

56 Bibber Parkway  
Brunswick, ME 04011

Phone: 725-0100  
Fax: 725-0101

**TITLE:** Pile Driving  
**PROJECT:** GMRI -- Research Laboratory  
**DRAWING:**  
**STATUS:** AAN  
**BIC:**

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 21  
**DAYS OVERDUE:** 0

RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
FLEMING DS	SMRT DL	SMRT DL	FLEMING DS

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Seplas	Prints	Drawing Date	Held	Elapsed
001	Pile Driving Criteria	7/24/2003	7/28/2003	8/12/2003	8/14/2003	AAN	3	3		0	21



# Submittal Review Memo

ARCHITECTURE  
ENGINEERING  
PLANNING

**Project Name:** Gulf of Maine Research Inst Research Lab      **Job #:** 0303400

**To:** Mike Ouellet  
Ouellet Associates      **Submittal #:** 1-02000  
56 Bibber Parkway

Brunswick, ME 04011

**Submittal Title:** Pile driving criteria.

**ACTION: Please take action below:**

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site: information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction: coordination of the work of all trades: and for performing all work in a safe and satisfactory manner.

**SMRT, Inc.**

**REVIEW DATE:** 08/11/03

**BY:** Andrew Bradley

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
  - Not a specified product
  - Incomplete
  - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

03034-00 #1

**Remarks:**

1. Acceptable criteria, however, driving of piles shall not proceed without contract, permit, and signed and sealed construction documents.

# Ouellet Associates, Inc.

SUBMITTAL  
NO. 02000-001

56 Bibber Parkway  
Brunswick, ME 04011

Phone: 725-0100  
Fax: 725-0101

TITLE: Pile Driving  
PROJECT: Research Laboratory  
DRAWING:  
STATUS: REVD  
BIC:

REQUIRED START:  
REQUIRED FINISH:  
DAYS HELD: 0  
DAYS ELAPSED: 4  
DAYS OVERDUE: 0

RECEIVED  
JUL 29 2003  
SMRT, INC.

RECEIVED FROM: FLEMING DS  
SENT TO: SMRT DL  
RETURNED BY:  
FORWARDED TO:

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Seals	Prints	Drawing Date	Held	Elapsed
001	Pile Driving Criteria	7/24/2003	7/28/2003			REVD	0	7		0	4

SUBMITTAL REVIEW  
MEMO ATTACHED

03634-00 #1

**H.B. FLEMING**  
89 PLEASANT AVE  
SOUTH PORTLAND, MAINE 04106  
Phone: 207-799-8514 Fax: 207-799-8538  
[www.HBFLEMING.com](http://www.HBFLEMING.com)



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## SUBMITTAL

### Submitted To:

Client: Ouellet Associates  
Attention: David M. Lawrence

Date: 7/23/03  
Project: Gulf of Maine Aquarium  
Location: Portland, Maine

### Subject: Pile Driving Criteria

H.B. Fleming Proposes to use the following driving criteria for the piles to be installed at the above location.

#### Hammer

- An MKT DE-42 open ended diesel pile hammer will be used to drive the piles. The DE-42 has a ram weight of 4,200 lbs, a maximum stroke of 10'6", and a rated energy of 42,000 ft-lbs.
- The hammer cushioning material consists of 2.5 inches of Hamortex material.

#### Pile

- HP12x74 ASTM A572 Gr. 50 steel piles.
- The design capacity is 80 tons.
- The Ultimate Capacity which we based our analysis on is 180 tons
- Piles will be fitted with cast steel driving points.

#### Results

- Test piles will be driven until a blow count of 6 blows per inch for three consecutive inches is obtained.
- These criteria are based upon the output generated from the WEAP analysis that follows. Testing of driven piles will determine whether the above criteria are used throughout the project or if any adjustments need to be made.

Signed: 

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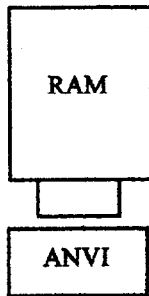
John Linscott IV "Scotty"

## H.B. FLEMING PILE EQUIPMENT DATA SHEET

Project: Gulf of Maine Aquarium  
 Location: Portland, Maine

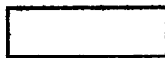
Date: 7/23/03  
 Client: Ouellet Associates

### HAMMER



Manufacturer:	MKT
Model:	DE-42
Type:	Single Acting Diesel
Length of Stroke:	10' - 6"
Rated Energy at Given Stroke:	42,000 ft-lb
Modifications:	None

### HAMMER CUSHION



Material:	Hamortex
Thickness:	2.5"
Area:	285 in <sup>2</sup>
Modulus of Elasticity:	29,000 psi
Coefficient of Restitution:	0.8

### DRIVE HEAD



Weight:	1200 lb
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### PILE CUSHION

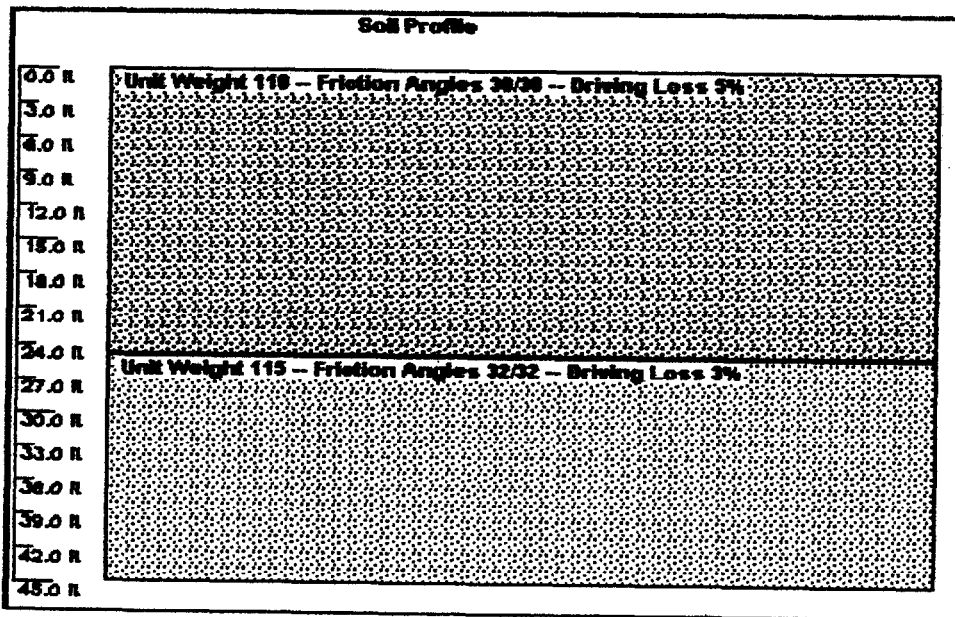
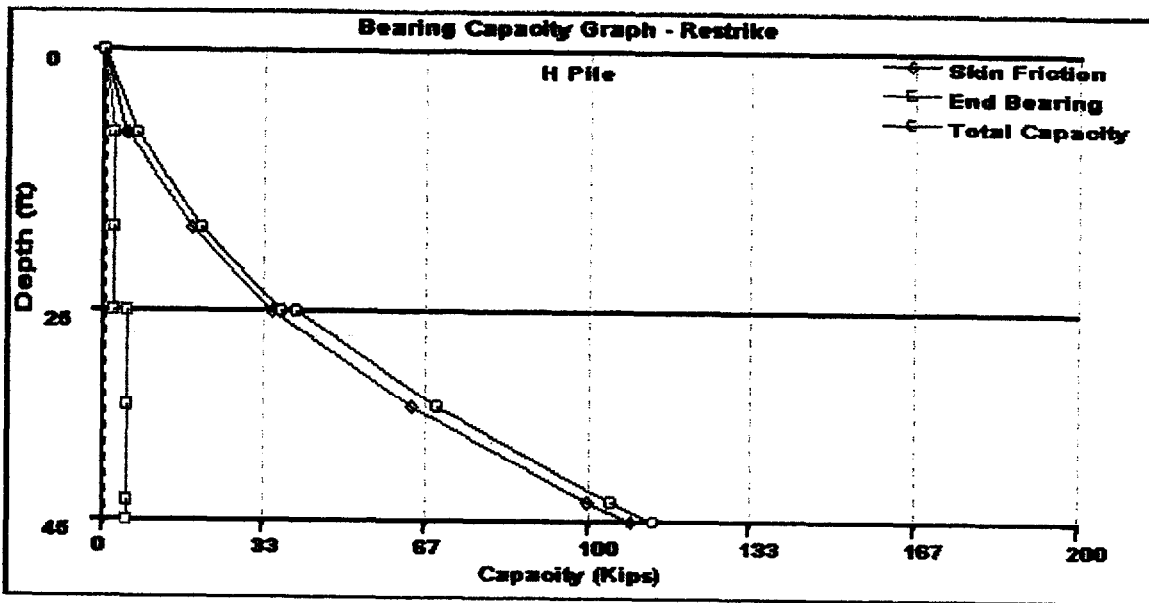


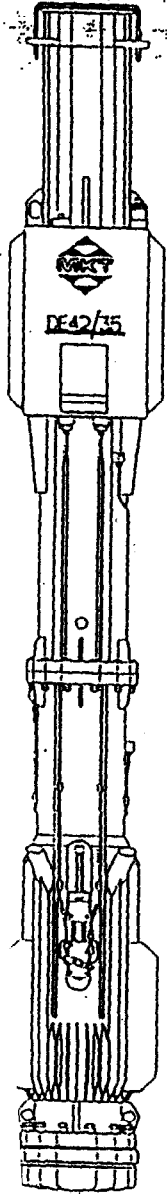
Cushion Material:	N/A
Thickness:	N/A
Modulus of Elasticity:	N/A
Coefficient of Restitution:	N/A

### PILE



Pile Type:	HP 12x74
Length in Leads:	45'
Weight/LF:	74 lbs
Wall Thickness:	.605"
Taper:	N/A
Cross Sectional Area:	21.8 in <sup>2</sup>
Design Capacity of Pile:	80 tons
Splice Description:	Full Penetration Butt Weld
Tip Treatment Description:	Cast Steel Point





INTRODUCING THE  
NEW

# DE42/35

MAXIMUM DIESEL HAMMER FLEXIBILITY  
FITTING IN 8 x 20 LEADS WITH RAM  
WEIGHTS TO 4,200 LBS.

ONE HAMMER... MULTIPLE RAM SIZES...  
AND ENERGY RANGES. ANOTHER MKT  
FIRST PROVIDING THE CONTRACTOR  
WITH HAMMER SIZE FLEXIBILITY AND  
REDUCED EQUIPMENT INVESTMENT  
COSTS. MKT DIESEL HAMMERS CONTINUE  
TO OFFER FEATURES WHICH INSURE  
DEPENDABLE AND PRODUCTIVE  
OPERATION. USING EITHER STANDARD OR  
REMOTE FUEL DELIVERY SYSTEMS.

## SPECIFICATIONS DE-42/35

RAM-PISTON WEIGHT (LBS.)	<del>3,500</del>	4,200
ENERGY RATING (FT.LBS.)	<del>35,000</del>	42,000
BEARING BASED ON ENGINEERING NEWS FORMULA (TONS)	<del>130</del>	230
MAXIMUM OBTAINABLE STROKE	<del>1'-6"</del>	10'-6"
OVERALL LENGTH WITH DRIVE CAP	<del>16'-7"</del>	16'-7"
WEIGHT, HAMMER ONLY (LBS.)	<del>8,600</del>	9,300
WEIGHT, HAMMER AND UNIVERSAL DRIVE CAP (LBS.)	<del>9,550</del>	10,250

PUBLISHED ENERGY RATINGS ARE EQUAL TO RAM WEIGHT X 10.0 FT. RAM STROKE. ACTUAL ENERGIES DELIVERED ARE A FUNCTION OF THE OVERALL JOB CONDITIONS. BEARING RATINGS ARE BASED UPON ENGINEERING NEWS FORMULA, PILE SET EQUAL TO 9.1 IN. BLOW.

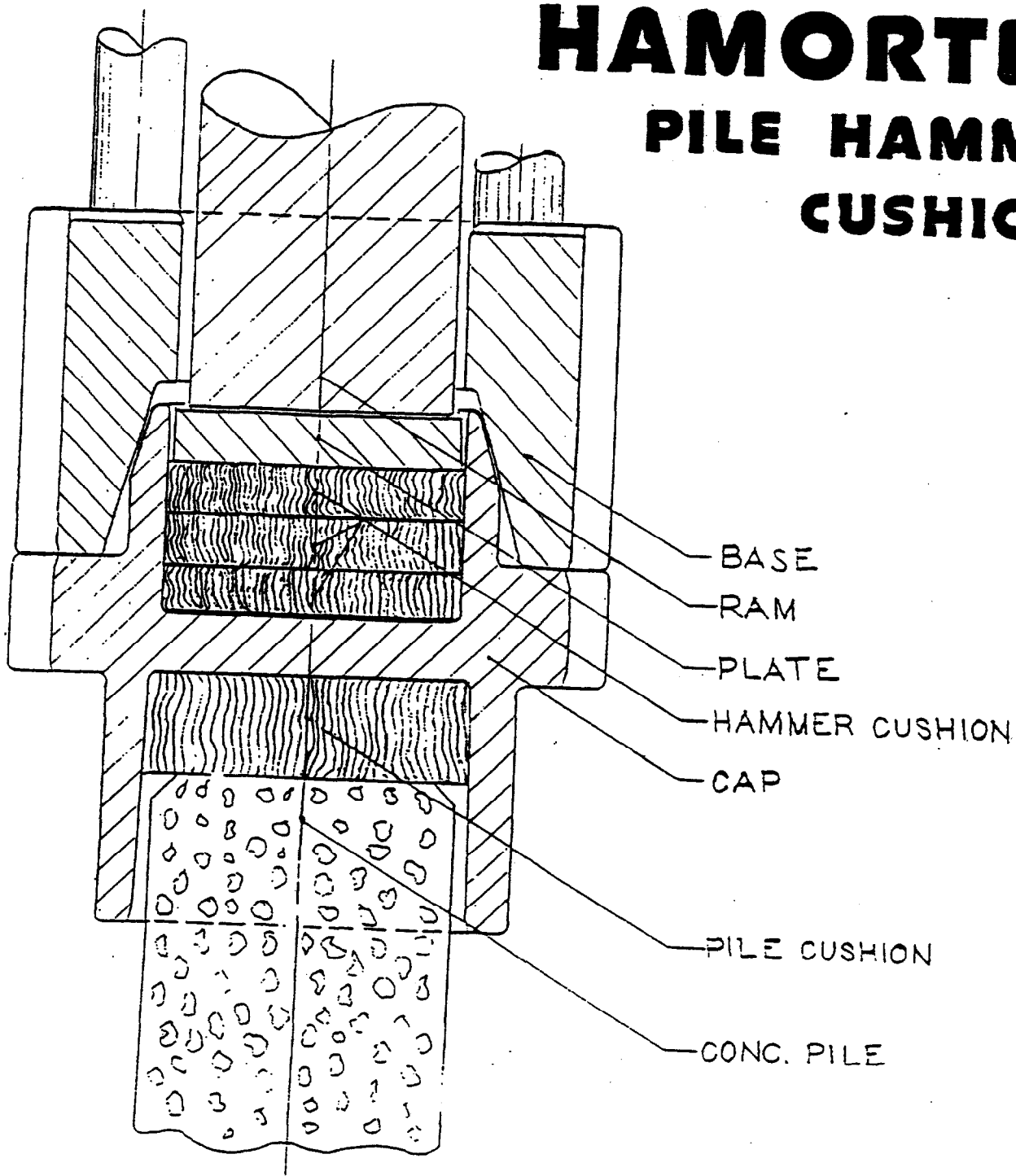
## PRODUCT LIST

SINGLE ACTING DIESEL PILE HAMMERS  
AIR PILE HAMMERS  
VIBRATORY PILE DRIVERS/EXTRACTORS  
VIBRATORY HAMMER ACCESSORIES  
PILE DRIVING LEAD SYSTEMS  
CUSTOM ENGINEERED PRODUCTS

DOUBLE ACTING DIESEL PILE HAMMERS  
DRIVE CAPS AND ACCESSORIES  
HYDRAULIC POWER UNITS  
HYDRAULIC AUGER SYSTEMS  
BOTTOM BRACES  
LEAD ACCESSORIES

# HAMORTEX<sup>®</sup>

## PILE HAMMER CUSHIONS



DESIGNED FOR — DRIVING EFFICIENCY

BY — FREDERICK ENGINEERING



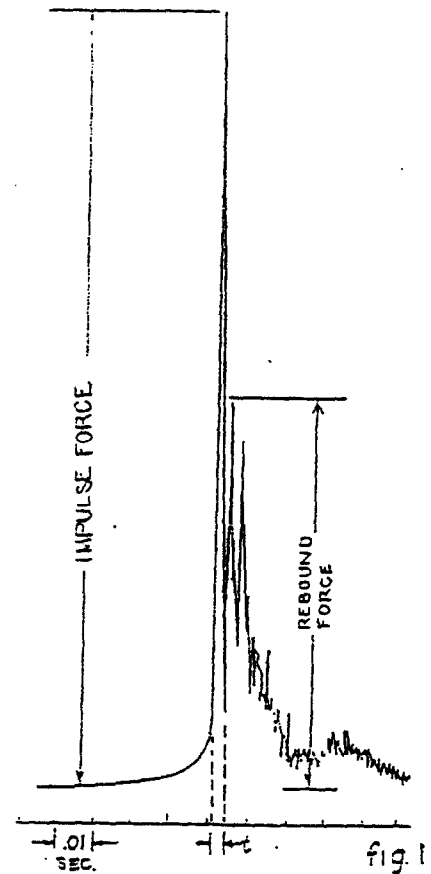
## THE CUSHION FUNCTION AND "HAMORTEX"

In a pile driving system, a hammer cushion, like a damper or shock absorber, stores the quick charge of energy from the hammer and then discharges it to the pile at a rate suitable for efficient driving. This conversion generates heat that must be dissipated. The development of a non-asbestos material with the desired impact characteristics, endurance and temperature level has been a new problem for engineers-- that is further aggravated by the advent of higher performance hammers and heavier piles with greater bearing.

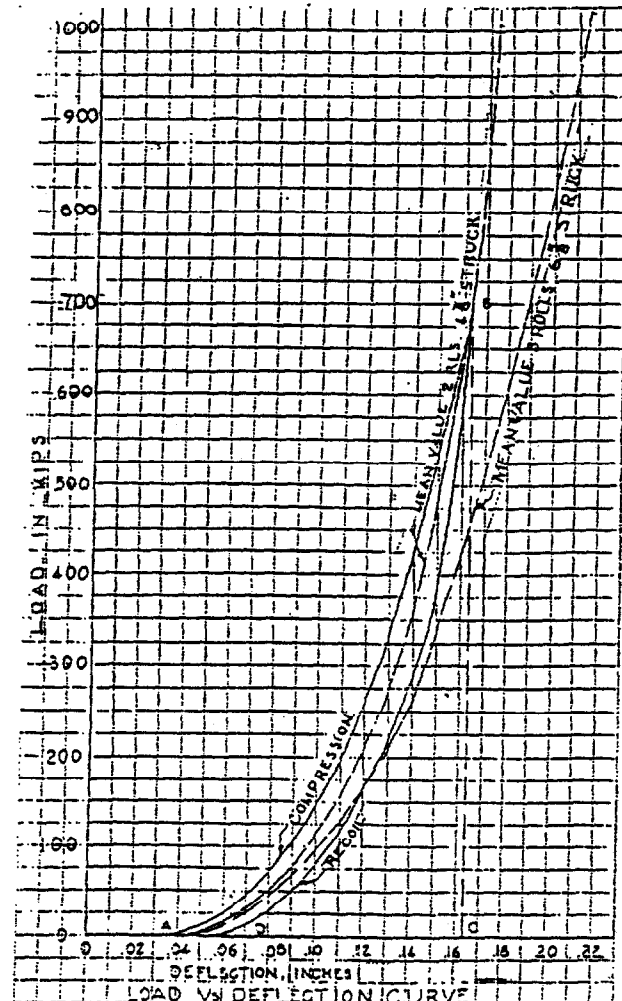
FREDERICK ENGINEERING has met all facets of this challenge by developing a material called "HAMORTEX", made of laminated fibre and aluminum and wound in narrow rolls. Two or three pieces are placed in the cup flatwise under the striker plate. When struck, the layers form a zig-zag pattern that acts much like a dampened spring with a short deflection. The friction heat generated is conducted away thru the aluminum foil to the bottom of the cup which radiates it to the air. (See the cover sheet)

HAMORTEX has these advantages:

1. Its dampened impact characteristics greatly improves driving efficiency, especially for heavy high load piles.
2. Its built-in heat dissipating system prevents burning.
3. It prevents feed-back and rebound energy from returning to the hammer, which is the cause of hammer-bounce and early metal fatigue failure.
4. The cushion can be rebuilt by simply adding new layers to the worn part.
5. It conforms easily to irregular and non-parallel surfaces.
6. It is easily installed by simply fitting the roll to the cup by unwinding the excess.
7. It is made in four endurance grades, two of which are impervious to water. See fig 5 to determine the cushion load.



UNDAMPENED IMPACT



ENGINEERING DATA

HAMORTEX material has been tested by the DEEP FOUNDATIONS INST. accepted STANDARD TESTING METHOD for DEFLECTION CHARACTERISTICS. The graphs figs. 2,3 and 4 are the results of this test taken on a 3 layer sample after driving 68 piles. The cushion was tested in the cap.  
 AT 800 KIPS LOAD: COEF. OF RESTITUTION = 0.78  
 $K_S = 7,960,000$        $K_T = 11,823,000$   
 $E_S = 172,375$        $E_T = 495,769$

HAMORTEX'S desirable dampening characteristics are similar to hard end grain Oak; however, it has superior heat dissipation, temperature range and longevity.

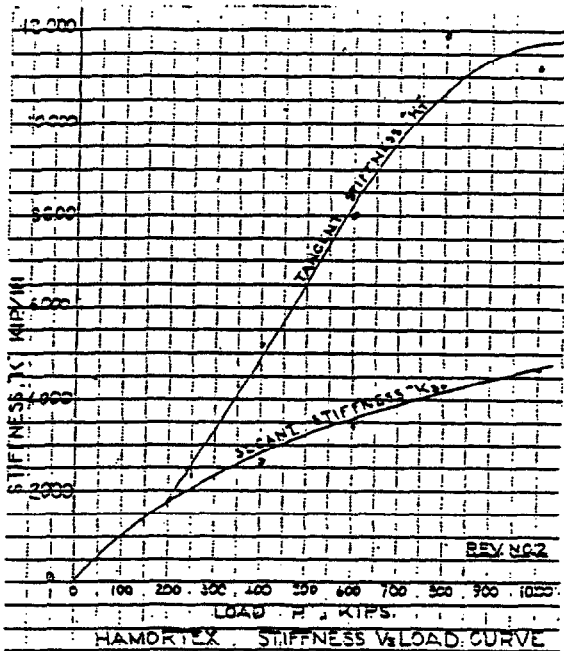


fig 3

HAMORTEX increases driving energy input by reducing energy feed-back to the hammer. By comparing the coef. of impact defined as  $e = (h/H)^{1/2}$ , where  $H$  is the fall height of a steel ball onto a sample of solidly supported material and  $h$  is the measured rebound one finds these values:

NYLON, (blue pltc)	0.84	Micarta	0.74
HAMORTEX, struck	0.35	Dura-Cush	0.69
Plywood, unstruck	0.25	Steel, soft	0.55
struck up to	0.59	Oak, end gr	0.50

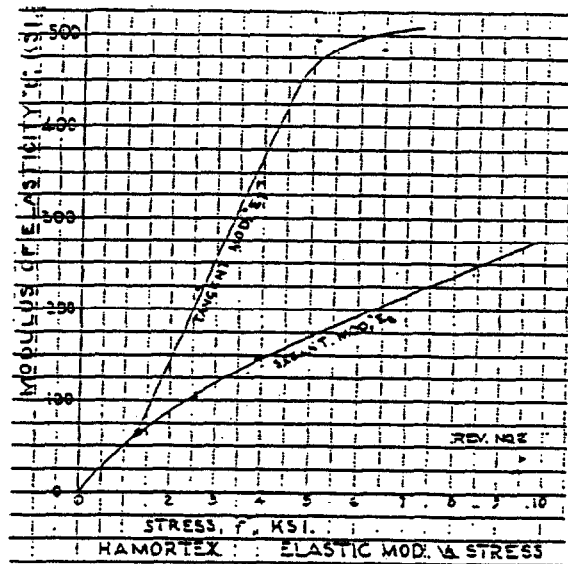


fig 4

Converting the equation,  $h = e^2H$ , and using the ram fall height for  $H$ , then  $h$  multiplied by the ram weight,  $W$  becomes the possible feed-back energy. For example: Using a hammer with a 3 ft. stroke and a ram weight  $W$  of 5000 lbs. one finds:

NYLON:  $hw = (0.84)^2 \times 3 \times 5000$   
 $= 10850 \text{ '}$

HAMORTEX:  $hw = (0.35)^2 \times 3 \times 5000$   
 $= 1838 \text{ '}$

Possible feed-back =  $\frac{10850}{15000} = 72\%$

Possible feed-back =  $\frac{1838}{15000} = 12\%$

Feed-back energy causes internal stress in the hammer. When this stress double hammer failures quadruple.

HAMORTEX MINIMIZES FEED-BACK ENERGY

Symptoms of feed-back can be quickly detected on a job site. On hard driving, air hammers speed up without additional air volumn. Feed-back energy is obviously assisting the air pressure to lift the ram, thus shortening the dwell time and increasing the blow count per minute. Excess amounts of energy will cause the entire hammer to jump. Throttling the air relieves the overstroke but it does not cure the feed-back loss problem--HAMORTEX DOES. Closed top diesel hammers act the same way. Open top types manifest this problem by simply increasing the ascent stroke. The amount can easily be quantified.

HAMORTEX MAXIMIZES THE DRIVING ENERGY DURING HARD DRIVING WHEN IT IS MOST NEEDED.

**HAMORTEX CUSHION MATERIALS**

The cushion load is generated from the inertia of the cap and pile and the driving resistance. Find the Weight of the Pile to Weight of the Ram Ratio and project it on graph 5 across to the blows per inch line required for the pile, then project downward to find the cushion load per square inch and the recommended HAMORTEX TYPE. (see example).

- HAMORTEX-C: For light piles and low bearing.
- HAMORTEX-S: Medium weight piles--average bearing, intermittent driving.
- HAMORTEX-X: Heavy piles--high bearing, continuous driving, high ambient temperatures, high energy output hammers. Temp. Range 600°F.
- HAMORTEX-XL: Heavy piles, high bearing, continuous driving, high amb. temperatures, high energy output hammers and diesel hammers with hot anvils. Temp. Range 600°F. Coef. of Impact 0.49.

**STANDARD SIZES**

HAMTX STOCK NUMBER	CUSHION BLK SIZE Dia. x Thk.	FOR PILE HAMMER MODEL	DPH OF CUP	NO IN CUP
ADD SUFFIX C OR S		VULCAN & COMACO HMRS		
107525-	10-3/4x2 1/2"	VUL #2, 30C	8"	2
*120025-	12 x 2 1/2"	CON #50,65: VUL #1, 06,50,50C,65,65C	8"	2
*142525-	14 1/2 x 2 1/2"	VUL 80C,0,0B,08,010 CON 80,100,115	10"	3
*177525-	17-3/4x2 1/2"	VUL 140C,014,016,014M 016M: CON 140,160	8 1/2"	3
200025-	20 x 2 1/2"	VUL 200C,020,030	8 1/2"	2
*232525-	23 1/2 x 2 1/2"	CON 200,300,5300	10 1/2"	3
		DIESEL HAMMERS		
*190025-	19 x 2 1/2"	DE-20-30, D-12	4"	1
*232525-	23 1/2 x 2 1/2"	DE40-50-70, D-22 to D-44	6"	1
*STOCK	SPECIAL SIZES ON REQUEST			

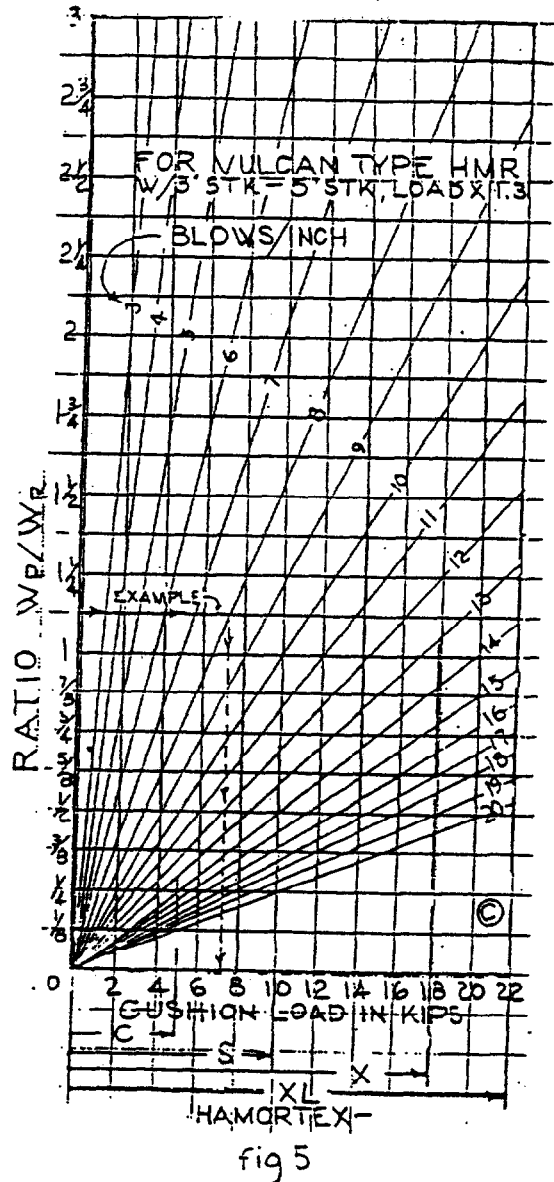


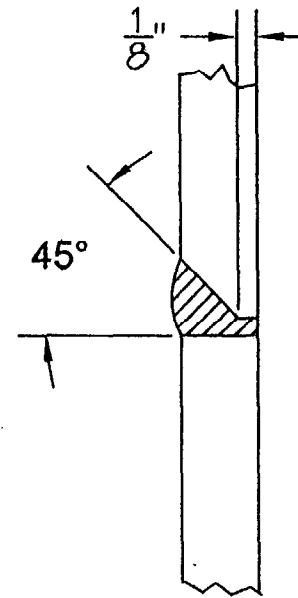
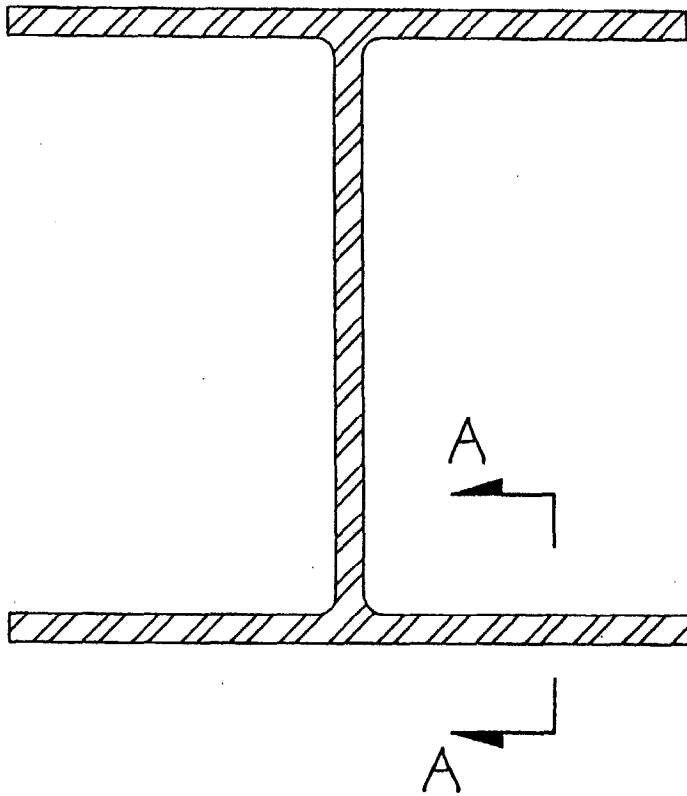
fig 5

LIABILITY: FREDERICK ENGINEERING CO. does not accept any liability for pile hammer or drive cap parts in the event they are broken during the use of HAMORTEX cushions.

PATENTS: USA 4,366,870  
 Can 1,150,523; (R) Reg TM. 1,198,494; Eur 80,902,263  
 COPY RIGHTS RESERVED

**MANUFACTURER :** FREDERICK ENGINEERING CO.  
 15 CRESTVIEW TERR., WHIPPANY, N.J. 07981  
 TEL. (201) 887-1256

**DISTRIBUTOR :**



SECTION A-A

NOTES:

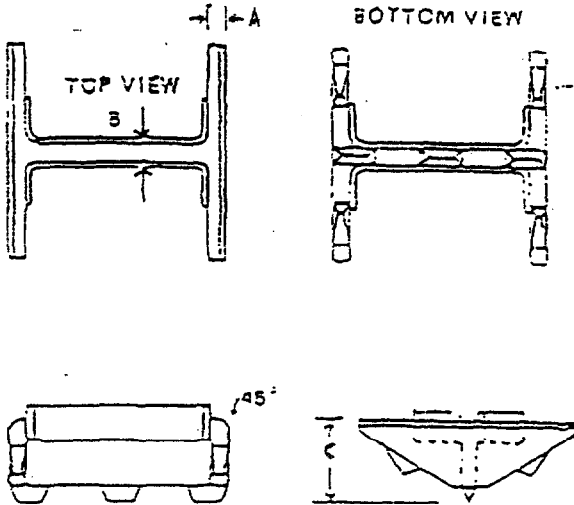
1. 100% BUTT WELDED SPLICE.
2. EITHER TOP OR BOTTOM SECTION OF PILE MAY BE BEVELED.
3. ALL WELDERS WILL BE AWS CERTIFIED.
4. WELDING ELECTRODE WILL BE E70XX.

H.B. FLEMING

TYPICAL H-PILE SPLICE DETAIL

# HARD-BITE

## Dimensions



Material Cast Steel

ASTM A148 90/60...- HEAT-TREATED

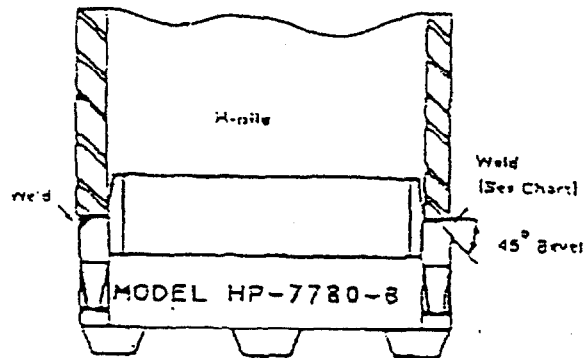
	12"
A	3/4"
B	3/4"
C	3-5/8"

MADE IN U.S.A.

## Installation Instructions

HARD-BITE POINT MODEL HP-7780-B...

1. Fit point onto the end of a square cut pile end.
2. Weld point to the pile in either flat or vertical position using E60 or E70XX electrodes.
3. Weld across full width of flange following chart below for minimum size weld.



Pile Size	Flange Thickness	Min. Size Groove Weld
HP 12 x 84	.585	3/8
x 74	.510	3/8
x 60	.515	5/16
x 50	.425	5/16
HP 10 x 57	.565	5/16
x 42	.420	5/16
HP 8 x 38	.445	5/16



**ASSOCIATED PILE & FITTING CORP.**

BOX 1048, CLIFTON, N.J. 07014 ■ 201-773-8400

Call toll free 800-526-9047

**ABOUT THE WAVE EQUATION ANALYSIS RESULTS**

The GRLWEAP program simulates the behavior of an impact driven pile. The program contains mathematical models which describe hammer, driving system, pile and soil during the hammer blow. Under certain conditions, the models only crudely approximate often complex dynamic situations.

A wave equation analysis also relies on input data which represents normal situations. The data may be the best available information at the time of the analysis, however, it may greatly differ from actual field conditions.

The program authors, therefore, recommend prudent use of GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic measurements. Estimates of bending or other local non-axial stresses and prestress effects must also be accounted for by the user.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of a safety factor to yield a design or working load.

**GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS**  
Version 1998-2  
English Units

: 07/23/2003 :

Hammer Model:	DE 42/35	Made by:	MKT		
No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	1.400				
2	1.400	65596.5	1.000	0.0100	
3	1.400	65596.5	1.000	0.0100	
Imp Block	0.800	42661.1	0.900	0.0100	
Helmet	1.200	14175.0	0.780	0.0100	6.0

**HAMMER OPTIONS:**

Hammer File ID No.	154	Hammer Type	1
Stroke Option	0	Stroke Convergence Crit.	0.020
Fuel Pump Setting	1	Hammer Damping	2

**HAMMER DATA:**

Ram Weight	(kips)	4.20	Ram Length	(inch)	150.00
Maximum Stroke	(ft)	10.00	Actual Stroke	(ft)	5.00
			Efficiency		0.720
Maximum Pressure	(psi)	1450.00	Actual Pressure	(psi)	1450.00
Compression Exponent		1.350	Expansion Exponent		1.250
Ram Diameter	(inch)	12.00	Minimum Stroke	(ft)	5.00
Combustion Delay	(s)	0.00100	Ignition Duration	(s)	0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

<b>HAMMER CUSHION</b>			<b>PILE CUSHION</b>		
Cross Sect. Area	(in2)	283.50	Cross Sect. Area	(in2)	0.00
Elastic-Modulus	(ksi)	125.0	Elastic-Modulus	(ksi)	0.0
Thickness	(inch)	2.50	Thickness	(inch)	0.00
Coeff of Restitution		0.8	Coeff of Restitution		0.0
RoundOut	(ft)	0.0	RoundOut	(ft)	0.0
Stiffness	(kips/in)	14175.0	Stiffness	(kips/in)	0.0

: 07/23/2003 :  
 07/23/2003  
 H.B. Fleming  
 1998-2

GRLWEAP(TM) Version

PILE PROFILE:

L b Top	Area	E-Mod	Spec Wt	Circmf	Strength	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft	ksi	ft/s	k/ft/s
0.0	21.80	29000.	492.0	4.1	50.000	16524.	38.3
45.0	21.80	29000.	492.0	4.1	50.000	16524.	38.3

Wave Travel Time 2L/c (ms) 5.440

Toe 85.0 0.150 0.10

PILE, SOIL, ANALYSIS OPTIONS:

Uniform/Non-Uniform/2-Pile	0	File Segments: Automatic	
No. of Slacks/Splices	0	File Damping (%)	1
		File Damping Fact. (k/ft/s)	0.765
% Skin Friction	15	% End Bearing	85
Soil Resistance Distr. No.	0		
Soil Damping Option	Smith		
Max No Analysis Iterations	0	Time Increment/Critical	160
Residual Stress Analysis	0	Output Option	0
Output Time Interval	1	Analysis Time-Input (ms)	0
Output Segment Generation	Automatic		

: 07/23/2003 :  
 07/23/2003  
 H.B. Fleming  
 1998-2

GRLWEAP(TM) Version

Rut	Bl Ct	Stroke (ft)	Ten Str	i, t	Comp Str	i, t	ENTHRU	Bl Rt
(kips)	(bpf)	down up	(ksi)		(ksi)		(kip-ft)	(b/min)
100.0	10.9	6.62 6.63	-0.13	( 7, 42)	23.06	( 3, 2)	18.9	45.7
160.0	20.7	7.73 7.73	0.00	( 1, 0)	25.94	( 3, 2)	17.4	42.3
220.0	33.3	8.29 8.44	-0.18	( 5, 44)	27.30	( 4, 3)	16.6	40.7
280.0	47.1	8.90 8.93	-0.58	( 6, 38)	31.53	( 13, 5)	16.8	39.5
320.0	58.3	9.20 9.23	-0.84	( 6, 36)	33.97	( 13, 5)	17.1	38.9
360.0	72.5	9.36 9.47	-0.76	( 7, 36)	35.59	( 13, 5)	17.4	38.5
400.0	86.4	9.70 9.73	-0.69	( 8, 36)	37.69	( 13, 5)	18.0	38.0
450.0	111.3	9.87 9.96	-0.88	( 6, 35)	39.30	( 13, 5)	18.3	37.6
510.0	155.1	9.96 10.20	-1.17	( 7, 35)	40.37	( 13, 5)	18.4	37.3
600.0	280.2	10.00 9.81	-2.41	( 7, 18)	41.18	( 13, 5)	18.1	37.6

H.B. Fleming  
: 07/23/2003 :

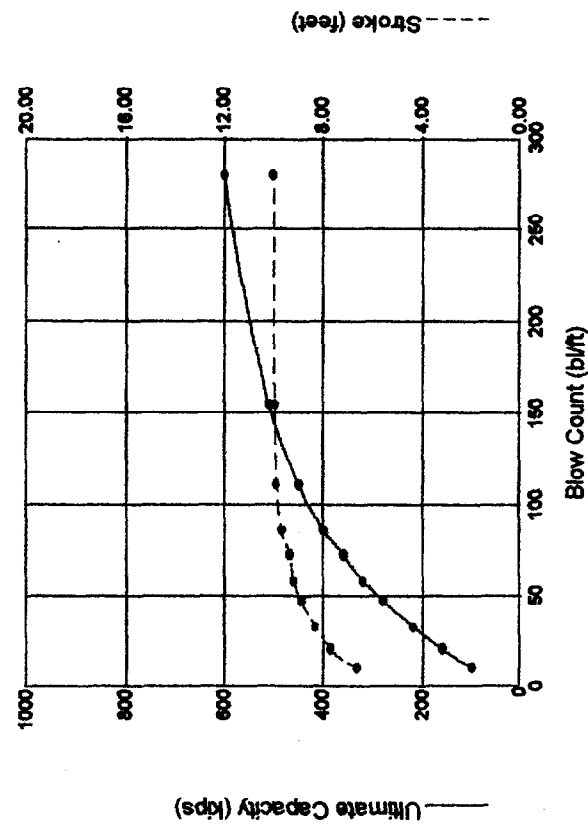
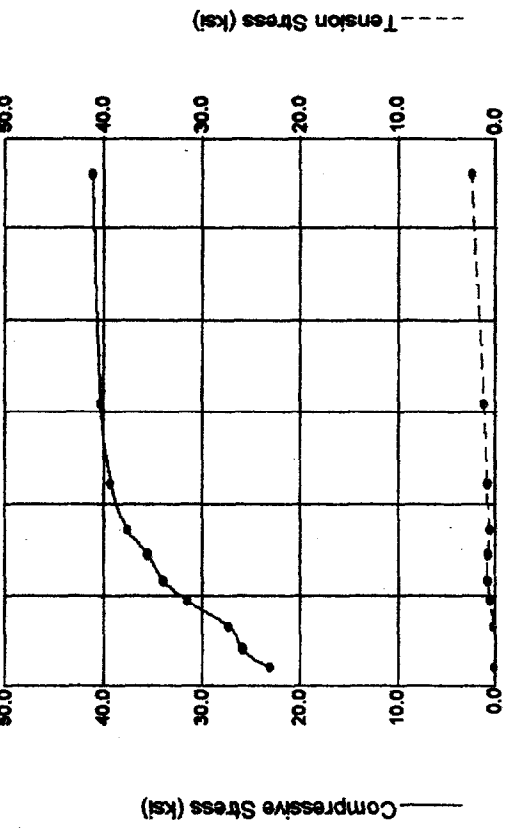
23-Jul-2003  
GRLWEAP(TM) Version 1998-2

Ultimate Capacity kips	Maximum Compression Stress ksi	Maximum Tension Stress ksi	Blow Count bl/ft	Stroke feet	Energy kips-ft
100.0	23.063	0.133	10.9	6.62	18.95
160.0	25.936	0.000	20.7	7.73	17.39
220.0	27.304	0.176	33.3	8.29	16.57
280.0	31.532	0.577	47.1	8.90	16.82
320.0	33.970	0.841	58.3	9.20	17.11
360.0	35.590	0.760	72.5	9.36	17.36
400.0	37.691	0.691	86.4	9.70	18.00
450.0	39.300	0.878	111.3	9.87	18.29
510.0	40.369	1.175	155.1	9.96	18.38
600.0	41.183	2.407	280.2	10.00	18.14



H.B. Fleming  
: 07/23/2003 :

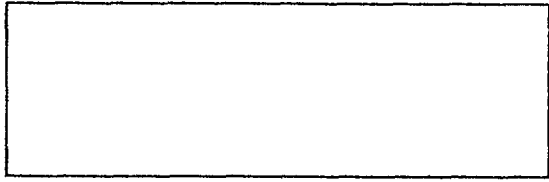
23-Jul-2003  
GRLWEAP (TM) Version 1988-2



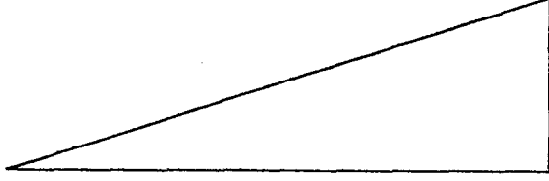
MKT DE 42/35

Efficiency 0.720  
 Helmet 1.20 kips  
 Hammer Cushion 14175 kips/in  
 Skin Quake 0.100 in  
 Toe Quake 0.100 in  
 Skin Damping 0.050 sec/ft  
 Toe Damping 0.150 sec/ft  
 Pile Length 44.95 ft  
 Pile Top Area 21.80 in<sup>2</sup>

Pile Model



Skin Friction Distribution



Res. Shaft = 15 %  
(Proportional)

# CONSTANT CAPACITY

H.B. Fleming  
: 07/23/2003 :

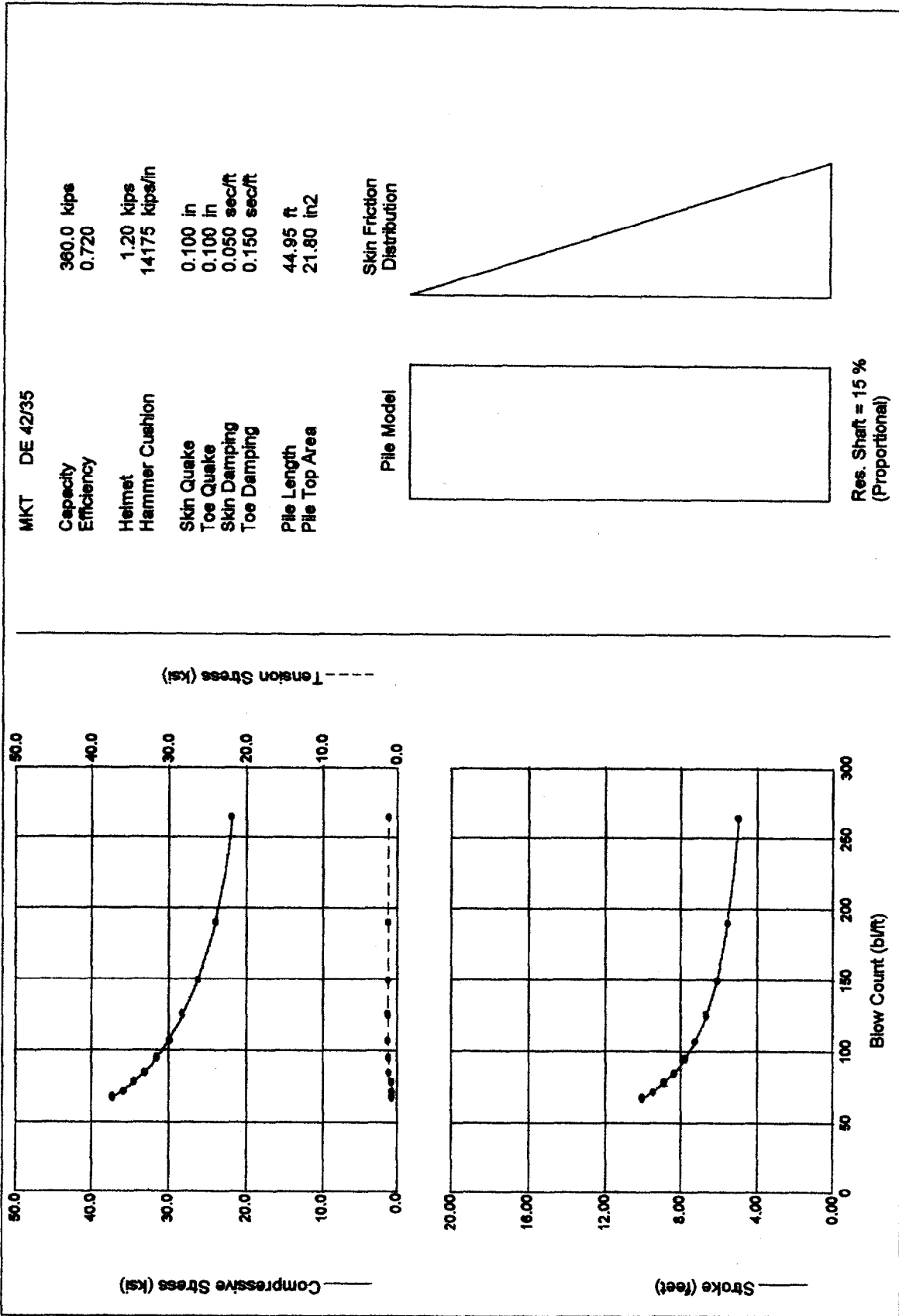
23-Jul-2003  
GRLWEAP(TM) Version 1998-2

Ultimate Capacity kips	Maximum Compression Stress ksi	Maximum Tension Stress ksi	Blow Count b/ft	Stroke feet	Energy kips-ft
360.0	21.890	1.230	265.4	5.00	8.17
360.0	24.015	1.277	190.6	5.56	9.40
360.0	26.245	1.283	150.1	6.11	10.60
360.0	28.197	1.266	124.7	6.67	11.74
360.0	29.956	1.256	107.3	7.22	12.89
360.0	31.468	1.156	94.9	7.78	14.04
360.0	33.060	1.224	84.9	8.33	15.25
360.0	34.493	0.874	77.6	8.89	16.40
360.0	35.905	0.725	71.8	9.44	17.50
360.0	37.307	0.751	66.8	10.00	18.62

# CONSTANT CAPACITY

H.B. Fleming  
: 07/23/2003 :

23-Jul-2003  
GRLWEAP (TM) Version 1998-2



# Ouellet Associates, Inc.

**SUBMITTAL  
NO. 02000-002**

56 Bibber Parkway  
Brunswick, ME 04011

Phone: 725-0100  
Fax: 725-0101

**TITLE:** Pile Driving  
**PROJECT:** GMRI -- Research Laboratory  
**DRAWING:**  
**STATUS:** NEW  
**BIC:** SMRT

**REQUIRED START:**  
**REQUIRED FINISH:**  
**DAYS HELD:** 1  
**DAYS ELAPSED:** 16  
**DAYS OVERDUE:** 0

RECEIVED FROM		SENT TO		RECEIVED BY		RECEIVED TO	
FLEMING	DS	SMRT	DL	SMRT	DL	FLEMING	DS

Item No.	Description/Remarks	Required	Subm.	Required	Subm.	Status	Seq.	Days	Days Elapsed
001	Rock Anchor Details & Products	8/11/2003	8/11/2003	8/16/2003	8/16/2003	RAR	0	6	0 5
002	Rock Anchor Details & Re-Submittal Comments	8/26/2003	8/26/2003			NEW	0	6	1 1

# Maine Drilling & Blasting

Resubmittal  
August 22, 2003  
GMRI- Research Laboratory

SMRT Submittal # 2-02000-02

The minimum depth can be expanded to 35 feet based on the feedback from R. W. Gillespie. This is a significant change from the SMRT requirement of 10 feet on drawing SG001 issued 6-27-03. Commercial issues are addressed under separate cover.

The bond will start 5 feet below the rock surface.

The grout will be Portland Cement as submitted.

The jacking equipment has been recalibrated within the last 12 months, we will submit this paper work with the jacking results

The revised submittal shows pile cap cast in place similar to Detail J-5 on drawings with exception recess is 14" by 14" for our jack plate.

Cover plates will be added to the H pile.

#### OTHER ISSUES:

We have changed our anchor cover to use the bond directly to the epoxy anchor in the bond zone. We will slide a 1¼ inch PVC pipe over the unbonded length all the way to the top. This allows us to single stage grout the entire length of the bar as soon as the anchor is installed. The primary advantage of single stage grouting is it creates so much tremie head with the grout filled to the top pumped from the bottom. This head forces grout to fill any fractures in the rock in the bonded zone. The PVC sleeve in the unbonded zone allows the anchor to elongate within the PVC as the tensioning is applied.

Stephen Blaisdell  
Construction Manager

Maine Drilling and Blasting, Inc.  
P.O. Box 1140  
Brunswick Road  
Gardiner, ME 04345  
207 582-2338  
FAX 207 582-8794

Divisional Offices:  
Maine 207 582-2338  
Massachusetts 508 689-2983  
New Hampshire 603 647-0299  
Vermont/New York 802 479-3341

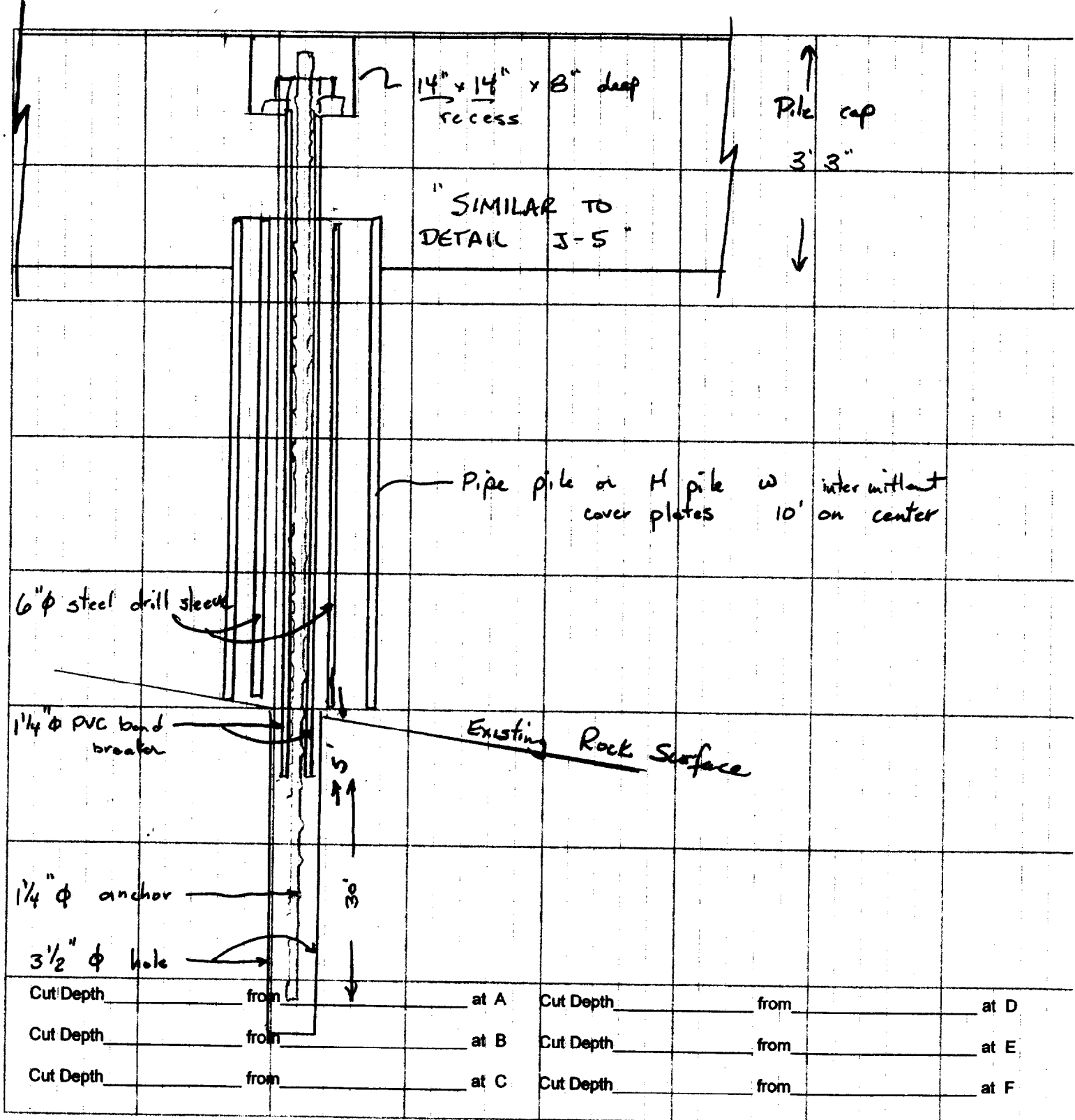
*An Equal Opportunity Employer*

CUSTOMER <b>OUELLET ASSOCIATES</b>	
PROJECT <b>GULF OF MAINE RESEARCH</b>	
LOCATION <b>PORTLAND</b>	DATE <b>8/25/03</b>
SCALE	JOB#
MANAGER <b>STEVE BLAISDELL</b>	

# Maine Drilling & Blasting

## ATTACHMENT B

### AGREED PLAN OF AREA TO BE BLASTED



Customer Signature \_\_\_\_\_

Subcontractor Signature \_\_\_\_\_

# Ouellet Associates, Inc.

**SUBMITTAL  
NO. 02000-002**

56 Bibber Parkway  
Brunswick, ME 04011

Phone: 725-0100  
Fax: 725-0101

**TITLE:** Pile Driving  
**PROJECT:** GMRI -- Research Laboratory

**REQUIRED START:**  
**REQUIRED FINISH:**

**DRAWING:**  
**STATUS:** NEW  
**BIC:**

**DAYS HELD:** 0  
**DAYS ELAPSED:** 0  
**DAYS OVERDUE:** 0

RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
FLEMING DS	SMRT DL		

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Sept	Prints	Date	Held	Elapsed
001	Rock Anchor Details & Products	8/11/2003	8/11/2003			NEW	0	6		0	0





# Ouellet Associates, Inc.

SUBMITTAL  
NO. 02000-002

56 Bibber Parkway  
Brunswick, ME 04011

Phone: 725-0100  
Fax: 725-0101

TITLE: Pile Driving

REQUIRED START:

PROJECT: GMRI -- Research Laboratory

REQUIRED FINISH:

DRAWING:

DAYS HELD: 0

STATUS: NEW

DAYS ELAPSED: 0

BIC:

DAYS OVERDUE: 0

RECEIVED  
AUG 12 2003  
SMRT, INC.

RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
FLEMING DS	SMRT	DL	

Revision No.	Description / Remarks	Received	Sent	Returned	Forwarded	Status	Days Held	Days Elapsed	
001	Rock Anchor Details & Products	8/11/2003	8/11/2003			NEW	0	6	0

03034-00#2

# Maine Drilling & Blasting

August 8, 2003

David Lawrence  
Project Manager  
Ouellet Associates, Inc  
56 Bibber Parkway  
Brunswick, ME 04011-7357

RE: Submittal for Gulf of Maine Research Laboratory

David;

We have passed general information back and forth. Here is our formal submittal. You will find our sketch of means and methods with two modifications. First, we have changed to 1 ¼ inch diameter as specified. Second, the pipe pile may be substituted with an H-pile.

All normal post tensioning submittal requirements have been included as well

Thank you



Stephen Blaisdell  
Construction Manager

**RECEIVED**

AUG 11 2003

QUELLET ASSOCIATES

Maine Drilling and Blasting, Inc.  
P.O. Box 1140  
Brunswick Road  
Gardiner, ME 04345  
207 582-2338  
FAX 207 582-8794

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Vermont/New York 802 479-3341

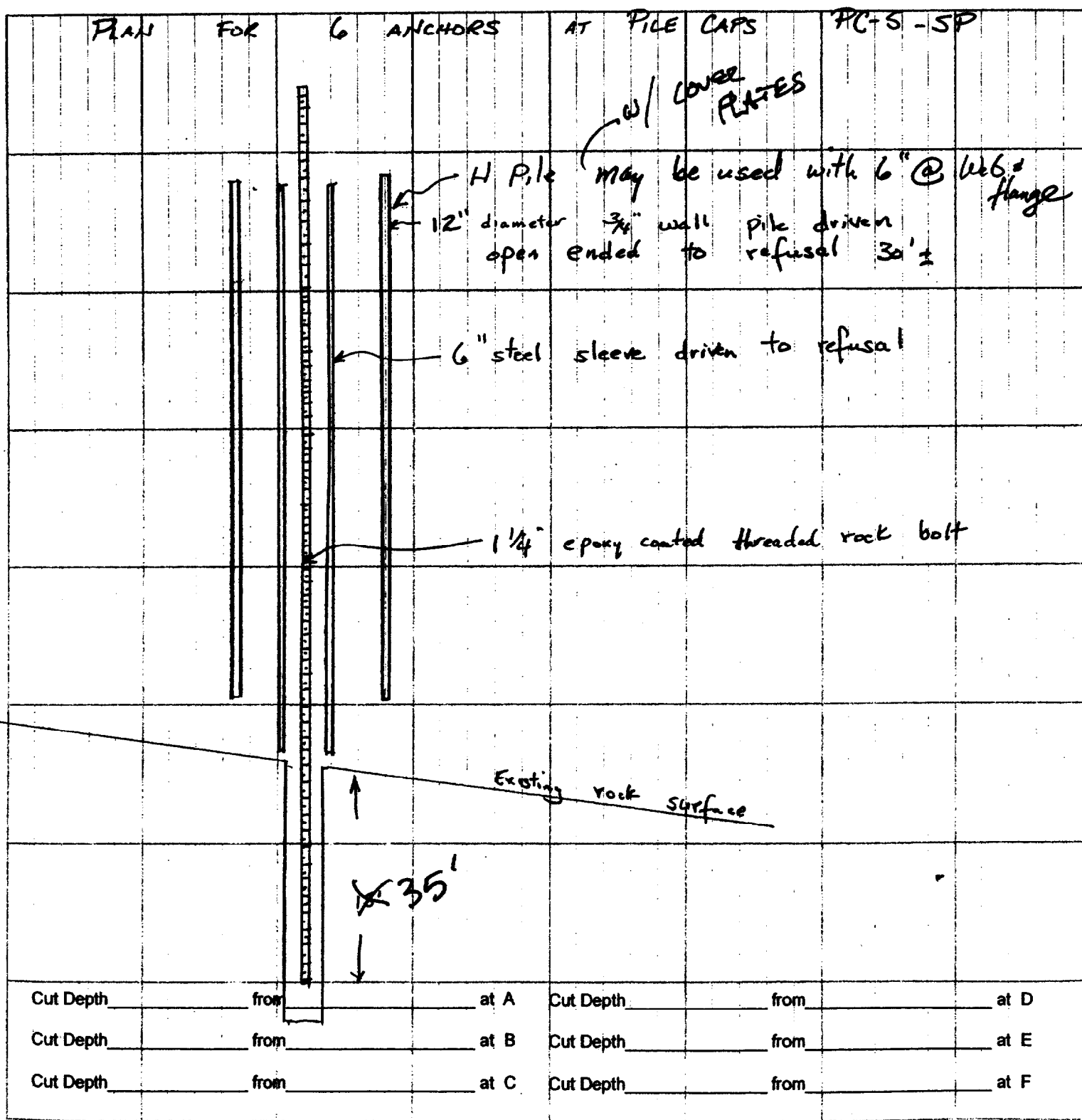
*An Equal Opportunity Employer*

CUSTOMER <b>OUELLET ASSOCIATES</b>	
PROJECT <b>GULF OF MAINE RESEARCH</b>	
LOCATION <b>PORTLAND</b>	DATE <b>7/16/03 Rev 8/8/03</b>
SCALE	JOB#
MANAGER <b>STEVE BLAISDELL</b>	

# Maine Drilling & Blasting

## ATTACHMENT B

### AGREED PLAN OF AREA TO BE BLASTED



Customer Signature

Subcontractor Signature

HB Fleminging: Drive 12" pipe <sup>or H pile</sup> pile open ended to refusal

HB Fleminging: Drive 6" steel casing for rock anchor drill hole

Main Drilling: Drill with hydraulic drill & compressed air through 6" steel until soil on top of rock collapses. Hole 4 1/2" diameter hole.

HB Fleminging: Reseat 6" sleeve through collapsed soil zone on top of rock. Now casing is on top of rock and hole will stay clean.

Main Drilling: Drill  $3\frac{1}{2}$ "  $\frac{1}{4}$ " (min) anchor through sleeve into rock ~~20'~~ 35' in rock.

Main Drilling: Install anchor with  $\frac{1}{4}$ " bond zone, Hang from surface to allow 3' to 5' of hole below anchor. Grout bond zone & stress zone. This places field grout between anchor & 6" steel casing to the surface

Main Drilling: Allow grout to cure 7 days minimum.

Main Drilling: Test anchor and leave tensioned at 131 kips.

# **TABLE OF CONTENTS**

**SECTION ONE: Shop drawings and anchor cut sheets**

**SECTION TWO: Drilling Equipment**

**SECTION THREE: Grout specification and grouting equipment**

**SECTION FOUR: Testing equipment and procedures**

**SECTION FIVE: Completed projects**

# **SECTION ONE**

# SAS STRESSTEEL

## ANCHOR

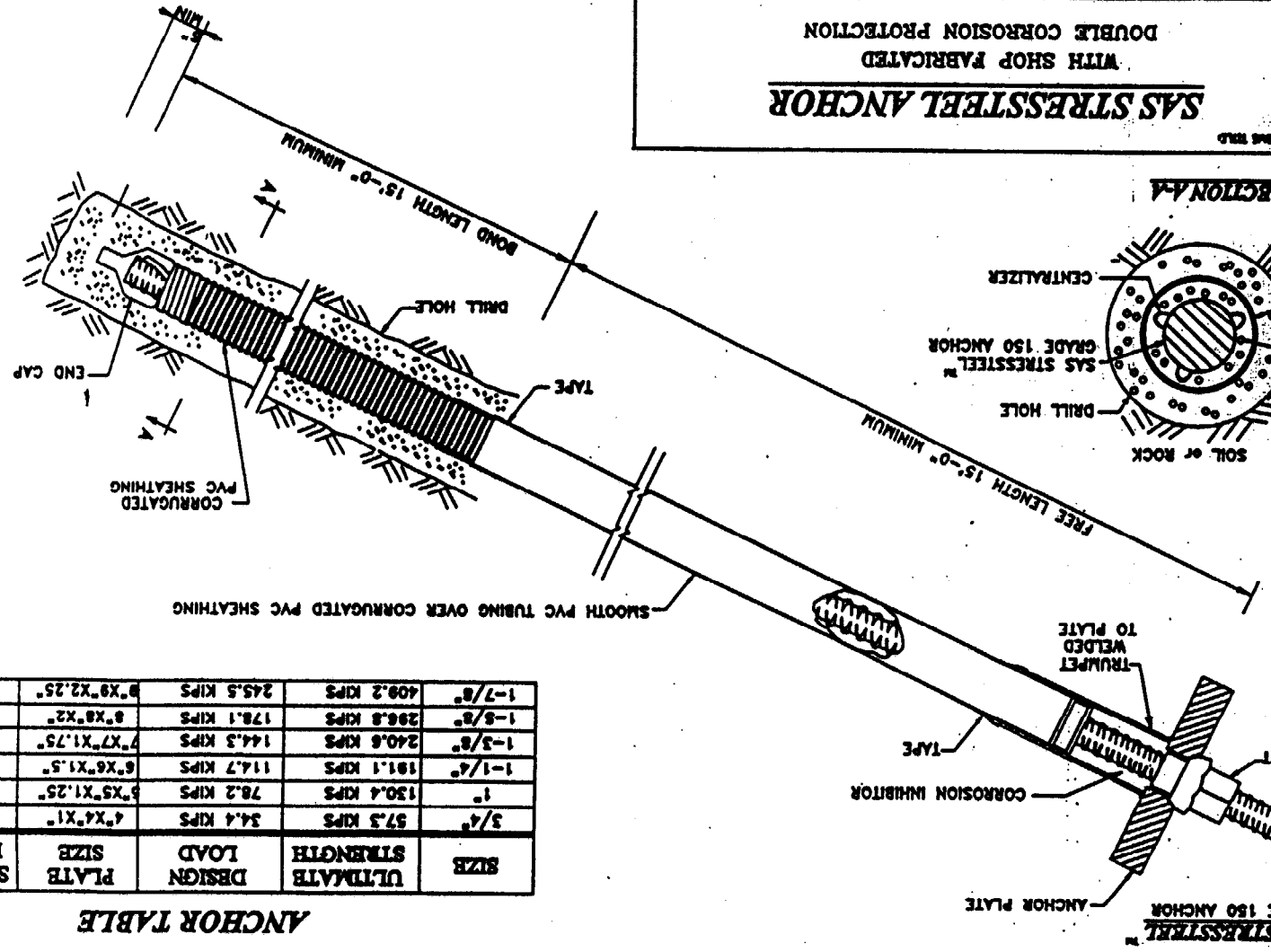
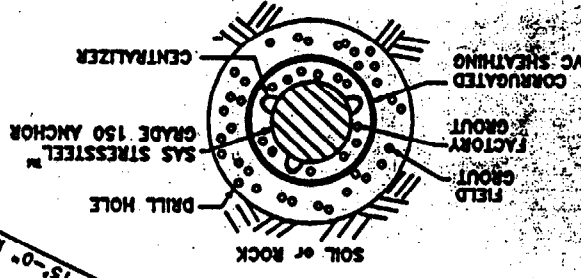
WITH SHOP FABRICATED  
DOUBLE CORROSION PROTECTION

ANCHOR TABLE

SIZE	ULTIMATE STRENGTH	DESIGN LOAD	PLATE SIZE	SHEATHING DIAMETER
3/4'	57.3 KIPS	34.4 KIPS	4'X4'X1'	50 mm
1'	130.4 KIPS	78.2 KIPS	5'X5'X1.25'	50 mm
1-1/4'	191.1 KIPS	114.7 KIPS	6'X6'X1.5'	56 mm
1-3/8'	240.6 KIPS	144.3 KIPS	7'X7'X1.75'	65 mm
1-5/8'	297 KIPS	178 KIPS	8'X8'X2'	65 mm
1-7/8'	409 KIPS	246 KIPS	9'X9'X2.25'	80 mm

**SAS STRESSTEEL ANCHOR**  
 WITH SHOP FABRICATED  
 DOUBLE CORROSION PROTECTION

**SECTION A-A**



SIZE	ULTIMATE STRENGTH	DESIGN LOAD	PLATE SIZE	SHAFT DIA
3/4"	57.3 KIPS	34.4 KIPS	4"x4"x1"	50 mm
1"	130.4 KIPS	78.2 KIPS	5"x5"x1.25"	50 mm
1-1/4"	191.1 KIPS	114.7 KIPS	6"x6"x1.5"	56 mm
1-3/8"	240.6 KIPS	144.3 KIPS	7"x7"x1.75"	65 mm
1-5/8"	296.8 KIPS	178.1 KIPS	8"x8"x2"	65 mm
1-7/8"	408.2 KIPS	245.5 KIPS	9"x9"x2.25"	80 mm

**ANCHOR TABLE**





SAS STRESSTEEL, INC.

Grade 150 Ksi



**Y 1050 H Ø R - R**

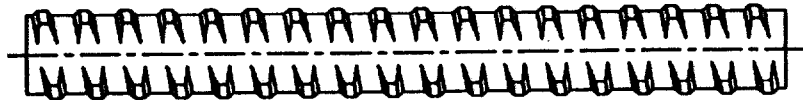
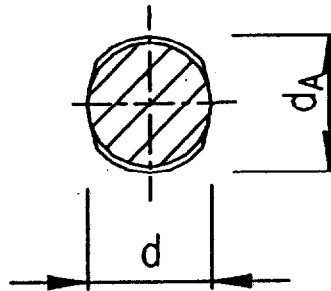
**Grade 150 Ksi**

*Stressteel bar, hot rolled*

**Y 1050 H Ø R - R EP**

**Grade 150 Ksi**

*Stressteel bar, hot rolled, epoxy-coated*



$\emptyset$	[mm] [in]	18 %	26.5 1	32 1 1/4	36 1 3/8	40 1 5/8	47 1 7/8
$f_y / f_{pu} / \Delta r^{1)}$		950 N/mm <sup>2</sup> / 1050 N/mm <sup>2</sup> / 7 % 138 ksi / 153 ksi / 7 %					
$F_y (F_{P0.2})$	[kN] [kips]	230 51.7	525 118.0	760 170.9	970 218.1	1190 267.6	1650 371.0
$F_{pu}$	[kN] [kips]	255 57.3	580 130.4	850 191.1	1070 240.6	1320 296.8	1820 409.2
Area	[mm <sup>2</sup> ] [in <sup>2</sup> ]	241 0.37	551 0.85	804 1.25	1020 1.58	1257 1.95	1735 2.69
Weight	[kg/m] [lbs/ft]	1.96 1.32	4.48 3.01	6.53 4.39	8.27 5.56	10.21 6.86	14.10 9.48

1) Elongation after rupture in a gage length equal to 10 bar diameters (ASTM A 722/ ASTM 722M - 98)




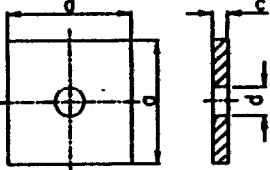
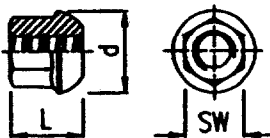
GRADE 150 Ksi

SAS STRESSTEEL, INC.

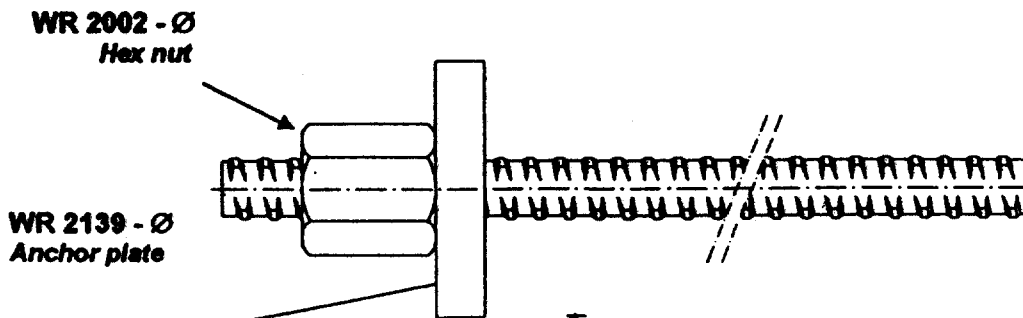


Item Number	Specification	Ø [mm] [in]					
		18 3/4	22.5 1	32 1 1/4	36 1 3/8	40 1 5/8	47 1 7/8
Y 1050 H Ø R - R	Stressteel bar, hot rolled	X	X	X	X	X	X
WR 2002 - Ø	Hex nut	X	X	X	X	X	X
WR 2139 - Ø	Anchor plate	X	X	X	X	X	X
WR 2001 - Ø	Anchor nut, 55°	-	X	X	X	X	-
WR 2011 - Ø	Anchor plate, 55°	-	X	X	X	X	-
WR 3003 - Ø	Coupler, standard	X	X	X	X	X	X
WR 5005 - Ø	Lock nut	X	X	X	X	X	X

Accessories for epoxy-coated stress bars available on request.

Accessories	Ø	28.5 1	32 1.14	36 1.38	40 1.57	47 1.78		
<b>WR 2002 - Ø</b> Hex nut  material S355J2G3	SW [mm] [in]	41 1.61	46 1.81	55 2.17	60 2.36	70 2.76	80 3.15	
	L [mm] [in]	60 2.36	80 3.15	90 3.54	110 4.33	120 4.72	140 5.51	
	W [kg] [lbs]		0.75 1.69	1.20 2.70	1.85 4.16	2.65 5.96		
<b>WR 2139 - Ø</b> Anchor plate  material S 235 JR	a [mm] [in]	120 4.72	140 5.51	160 6.30	180 7.09	200 7.87	240 9.45	
	c [mm] [in]	20 0.79	30 1.18	40 1.57	45 1.77	50 1.97	55 2.17	
	d [mm] [in]	25 0.98	32 1.26	38 1.50	45 1.77	50 1.97	58 2.28	
	W [kg] [lbs]	2.20 4.95	4.50 10.12	7.65 17.20	10.90 24.51	15.10 33.95	23.50 52.83	
<b>WR 2001 - Ø</b> Anchor nut, 55°  material E 335	SW [mm] [in]	-	46 1.81	55 2.17	60 2.36	65 2.56	-	
	L [mm] [in]	-	55 2.17	75 2.95	90 3.54	100 3.94	-	
	d [mm] [in]	-	62 2.44	72 2.83	80 3.15	90 3.54	-	
	W [kg] [lbs]	-	0.60 1.35	1.10 2.47	1.50 3.37	1.80 4.05	-	

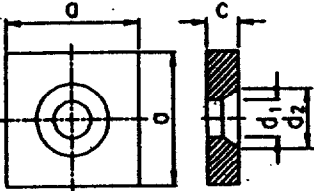
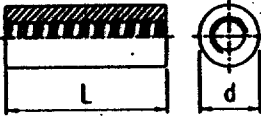
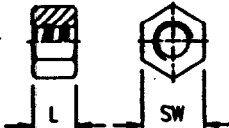
**Suggested assembly of temporary anchor components**

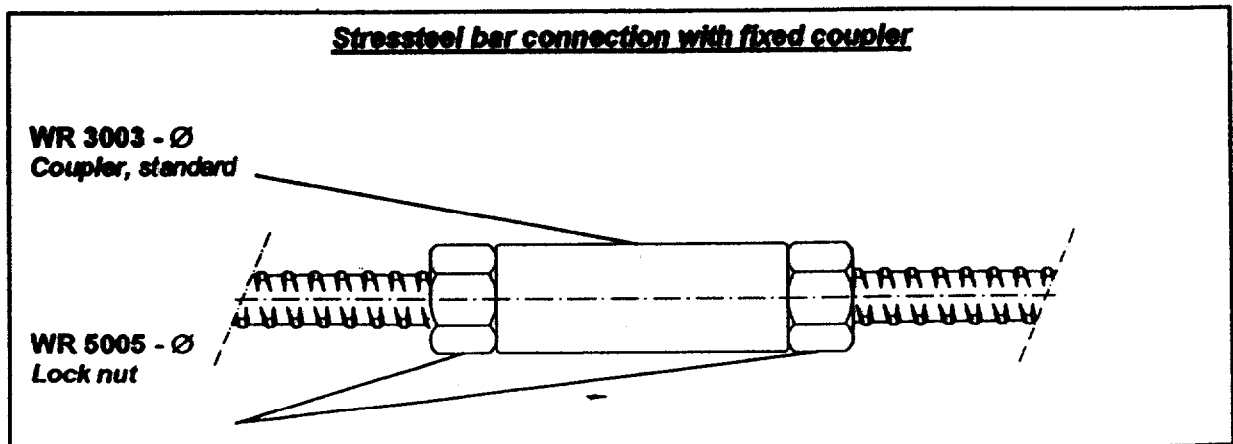




GRADE 150 Ksi

SAS STRESSTEEL, INC.

Accessories	Ø [mm] [in]	18 3/4	28.5 1	32 1.14	36 1.38	40 1.58	47 1.78
<b>WR 2011 - Ø</b> <b>Anchor plate, cone 55°</b>  material S 235 JR.	<b>d</b> [mm] [in]	-	140 5.51	160 6.30	180 7.09	200 7.87	-
<b>c</b> [mm] [in]	-	30 1.18	40 1.57	45 1.77	50 1.97	-	-
<b>d<sub>1</sub></b> [mm] [in]	-	38 1.50	45 1.77	50 1.97	50 1.97	-	-
<b>d<sub>2</sub></b> [mm] [in]	-	62 2.44	72 2.83	82 3.23	92 3.62	-	-
<b>W</b> [kg] [lbs]	-	4.50 10.12	7.40 16.64	10.60 23.83	14.80 33.27	-	-
<b>WR 3003 - Ø</b> <b>Coupler, standard</b>  material S355J2G3	<b>L</b> [mm] [in]	36 1.42	150 5.91	180 7.09	210 8.27	230 9.06	89 3.50
<b>d</b> [mm] [in]	52 2.05	50 1.97	62 2.44	67 2.64	72 2.83	280 11.02	-
<b>W</b> [kg] [lbs]	-	1.70 3.82	3.20 7.19	4.20 9.44	5.10 11.47	-	-
<b>WR 5005 - Ø</b> <b>Lock nut</b>  material S355J2G3	<b>SW</b> [mm] [in]	30 1.18	36 1.42	41 1.61	46 1.81	50 1.97	60 2.36
<b>L</b> [mm] [in]	20 0.79	20 0.79	20 0.79	25 0.98	25 0.98	30 1.18	-
<b>W</b> [kg] [lbs]	-	0.15 0.34	0.20 0.45	0.25 0.56	0.25 0.56	0.30 0.67	-



## **SECTION TWO**

## 2. Technical data

### ROC F9 - 10/11

#### Weight (Standard equipment Without drill steel)

ROC F9-11	
Weight	16200 Kg
ROC F9-10	
Weight	15600 Kg
ROC F9-LM	
Weight	16300 Kg

#### Performance

Diesel engine, Caterpillar 3176C	
power output at 2000 rpm	231 kW
Temperature range in operation	-25 ° to +50 ° C
Tramming speed, max.	3.6 km/h
Tractive force	112 kN
Gradient angles - tramming (in direction):	
downward/upward, max. without winch	20/20 °
laterally, max.	20/20 °
downward/upward, with winch	35/35 °
Gradient angles for drill rig during drilling:	
Longitudinally, max. (Upward/Downward)	20/20 °
Laterally, single-section boom on extreme gradients (left/right) (max)	20/10 °
Laterally, folding boom on extreme gradients (left/right) (max)	15/7 °
Laterally, LM on extreme gradients	9/2 °
Ground pressure, average	0.075 N/mm <sup>2</sup>
Ground clearance	405 mm
Max. hydraulic pressure	230 bar
Track oscillation	+/- 10 °
Noise level (inside cab)	81.2 dB(A)

Noise level (outside cab)	
Idling (1500 rpm)	109.1 dB(A)
Max. engine speed (2100 rpm)	117.0 dB(A)
Drilling (2000 rpm)	122.9 dB(A)
Vibration in operator's seat during drilling (weighted average)	0.05 m/s <sup>2</sup>

### Hydraulic systems

Hydraulic oil cooler for max. ambient temperature	+50° C
---	--------

### Electrical system

Voltage	24 V
Batteries	
Voltage	2 x 12 V/170 Ah
Working lights	
Voltage	24 V/70W
Generator	
Voltage	28V/80 Ah

### Air system

Compressor: XAH 4 compressor	
Max. air pressure	14 bar
Free air delivery at 10.5 bar	188 l/s
Working pressure	12 bar

### Capacities

Hydraulic oil tank	300 l
Hydraulic systems	
total	380 l
Fuel tank	400 l
Traction gear	3 l
Compressor oil	38 l
Lubricating oil tank	5 l
Diesel engine	17 l
Engine cooling system	60 l

### Miscellaneous

Fire extinguisher	
A-B-C powder	1 x 6 kg

# Dimensions (-10)

## Transport dimensions

Table 2.1. Alt. 1

Length	Width	Height
8600 mm	2490 mm	3800 mm

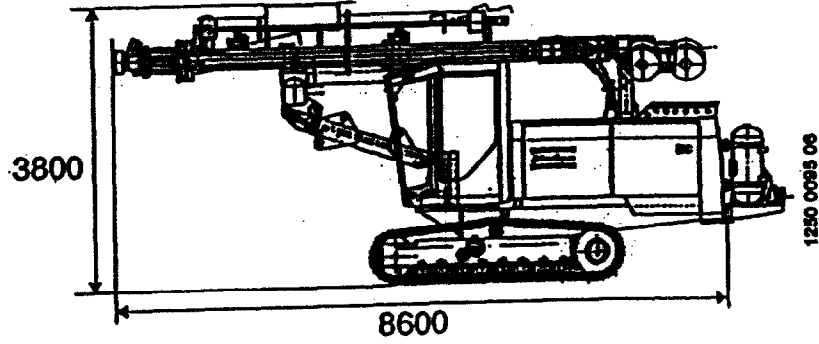


Figure 2.1. Alt. 1

Table 2.2. -10 Alt. 2

Length	Width	Height
12100 mm	2490 mm	3200 mm

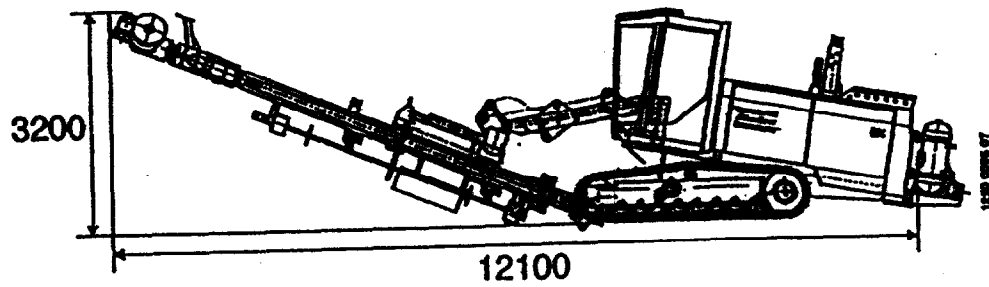


Figure 2.2. Alt. 2



# Dimensions (-10)

## Transport dimensions

Table 2.1. Alt. 1

Length	Width	Height
8600 mm	2490 mm	3800 mm

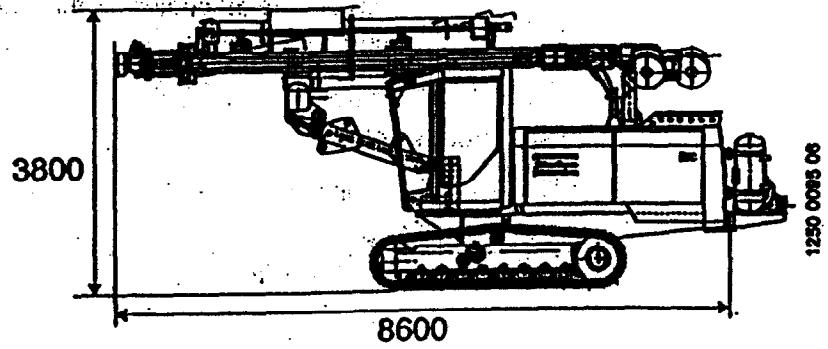


Figure 2.1. Alt. 1

Table 2.2. -10 Alt. 2

Length	Width	Height
12100 mm	2490 mm	3200 mm

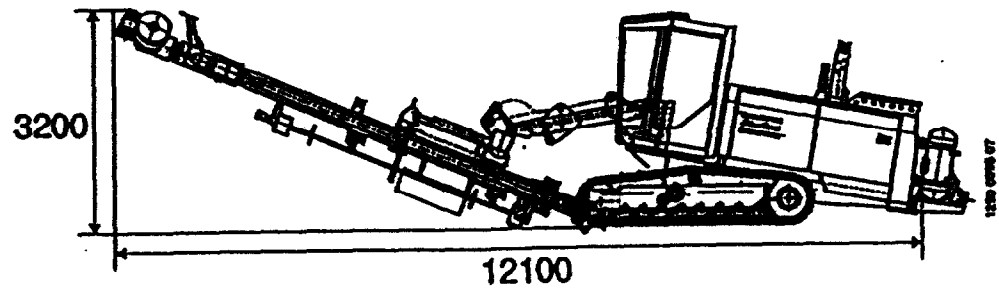


Figure 2.2. Alt. 2

Coverage area

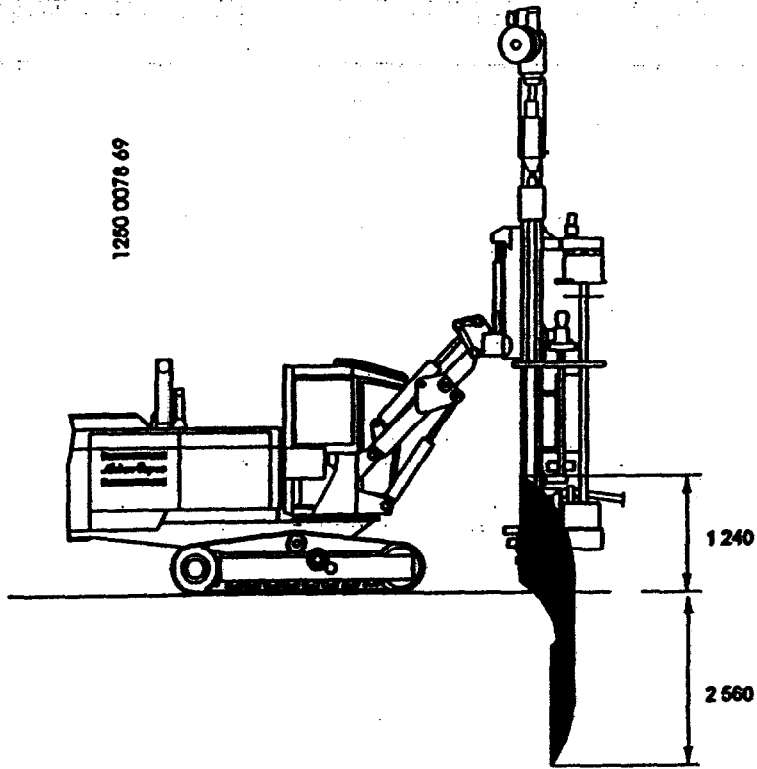


Figure 2.5.

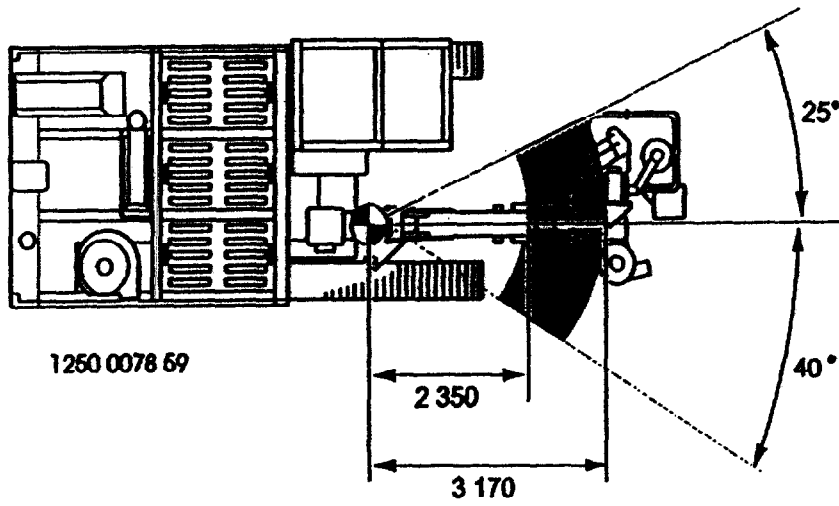


Figure 2.6.

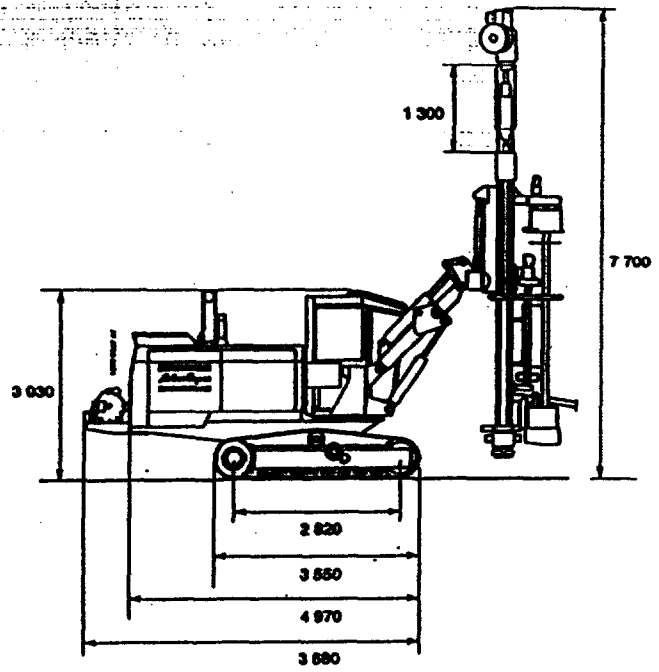


Figure 2.3.

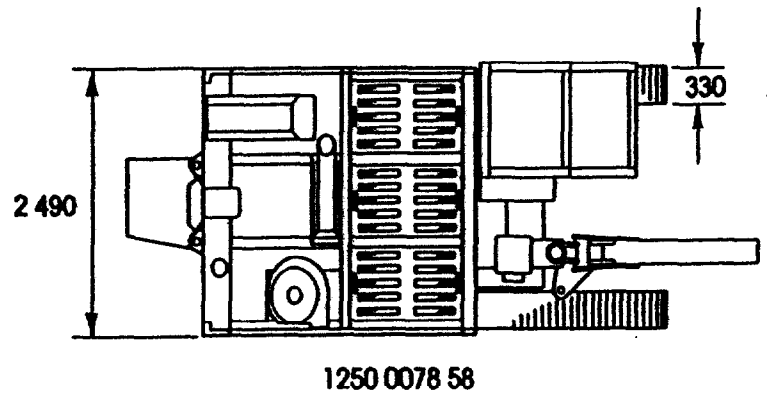


Figure 2.4.

## **SECTION THREE**

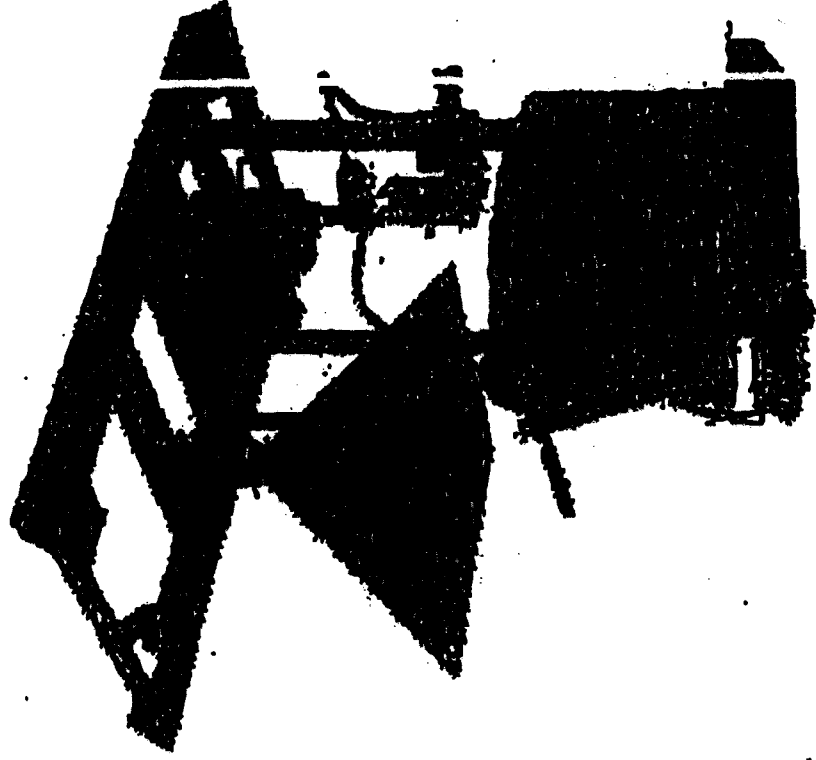
**PROPOSED GROUT MIX**

**(1) 94 LB BAG OF TYPE II  
PORTLAND CEMENT. MIXED WITH  
5 GALLONS OF WATER**

<p><b>M.I. TEST RESULTS</b> Laboratory at Thomaston, Maine</p>	<p>Date: December 7, 2000 Cement Type: II Silo Number:</p>
--	--

CHEMICAL DATA	Percent	PHYSICAL DATA
Silicon Dioxide.....	20.9	Specific Surface.....396 Blaine (sq m/kg)
Alumina & Dioxide.....	4.5	Percent Passing 325 Mesh.....98.2
Ferric Oxide.....	3.3	Compressive strength (psi)
Calcium Oxide.....	63.0	Mortar Cubes
Magnesium Oxide.....	3.0	1 day.....2720
Sulphur Trioxide.....	2.9	3 day.....3810
Loss on Ignition.....	1.54	7 day.....4820
Insoluble Residue.....	0.13	28 day.....
Tricalcium Silicate (ASTM C-150) 54 (AASHTO M-85) 51		Vicat Setting Time
Dicalcium Silicate.....	19	Initial (min.).....100
Tricalcium Aluminate (ASTM C-150) 7 (AASHTO M-85) 8		Final (min.).....245
Sodium Oxide.....	0.27	Air Content (%).....7.5
Potassium Oxide.....	1.10	Autoclave Expansion (%)...0.09
Equivalent Alkali.....	1.00	Certified by:
		<i>J. Kimball for J. E. McKale</i>
		James McKale

We hereby certify that this cement complies with current ASTM C-150 and AASHTO M-85 specifications.



CG 550/030/A

## GENERAL DESCRIPTION

The ChemGrou Model CG550/030/A is an air powered skid mounted cement grout plant consisting of one 44 gallon (166 liter) capacity vertical shaft paddle mixer with an oversize 6" (150mm) diameter discharge gate to facilitate discharge of thick mixes and one CG-030 single acting piston type grout pump. The grout pump is driven by a 6" diameter self-reciprocating cylinder which allows the pump to produce discharge rates up to 14 GPM (38 L/m) and pressures up to 300 psi (20.7 bar). The mixer discharges directly into a top mounted and removable pump hopper, making continuous operation possible.

All pump components are assembled with horseshoe shaped pins making assembly and disassembly for cleaning and maintenance easily accomplished with no special tools.

Simplicity of design and construction ensures years of dependable service with proper and timely maintenance.

Dimensions: 76" (30 CM) X 31" (12.2 CM) X 51" (20 CM)  
Weight: 640 lbs (290 Kg)

**ChemGrou**



# OPERATING INSTRUCTIONS

## GENERAL

### \*\*\*\*\* WARNING \*\*\*\*\*

NEVER PUT HANDS OR TOOLS IN MIXERS OR PUMP UNLESS PRIMARY POWER SOURCE IS SHUT OFF AND DISCONNECTED. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND/OR DAMAGE TO THE MACHINE.

### SET-UP

In general, the most important factors in setting up are proximity to the work and access to materials and water supply; consideration should be given to the disposal of waste materials and wash-out residue.

It is always best to keep grout lines as short as possible to reduce pumping distances. This is particularly important when pumping hard-to-pump materials, such as sanded grouts and pre-blended material.

The source of solid materials (cement, fly ash, sand, etc.) should be readily accessible and an adequate supply of water should be available for mixing and clean-up.

When planning a project for high production rates, it is well to remember that the greatest consumption of time occurs when charging the mixers. A proper set-up can reduce this to a minimum.

### START-UP

After set up, visually inspect that there are no foreign objects or old set up materials in either the pump or the mixer(s), then make all necessary connections.

With operating levers, valves, or handles in either "NEUTRAL" or "OFF" position and the primary power source turned OFF, fill the pump hopper with clear water.

**ChemGroul**

## **OPERATING INSTRUCTIONS (cont'd)**

Turn on the primary power source and observe that conditions are normal and machine is ready to run.

Check each mixer for proper operation by running the mixer in both forward and reverse directions, if it is so constructed as to allow reverse direction.

Next, start the delivery pump to discharge the water that was previously introduced into the pump hopper. This is an ideal opportunity to check the grouting system to determine that all lines and hoses are clear and unobstructed. Pump condition may also be checked at this time by testing discharge pressure.

When it is determined that all systems are normal, shut off the pump and drain the water from the pump and all lines.

**NOTE:** Some pre-blended materials and some on-site mixes of sand and cement tend to separate and clog the hoses upon contact with residual water in the hose; so it's a good procedure to mix and pump out a cement/water slurry prior to mixing and pumping the production material, to lubricate the pump and hoses.

### **PRODUCTION**

During the production phase of the work, monitor pump and mixer performance continuously, being alert to any signs of abnormality.

Keep mixers free of material build-up, keep the outside of the machine clean, and keep pump packing lubricated and just tight enough to prevent leakage. (Section 5)

### **CLEAN-UP**

After disposing of excess production material, carefully wash out mixer tanks, paddles and baffles into the pump hopper and pump the resulting washout material through the grout hoses to a suitable disposal site. Continue this operation until only clear water is discharged.

It is advisable to drain all residual wash water from the pump and all hoses when washout is complete.

**CAUTION: NEVER RUN PUMP WITHOUT FLUID AS IT WILL CAUSE SEVERE DAMAGE TO STATOR AND ROTOR.**

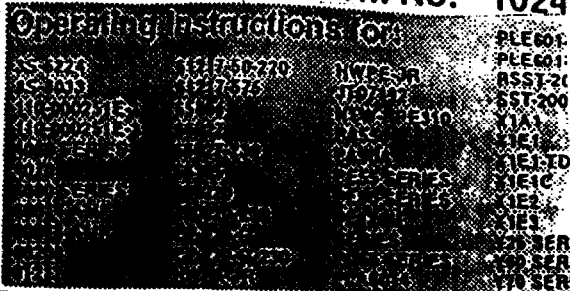
**ChemGROUT**

## **SECTION FOUR**

**POWER TEAM,**  
SPX Corporation  
2121 West Bridge Street  
Owatonna, MN 55060 USA  
Phone: (507) 455-7100  
Tech. Services: (800) 477-8326  
Fax: (800) 765-8326  
Order Entry: (800) 541-1418  
Fax: (800) 288-7031  
International Sales: (507) 455-7150  
Fax: (507) 455-7122

**OTC**  
SPX Corporation  
655 Eisenhower Drive  
Owatonna, MN 55060-0995 USA  
Phone: (507) 455-7000  
Tech. Services: (800) 533-6127  
Fax: (800) 955-8329  
Order Entry: (507) 455-1480  
Fax: (800) 283-8665  
International Sales: (507) 455-7223  
Fax: (507) 455-7746

Form No. 1024

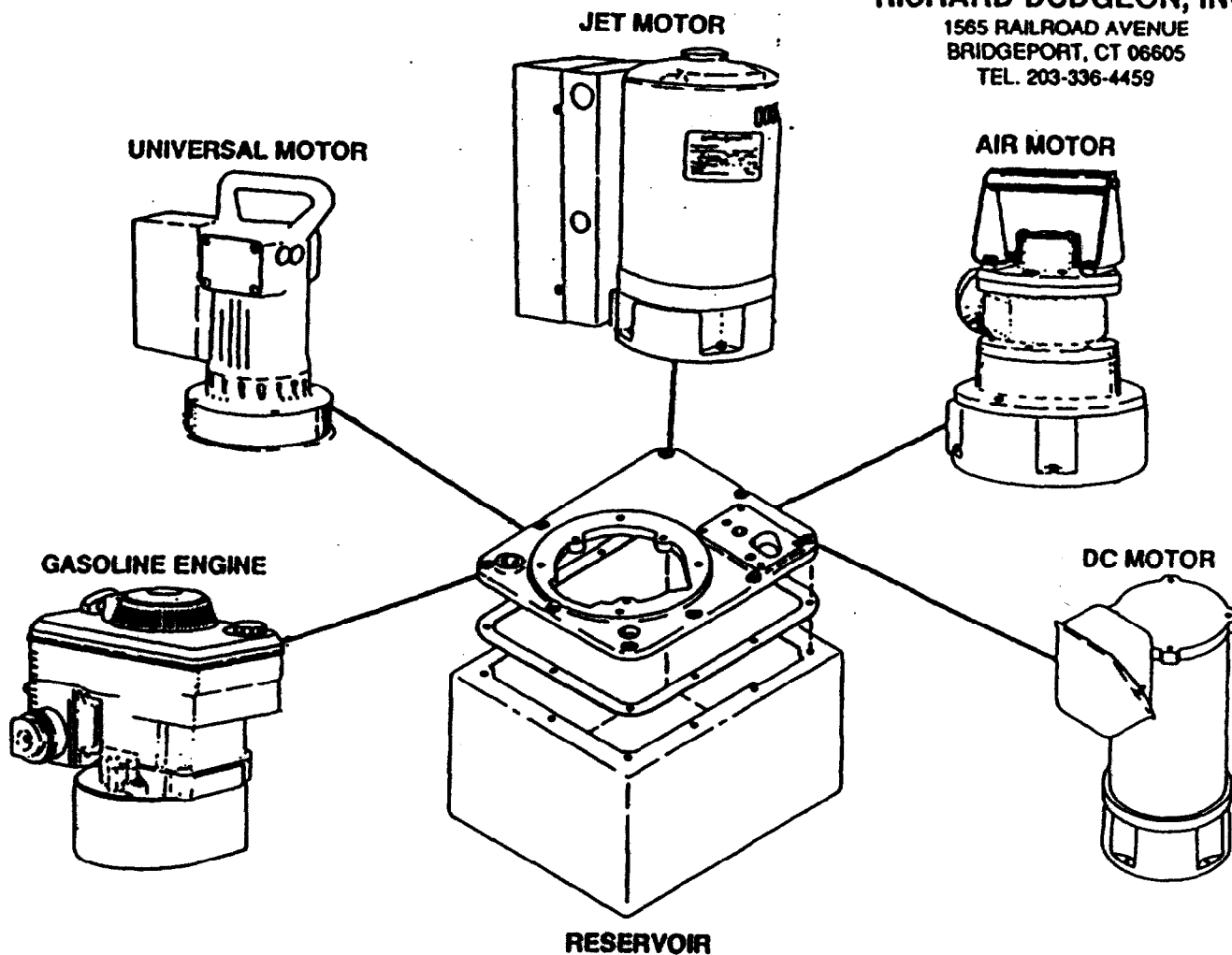


# AIR, ELECTRIC, OR GAS-POWERED TWO-STAGE HYDRAULIC PUMP

5,000 OR 10,000 PSI

RICHARD DUDGEON, INC

1565 RAILROAD AVENUE  
BRIDGEPORT, CT 06605  
TEL. 203-336-4459



**NOTE:**

- Carefully inspect the pump upon arrival. The carrier, not the manufacturer, is responsible for any damage resulting from shipment.
- Read and carefully follow these instructions. Most problems with new equipment are caused by improper operation or installation.
- The hydraulic power unit can be ordered with "building block" flexibility. The customer can choose from a variety of motors, controls, reservoirs, and other options. Because of the many options available, these instructions will include directions for options that your particular pump may not have.
- Do not change motors without consulting the pump manufacturer's Technical Services Department.

Notes Shaded areas reflect last revision(s) made to this form.

Sheet No. 1 of 7

Rev. 5 Date: 12 May 1999

RICHARD DUDGEON, INC.

1565 RAILROAD AVE. BRIDGEPORT, CT 06605 TEL: 203-336-4459

FAX: 203-333-84

FACTORY/SHIPPING ORDER

RENTAL NO: L13303

SHIP DATE: 07/01/02

CUSTOMER: MAINE DRILLING & BLASTING

VIA: BEST WAY

TELEPHONE: 207-582-2338

SHIP ADD: BRUNSWICK ROAD, RTE 201

ORDER DATE: 06/08/02

SHIP ADD: RTE 201

P O No.: VERBAL, STEVE

SHIP CITY: GARDNER

ST: ME

Z: 04345

QTY	ITEM NO	DESCRIPTION	SERIAL No.'s, etc
1	J1508DC	JACK, 150 TON, 8" STR, DA, 3-1/8" CH	3559
1	GW1006Q	CERT GAUGE, 10000 PSI, 6", QDC	2100504
1	PE554	PUMP, ELEC (115V), 2.5 GAL, 4-W V	319483
1	HLHVG	HOSE LHV-GAGE TEE, QDC'S	
1	H63WQ	HOSE, 6FT, 3WIRE, 1/2" ID, QDC'S	
3	H203WQ	HOSE, 20FT, 3 WIRE, 1/4" ID, QDCS	
*		*****	
1	JCR	JACK/GAGE CALIBR'N RPT	
	CALINC	120 TON TOTAL, 20 TON INCREMENTS	
2	JC	CHAIR FOR 150T-6", 3-1/8" CH JACK	

ORDER CHECK LIST:  QDC SPARES KIT  HYDRAULIC SCHEMATIC  CONVERSION CH  
 GAUGE CERTIFICATION  JACK/GAUGE CALIBRATION  LOAD CELL CALIBRATION

INSTRUCTIONS:  GENERAL  LOAD CELL  PILE TEST  PUMP  SPECIAL

ORDER PREPARED BY: \_\_\_\_\_ SUPERVISORS CHECK: \_\_\_\_\_

SHIPMENT RECEIPT: DATE: \_\_\_\_\_ CUST. SIGNATURE: \_\_\_\_\_

RETURNED EQUIPMENT RECEIPT

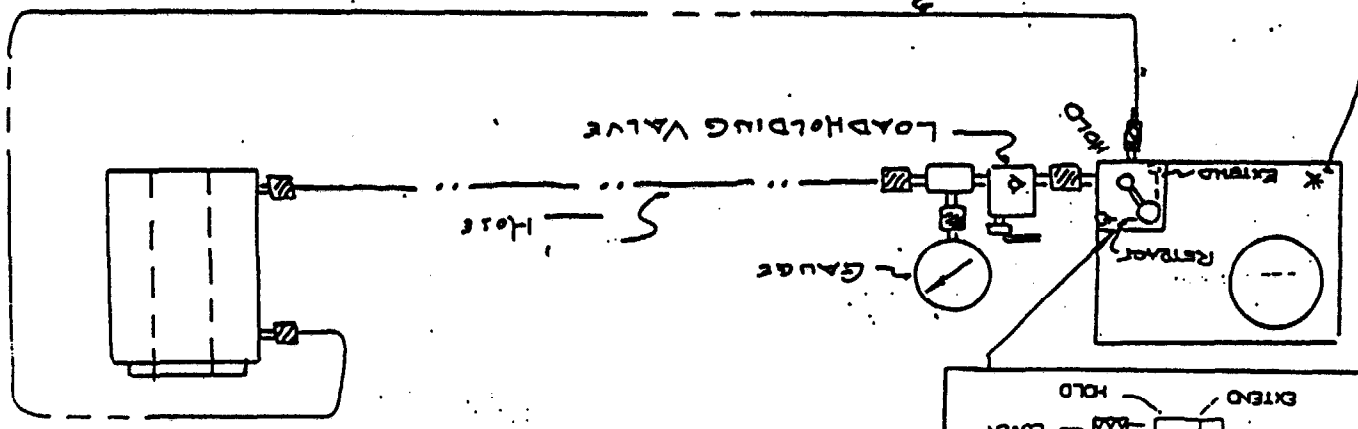
VISUAL INSPECTION, PARTS MISSING OR DAMAGED \_\_\_\_\_

RDI SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_  
FILE - D:\QA\QATEXT\SHOP.FRM - (SHOP.FRM-OCT 24, 1995)

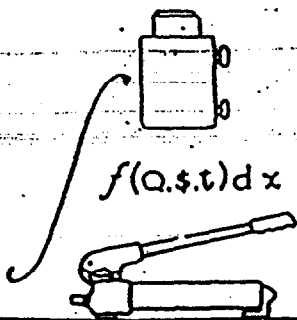
ESTIMATED EQUIPMENT WEIGHT: 219.6 LBS

Date \_\_\_\_\_ By \_\_\_\_\_ Ref: \_\_\_\_\_  
**RICHARD DUDGEON, INC.**  
 1565 RAILROAD AVENUE  
 BRIDGEPORT, CT 06605  
 PHONE (203) 336-4459 • FAX (203) 333-8417  
 TOLL FREE 1-800-857-3047  
 1-888-DUDGEON  
 HYDRAULIC SCHEMATIC PREPARED FOR

"STROKE"  
 TON  
 HYDRAULIC JACK  
 CENTERHOSE



- EXTEND**
1. Close Loadholding Valve clockwise hand tight.
  2. Place Pump Control Valve in "Hold" position.
  3. Start Pump.
  4. Place Pump Control Valve in "Extend" position and note extension and gauge pressure.
- Note: To hold load for any length of time, place pump control valve in "Hold" position.
- LOWER (UNDER LOAD)**
1. With pump off, place Pump Control Valve in "Retract" position.
  2. Slowly open Loadholding Valve and lower at desired rate or bleed pressure gently out of system.
- RETRACT**
1. With no pressure showing on gauge, fully open Loadholding Valve counterclockwise.
  2. Place Pump Control Valve in "Hold" position.
  3. Start pump.
  4. Place Pump Control Valve in "Retract" position and close jack.



# RICHARD DUDGEON, INC.

MANUFACTURERS AND DESIGNERS OF HYDRAULIC SYSTEMS SINCE 1850  
 1845 Railroad Ave., Bridgeport, CT 06605

Tel (203) 336-4459  
 Fax (203) 333-8417  
 (800) 927-7217

## JACK CALIBRATION REPORT

Cylinder 150 Tons Capacity, 8 " Stroke, Serial No. RT 3559  
 Gauge 10,000 PSI Rating, 6 " Dial Dia., Serial No. Z7005W4

NOTICE: Calibration reports prepared by Richard Dudgeon, Inc. are submitted on a confidential basis and the data contained therein is our customer's proprietary information. Such reports may or may not be used by others without the express written consent of Richard Dudgeon, Inc and its' customer.

Dudgeon Order No. L13803 Order Date 4/28/02 Test Date 7/1/02  
 Customer MAINE DRILLING + BLASTING Purchase Order No. VERBAL  
 Test Performed By W. Reid In 700 Ton Load Frame, S/N 700TF-1  
 Output Measured By 190 Ton Loadcell S/N 692029PM, with Strain Indicator Model P3500, S/N 89611, Test No. 2.333 Zero Set +/- 0000.

Test Method: Cylinder pressure increased in even increments at slow rate by hydraulic pump. Output force of cylinder measured by calibrated Loadcell (within a tolerance of one percent) between 20 and 190 tons and traceable to the Nat'l Institute of Standards and Technology (formerly the Nat'l Bureau of Standards).

LOAD ON CYLINDER (KIPS/TONS)	GAUGE READINGS IN PSI AT RAM EXTENSIONS OF			AVERAGE PRESSURE (PSI)
	2 INCHES	4 INCHES	6 INCHES	
20	1300	1325	1325	1325
40	2650	2650	2650	2650
60	3950	3950	3950	3950
80	5300	5925	5925	5925
100	6600	6600	6600	6600
120	7950	7950	7950	7950

RICHARD DUDGEON, INC.

1565 RAILROAD AVE. BRIDGEPORT, CT. 06605 TEL:203-336-4459 FAX:203-333-8417

PRESSURE GAUGE CERTIFICATION

CUSTOMER: MAINE DRILLING & BLASTING

CUSTOMER'S ORDER NO                      DUDGEON ORDER NO.                      ORDER DATE  
VERBAL, STEVE                              L13303                                      06/08/02

GAUGE SERIAL NO.    CAPACITY

2700SW4    10,000 Psi 1 1/2" φ

WE HEREBY CERTIFY THE ABOVE HYDRAULIC GAUGE HAVE BEEN TESTED AGAINST OUR HEISE DIGITAL PRESSURE INDICATOR, SERIAL NO. S7-9400 AND FOUND TO BE WITHIN A STANDARD ACCURACY (PLUS OR MINUS 1/2%) OF FULL SCALE. OUR TEST EQUIPMENT IS TRACEABLE TO THE NATIONAL BUREAU OF STANDARDS.

REFERENCE PRESSURE (PSI)	GAUGE READING (PSI)
0	0
1000	950
2000	1950
3000	2950
4000	3950
5000	4950
6000	5950
7000	6950
8000	7950
9000	8950
10000	x

RICHARD DUDGEON, INC.

W. Reed  
DATE: 7/1/02



**Load**

**AL**

**0.25 P**

**AL**

**0.25 P**

**0.50 P**

**AL**

**0.25 P**

**0.50 P**

**0.75 P**

**AL**

**0.25 P**

**0.50 P**

**0.75 P**

**1.00 P**

**AL**

**0.25 P**

**0.50 P**

**1.0 P**

**1.25 P**

**AL**

**0.25 P**

**0.50 P**

**1.0 P**

**1.25 P**

**1.50 P Test Load (10 minute hold)**

**Adjust to Lockoff Load**

**Proof Tests**      *All other anchors*

The proof test shall be made by incrementally loading the anchor in accordance with section 3.7.2 of the PTI manual, this specification and the following load increments:

**P = Design Load as indicated on the drawings**

**AL = Alignment Load = 10 tons**

**Loads**

**AL**

**0.25 P**

**0.50 P**

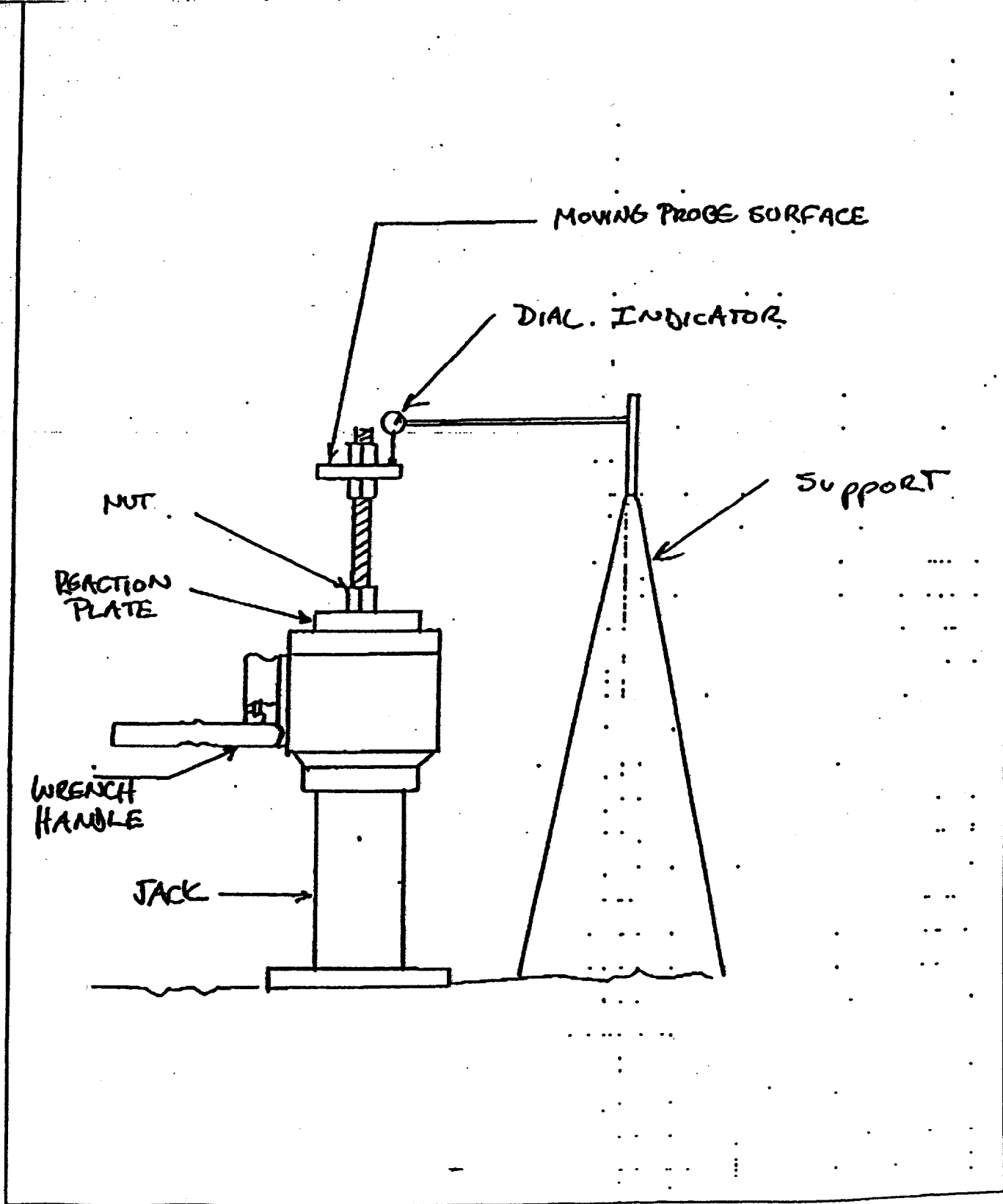
**0.75 P**

**1.0 P**

**1.20 P**

**1.33 P Test Load (10 minute hold)**

**Adjust to Lockoff Load**







# CALIBRATION REPORT

FORM#CAR\_MTI.1

## MAINE DRILLING & BLASTING

Certificate Number 501405

Control Number I103915

Asset No. I103915

Due Date: 05/22/2001

Description: INDICATOR

Result: PASS

Manufacturer: STARRETT *DEAL GAUGE*

Cal Frequency Months: 12

Model: 25-2041

Performed on: 05/22/2000

Serial#: NA

Cal Tech: Calibration Tech #14

Procedure: A0081 IND .001 RES 2.000 Inch INDYST-01

Environment: Temp. 72.0°F Humid: 42

Location: NA

Condition FIL: AS-FOUND

Notes: CALIBRATED AND CERTIFIED

This certifies that the above named instrument has been calibrated by comparison with standards traceable to the National Institute of Standards and Technology, in compliance with ANSINGSL Z540-1-1994 and ISO 10012-1.

Standards Used

Asset	Mfg	Model	Description	Cal. Date	Due D
INDYST-01	STARRETT	716	INDICATOR TESTER	3-May-00	3-May

Test Data

TEST#	STD PARAMETER	TRUE VALUE	READING	UNIT UNDER TEST TOLERANCE	UT ERROR	ERROR in (% of Tol)	NOTIFY USER
INITIAL PROCEDURE							
Resolution = .001 Tolerance = .001							
UIT set to zero.							
1	Result of Operator Evaluation						PASS
2	2.0000 Inch		2.0000	.002Inch	0 Inch	0	
3	1.5000 Inch		1.4997	.002Inch	-0.0003 Inch	15	
4	1.0000 Inch		0.9997	.002Inch	-0.0003 Inch	15	
5	0.5000 Inch		0.4999	.002Inch	-0.0001 Inch	5	
6	0.2500 Inch		0.2494	.002Inch	-0.0006 Inch	30	
7	0.2000 Inch		0.1993	.002Inch	-0.00075 Inch	38	
8	0.1000 Inch		0.1002	.002Inch	0.00015 Inch	7	
9	0.0500 Inch		0.0502	.002Inch	0.0002 Inch	10	
10	0.0300 Inch		0.0302	.002Inch	0.00015 Inch	8	
11	0.0150 Inch		0.0149	.002Inch	-0.0001 Inch	5	
12	0.0050 Inch		0.0050	.002Inch	0 Inch	0	
13	0.0020 Inch		0.0020	.002Inch	0 Inch	0	

End of Test Data

*Nicah Gilbert*  
Checked by *Wong*  
Page 1 of 0

Report for Control Number I103915

Printed on: 05/23/2000

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## **SECTION FIVE**