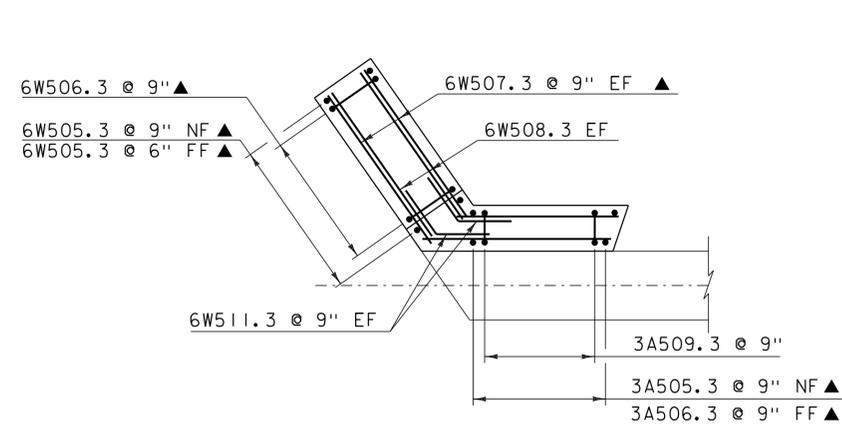
**NOTE:**

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- 3'-5" LAP FOR #7 BAR
- 4'-6" LAP FOR #8 BAR

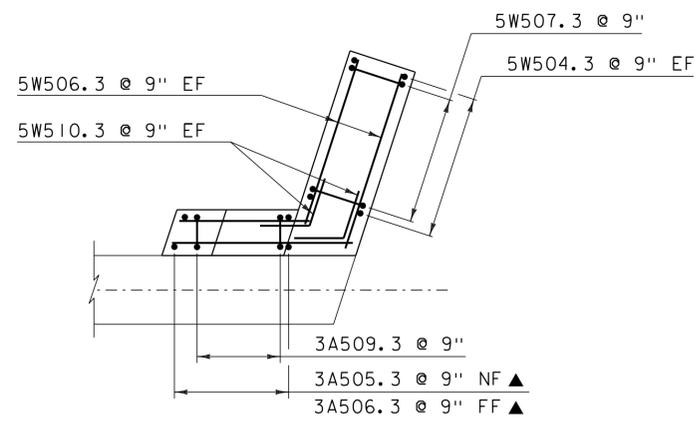
PROJECT NAME: HARTFORD  
PROJECT NUMBER: IM 091-2(79)

FILE NAME: sl2al32sub\_ab2  
PROJECT LEADER: K. HIGGINS  
DESIGNED BY: G. LAROCHE  
ABUTMENT 2 FOOTING

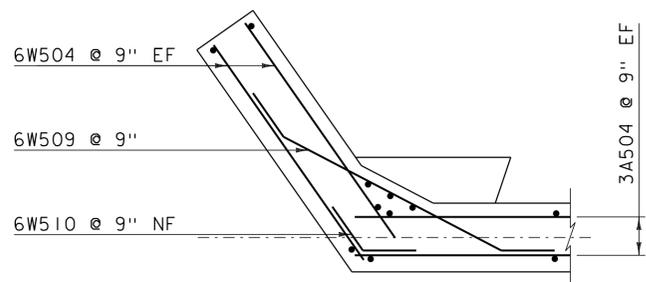
PLOT DATE: 15-DEC-2014  
DRAWN BY: J. SALVATORI  
CHECKED BY: G. LAROCHE  
SHEET 106 OF 166



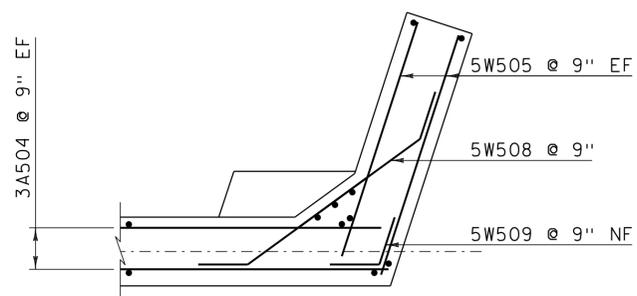
**WINGWALL 6 CORNER DETAIL  
ABOVE BRIDGE SEAT**  
SCALE: 1/4" = 1'-0"



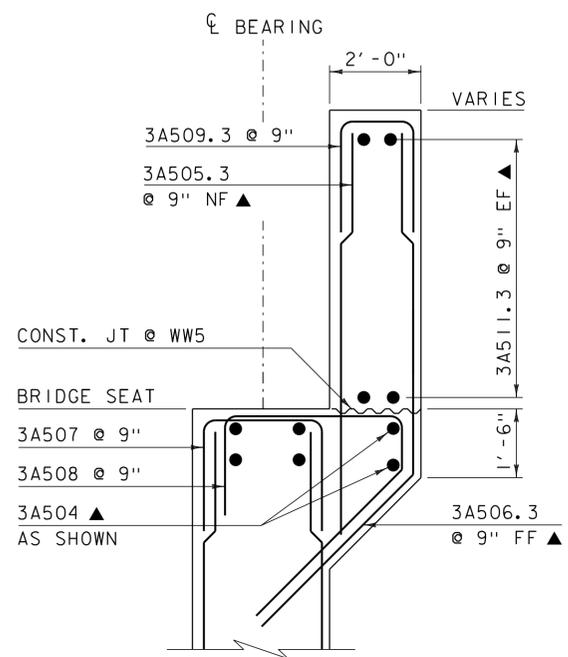
**WINGWALL 5 CORNER DETAIL  
ABOVE BRIDGE SEAT**  
SCALE: 1/4" = 1'-0"



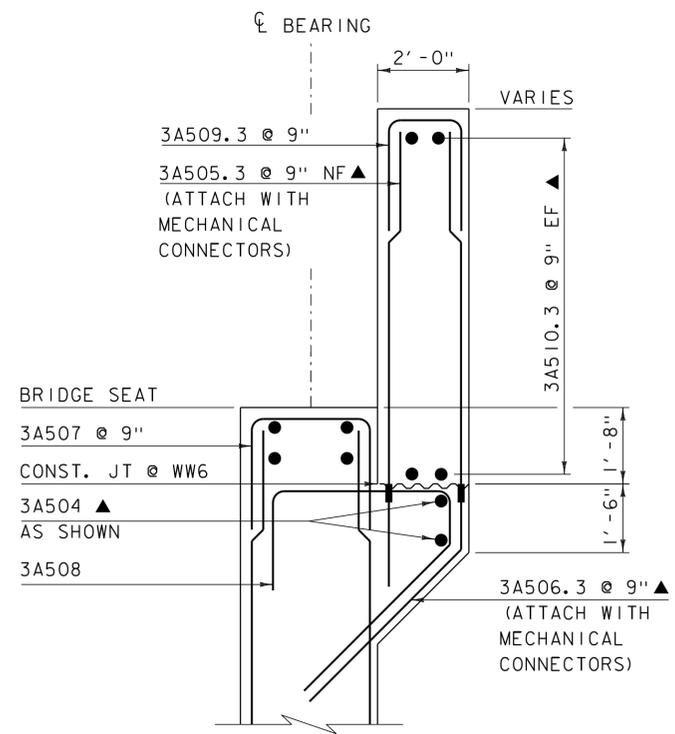
**WINGWALL 6 CORNER DETAIL  
BELOW BRIDGE SEAT**  
SCALE: 1/4" = 1'-0"



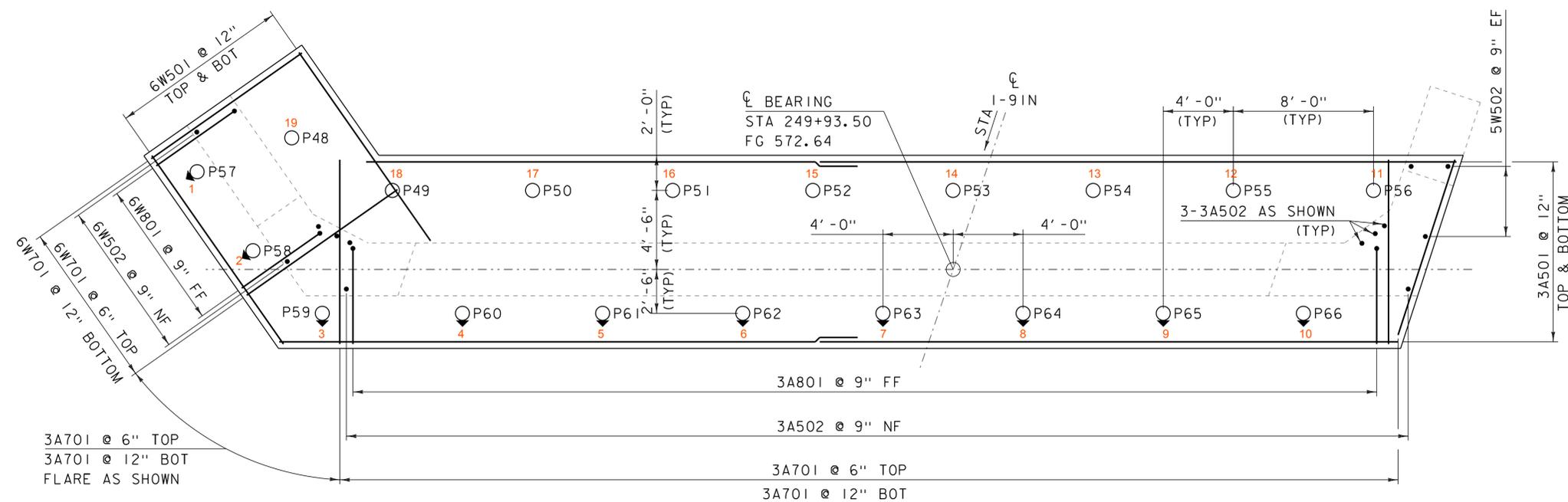
**WINGWALL 5 CORNER DETAIL  
BELOW BRIDGE SEAT**  
SCALE: 1/4" = 1'-0"



**ABUTMENT 3 CHEEK WALL  
REINFORCING @ WW 5**  
SCALE: 1/2" = 1'-0"



**ABUTMENT 3 CHEEK WALL  
REINFORCING @ WW 6**  
SCALE: 1/2" = 1'-0"



**ABUTMENT 3 FOOTING PLAN**  
SCALE: 1/4" = 1'-0"

**NOTE:**  
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 EF = EACH FACE  
 ▲ = CUT TO FIT IN FIELD  
 ■ = MECHANICAL CONNECTOR  
 3" CLEAR, UNLESS OTHERWISE SPECIFIED ON THE PLANS.  
 2'-2" LAP FOR #5 BAR  
 2'-7" LAP FOR #6 BAR  
 3'-5" LAP FOR #7 BAR  
 4'-6" LAP FOR #8 BAR  
 5'-9" LAP FOR #9 BAR

PROJECT NAME: HARTFORD	PLOT DATE: 15-DEC-2014
PROJECT NUMBER: IM 091-2(79)	DRAWN BY: J. SALVATORI
FILE NAME: sl2al32sub_ab3	CHECKED BY: G. LAROCHE
PROJECT LEADER: K. HIGGINS	SHEET 110 OF 166
DESIGNED BY: G. LAROCHE	
ABUTMENT 3 FOOTING	

**Drill Rig and Equipment Cut-sheets:**

We will be utilizing the diesel powered Klemm 704 and Davey Kent DK-525 drill rigs for the work. (or similar). Both rigs have sectional masts for low headroom access. The Cut sheets for the rigs are enclosed.

Mixing and pumping grout will be accomplished with the ChemGrout CG-500 mixer and Moyno pump system. Cut sheets are enclosed.



# KR 704 D/E

Hydraulisches Bohrgerät  
Hydraulic Drill Rig



**KLEMM**  

---

**Bohrtechnik**

## KR 704

Die Gerätetypen KR 704 E (Elektromotor) und KR 704 D (Dieselmotor) gehören in die Geräteklasse der „kleinen Bohrgeräte“. Als Kompaktanlage mit der Antriebseinheit an Bord und einer minimalen Gerätebreite von 750 mm ergeben sich eine Vielzahl von Anwendungsmöglichkeiten - auch unter **beengten Raumverhältnissen**.

Für die optimale Anpassung an das jeweilige Bohrvorhaben stehen eine Reihe von Optionen zur Verfügung:

- Kraftdrehköpfe bis 13 kNm (KH 9, KH 13, KH 13 S, KH 9 SF)
- Hydr. Klemmvorrichtung für max. Ø 356 mm (14")
- Hydraulische Klemm- und Brechvorrichtung für Rohre bis Ø 254 mm
- Seilwinde bis 10 kN Zugkraft
- Hochdruckinjektionsausrüstung (für 1-, 2- und 3-Phasensystem)
- Direktsteuerung für Dieselversion (schwenkbar am Gerät angebauter Bedienungsstand)
- Duplexköpfe für verrohrte Bohrungen bis Ø 356 mm
- Spülköpfe für Zentralspülung (Luft, Wasser, Suspension)

Die Standsicherheit wird einmal durch ein hydraulisch **spreizbares Raupenfahrwerk** (750 - 1200 mm), zum anderen durch die **teleskopierbare hydraulische 2-Punkt-Abstützung** gewährleistet.

Unterschiedliche Raumhöhen können durch die **Teleskopbohrlafette** im Bereich von 2150 - 3250 mm (2400 - 3500 mm) ausgeglichen werden. Dadurch ist es möglich, Bohrrohre bis zu einer max. Nutzlänge von 2 m zu verwenden.

*The KR 704 E (with electro-motor) and the KR 704 D (with Diesel engine) are located in the "small drilling rig class". The drilling rig - with the on-board power unit and a minimum width of 750 mm - was developed specially for drilling under **confined conditions**.*

*A serie of options is available for providing the optimum rig configuration for a particular drilling process*

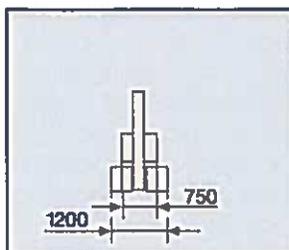
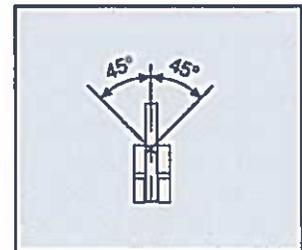
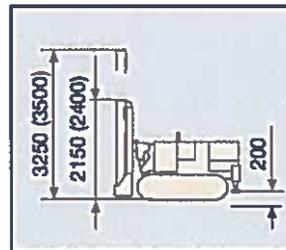
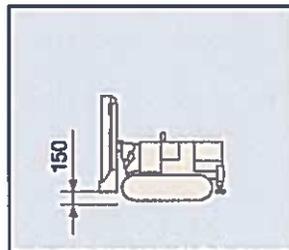
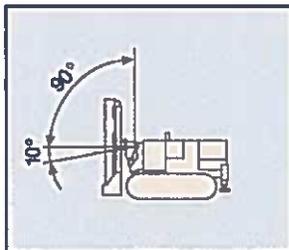
- Rotary heads up to 13 kNm torque (KH 9, KH 13, KH 13 S, KH 9 SF)
- Hydraulic clamping device for drill tubes up to Ø 356 mm (14")
- Hydraulic breaking and clamping device for drill tubes up to Ø 254 mm
- Hydraulic winch with up to 10 kN line pull
- High pressure grout injection equipment for 1-, 2- and 3-phase system
- Direct operating controls for Diesel version (mounted on a pivot arm)
- Duplex rotary heads for cased holes up to Ø 356 mm
- Flushing heads with central flushing (air, water, grout)

*Rig stability is guaranteed on the one hand by a hydraulically **extendible crawler base** (750 - 1200 mm) and on the other by two hydraulically operated **telescopic outriggers**.*

*A **telescopic drill mast** makes the rig easily adaptable to varying headroom conditions ranging between 2150 mm and 3250 mm (2400 - 3500 mm). This allows drill tubes up to 2 m in length to be used in accordance with the selected drilling process.*

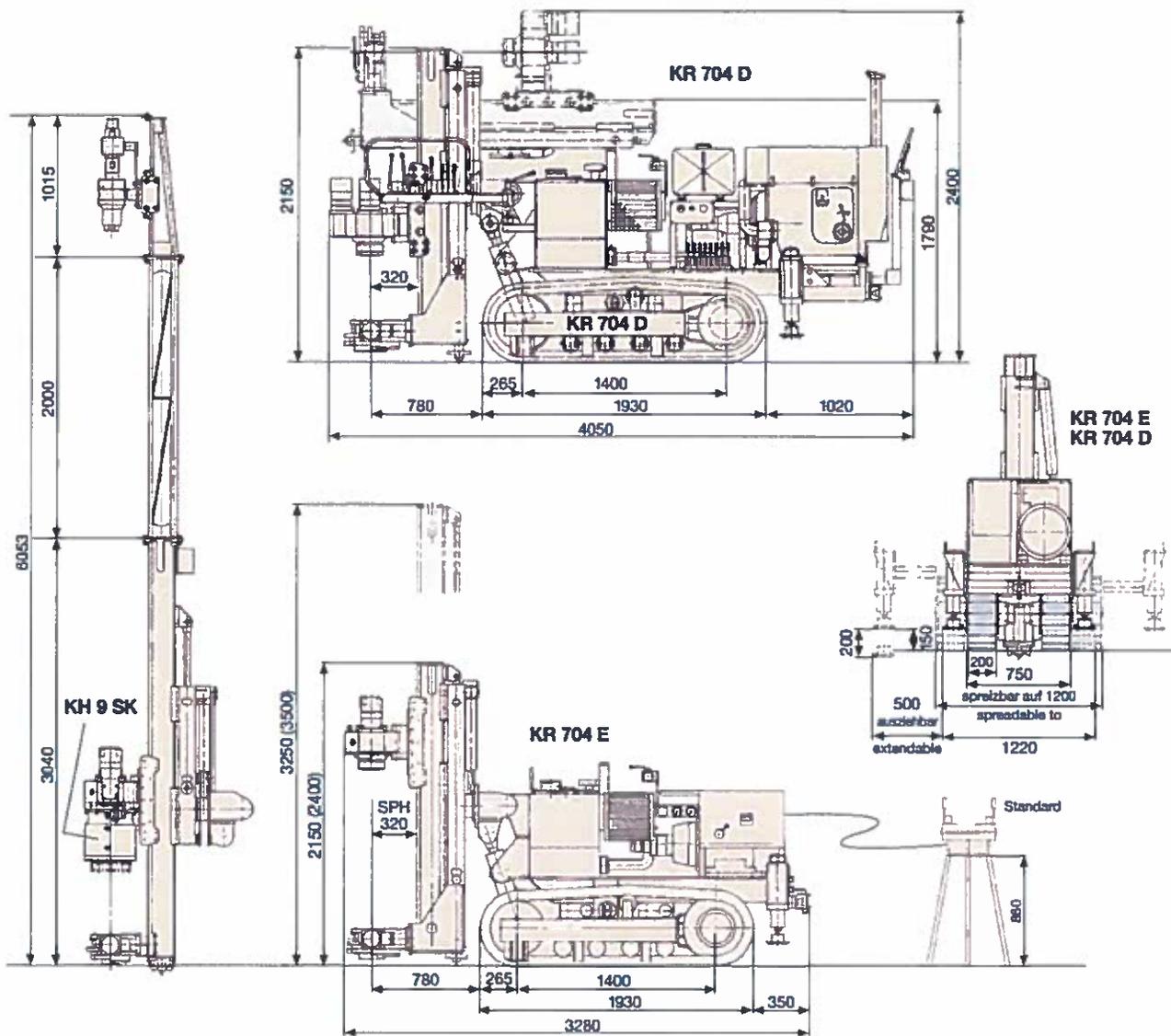
## Schwenkbereiche

## Mast Movements



# Abmessungen / Dimensions

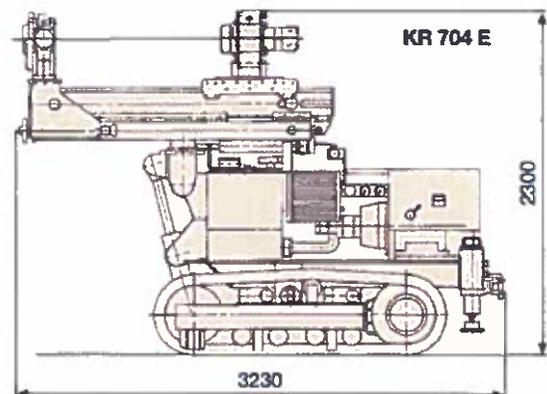
# KR 704



## Transportabmessungen

## Transport Dimensions

		KR 704 E	KR 704 D
Gesamtlänge	overall length:	3.230 mm	3.900 mm
Gesamtbreite	overall width:	1.220 mm	1.220 mm
Höhe	overall height:	2.300 mm	2.400 mm
Gewicht	overall weight:	4.000 kg	4.300 kg



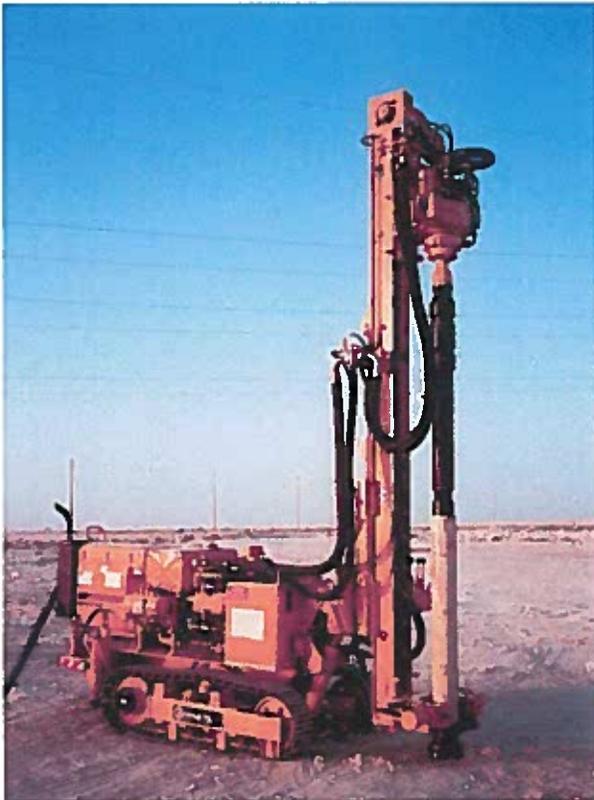
# Technische Daten / Technical Specification

# KR 704

<b>Hydraulikaggregat</b>		<b>Hydraulic power pack</b>		<b>Dieselmotor</b>	<b>E-Motor</b>	
Motortyp		engine type		Hatz 4 L 40 C	Siemens -	
Leistung / bei		rated output / at	kW / rpm	48,1 / 2900	37 / 2945	
Dieseltank		fuel tank capacity	l / litres	85	-	
Elektrosystem		electrical system	V / Hz	-	400 / 50	
Schutzart		protective system		-	IP 54	
<b>Hydrauliksystem</b>		<b>Hydraulic system</b>				
Hydraulikpumpen		hydraulic pumps				
1. Kreislauf		1 <sup>st</sup> circuit	l/min	93	94	
2. Kreislauf		2 <sup>nd</sup> circuit	l/min	23	15	
3. Kreislauf		3 <sup>rd</sup> circuit	l/min	15	-	
Systemdruck		operating pressure	bar		250	
Hydrauliktank		hydraulic tank capacity	l / litres		180	
<b>Raupenfahrwerk</b>		<b>Crawler base</b>				
Laufwerk		crawler type			B 00	
Zugkraft max.		towing force	kN		40	
Fahrgeschwindigkeit max.		crawler speed	km/h		1,8	
Spez. Bodendruck		ground pressure	N/cm <sup>2</sup>	7,6	7,1	
Gesamtbreite		overall width	mm		750 - 1200	
Kettenbreite		track width	mm		200	
Länge der Fahrschiffe		length of crawler units	mm		1930	
Bodenfreiheit		ground clearance	mm		210	
Option: gummierte Kette		optional: rubber coated track shoes				
<b>Bohrlafette Typ</b>		<b>Drill mast type</b>		160 *	161	162
				teleskopierbar	Vorschubgetriebe	
				telescopic	feed gear	
Zulässiges Drehmoment	max. permissible torque	kNm		15	15	
Gesamtlänge	overall length	mm		2150 - 3250	4000	
Option	optional			(2400 - 3500)		
Vorschublänge	feed length	mm		820 - 1920	3100	
Option	optional			(1100 - 2200)		
Vorschubkraft	feed force	kN/tons		26/2,6	40/4,0	60/6,0
Rückzugskraft	retraction force	kN/tons		39/3,9	40/4,0	60/6,0
Vorschubgeschwindigkeit	feed rate	m/min		14	7	4
Rückzuggeschwindigkeit	retraction rate	m/min		9	7	4
Vorschub schnell	fast feed rate	m/min		48	47	29
Rückzug schnell	fast retraction rate	m/min		32	47	29
<b>Hydr. Kraftdrehkopf</b>		<b>Hydr. rotary head</b>				
empfohlen	recommended				KH 9 / KH 9 SK KH 13 / KH 13 S KH 9 SF	
<b>Gewicht</b>		<b>Weights</b>				
Bohrgerät komplett mit Kraftdrehkopf	drilling rig c/w rotary head	t		4,3	4,0	

## Standard Bohrverfahren / Standard Drilling Processes

- Drehbohren mit Bohrschnecke
- Drehbohren im Spülverfahren (verrohrt/unverrohrt)
- Drehschiagbohren mit im-Loch-Hammer
- Hochdruckinjektion
- Aufschlussbohrungen

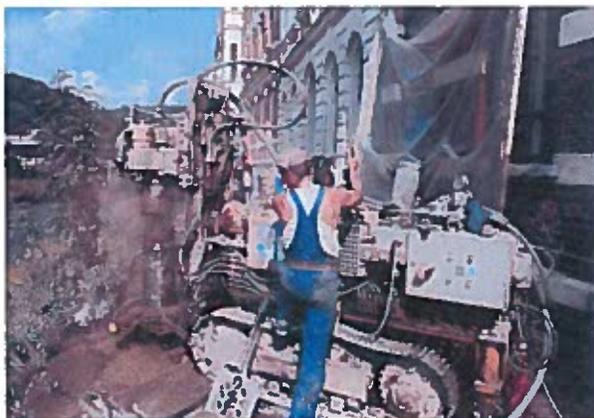


- Rotary drilling with auger
- Rotary flush drilling (cased or uncased)
- Rotary percussive drilling with down-the-hole hammer (+ air compressor)
- High pressure grout injection
- Drilling for ground investigation

KR 704 D mit Bohrlafette Typ 162 (Getriebevor-schub), Kraftdrehkopf KH 9 und Tieflochhammer DHD 380.

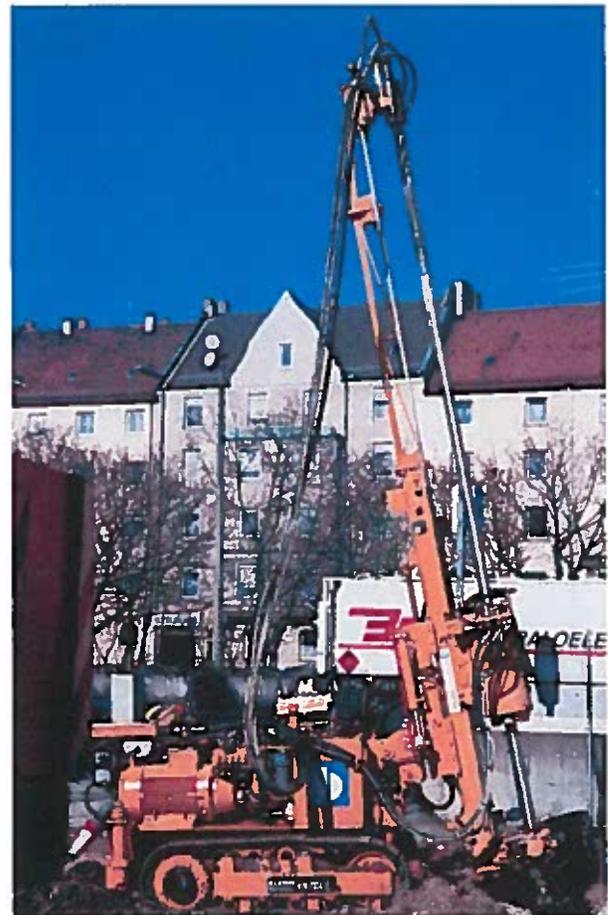
Mikropfähbohrungen Ø 305 mm zur Aufnahme von Hochspannungsmasten.

*KR 704 D with drill mast type 162 (feed gear), rotary head KH 9 and down-the-hole-hammer DHD 380. Drilling micropiles Ø 305 mm for electrification pylons.*



KR 704 E mit Kraftdrehkopf KH 13, ausgerüstet für Mikropfähbohrungen Ø 305 mm.

*KR 704 E with rotary head KH 13, equipped for drilling micropiles in Duplex-Mode (Ø 305 mm).*



KR 704 E mit Gittermastverlängerung (3 m) für HDI-Unterfangung eines Wohn- und Geschäftshauses.

*KR 704 E with 3 m lattice mast extension for jet-grouting underpinning of a residential building and business premises.*

# **KLEMM**

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## **Bohrtechnik**

**KLEMM Bohrtechnik GmbH**  
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Telefax: +49(0)2761/705-50  
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Internet: <http://www.klemm-bt.de>



**Bilder nur für Korrektur!**



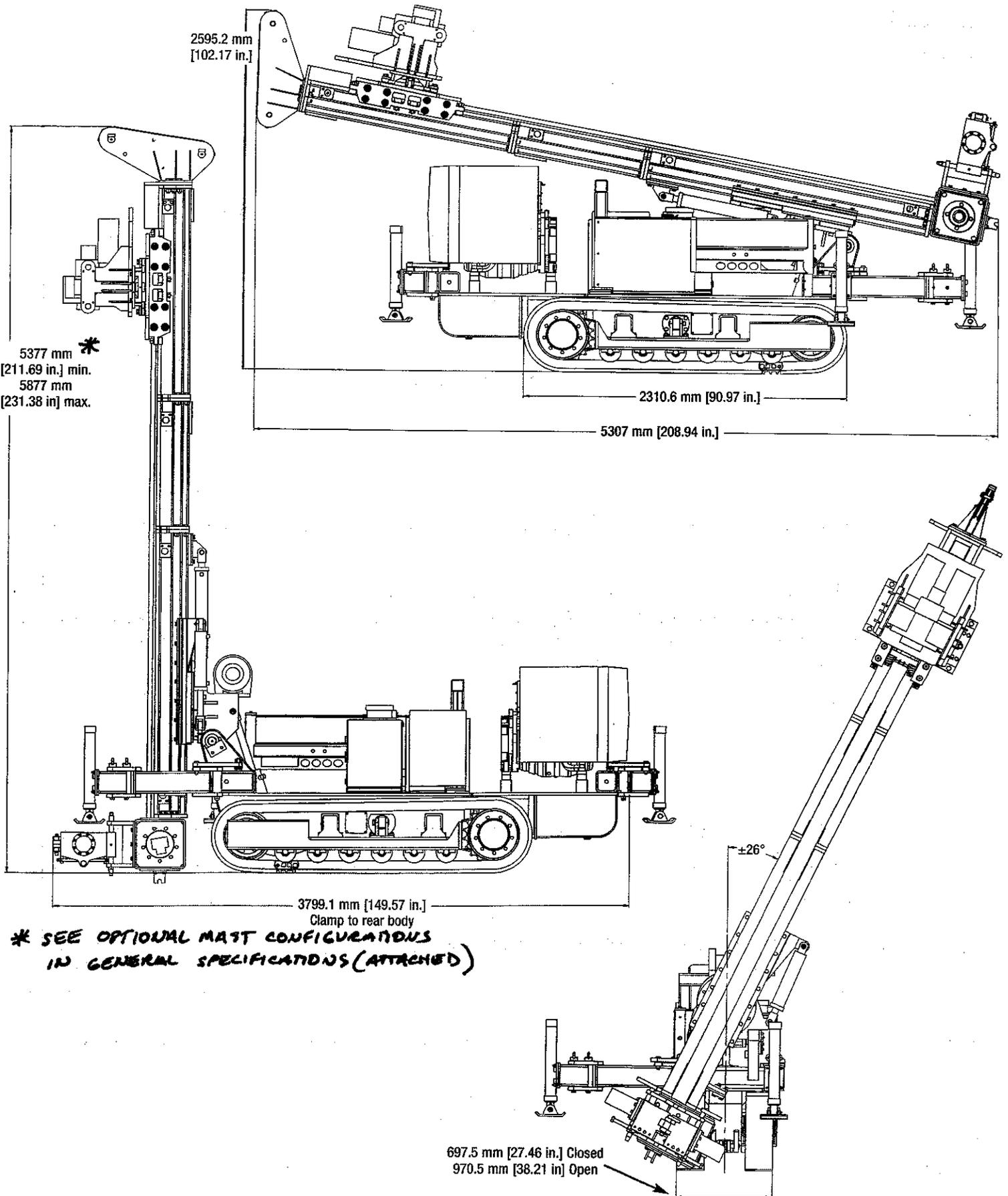
Technische Änderungen ohne Vorankündigung und Verpflichtung gegenüber früher gelieferten Geräten. Die abgebildeten Geräte können Sonderausstattungen haben. Irrtum und Druckfehler vorbehalten.

*Technical Specifications are subject to modifications without prior notice and incurring responsibility for machines previously sold. The shown machines may have optional equipment. Error and misprints reserved.*



# Model DK525

## General Dimensions



# DK525

## Model DK525 General Specifications

Effective March 1, 2000

### UNDERCARRIDGE (std.)

Crawler Type:	B-0	Expanding
Width (min.):	29.25 in.	743 mm
Width (max.):	40.43 in.	1,027 mm
O/A Length:	7.58 ft.	2,310 mm
Axle Distance:	5.84 ft.	1,780 mm
Shoe Width:	7.87 in.	200 mm
Gnd. Pressure:	10.26 lb./in. <sup>2</sup>	7.08 N/cm <sup>2</sup>
Gradeability:	30 degrees +	
Travel Speed:	1.0 mph +	1.6 Kph
Expend Tracks:	11.18 in.	284 mm

ENGINE	A	B
Make:	Hatz	Deutz
Model:	4L40C	BF4L1011F
Power:	66.1 hp (49.3 kW)	72 hp (53.7 kW)
Speed:	3,000 rpm	2,800 rpm
Tank Capacity:	27.4 gal.	103.7 L

### HYDRAULIC SYSTEM

(@ 2,800 rpm)

First Circuit:	37.0 gpm @ 3,000 psi.	140.1 Lpm @ 205 bar
Second Circuit:	14.5 gpm @ 3,000 psi.	54.9 Lpm @ 205 bar
Third Circuit:	7.2 gpm @ 3,000 psi.	27.3 Lpm @ 205 bar
Fourth Circuit:	7.2 gpm @ 3,000 psi.	27.3 Lpm @ 205 bar
Tank Capacity:	27.4 gal.	103.7 L

### DRILL MAST (std.)

Type:	Motor/Chain	A	B	C
Length (less crown):	Variable	8.08 ft. (2,464 mm)	11.21 (3,417 mm)	16.21 (4,941 mm)
Working Stroke:	Variable	3.00 ft. (914 mm)	6.13 ft. (1,867 mm)	11.13 ft. (3,391 mm)
Feed/Extract Force:	16,874 lb.	75.1 kN		
System Press. (max.):	3,000 psi.	205 bar		
Feed/Extract Rate #1:	18.8 ft./min.	5.7 m/min.		
Feed/Extract Rate #2:	28.8 ft./min.	8.8 m/min.		
Feed/Extract Rate #3:	57.5 ft./min.	17.5 m/min.		

### ROTARY/DRIFTER HEAD(S):

(120 Lpm std.)

Model:	R1000-D2	R1400-D3
Type:	Rotary 333500	Rotary 283435
Speeds:	34 to 100 rpm	21 to 125 rpm
Torque:	2,395 to 7,085 ft.-lb. (325 to 961 daNm)	1,925 to 10,860 ft.-lb. (261 to 1,473 daNm)
Connection:	4-1/2 API Reg. box	4-1/2 API Reg. box
Flushing:	Thru-spindle	Thru-spindle

### CLAMPS/BO WRENCH

(@ 3,000 psi.)

Model:	SC250	
Diameter (max.):	10.50 in.	265 mm
Clamping Force:	75,000 lb.	334 kN
Breakout Torque:	16,500 ft.-lb.	22kNm

### OPTIONAL COMPONENTS

Winch (line pull):	5,000 lb.	22.2 kN
Water Pump:	16 gpm/1,000 psi.	60.5 Lpm/68 bar
Urethane Track Shoes:	7.87 in. and 11.81 in.	200 mm and 300 mm

WEIGHT: (approx.):	12,500 lb.	5,680 kg
--------------------	------------	----------

### Design brief: DK525

This light weight machine is similar to our DK515. Often purchased for specialized limited access projects, the DK525 has the muscle for many outdoor drilling applications. This self-contained machine utilizes an on-board diesel engine for ease of set-up and operation.

NOTE: Optional rotators (speeds and torques) are available on request.

# ChemGrout® CG-500 Versatile Series

The CG-500 Series are balanced systems that enable high volume production and continuous mixing for a broad range of applications.

**CG500/2C6/A**  
**Air Powered**



Specially designed mix tank provides high shearing action for thorough and complete particle wetting, producing superior grout.

For grouting tunnels, shafts, dams, mines, void filling, tiebacks, piling encasements, rock grouting & wells.

Mixes & pumps neat cement or cement/sand grouts. Mixing & pumping all on one skid for fast mobilization.

Maximum output 20 gpm (76 lpm). Maximum pressure 174 psi (12 Bar), optional 261 psi (18 Bar).

Two 70 gallon (265 liter) mixing tanks & a 15 gallon (57 liter) holding hopper allows continuous production.

Power options include air, hydraulic, electric/hydraulic gas/hydraulic & diesel/hydraulic.

## **ChemGrout®**

Widest Selection of Grouting Equipment in the World

## Versatile Series – High Output, Continuous Operation

Highly versatile, the CG-500 handles a broad range of grouting applications including tunnels, shafts, dams, plant maintenance and geotechnical works. The unique twin mix tank design permits continuous pumping as each tank alternates feeding the hopper. This non-stop pumping process maximizes the batching of materials such as neat cement, sand/cement, and most commercial pre-bagged grouts.

Two high-capacity 70-gallon mixing tanks, pump, and 15-gallon holding hopper are all mounted on a single skid for quick, easy set-up and immediate operation. The holding hopper includes an internal auger that keeps the material thoroughly mixed while supplying the pump.

The open throat grout pump features a non-pulsating positive displacement rotor-stator that provides a constant discharge of materials. This progressing cavity pump is variable speed with an output of up to 20 gpm with a standard maximum pressure of 174 psi (261 psi optional).



**CG-500GH**  
Gas/Hydraulic

## Specifications

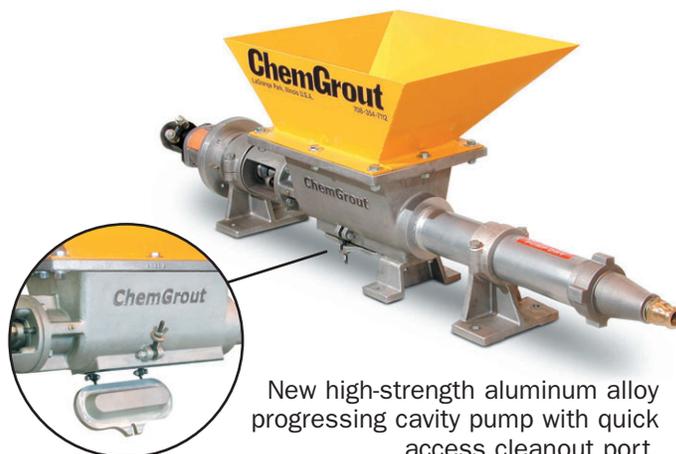
CG500 Pump	2C6	3C6
Pump	open throat, non pulsating	
Maximum Output	20 gpm (76 lpm)	
Maximum Pressure	174 psi (12 Bar)	261 psi (18 Bar)

CG500 Power	Required	Weight	Size
Air	250 cfm, 100 psi	1100 lbs	88L X 34W X 58H
Hydraulic	12 gpm, 1200 psi	1050 lbs	88L X 34W X 58H
Electric/Hydraulic	*3 Phase only	1550 lbs	88L X 34W X 58H
Gas/Hydraulic	Self contained	1425 lbs	88L X 34W X 58H
Diesel/Hydraulic	Self contained	1625 lbs	100L X 34WX 58H

\* Several voltages available

## Industries

Tunneling	Well Drilling	Geotechnical
Construction	Mining	Municipal
Restoration	Highway	



New high-strength aluminum alloy progressing cavity pump with quick access cleanout port.

## Accessories

**Grout Hose.** Equipped with quick disconnect fittings. Available in 25 and 50 foot lengths.



**Water Meters.** Available in manual or automatic. Accurately measures the water for each batch.



**Diaphragm Protected Pressure Gauge.**



**Mechanical Surface Packer.** Equipped with shut-off valve and a quick disconnect fitting.

## Applications include:

Soil compaction, rock grouting, void-filling, waterproofing, soil anchors, cable bolts, rock bolts, well encasements, contact grouting, well abandonment, marine/underwater, post tensioning, precast, machine base installation, self-leveling floor underlayments, slab undersealing and slabjacking.

# ChemGrout®

Widest Selection of Grouting Equipment in the World

## Drill and Installation Procedure:

### MATERIAL DATA

- Drill Casing: 9.625" O.D. x .432" minimum wall Grade 80 Steel outfitted with a 10" diameter cutting shoe. Anticipated casing length is 5' flush joint threaded sections, completely shouldered with no stripped threads. There will be no welded joints. **Casing certifications will be provided before installation begins.**
- Cement Grout: Type I/II Neat cement grout 28 day strength of 4,500 PSI water/cement ratio .55 by weight (5.5-6 gal/94 lb. bag.) High range water reducer (FX-32) will be added in accordance with manufacturers recommendations
- Core reinforcement: One #14 grade 75 all thread bar
- Embedment Length: As per State of Vermont Agency of Transportation dwg. Sheet 100 of 166 attached.

### Drilling:

A 10" inch nominal diameter grouted pile will be utilized to develop the required capacity in the rock. The average total pile length from the cut off elevation is expected to be approximately 25 feet.

The small diameter grouted piles will be drilled using 9.625"(od) x 0.432" minimum wall casing consisting of Grade 80 steel, outfitted with a 10" diameter cutting shoe. The casing will be drilled through the overburden and will be seated into the rock as per sheet 100 of 166. The 1' minimum seating at the plumb locations and the plunge length for the battered locations will be measured from top of competent bedrock and installed to the depths as shown on sheet 100 of 166. **The plunge length will be achieved either by the rotary drilling of the J-tooth casing shoe or the use of the "Super Jaws" percussion hammer, which opens a hole larger than the casing diameter. (Cut sheets are attached). The method of installation will not vary between the battered and plumb piles. When the grout mix of cement and water is pumped by tremie at the bottom of the rock socket, the neat mix will fill the annulus between the 10" hole and 9-5/8" casing in the plunge length.** The 8.535' diameter x 5' long pile socket will be advanced the required depth using direct flush, percussion methods with air flush. Wet rotary drilling techniques will only be used if subsurface conditions warrant. The pile will be advanced through obstructions encountered with percussion methods or the use of a roller bit attached to an inner rod. Since the holes are fully cased, drill slurry (vinyl polymer) will not be used to maintain an open hole, but may be used as an additive to the drill water to assist in the flushing of the material from the hole. Grout mix will consist of 4,500 psi mix proportioned at a ratio of 5.5 - 6 gallons of potable water to one 94 pound bag of Portland Type I/II cement. Grout shall conform to ASTM C109.

The sequencing of the work will be dependent on the needs of the General Contractor and the availability of the work area. Anticipated sequence at each abutment is shown in red on the numbering plan. Since holes are fully cased to rock, multiple piles may be drilled and then grouted in one operation. Holes will not be progressed or grouted within a 5' radius of an existing pile until that grout has set for 24 hours. We anticipate a production rate of between 2-3 piles per rig per shift. **Each pile will require approximately 1.5 hours to drill, .75 hours to flush and grout and .5 hours to set the bar.**

Prior to grouting at each location, core steel with centralizers will be inserted to the bottom of the pile. Splices in the bar (if needed) will be made with couplers supplied by the bar manufacturer exceeding 100% of the bars ultimate strength (cut sheet enclosed). Grout will then be pumped via tremie tube placed to the bottom of the hole until a suitable, undiluted grout return is observed at the top of the pile. Casing will be left seated into rock as per the schedule listed on sheet 100 of 166.

Drill spoils will be contained in pits adjacent to the drill rig. The spoils will be removed from the pits by others.



# SUPER JAWS<sup>®</sup>\*

## Overburden Drill Bits

### ND / DUPLEX DRILLING

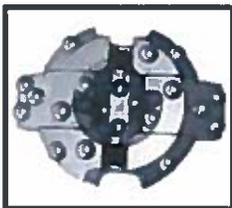
## FEATURES

- Micropile / Tieback / Soil Nail and various construction applications.
- Systems for use with heavy wall casing. No drive shoe required.
- A revolutionary, new under overburden system for simultaneously drilling and casing hole sizes 5-1/8" to 16" (130 mm - 406 mm) in diameter.
- Designed for top performance in both overburden and solid rock formations.
- Large bit face area for transferring blow energy to the formation yielding faster penetration rates.
- Uniquely designed bit wings extend out further than the casing O.D. when the bit reaches bottom to allow simultaneous drilling and casing.
- The bit can be used to the full operating pressure of the hammer resulting in rapid penetration and minimum drilling time.
- Bit wings retract inside the casing when the hammer is pulled off bottom. No reverse rotation, which can cause unscrewing problems, is required.
- No ring bits or other drilling equipment is left down the hole.



**Drilling  
Position**

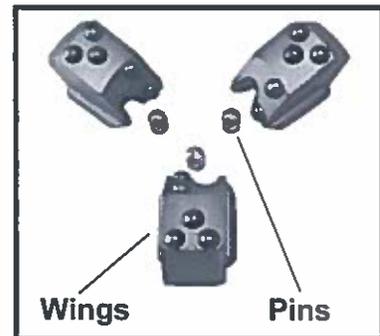
**Retract  
Position**



**2 Wing**  
**T105 ND - T165 ND**



**3 Wing**  
**T190 ND - T302 ND**



**Wings**

**Pins**

Patents USA: 5,881,827  
Korea: 0461525  
Patents pending in other countries.

\* manufactured under license from TONE Corporation

# Super Jaws® - Overburden Drill Bits

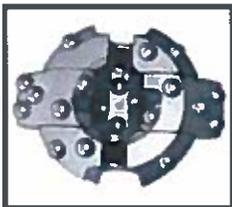
## ND / DUPLEX DRILLING

### SPECIFICATIONS

System	Hammer Model	No. of Wings	Outer Diameter of Bit		Applicable Casing		Weight *
			Expanded	Retracted	Inner Dia.	Outer Dia.	
T105 ND	P35A	2	5.540" (140.7 mm)	4.074" (103.5 mm)	4.250" (108.0 mm)	5.125" (130.1 mm)	21.2 (9.6Kg)
T115 ND	C40	2	5.827" (148.0 mm)	4.527" (115.0 mm)	4.670" (118.6 mm)	5.500" (139.8 mm)	29.0 (13.2Kg)
T117 ND	C40	2	6.000" (152.4 mm)	4.589" (116.5 mm)	4.670" (118.6 mm)	5.500" (139.8 mm)	30.0 (13.6Kg)
T130 ND	C40	2	6.400" (162.6 mm)	4.983" (126.6 mm)	5.118" (130.0 mm)	6.000" (152.4 mm)	62.0 (28.1Kg)
T140 ND	P50	2	7.280" (184.9 mm)	5.551" (141.0 mm)	5.625" (142.9 mm)	6.625" (168.3 mm)	66.0 (29.9Kg)
T150 ND	P50 P60W/WQ	2	7.750" (197.0 mm)	5.880" (149.4 mm)	6.000" (152.4 mm)	7.000" (177.8 mm)	87.0 (39.5Kg)
T165 ND	P50 P60W/WQ	2	8.340" (211.8 mm)	6.500" (165.1 mm)	6.625" (168.3 mm)	7.625" (193.7 mm)	95.0 (43.1Kg)
T190 ND	P60W/WQ	3	9.329" (237.0 mm)	7.520" (191.0 mm)	7.625" (193.7 mm)	8.625" (219.1 mm)	120.0 (54.4Kg)
T215 ND	P80	3	10.375" (263.5 mm)	8.307" (211.0 mm)	8.565" (216.8 mm)	9.625" (244.5 mm)	190.0 (86.2Kg)
T240 ND	P80	3	11.420" (290.0 mm)	9.449" (240.0 mm)	9.560" (242.8 mm)	10.750" (273.0 mm)	230.0 (104.3Kg)
T265 ND	N100	3	12.400" (315.0 mm)	10.430" (264.9 mm)	10.715" (272.2 mm)	11.875" (301.6 mm)	347.0 (157.4Kg)
T292 ND	N100	3	13.810" (350.7 mm)	11.398" (289.5 mm)	11.560" (293.6 mm)	12.750" (323.9 mm)	410.0 (181.4Kg)
T302 ND	N100	3	14.250" (361.5 mm)	11.890" (302.0 mm)	12.125" (308.0 mm)	12.750" (323.9 mm)	420.0 (190.5Kg)
T385 ND	P125	4	17.680" (449.1 mm)	15.125" (384.2 mm)	15.375" (390.5 mm)	16.000" (406.4 mm)	680.0 (308.4Kg)

Casing specifications required upon placement of order. All casing sizes are nominal.

\* Weights are approximate. Other sizes and shanks may be available upon request.



**2 Wing**  
T105 ND - T165 ND

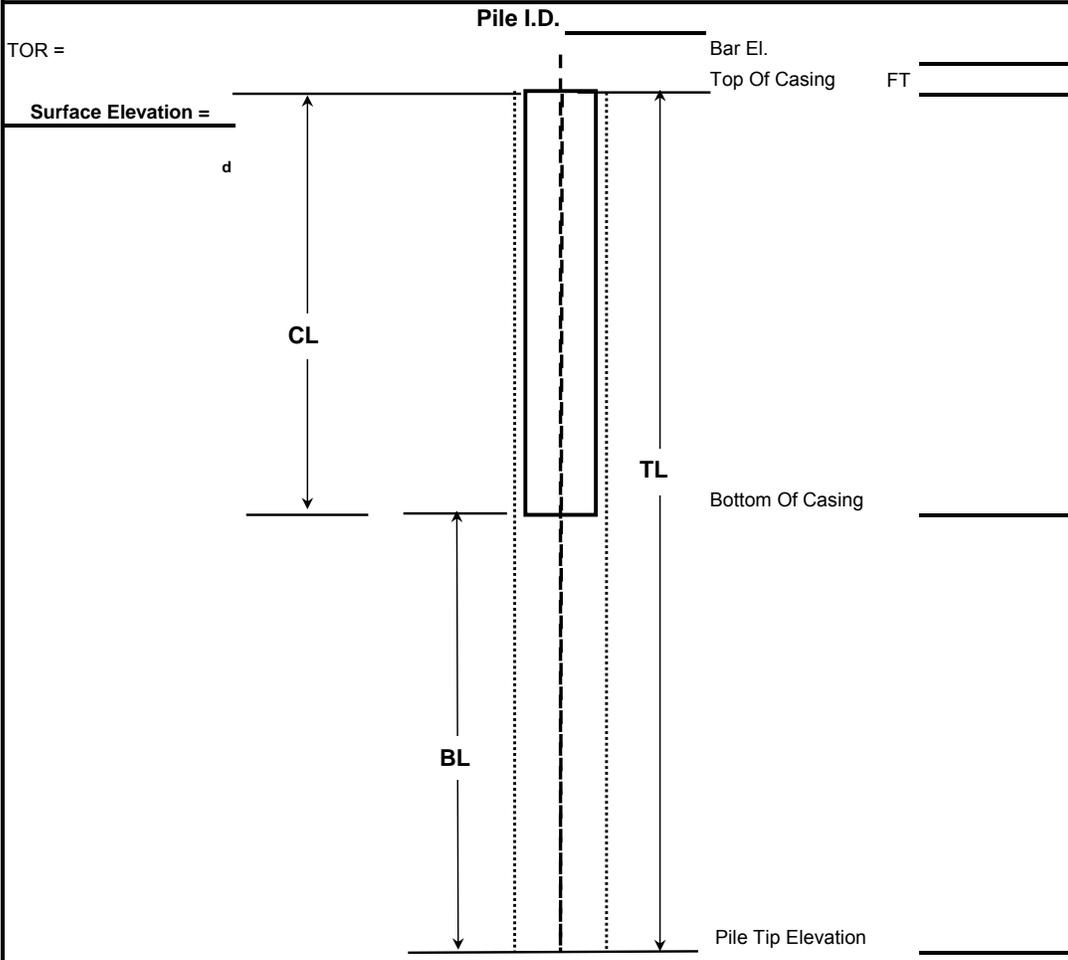
**3 Wing**  
T190 ND - T302 ND



646 Thompson Road • Thompson, CT 06277 USA  
 Phone: (800) 356-NUMA • (860) 923-9551 • Fax: (860) 923-2617  
 E-mail: [numa@numahammers.com](mailto:numa@numahammers.com) • [www.numahammers.com](http://www.numahammers.com)



### MINI PILE INSTALLATION LOG



<b>DATE DRILLED</b>	
Casing Size =	_____
Pile Diameter	_____
Pile Capacity	_____
Bar Diameter	_____
Drill	_____
Driller	_____
<b>DATE GROUTED</b>	
Cement Type	_____
No. Bags	_____
Max pressure =	_____
<b>DATE POST GROUTED</b>	
Cement Type	_____
No. Bags	_____
Max pressure =	_____
<b>GOMETRY</b>	
<b>CL</b> Casing length =	_____
<b>BL</b> Bond length =	_____
<b>TL</b> Total length =	_____
<b>Drilled Depth =</b>	_____

COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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 \_\_\_\_\_  
 \_\_\_\_\_

**Grout Mix Design, mill certs and Sample Grout Breaks:**

Cement grout will be Type I/II neat cement mix with a maximum water cement ratio of 0.55 by weight, reaching a minimum 28 day compressive strength of 4500 PSI. This ratio will be achieved by mixing 5.5 - 6 gallons of potable water to 1 - 94 lb. bag of cement (see chart enclosed). The specific gravity will be measured **at a frequency of one test per pile** using a Baroid Mud Balance.

**Sample grout breaks from previous projects have been attached. The lab responsible for these breaks will not be the lab used for the breaks at this project. The lab used for the sample breaks is accredited by CCRL.**

**CCRL provides onsite inspections and proficiency samples in cement, concrete, masonry , and aggregate (inspection only). CCRL's services can be used to obtain AASHTO accreditation.**

**AMRL provides onsite assessments and proficiency samples in bituminous materials, soils, and aggregates. AMRL's services can be used to obtain AASHTO accreditation.**

**I have attached additional samples of the same mix design, however this lab (and others we have used throughout New England) is also CCRL certified.**



## Grout - Specific Gravity

W/C RATIO (BY WEIGHT)	GALLONS PER 94 LB BAG CEMENT	WIEIGHT OF H <sub>2</sub> O (LBS)	WEIGHT OF CEMENT (LBS)	TOTAL WEIGHT OF GROUT (LBS)	VOLUME OF WATER (FT <sup>3</sup> )	VOLUME OF CEMENT (FT <sup>3</sup> )	TOTAL VOLUME OF GROUT (FT <sup>3</sup> )	GROUT DENSITY (LB/FT <sup>3</sup> )	GROUT SPECIFIC GRAVITY
0.4	4.488	400	1000	1400	6.41025641	5.087505088	11.49776150	121.7628319	1.951327434
0.425	4.7685	425	1000	1425	6.81089744	5.087505088	11.89840252	119.7639765	1.919294495
0.45	5.049	450	1000	1450	7.21153846	5.087505088	12.29904355	117.8953464	1.8893485
0.475	5.3295	475	1000	1475	7.61217949	5.087505088	12.69968458	116.1446169	1.861291938
0.5	5.61	500	1000	1500	8.01282051	5.087505088	13.10032560	114.5009709	1.834951456
0.525	5.8905	525	1000	1525	8.41346154	5.087505088	13.50096663	112.9548752	1.810174282
→ 0.55	6.171	550	1000	1550	8.81410256	5.087505088	13.90160765	111.4978957	1.786825252
0.575	6.4515	575	1000	1575	9.21474359	5.087505088	14.30224868	110.1225433	1.764784349
0.6	6.732	600	1000	1600	9.61538462	5.087505088	14.70288970	108.8221453	1.743944637
0.625	7.0125	625	1000	1625	10.0160256	5.087505088	15.10353073	107.5907368	1.724210526
0.65	7.293	650	1000	1650	10.4166667	5.087505088	15.50417175	106.4229696	1.705496308
0.675	7.5735	675	1000	1675	10.8173077	5.087505088	15.90481278	105.3140344	1.68772491
0.7	7.854	700	1000	1700	11.2179487	5.087505088	16.30545381	104.2595944	1.670826833
0.725	8.1345	725	1000	1725	11.6185897	5.087505088	16.70609483	103.255729	1.654739246
0.75	8.415	750	1000	1750	12.0192308	5.087505088	17.10673586	102.2988848	1.639405204
0.775	8.6955	775	1000	1775	12.4198718	5.087505088	17.50737688	101.3858336	1.624772975
0.8	8.976	800	1000	1800	12.8205128	5.087505088	17.90801791	100.5136364	1.610795455
0.825	9.2565	825	1000	1825	13.2211538	5.087505088	18.30865893	99.67961097	1.597429663
0.85	9.537	850	1000	1850	13.6217949	5.087505088	18.70929996	98.88130523	1.584636302
0.875	9.8175	875	1000	1875	14.0224359	5.087505088	19.10994099	98.11647254	1.572379368
0.9	10.098	900	1000	1900	14.4230769	5.087505088	19.51058201	97.38305085	1.560625815
0.925	10.3785	925	1000	1925	14.8237179	5.087505088	19.91122304	96.67914404	1.549345257
0.95	10.659	950	1000	1950	15.224359	5.087505088	20.31186406	96.00300563	1.538509706
0.975	10.9395	975	1000	1975	15.625	5.087505088	20.71250509	95.35302425	1.528093337
1	11.22	1000	1000	2000	16.025641	5.087505088	21.11314611	94.72771084	1.518072289
1.1	12.342	1100	1000	2100	17.6282051	5.087505088	22.71571022	92.44703247	1.481522956
1.2	13.464	1200	1000	2200	19.2307692	5.087505088	24.31827432	90.46694561	1.449790795
1.3	14.586	1300	1000	2300	20.8333333	5.087505088	25.92083842	88.73169774	1.421982336
1.4	15.708	1400	1000	2400	22.4358974	5.087505088	27.52340252	87.19852126	1.3974122
1.5	16.83	1500	1000	2500	24.0384615	5.087505088	29.12596663	85.83406113	1.375545852
1.6	17.952	1600	1000	2600	25.6410256	5.087505088	30.72853073	84.61192053	1.355960265
1.7	19.074	1700	1000	2700	27.2435897	5.087505088	32.33109483	83.51093627	1.338316286
1.8	20.196	1800	1000	2800	28.8461538	5.087505088	33.93365893	82.51394303	1.322338831
1.9	21.318	1900	1000	2900	30.4487179	5.087505088	35.53622304	81.60687187	1.307802434
2	22.44	2000	1000	3000	32.0512821	5.087505088	37.13878714	80.77808219	1.294520548
2.1	23.562	2100	1000	3100	33.6538462	5.087505088	38.74135124	80.01785949	1.282337492
2.2	24.684	2200	1000	3200	35.2564103	5.087505088	40.34391534	79.31803279	1.27112232
2.3	25.806	2300	1000	3300	36.8589744	5.087505088	41.94647945	78.67167981	1.260764099
2.4	26.928	2400	1000	3400	38.4615385	5.087505088	43.54904355	78.0728972	1.251168224
2.5	28.05	2500	1000	3500	40.0641026	5.087505088	45.15160765	77.51661972	1.242253521
2.6	29.172	2600	1000	3600	41.6666667	5.087505088	46.75417175	76.9984766	1.233949946
2.7	30.294	2700	1000	3700	43.2692308	5.087505088	48.35673586	76.51467649	1.226196739
2.8	31.416	2800	1000	3800	44.8717949	5.087505088	49.95929996	76.06191446	1.218940937
2.9	32.538	2900	1000	3900	46.474359	5.087505088	51.56186406	75.6372965	1.212136162
3	33.66	3000	1000	4000	48.0769231	5.087505088	53.16442816	75.23827751	1.205741627
3.1	34.782	3100	1000	4100	49.6794872	5.087505088	54.76699227	74.86261031	1.199721319
3.2	35.904	3200	1000	4200	51.2820513	5.087505088	56.36955637	74.50830325	1.194043321
3.3	37.026	3300	1000	4300	52.8846154	5.087505088	57.97212047	74.17358491	1.188679245
3.4	38.148	3400	1000	4400	54.4871795	5.087505088	59.57468458	73.85687447	1.183603757
3.5	39.27	3500	1000	4500	56.0897436	5.087505088	61.17724868	73.55675676	1.178794179

# GEOTECHNICAL CONSULTANTS, INC.

201 BOSTON POST ROAD WEST  
MARLBOROUGH, MA 01752

*GCITesting*

Telephone: (508)229-0900  
FAX: (508)229-2279

## CONCRETE INSPECTION REPORT

Hayward Baker  
9 Whipple St

Cumberland RI 02864

Job No: 2133598

Project: Branford Station - CTDOT

Location: Branford CT

Series ID#: 13501

<b>TARGET STRENGTH:</b> 5000	<b>CONCRETE SUPPLIER:</b> Site Batched	<b>ASTM:</b> Concrete- C-39, C-143, C-231 Grout- C-1019 Mortar- C-109 Drilled Cores - C-42
---------------------------------	---	--

**SAMPLES:** 6

**SLUMP:**

**LOCATION:**  
12/6

**AIR TEMP:** F

**CONC TEMP:** F

**AIR CONTENT:** %

**TRUCK NO.**

**TIME CAST:**

LAB NO.	SIZE	AREA (SQ.IN.)	DATE CAST	DATE TESTED	AGE DAYS	STRENGTH (PSI)	FRACTURE	REMARKS
58073	2x2	4	12/6/2013	12/13/2013	7	5170		
58074	2x2	4	12/6/2013	12/13/2013	7	5320		
58075	2x2	4	12/6/2013	12/20/2013	14	6070		
58076	2x2	4	12/6/2013	12/20/2013	14	5860		
58077	2x2	4	12/6/2013	1/3/2014	28	6870		
58078	2x2	4	12/6/2013	1/3/2014	28	6640		

REMARKS:

## GEOTECHNICAL CONSULTANTS, INC.

INSPECTED BY: OTHER

REVIEWED BY: Paul Sousa

# GEOTECHNICAL CONSULTANTS, INC.

201 BOSTON POST ROAD WEST  
MARLBOROUGH, MA 01752

*GCITesting*

Telephone: (508)229-0900  
FAX: (508)229-2279

## CONCRETE INSPECTION REPORT

Hayward Baker  
9 Whipple St

Cumberland RI 02864

Job No: 2133598

Project: Branford Station - CTDOT

Location: Branford CT

Series ID#: 13499

<b>TARGET STRENGTH:</b> 5000	<b>CONCRETE SUPPLIER:</b> Site Batched	<b>ASTM:</b> Concrete- C-39, C-143, C-231 Grout- C-1019 Mortar- C-109 Drilled Cores - C-42
---------------------------------	---	--

**SAMPLES:** 6

**SLUMP:**

**LOCATION:**  
12/4

**AIR TEMP:** F

**CONC TEMP:** F

**AIR CONTENT:** %

**TRUCK NO.**

**TIME CAST:**

LAB NO.	SIZE	AREA (SQ.IN.)	DATE CAST	DATE TESTED	AGE DAYS	STRENGTH (PSI)	FRACTURE	REMARKS
58061	2x2	4	12/4/2013	12/11/2013	7	5340		
58062	2x2	4	12/4/2013	12/11/2013	7	5600		
58063	2x2	4	12/4/2013	12/18/2013	14	5810		
58064	2x2	4	12/4/2013	12/18/2013	14	5650		
58065	2x2	4	12/4/2013	1/1/2014	28	5800		
58066	2x2	4	12/4/2013	1/1/2014	28	6160		

REMARKS:

## GEOTECHNICAL CONSULTANTS, INC.

INSPECTED BY: OTHER

REVIEWED BY: Paul Sousa

# GEOTECHNICAL CONSULTANTS, INC.

201 BOSTON POST ROAD WEST  
MARLBOROUGH, MA 01752

*GCITesting*

Telephone: (508)229-0900  
FAX: (508)229-2279

## CONCRETE INSPECTION REPORT

Hayward Baker  
9 Whipple St

Cumberland RI 02864

Job No: 2133598

Project: Branford Station - CTDOT

Location: Branford CT

Series ID#: 13498

<b>TARGET STRENGTH:</b> 5000	<b>CONCRETE SUPPLIER:</b> Site Batched	<b>ASTM:</b> Concrete- C-39, C-143, C-231 Grout- C-1019 Mortar- C-109 Drilled Cores - C-42
---------------------------------	---	--

**SAMPLES:** 6

**SLUMP:**

**LOCATION:**  
12/2

**AIR TEMP:** F

**CONC TEMP:** F

**AIR CONTENT:** %

**TRUCK NO.**

### TIME CAST:

LAB NO.	SIZE	AREA (SQ.IN.)	DATE CAST	DATE TESTED	AGE DAYS	STRENGTH (PSI)	FRACTURE	REMARKS
58055	2x2	4	12/2/2013	12/11/2013	9	5200		
58056	2x2	4	12/2/2013	12/11/2013	9	5480		
58057	2x2	4	12/2/2013	12/16/2013	14	5830		
58058	2x2	4	12/2/2013	12/16/2013	14	5560		
58059	2x2	4	12/2/2013	12/30/2013	28	6090		
58060	2x2	4	12/2/2013	12/30/2013	28	5900		

REMARKS:

## GEOTECHNICAL CONSULTANTS, INC.

INSPECTED BY: o

REVIEWED BY: Paul Sousa



5 Richardson Lane, Stoneham, MA 02180 781-438-7755 (Voice) 781-438-6216 (Fax)

**Compressive Strength Report - Concrete**

Distribution Copy

Report Date 05/09/2011  
 Report No. 6  
 Job Number 14321  
 Project MIT Boiler #9 & Deaerator #3, Cambridge  
 PO#: 4501377602  
 Contractor Bond Brothers  
 Concrete Co. On Site

**ALL FIELD TESTS DONE ACCORDING TO ASTM: C-172 C-31 C-143 C-1064 C-109**

**ALL COMPRESSIVE STRENGTH TESTS DONE ACCORDING TO ASTM: C-39**

**CLASS CONCRETE: 5000# Grout**

**No. Of Sets: 2**

**CUBIC YARDS:**

**SET 1 LOCATION:** Pile #18

Lab No.	Size (in.)	Area (sq. in.)	Condition	Date Cast	Date Tested	Age Days	Total Load (lbs.)	Unit Load (psi.)	Fracture Type
P055	2x2x2	4.00	Good	05/09/2011	05/24/2011	15	18,500	4,630	
P056	2x2x2	4.00	Good	05/09/2011	06/06/2011	28	24,500	6,130	
P057	2x2x2	4.00	Good	05/09/2011	06/06/2011	28	26,000	6,500	

Slump (in.)	
Air Temp. (F.)	
Conc Temp (F)	
Truck No.	
Ticket No.	
Time	
Unit Wt lbs/cu ft	
Air Content (%)	

**SET 2 LOCATION:** Pile #19

Lab No.	Size (in.)	Area (sq. in.)	Condition	Date Cast	Date Tested	Age Days	Total Load (lbs.)	Unit Load (psi.)	Fracture Type
P043	2x2x2	4.00	Good	05/09/2011	05/24/2011	15	16,500	4,130	
P044	2x2x2	4.00	Good	05/09/2011	06/06/2011	28	23,500	5,880	
P045	2x2x2	4.00	Good	05/09/2011	06/06/2011	28	24,500	6,130	

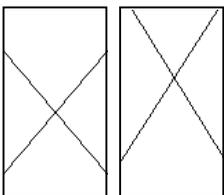
Slump (in.)	
Air Temp. (F.)	
Conc Temp (F)	
Truck No.	
Ticket No.	
Time	
Unit Wt lbs/cu ft	
Air Content (%)	

**GENERAL REMARKS:** Grout prisms were cast by others

Inspector Name	Premium Time	Hours	Travel Time
CAST BY OTHERS	No		

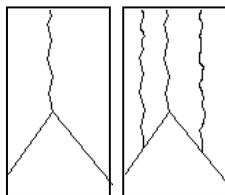
**REVIEWED BY:** Robert S. Granada

**FRACTURE TYPES**



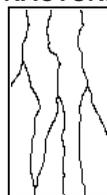
**Type 1**

Reasonably well-formed cones on both ends,



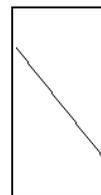
**Type 2**

Well-formed cone on one end, vertical cracks



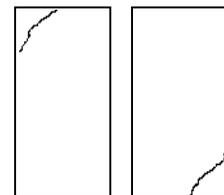
**Type 3**

Columnar vertical cracking through



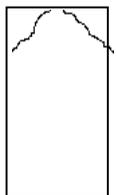
**Type 4**

Diagonal fracture with no cracking



**Type 5**

Side fractures at top or bottom (occur



**Type 6**

Similar to Type 5 but end of



5 Richardson Lane, Stoneham, MA 02180 781-438-7755 (Voice) 781-438-6216 (Fax)

**Compressive Strength Report - Concrete**

Distribution Copy

Report Date 06/01/2011  
 Report No. 21  
 Job Number 14321  
 Project MIT Boiler #9 & Deaerator #3, Cambridge  
 PO#: 4501377602  
 Contractor Bond Brothers  
 Concrete Co.

**ALL FIELD TESTS DONE ACCORDING TO ASTM: C-172 C-31 C-143 C-1064 C-109**

**ALL COMPRESSIVE STRENGTH TESTS DONE ACCORDING TO ASTM: C-39**

**CLASS CONCRETE: 5000# Mortar**

**No. Of Sets: 1**

**CUBIC YARDS:**

**SET 1 LOCATION:**

Lab No.	Size (in.)	Area (sq. in.)	Condition	Date Cast	Date Tested	Age Days	Total Load (lbs.)	Unit Load (psi.)	Fracture Type
S591	2x2x2	4.00	Good	06/01/2011	06/08/2011	7	16,500	4,130	
S592	2x2x2	4.00	Good	06/01/2011	06/29/2011	28	28,500	7,130	
S593	2x2x2	4.00	Good	06/01/2011	06/29/2011	28	27,600	6,900	

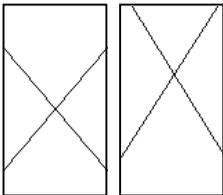
Slump (in.)	
Air Temp. (F.)	
Conc Temp (F)	
Truck No.	
Ticket No.	
Time	
Unit Wt lbs/cu ft	
Air Content (%)	

**GENERAL REMARKS:**

Inspector Name	Premium Time	Hours	Travel Time
CAST BY OTHERS	No		

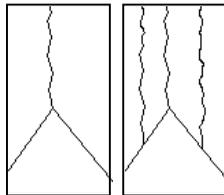
REVIEWED BY: Robert S. Granada

**FRACTURE TYPES**



**Type 1**

Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps



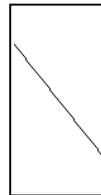
**Type 2**

Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end



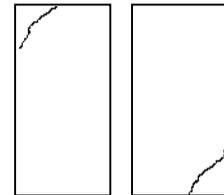
**Type 3**

Columnar vertical cracking through both ends, no well-formed cones



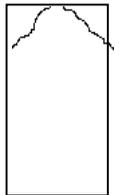
**Type 4**

Diagonal fracture with no cracking through ends; with hammer to distinguish from Type 1



**Type 5**

Side fractures at top or bottom (occur commonly with unbonded caps)



**Type 6**

Similar to Type 5 but end of cylinder is pointed



5 Richardson Lane, Stoneham, MA 02180 781-438-7755 (Voice) 781-438-6216 (Fax)

**Compressive Strength Report - Concrete**

Distribution Copy

Report Date 06/01/2011  
 Report No. 20  
 Job Number 14321  
 Project MIT Boiler #9 & Deaerator #3, Cambridge  
 PO#: 4501377602  
 Contractor Bond Brothers  
 Concrete Co.

**ALL FIELD TESTS DONE ACCORDING TO ASTM: C-172 C-31 C-143 C-1064 C-109**

**ALL COMPRESSIVE STRENGTH TESTS DONE ACCORDING TO ASTM: C-39**

**CLASS CONCRETE: 5000# Mortar**

**No. Of Sets: 1**

**CUBIC YARDS:**

**SET 1 LOCATION:**

Lab No.	Size (in.)	Area (sq. in.)	Condition	Date Cast	Date Tested	Age Days	Total Load (lbs.)	Unit Load (psi.)	Fracture Type
S594	2x2x2	4.00	Good	06/01/2011	06/08/2011	7	15,500	3,880	
S595	2x2x2	4.00	Good	06/01/2011	06/29/2011	28	24,000	6,000	
S596	2x2x2	4.00	Good	06/01/2011	06/29/2011	28	25,500	6,380	

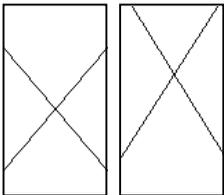
Slump (in.)	
Air Temp. (F.)	
Conc Temp (F)	
Truck No.	
Ticket No.	
Time	
Unit Wt lbs/cu ft	
Air Content (%)	

**GENERAL REMARKS:**

Inspector Name	Premium Time	Hours	Travel Time
CAST BY OTHERS	No		

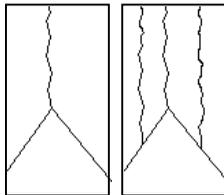
REVIEWED BY: Robert S. Granada

**FRACTURE TYPES**



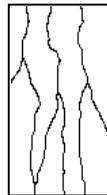
**Type 1**

Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps



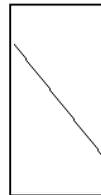
**Type 2**

Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end



**Type 3**

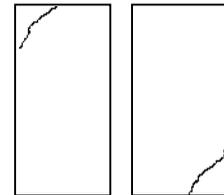
Columnar vertical cracking through both ends, no well-formed cones



**Type 4**

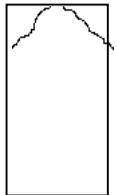
Diagonal fracture with no cracking through ends; with hammer to distinguish from Type 1

Type 1



**Type 5**

Side fractures at top or bottom (occur commonly with unbonded caps)



**Type 6**

Similar to Type 5 but end of cylinder is pointed

# Lehigh Northeast Cement Company



**313 Warren Street, PO Box 440  
Glens Falls, NY 12801  
518-792-1137  
800-833-4157  
518-792-0731 (fax)**

June 28, 2011

Barker Steel Company  
136 Will Drive  
Canton, MA 02021

Project Name:  
General Contractor: G. Donaldson  
Mason Contractor:

To Whom It May Concern:

This letter certifies that Lehigh Northeast Cement Company's Type I-II Portland cement produced at our Glens Falls, NY plant meets the respective requirements of the ASTM C150 and AASHTO M85 specifications for Type I and Type II Portland cement.

If you have any questions, please contact me at 518-792-1137, ext. 218.

Sincerely,

A handwritten signature in black ink that reads "Hermanus Potgieter". The signature is written in a cursive style.

Hermanus Potgieter, Quality Manager

# Lehigh Northeast Cement Company

**LEHIGH**  
HUBBARD CEMENT GROUP

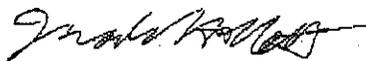
313 Warren Street, PO Box 440  
Glens Falls, NY 12801  
518-792-1137  
800-833-4157  
518-792-0731 (fax)

## TEST REPORT

Plant: Lehigh/Glens Falls      Cement Type : Type II Portland  
Terminal: Glens Falls      Cement Type : Type I/II Portland  
Report Date: 1/20/2009      Production Date: November-08

STANDARD CHEMICAL REQUIREMENTS ASTM C 114	TEST RESULTS	ASTM C150 / AASHTO M85
		TYPE II specifications
Silicon Dioxide (SiO <sub>2</sub> ), %	20.15	
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %	5.04	6.0 Max
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %	3.40	6.0 Max
Calcium Oxide (CaO), %	62.96	
Magnesium Oxide (MgO), %	2.20	6.0 Max
Sulfur Trioxide (SO <sub>3</sub> ), %	3.14	3.0 Max
Loss on Ignition (LOI), %	0.93	3.0 Max
Insoluble Residue, %	0.24	0.75 Max
Total Alkalies (Na <sub>2</sub> O equivalent), %	0.97	
Tricalcium Silicate (C <sub>3</sub> S), %	53.6	
Tricalcium Aluminate (C <sub>3</sub> A), %	7.6	8 Max
C <sub>3</sub> S + 4.75 C <sub>3</sub> A ≤ 100	89.7	100 Max
CO <sub>2</sub> (%)	0.5	
Limestone (%)	1.1	5.0 Max
CaCO <sub>3</sub> in Limestone (%)	95.3	70 Min
PHYSICAL REQUIREMENTS		
(ASTM C 204) Blaine Fineness, m <sup>2</sup> /kg	345	280 Min, 420 Max***
(ASTM C 430) -325 Mesh, % retained	3.0	----
(ASTM C 191) Time of Setting - Initial (Vicat)	120	45 Min
(ASTM C 191) Time of Setting - Final (Vicat)	235	375 Max
(ASTM C 185) Air Content, %	6.4	12 Max
(ASTM C 451) Paste False Set, %	65.3	
(ASTM C 151) Autoclave Expansion, %	0.03	0.80 Max
(ASTM C 1038) Expansion in Water, %	0.004	0.020 Max
(ASTM C 187) Normal Consistency, %	28.0	----
(ASTM C 109) Compressive Strength, psi		
1 Day	2570	----
3 Day	3710	1450 Min
7 Day	4450	2470 Min
28 Day	5620	

The above test results are representative of cement from which the shipment was made. This cement complies with the requirements of ASTM C150 and AASHTO M 85 specifications. Type II Heat of hydration was 84 cal/g tested December 2008.



Mark Hollett, Quality Control, Manager

\* Optional requirement

\*\*\* AASHTO only

Tested by GH, JP, and MV *J.P.*



# FX-32

## Catalytic Agent

### DESCRIPTION:

**FX-32 Catalytic Agent** is a high range water reducing admixture for Portland cement based materials. **FX-32 CA** is available in liquid or powder forms and meets the performance requirements of ASTM C 494 Type F admixtures. A water reduction, in concrete and grout up to 25% can be achieved at a normal level of workability **FX-32** provides excellent workability of plastic concrete, superior later-age strength and improved finishability, **FX-32** produces high-early strength, scale resistant concrete or grout even with low cement mixes.

### ADVANTAGES:

- Reduces water demand of Portland cement mixes.
- Retards initial set, depending on dosage used from 1/2 to 1 hour when compared to control mix. It is capable of producing structural concrete in 24 hours.
- Increases density and lowers chloride and other chemical intrusion.
- Increases bond of new concrete or mortar to old.
- Resists attack by water with an altered pH condition or salt spray when used in marine environment or on bridge decks.
- Lower water content reduces shrinkage by 25% to 40%.

### WHERE TO USE:

In concrete: For use where corrosion resistance is an important design consideration, and where the level of chloride or chemical intrusion is needed to be kept to its lowest possible levels.

In grout: To increase fluidity, strength, density and bond. Bridge decks, tie backs, underpinning precast concrete, parking decks, and on-grade highway patching are examples of where **FX-32CA** has been successfully employed.

### PHYSICAL PROPERTIES:

Concrete gives compressive strengths of 7000 to 9000 psi in 28 days depending on the dosage used. **FX-32CA** contains no calcium chloride, salts, foaming agents or sugar.

If air-entrained concrete or mortars are desired, trial mixes should be run to establish the amount of air-entraining agent required and the compatibility of the cement used (do not use Type II cement or Type I modified, unless trial mixes have established their compatibility). Usually, 1 to 2.5 liquid ounces of a vinsol resin type air-entraining agent such as **FX-340** is recommended.

### APPLICATION:

**FX-32 CA Liquid** - Use 16 to 32 ounces of **FX-32 CA** per 100 lbs of cement, depending upon design requirements.

**FX-32 CA Powder** - Use 1/2 to 1 lb per 100 lbs of cement, depending upon design requirements.

Mix designs can be provided by Fox Industries.

### MIXING:

16 fluid ounces of **FX-32 CA** per 100 lbs of cement will retard the initial set of concrete or mortar approximately 1/2 to 1 hour at 70°F, while reducing water requirements for a given slump by 15% to 25%.

### PACKAGING:

**FX-32 CA** liquid is packaged in 5 gallon pails or 55-gallon drums.

**FX-32 CA** powder is packaged 33 pounds in a 5 gallon pail.

### SHELF LIFE:

One year

### LIMITATIONS:

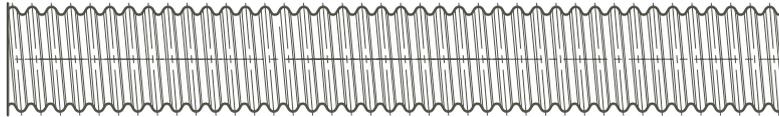
Prevent liquid from freezing. Keep powder dry. Avoid extreme heat (above 120°F) in storage.

FOR INDUSTRIAL USE ONLY. KEEP AWAY FROM CHILDREN. 6/2007

Cut sheets for the proposed bar material and centralizers:

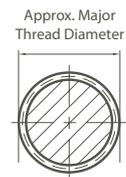
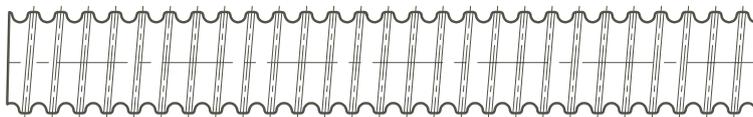
# Threaded Bars

## Cold Rolled Threaded Bars



Cold Rolled Threaded Bar – Grade 75 – ASTM A 615								
Bar Designation	Nominal Diameter in (mm)	Min. Net Area Thru Threads in <sup>2</sup> (mm <sup>2</sup> )	Min. Ultimate Strength kips (kN)	Min. Yield Strength kips (kN)	Nominal Weight lbs/ft (kg/m)	Approx. Major Thread Diameter in (mm)	Thread Orientation	Max. Length ft (m)
#8	1 25	0.790 510.0	79 351.4	59.3 263.8	2.70 4.0	1 1/8 28.5	Left Hand	60 18.3
#9	1 1/8 28	1.000 645.0	100 444.8	75 333.6	3.40 5.1	1 1/8 32.0	Left Hand	60 18.3
#10	1 1/4 32	1.270 819.0	127 564.9	95.3 423.9	4.30 6.4	1 3/8 35.0	Left Hand	60 18.3
#11	1 1/2 35	1.560 1006.0	156 694.0	117 520.5	5.30 7.9	1 1/2 38.1	Left Hand	60 18.3
#14	1 3/4 45	2.250 1452.0	225 1000.9	168.7 750.4	7.65 11.4	1 3/4 47.6	Right Hand	60 18.3
#18	2 1/4 55	4.000 2581.0	400 1779.4	300 1334.5	13.60 20.2	2 3/8 62.0	Right Hand	60 18.3
#20	2 1/2 64	4.910 3168.0	491 2184.0	368 1637.0	16.69 24.8	2 3/4 70.0	Right Hand	60 18.3
#24	3 76	7.070 4417.0	707 3142.0	530 2356.0	24.10 35.9	3 1/4 82.6	Right Hand	60 18.3
#28	3 1/2 89	9.610 6200.0	960 4274.0	720 3206.0	32.70 48.7	3 3/4 95.3	Right Hand	60 18.3

Cold rolled threaded bars conform to the physical and chemical requirements of ASTM A 615 Grade 75 ksi "Standard Specification for Deformed Carbon Steel Bars for Concrete Reinforcement"



Cold Rolled Threaded Bar – Grade 150 – ASTM A 722							
Nominal Diameter in (mm)	Min. Net Area Thru Threads in <sup>2</sup> (mm <sup>2</sup> )	Min. Ultimate Strength kips (kN)	Min. Yield Strength kips (kN)	Nominal Weight lbs/ft (kg/m)	Approx. Major Thread Diameter in (mm)	Thread Orientation	Max. Length ft (m)
1 26	0.850 549	128 567	102 454	3.1 4.6	1 1/8 28.6	Left Hand	60 18.3
1 1/4 32	1.250 807	188 834	150 667	4.5 6.7	1 1/2 38.1	Left Hand	60 18.3
1 1/2 36	1.580 1019	237 1054	190 843	5.7 8.5	1 5/8 41.3	Left Hand	60 18.3
1 3/4 46	2.600 1664	400 1779	320 1423	9.1 13.5	2 50.8	Left Hand	60 18.3
2 1/4 57	4.000 2581	600 2669	480 2135	13.6 20.2	2 3/8 62	Left Hand	60 18.3
2 1/2 65	5.190 3350	778 3457	622 2766	18.3 27.2	2 3/4 69.9	Left Hand	60 18.3
3 75	7.060 4169	1059 4702	847 3766	24.0 35.7	3 1/4 82.6	Left Hand	60 18.3

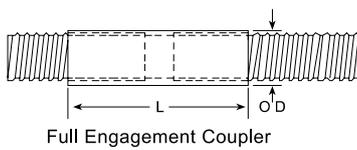
1 inch to 1 1/4 inch diameter, ASTM A 722; 1 1/4 inch to 3 inch diameter bar manufactured in accordance with ASTM A 722 physical and chemical requirements.

# Threaded Bar Accessories

## Cold Rolled Threaded Bar Accessories

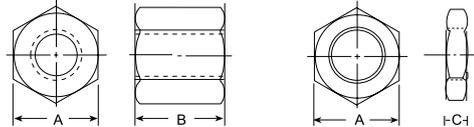
Plate size as per Sheet 100 of 166

### Couplers



Full Engagement Coupler

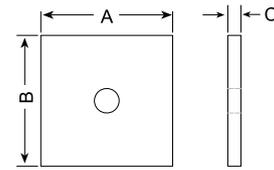
### Hex Nuts (Full Load and Jam Nuts)



Full Hex Nut

Jam Hex Nut

### Bearing Plates



Bearing plate dimensions reflect typical sizes. Actual design criteria should be used for specific plate sizing.

Grade 75 – ASTM A 108, A 576			
Bar Designation	OD in (mm)	L in (mm)	Weight lbs (kg)
#8	1.625 41.3	4.500 114.3	1.55 0.70
#9	1.875 47.6	5.000 127.0	2.39 1.08
#10	2.125 54.0	5.500 139.7	3.47 1.57
#11	2.250 57.2	6.000 152.4	4.02 1.82
#14	2.875 73.0	7.875 200.0	9.16 4.15
#18	3.500 88.9	9.125 231.8	13.93 6.32
#20	4.000 101.6	9.500 241.3	19.86 9.01
#24	4.750 120.6	10.750 273.0	31.01 14.07
#28	5.500 139.7	12.000 304.8	46.20 20.96

Grade 75 – ASTM A 108, A 576					
Bar Designation	A in (mm)	B in (mm)	C in (mm)	Weight lbs (kg)	
				Full	Jam
#8	1.625 41.3	2.000 50.8	0.500 12.7	0.81 0.37	0.20 0.09
#9	1.750 44.5	2.000 50.8	0.563 14.3	0.89 0.40	0.25 0.11
#10	2.000 50.8	2.187 55.5	0.625 15.9	1.33 0.60	0.38 0.17
#11	2.250 57.2	2.500 63.5	0.688 17.5	1.96 0.89	0.54 0.24
#14	2.750 69.9	3.250 82.6	0.938 23.8	3.86 1.75	1.11 0.50
#18*	3.500 88.9	3.500 88.9	1.000 25.4	6.32 2.87	1.81 0.82
#20*	4.000 101.6	4.000 101.6	1.125 28.6	9.83 4.46	2.76 1.25
#24**	4.750 120.6	4.500 114.3	1.500 38.1	12.98 5.89	4.33 1.96
#28**	5.500 139.7	6.000 152.4	1.563 39.7	23.10 10.48	6.02 2.73

\*Round collar nut available \*\*Round collar nut with flats

Grade 75 – ASTM A 36, A 572, A 588†				
Bar Designation	A in (mm)	B in (mm)	C in (mm)	Weight lbs (kg)
#8	8 203.20	8 203.20	¾ 19.05	13.40 6.08
#9	8 203.20	8 203.20	¾ 19.05	13.35 6.06
#10	8 203.20	8 203.20	1 25.40	17.73 8.04
#11	10 254.00	10 254.00	1 25.40	27.86 12.64
#14	10 254.00	10 254.00	1 ½ 38.10	41.37 18.76
#18	10 254.00	10 254.00	2 50.80	54.21 24.59
#20	10 254.00	10 254.00	2 ½ 63.50	67.06 30.42
#24	10 254.00	10 254.00	2 ½ 63.50	65.46 29.69
#28	12 304.80	12 304.80	2 ¾ 69.85	104.26 47.29

† Other ASTM Standards available

Grade 150 – ASTM A 108, A 576			
Nominal Diameter in (mm)	OD in (mm)	L in (mm)	Weight lbs (kg)
1 26	1.750 44.5	4.250 108.0	1.70 0.77
1 ¼ 32	2.125 54.0	5.250 133.4	3.11 1.41
1 ½ 36	2.375 60.3	5.750 146.1	4.22 1.91
1 ¾ 46	3.000 76.2	8.500 215.9	9.98 4.53
2 ¼ 57	4.000 101.6	9.000 228.6	21.45 9.73
2 ½ 65	4.250 108.0	10.000 254.0	23.96 10.87
3 75	5.000 127.0	12.000 308.0	41.24 18.71

Grade 150 – ASTM A 108, A 576					
Nominal Diameter in (mm)	A in (mm)	B in (mm)	C in (mm)	Weight lbs (kg)	
				Full	Jam
1 26	1.750 44.5	2.000 50.8	0.500 12.7	0.94 0.43	0.23 0.10
1 ¼ 32	2.250 57.2	2.500 63.5	0.625 15.9	2.07 0.94	0.52 0.24
1 ½ 36	2.500 63.5	2.750 69.9	0.750 19.1	2.78 1.26	0.75 0.34
1 ¾ 46	3.000 76.2	3.500 88.9	1.250 31.8	4.83 2.19	1.70 0.77
2 ¼ 57	4.000 101.6	4.250 107.95	1.500 38.10	11.68 5.30	4.09 1.86
2 ½ 65	4.000 101.6	4.750 120.7	1.750 44.45	10.82 4.91	3.99 1.81
3* 75	5.000 127.0	6.000 152.4	2.000 50.8	20.62 9.35	5.11 2.32

\*Round collar nut with flats with outside diameter of 5" (127mm).

Grade 150 – ASTM A 36, A 572, A 588†				
Nominal Diameter in (mm)	A in (mm)	B in (mm)	C in (mm)	Weight lbs (kg)
1 26	6 152.4	6 152.4	1 ¼ 31.8	12.76 5.79
1 ¼ 32	7 177.8	7 177.8	1 ½ 38.1	20.84 9.45
1 ½ 36	8 203.2	8 203.2	1 ¾ 44.5	31.76 14.41
1 ¾ 46	9 228.6	9 228.6	1 ¾ 44.5	40.20 18.23
2 ¼ 57	10 254.0	10 254.0	2 ¼ 63.5	70.89 32.16
2 ½ 65	10 254.0	10 254.0	2 ½ 63.5	70.89 32.16
3 75	12 304.8	12 304.8	2 ¾ 69.9	112.31 50.94

† Other ASTM Standards available

# C&M DURAFLEX™ PVC CENTRALIZERS

## The industry standard

*C&M's Duraflex™ PVC Centralizers offer a vast range of size, strength, flexibility and adaptability. Approved by DOT's, engineers, contractors and governmental agencies, Duraflex™ has become the most recognized and specified centralizer available for foundation applications. Its reliability has been proven on over 10,000 projects worldwide.*



Duraflex PVC Centralizers

NOMINAL PIPE SIZE (in inches) CL. 200	PIPE ID	MIN WALL THK	FORMED DIAMETER	
			MIN OD	MAX OD
0.75	0.926	.062	2"	4"
1.00	1.189	.063	2"	5"
1.25	1.502	.078	2"	6"
1.50	1.720	.090	3"	8"
2.00	2.149	.113	3"	10"
2.50	2.601	.137	4"	12"
3.00	3.166	.167	5"	18"
4.00	4.072	.214	7"	24"
SCH. 40				
0.75	0.824	.113	2"	6"
1.00	1.049	.133	2"	8"
1.25	1.380	.140	3"	12"
1.50	1.610	.145	3"	16"
2.00	2.067	.154	4"	18"
2.50	2.469	.203	5"	20"
3.00	3.068	.216	6"	24"
SCH. 80				
1.00	0.957	.179	4"	10"
1.25	1.278	.191	6"	12"
1.50	1.500	.200	6"	16"
2.00	1.939	.218	6"	30"
2.50	2.323	.276	8"	30"

Also available in 4", 5" & 6" Class 125/160 & Sch. 40

Centralizer class/schedule is determined by the anchor's weight, angle of anchor installation, and diameter of drill hole or casing. The i.d. required is determined by the anchor o.d. The formed diameter of the centralizer is determined by the drill hole or casing i.d.



Custom Bottom Centralizer



Duraflex PVC Spacer Straps

SCH. 40 spacers per SP 71(e), placement as per SP 73(b).

### ADVANTAGES

- Formed spring tension allows anchor to follow hole variations
- Split ends available for snap-on installation
- Wide selection of material available to meet specific anchor-load requirements
- No damage risk to anchor coatings or encapsulations
- Order to exact specifications and preferred outside diameters
- Specialty coatings not required
- No nuts or bolts required
- Lightweight & economical
- Conforms to ASTM D-1785 & D-2241

C&M Manufacturing Co.

9640-B Mission Gorge Road #165, Santee, CA 92071 • 800-458-6191 • 619-449-7200 • 619-449-0018 FAX  
www.centralizers.com • e-mail: curt@centralizers.com

**Qualifications:**

**1 – Project Manager**

**2 – Superintendent**

**3 – Driller/On site Supervisor**

(Resumes have been provided for anticipated personnel, if staffing changes are required due to availability at start of work, new resumes will be provided)



***RICHARD K. WILHELMSSEN***

96 Angelica Avenue  
Mattapoisett, MA 02739  
(508) 758-6594

*Bachelor of Science*  
*University of Massachusetts at Amherst - 1979*

*Member: American Society of Civil Engineers, Boston Society of Civil Engineers*  
*Int'l Association of Foundation Drilling, Deep Foundations Institute*

**WORK EXPERIENCE:**

- January, 2000 - Present      G. Donaldson Construction / Hayward Baker, Inc. - Division Mgr.
- 1994 - 2000                  Jay Cashman, Inc.- Cashman/PKA - Senior Engineer  
Involved in estimating, project buyout and project management for projects ranging from \$50,000 to Joint Venture, Central Artery projects totaling over \$400 million, including the \$152 million soil mixing project at Fort Point Channel.
- 1987 - 1994                  Co-founder of Delta Geotechnical Services, Inc. in 1987.  
Experienced in all phases of geotechnical construction including estimating, design, marketing, and field quality control and testing. Sold to GZA Geo-environmental in 1991, now a division of Layne-Christensen.
- 1985 - 1986                  Northeast Underpinning/F.E.S., Inc.  
Superintendent  
Worked extensively in the Back Bay area of Boston supervising underpinning and pile repair for commercial buildings and historic residences.
- 1982 - 1985                  Geo-Systems, Inc./Boston Underpinning and Foundation  
Operations Manager  
Estimation and supervision of work involving tiebacks, minipiles, grouting and conventional underpinning throughout the Northeast.
- 1980 - 1982                  R.W. Beck & Associates  
Field Engineer  
Supervisor and inspector of selective clearing, guy anchor installation and testing.

**EXPERIENCE**

G. Donaldson/Hayward Baker -July 2003 to present  
Northeast Excavating -Aug 2001 to June 2003  
Case Foundation Co. -Jan 2000 to July 2001  
Trevi Icos -Sept 1998 to Dec 1999

**AREAS OF SPECIALIZATION**

- Drilled Shafts
- Drilled Mini-piles
- Tiebacks
- Drilled Soldier Piles
- Jet Grouting

**PROFESSIONAL AFFILIATIONS**

Local 4-Operating Engineers Union

**SUMMARY OF PROJECT EXPERIENCE – G. Donaldson Construction Co a division of Hayward Baker, Inc.**

As a Superintendent of G. Donaldson/Hayward Baker., Mr. Camara is responsible for managing the field operations for various jet grout, drilled shaft, drilled mini-pile, and tieback/soil anchor Projects.

Mr. Camara's most relevant and most recent Project experience is summarized below:

G. Donaldson/Hayward Baker – Operating Engineer / Superintendent

RIDOT LAUREL AVE BRIDGE #397 c/o Cardi Corporation  
Coventry, RI Warwick, RI 02888  
RIDOT No. 2010-DF-055 PH: 401-739-8300  
Contract No. 6755 FX: 401-732-0006  
Micropiles

Fields Point Tunnel Pump Station – Providence, RI  
c/o Hart Engineering Corporation  
800 Scenic View Drive  
Cumberland, RI 401-658-4600  
Jet grouting and secant pile installation for a combined sewer overflow. Included jet grouting of bottom seal, jet grouting for underpinning and jet grouting for steel reinforced SOE.

Distrigas LNG Facility c/o Abington Group  
Everett, MA  
Micropiles

Case Foundation – Pump Man  
- I-90 Interchange  
- Jacking Pits  
c/o Modern Continental

Installed over 500 Caissons from 6 to 11' in diameter, and Jet Grouted the jacking slabs for the tunnel.

Trevi Icos Pump man / Rig Operator (Soilmec CM-40)  
Jet Grouting at South Station and W. Fourth St.

## Tim Vernon

Hayward Baker 2002-Present

### CERTIFICATIONS

OSHA - 40 Hr Hazmatt Training  
OSHA - 30 Hr Safety and Health Training  
OSHA - 10 Hr Safety and Health Training  
Confined Space Training  
RI/MA Hoist License

### DRILL TRAININGS:

Xxxx Date

### TECHNICAL COMPETENCIES:

- Micro Piles
- Soil Nails
- Tie Back Anchors
- Jet Grouting

### AFFILIATIONS:

Local MA04 Operators Union

9 Whipple Street  
Cumberland, Rhode Island

Phone: (401)255-2399

### WORK EXPERINCE:

Operator Foreman

- At Hayward Baker...

### RELATED EXPERIENCE

18561-CHESTNUT HILL SQUARE

02/2012-04/2012

- \* Drilled Permanent Tiedown Anchors
- \* Cassagrande-M9

20-0048-MBTA ORIENT HEIGHTS

04/2012-05/2013

- \* Drilled 9-Inch Micropiles
- \* Cassagrande-M9

18600-DISTRIGAS

06/2012-09/2012

- \* Drilled 9-Inch Micropiles
- \* Soilmec-SM-21

18591-B.U. TURF FIELD PARKING STRUCTURE

07/2012-09/2012

- \* Drilled 9-Inch Micropile SOE
- \* Davey Kent-DK-50

18660-B.U. ADMISSIONS

12/2012-02/2013

- \* Drilled 9-Inch Micropiles
- \* Davey Kent-DK-50

20-0073-HINES BRIDGE PIVOT PIER FENDER

02/2013-05/2013

- \* Drilled 9-Inch Micropiles
- \* Cassagrande-M9

18626-NORTHWEST BIKE TRAIL

05/2013-07/2013

- \* Drilled 7-Inch Micropiles
- \* Cassagrande-M9

## RELATED EXPERIENCE CONTINUED

### 20-0119-253 LONG NECK POINT

07/2013-10/2013

- \* Drilled Permanent Tiedown Anchors
- \* Interoc-94A

### 18611-LARZ ANDERSON BRIDGE

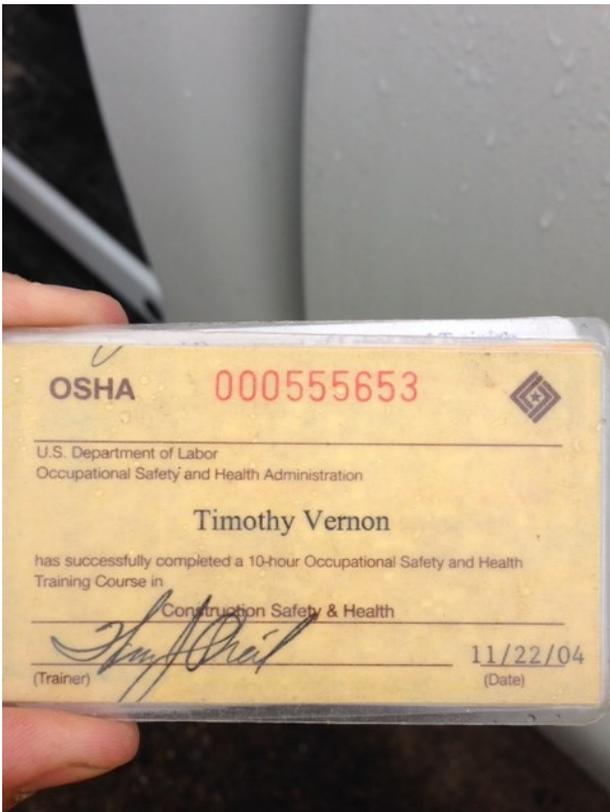
09/2013-11/2013

- \* Drilled 9-Inch Micropiles
- \* Cassagrande-C8

### 20-0143-WALNUT HILL BRIDGE

12/2013

- \* Drilled 7-Inch Micropiles
- \* Cassagrande-C8



**2014**

**200148**

1/27-3/28/14

**Webster Sq. Michael's Foundation**  
268 Daniel Webster Hgwy  
Nashua, NH 03060  
Contract No.  
Micropiles

**1/6/14**

**West Rac Contracting Corp.**  
687 Old Willets Path  
Hauppauge, NY 11788  
PH. 631-435-1818  
FX. 631-272-7673  
Charles Asaro

**200150**

2/3-4/25/14

Tax Exempt

**State St. Bridge over Mill River**  
State Street  
New Haven, CT 06511  
Contract No.  
Micropiles

**1/15/14**

**C.J. Fucci Construction, Inc.**  
63 Russell Street  
New Haven CT 06513  
PH: 203-469-7487  
FX: 203-468-6256  
Neil Velleca Jr.

**200229**

10/27-11//14/14

Tax Exempt

**Terminal A Renovations**  
1 Harborside Drive  
Boston, Ma 02128  
Contract No. 71095  
Micropiles

**10/7/14**

**Gilbane Company**  
7 Jackson Walkway  
Providence, RI 02903  
PH: 401-456-5800  
FX: 401-456-5937  
Charles MacDonald

**2013**

<b>200070</b> 4/1=6/7	<b>Branford &amp; Guilford Railroad Stations</b> 1 Kirkham Street Branford, CT <i>CT DOT# 310-056 &amp; 310-057</i> Micropiles	Rizzo Corporation 64 Triangle Street Danbury, CT 06810 PH: 203-731-3132 FX: 203-748-8747 Andrew Barszcz	<b>1/16/13</b>
<b>200073</b> <i>C.O. to 18450</i> 2/19=3/22	<b>Hines Bridge Pivot Pier Fender</b> Merrill Street Salisbury, MA <i>Mass DOT Contract #61787</i> <i>Subcontract No. 1001-10</i> <i>FAP #BR-002S (052)</i> Micropiles	Barletta Heavy Division Inc. 40 Shawmut Road Canton, MA 02021 PH: 781-821-6222 FX: 781-821-7444 Howard Goldberg	<b>1/24/13</b>

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**2012**

**18556**  
C  
3/1=6/15

**MBTA ORIENT HEIGHTS**  
East Boston, MA  
MBTA Contract No. S09CN10  
Subcontract #1104-06  
Micropiles

1/2012  
Barletta Heavy Division, Inc.  
40 Shawmut Road  
Canton, MA 02021-1409  
PH: 781-821-6222  
FX: 781-821-7444  
Wayne Willwerth

**18557-C.O. to**  
C **Job#18375**  
2/15=3/1

**Q BRIDGE MICROPILES**  
New Haven, CT  
CTDOT #209070  
Contract No. C.O.#209070S39-001  
Micropiles

1/2012  
Walsh/II in One Joint Venture III  
929 W. Adams  
Chicago, IL 60607  
PH: 312-563-5400  
FX: 203-562-0326

**2011**

**18465**  
**C**  
1/18=2/21

**ROUTE 7 MICROPILES DOT 34260**  
Danbury, CT  
CT DOT #0034-0260/P.O. #326  
F.A.P. #0007(144)  
New Foundation  
Micropiles

1/2011  
Empire Paving, Inc.  
30 Bernhard Road  
North Haven, CT 06473  
PH: 203-752-0002  
FX: 203-752-0242  
Phil Karsen

**18468**  
**C**  
4/1=6/15

**SAINT VINCENTS MEDICAL CTR PH 6B**  
Bridgeport, CT  
Contract No.  
Foundation Rehabilitation  
Micropiles

1/2011  
Bismark Construction Co., Inc.  
100 Bridgeport Avenue  
Milford, CT 06460  
PH: 203-876-8331  
FX: 203-876-8425  
Greg. J. Raucci

**2 0 1 0**

**18367**  
**C**  
2/22=3/22

**GOOD SAMARITAN MEDICAL CENTER**  
Caritas Christi Health Care  
235 North Pearl Street  
Brockton, MA 02301  
Contract No. #209095/Project No. 210029  
New Foundation  
Micropiles

1/2010  
Suffolk Construction Co.  
65 Allerton Street  
Boston, MA 02119  
PH: 617-445-3500  
FX: 617-445-2343  
David Belloch

**18375**  
**C**  
3/29=4/16

**I-95 Q-BRIDGE CONTRACT-B**  
Pearl Harbor Memorial Bridge  
New Haven, CT  
CT DOT #92-532/Job #209070  
Bridge – Temp Earth Retention  
Anchors

3/16/10  
Walsh Construction Company-PCL JV II  
45 Shawmut Rd., 3rd Floor  
Canton, MA 02121-1400  
PH: 781-793-9988  
FX: 781-793-9009  
**Jobsite:** 414A Chapel Street Suite 300  
New Haven, CT 06511  
PH: 203-562-0324  
FX: 203-562-0326  
Michael Bardin

**2009**

<b>18293</b> C 1/19=1/23	<b>MOHEGAN SUN EARTH EXPANSION SECTOR 5</b> Low Rise Connector Project Uncasville, CT Contract No./MBI #10-60-08068 New Foundation Micropiles	1/2009 Manafort Brothers, Inc. 414 New Britain Avenue P.O. Box 99 Plainville, CT 06062 PH: 860-229-4853 FX: 860-747-5299 Rob Lewandowski
<b>18296-001</b> 4/18=5/2	<b>NEW HAVEN HARBOR CROSSING</b> Contract E2 Bridge 952 Micropiles	Walsh Construction Company
<b>18297</b> 2/3=2/27	<b>BELLINGHAM COGENERATION FACILITY</b> Florida Power & Light Energy Bellingham, MA Contract No./Job #08325 New Foundation Micropiles	1/2009 Barr & Barr, Inc. 260 Cochituate Road, 2 <sup>nd</sup> Flr. Framingham, MA 01701 PH: 508-879-5750 FX: 508-879-5470 Gary Collette