Comments Due 4/9/2014

Agency of Transportation

Program Development Division
Construction Section

TO: ~~Carl Gleason, A. L. St. Onge~~ Scott

FROM: ~~Scott Wheatley, Resident Engineer~~ Carl

DATE: ~~February 12, 2014~~ March 26, 2014

SUBJECT: Enosburg BRO 1448(40) – Micropile Submittal Received 2-6-14

The following comments apply to the Micropile submittal received 2-5-14.

- **It is not evident that Stephen Christo was superintendant or even involved with the mircopile projects listed under Thomas' work history. Please clarify.** Stephen Christo has work continuously for Thomas since 1986 and has been involved with most of their Micro Pile Projects as referenced in the Plan. The 5 Micro Pile projects listing Stephen as Installer are separate from the others. Stephen was "superintendant" (as you characterize) on these 5 projects as well as many of the other.
- **Down the hole hammer needs approval by Engineer. This method is proposed for use by Thomas Drilling and Blasting** A DTH hammer is the appropriate piece of equipment
- **Where will the water for grout mixing come from? How much water is added per bag of type I/II cement? What specific cement manufacturer is planned for use?** AL St. Onge will provide the potable water used in the grout. Thomas' Plan details a W/C ratio of .45 with a Type I-II Portland cement.
- **Who will test the specific gravity of the grout on site? Who will acquire the grout samples and test compression strengths?** Stephen Christo will supervise the SG testing and the cubes will be tested at an approved laboratory (Possibly Knight Engineering)
- **Micropile layout drawing not supplied to show pile numbering and installation sequence** The Plan is to Drill Abutment 2 piles first. Starting with #1 and #6 and working backwards out of the hole towards #5 and #10. Then Abutment 1.
- **Please provide a drawing to show the planned cased drill setup (i.e., drill mandrel, bit lengths, casing lengths).** Casing lengths are 5',threded
- **Please provide a drawing to show the planned grouting setup (i.e., rod, centralizers, grout tube all attached); show sizes of each component** The Plan details "When ready for installation the anchor rod with centralizers is placed to the bottom of the rock socket…."
- **Provide the worksheet planned for use by the Contractor to record drilling data** Drilling day to be collected is- From the top of precast footing- the length to ledge, length in ledge, and lenth of rock socket.
- **Welder certifications and welding procedures not provided** St. Onge will provide a certified Welder.

THOMAS DRILLING AND BLASTING CORPORATION

BOX 200, SPOFFORD, NEW HAMPSHIRE 03462
TELEPHONE 603-363-4706

BILLING ADDRESS:	THOMAS DRILLING AND BLASTING. 1453 Route 9, Box 200 Spofford, NH 03462
TELEPHONE: FAX:	603/363-4706 603/363-4249
OFFICERS:	DAVID M. THOMAS, President LYNN M. THOMAS, Vice President
FEDERAL TAX ID#:	02-0505064
BANK INFORMATION: LOCATION; Bank Officer: Telephone:	Hampshire First Bank Keene, NH Christine Greenwood 603-353-1674

* Work Through out New England and New York.
* Drilling, Blasting,
* Rock and Soil Anchors.
* Grouting
* Non-Explosive Rock and Concrete Removal.

I did not see the layout drawings as required by Special Provision 52 (b) (9)

THOMAS DRILLING AND BLASTING

BOX 200, SPOFFORD, NEW HAMPSHIRE 03462

TELEPHONE 603-363-4706

Thomas Drilling and Blasting Corp has managed and supervised drilling and blasting and anchor projects through out the New England States and New York since 1972. Responsible for production, safety, quality control and operations.

We have licensed blasters in the states of Vermont, New Hampshire, Maine, Massachusetts, Connecticut, Rhode Island, New York and Pennsylvania.

Thomas Drilling & Blasting Corporation is experienced in all phases of Drilling and Bolting. We install rock and soil anchors and do grouting for dams, roads, utility construction, rock stabilization, tie back, soil nails, minipiles, and foundations among others.

We operate and supervise the operation of pneumatic and hydraulic drilling equipment including core, rotary, rotary percussion, both top hammer and down the hole hammer.

We own and operate all the necessary equipment for the installation, post tensioning, proof and performance testing of the anchors we install.

We can provide geotechnical engineering if required.

We are associated with the following organizations:

The International Society of Explosives Engineers
The Associated General Contractors
The Maine Better Transportation Association

Project:	Newington Cogeneration Facility	2001
Anchors:	1 ½ in DCP Epoxy Coated To 84ft for Ocean Intake Structure	
Contractor:	Callanhan Brothers Const	
Contact:	Tim Saunders	
Phone:	207 443 9747	
Project:	TV Tower, Baldwin, ME	2001
Anchors:	2 ½ in, DCP 150 KSI, Tested to 585 KIPS	
Contractor:	Warren Construction	
Contact:	Peter Warren	
Phone:	207 865 3522	
Project:	Cellular Tower, New Salem, MA.	2001
Anchor:	1 ¼ Epoxy Coated Post Tensioned Tower Base	
Contractor:	Wescott Telecommunications	
Contact:	Steve Bosworth	
Phone:	508 695 3565	
Project:	Bridge over School ST. Lowel MA.	2001
Anchor:	1 ¼ Epoxy Coated Post Tensioned Through Granite Foundation	
Contractor:	S & R Construction.	
Contact:	Peter Salinder	
Phone:	978-441-2000	
Project:	Rte 9 Bridge over CT. River Chesterfield NH	2002
Anchor:	1 ½ Grouted Tie Backs for Cofferdam Support	
Contractor:	Cianbro Corporation	
Contact:	Joe Foley	
Phone:	207-487-3311	
Project:	Westfield MA, Waste Water Treatment Facility	2002-2003
Anchor:	1 ¼ Epoxy Coated Post Tensioned Anchors Grouted	
Contractor:	Metheuen Construction Corp.	
Contact:	Jamie Pedro	
Phone:	603-328-2222	

Project:	New England Patriots Practice Facility, Foxboro MA	2003
Anchor:	40 mm Drillable Cement Grouted for Tie Down	
Contractor:	Summit Structures	
Contact:	David Howell	
Phone:	877-413-7197	
Project:	New England Deaconess Nursing Facility, Concord MA	2004
Anchor:	40 mm Soil Anchors for tieback walls 90kips	
Contractor:	FES Inc	
Contact:	Mike Emerson	
Phone:	(781) 284-1600	
Project:	Retaining Wall Repair. Quincey MA. MBTA	2004
Anchor:	Soil Anchor 1 ¾ 70 kips	
Contractor:	FES Inc.	
Contact	Mike Emerson	
Phone:	(781) 284-1600	
Project:	Repair of Graving Dock 3, Electric Boat Groton, CT	2005
Anchor:	1100 Rock Anchors 17/8 DCP Tested to 325 kips	
Contractor:	Kiewit Construction	
Contact	Jim Boyle	
Phone:	201-392-2266	
Project:	New Retaining Wall, Springfield VT, State of VT	2005
Anchor:	Rock Anchors 17/8 DCP 60 ft long	
Contractor:	Miller Construction.	
Contact	Roger Gillman	
Phone:	802-674-5525	
Project:	Metropolitan Boston Transportation, Greenbush Line	2005 - 2006
Anchor:	Rock Anchors 1, 1 ¼ , 1 3/8 Hingham MA., Weymouth MA	
Contractor:	J Cashman Inc.	
Contact	Chris Koegh, Jamie Doyle VP	
Phone:	339-237-1375, 781-335-5001	

Thomas Drilling & Blasting Rock Anchor Projects

Project:	State of Maine DOT Pasaconway Bridge York ME	2006
Anchor:	60ft 1 ¼ Grade 150 bars Epoxy Coated	
Contractor:	Reed & Reed	
Contact	Ted Clark	
Phone:	207-443-9747	
Project:	State of Maine DOT Brunswick, ME Bridge	2006
Anchor:	12 ft Epoxy Anchored Dowels 1 3/8	
Contractor:	Wyman & Simpson	
Contact	Dennis Strout	
Phone:	207-737-4471	
Project:	Repair of Graving Dock 1 and 2, Electric Boat Groton, CT	2007
Anchor:	Rock Anchors 17/8 DCP Tested to 325 kips	
Contractor:	Kiewit Construction	
Contact	Mark Dubois	
Phone:	203-410-4551	
Project:	Retaining Wall Reconstruction Castle Village Apts, Bronx	2007
Anchor:	R38 Bars 40 ft deep	
Contractor:	Kiewit Contractors	
Contact	Jim Boyle	
Phone:	201-392-2266	
Project:	Pile Anchors, Mount Tom Power Station, Holyoke MA.	2007- 2008
Anchor:	1 7/8 Grade 150 to 60 ft long	
Contractor:	Sea and Shore Contracting	
Contact	Mike Lally	
Phone:	617-523-1692	
Project:	St Paul's Academy, Concord NH	2008
Anchor:	1 3/8 150KSI Foundation Anchors	
Contractor:	North Branch Builders	
Contact	Jim Schwartzkopf	
Phone:	603-428-3233	

Project:	Super Stop and Shop Market, Meredith NH	2008
Anchor:	1 ¼ 150KSI 50 ft long Foundation Anchors	
Contractor:	Sea & Shore Inc.	
Contact	Mike Lally	
Phone:	781- 767-0090	

Project:	NY State DOT, Pedestrian Bridge over I 95New Rochel, NY	2008
Anchor:	1 3/8 Multi Corrosion Protected 75ft Long Anchors for Retaining Wall	
Contractor:	ELQ Industries	
Contact	Matthew Viviano	
Phone:	914-654-1040	

Project:	AT&T Cell Tower Hudson, NH	2008
Anchor:	1 inch 150 KSI 25ft long	
Contractor:	CZ Construction	
Contact	Mark Couch	
Phone:	603-731-8375	

Project:	AT&T Cell Tower Gorham, NH	2008
Anchor:	1 3/8 inch 150 KSI 30ft long	
Contractor:	CZ Construction	
Contact	Mark Couch	
Phone:	603-731-8375	

Project:	Rockport Music Festival, Rock Port MA	2008
Anchor:	1 7/8 Multiple Corrosion Grade 150 25ft long	
Contractor:	Consigli Construction Corp	
Contact	Richard Scopelliti	
Phone:	508-458-0395	

Project:	US Coast Guard- Boston Light	2009
Anchor:	1 ¾ Multiple Corrosion Protected 75ft long for pipe piles	
Contractor:	Atlantic Mechanical Inc.	
Contact	Larry Paul	
Phone:	207-386-0556	

Project:	Central Vermont Public Service, St Johnsbury, VT	2009
Anchor:	1 3/8 Multiple Corrosion Protected 40 ft long	
Contractor:	Bancroft Contracting	
Contact	Allan Howe	
Phone:	207-743-8946	

Project:	Vinalhaven Wind Project, Vinalhaven, ME	2009
Anchor:	2 ½ inch Grade 150 40ft long Foundation Anchors	
Contractor:	Cianbro Construction Inc.	
Contact	Chad Allen	
Phone:	207-487-3311	

Project:	Ashley Lake Dam, Beckett MA,	2009
Anchor:	1 3/8 Multiple Corrosion Protected, 35ft Long	
Contractor:	N.E. Infrastructure	
Contact	Jason Mauro	
Phone:	978-293-3535	

Project:	Worcester MA, Vocational Tech High School	2009
Anchor:	1 ¾ Grade 75 Dowels 8ft For Foundation Pinning	
Contractor:	O'Conner- Consigli	
Contact	Bob Marsh	
Phone:	781-830-1939	

Project:	AT&T Cell Tower (Rehab) Sterling MA.	2009
Anchor:	SRI Sting Ray anchor	
Contractor:	Mid-State Communications	
Contact	Scott McGregor	
Phone:	315-736-3061	

Project:	New York City, Willis Ave Bridge over the Harlem River	2009
Anchor:	1 3/8 Grade 150 Tie-Back Anchors 50Ft long	
Contractor:	Kiewit Constructors	
Contact	Travis Moore	
Phone:	201-571-2673	

Project:	Portsmouth Naval Shipyard, NH / Drydock#2	2010
Anchor:	2 ½ Grade 150Vertical Tie Down, 1 3/8 Wall, 1 3/8 Floor Dowels	
Contractor:	Cianbro	
Contact	Dave Shorey	
Phone:	1-207-416-2821	

Thomas Drilling & Blasting Rock Anchor Projects

Project:	I93 Exit 3 NHDOT	2010
Anchor:	1 ¼ Grade 150 Dowels 45 Kips	
Contractor:	Mass Rock (Saunders)	
Contact	Maureen Saunders	
Phone:	978-365-7611	
Project:	Vergennes VT Hydro Project	2010
Anchor:	1 ¾ Grade 150, 1 ¼ Grade 150 Dowels, #13, 16, 20 Strand Anchors	
Contractor:	Pizzagalli Construction Company	
Contact	Justin Reed	
Phone:	802-651-1378	
Project:	Kibby Series "A" Eustis, ME	2010
Anchor:	2 ½ Guy Anchor Grade 80 Epoxy Coated	
Contractor:	Northline Utilities	
Contact	David Rezsnyak	
Phone:	518-647-8198	
Project:	Knickerbocker Bridge Boothbay, ME	2010
Anchor:	1 3/8 Grade 150 MCPIII Epoxy Coated	
Contractor:	Wyman & Simpson	
Contact	Kim Suhr	
Phone:	207-737-4471	
Project:	Shelburne Falls Dam Shelburne Falls, MA	2011
Anchor:	1" Grade 150 DCP 47'	
Contractor:	CCB Inc.	
Contact	Rick Hastings	
Phone:	1-207-615-2443	
Project:	Little Bay Bridge, Newington, NH	2011
Anchor:	40/15 IBO Soil Nails	
Contractor:	Cianbro	
Contact	Nate Goff	
Phone:	1-207-416-5130	

Thomas Drilling & Blasting Rock Anchor Projects

Project:	Spruce Mountain Wind Tower	2011
Anchor:	3" Diameter Grade 150 Bars 42 Feet Long	
Contractor:	Cianbro	
Contact	Bradley Grillo / Red Webster	
Phone:	207-619-1207	

Project:	Wiswall Dam	2011
Anchors:	1 7/8 Diameter Grade 150 Bars 35 Feet Long	
Contractor:	Reed & Reed	
Contact	Jim Wentworth	
Phone:	207-319-8530	

Project:	Mountain Blue Tower Site	2011
Anchor:	1 ¼ Diameter Grade75 Re-bar 30 Feet Long	
Contractor:	Timberline Construction	
Contact	Steve Bosworth	
Phone:	617-438-5676	

Project:	Worumbo Dam	2011
Anchors:	#8 & #11Grade 60 Rock Dowels 10 Feet Long	
Contractor:	Cianbro	
Contact	Brayden Sheive	
Phone:	207-416-8367	

Project:	Verizon Tower Site	2011
Anchors:	1 ¼ Diameter Grade 150 Bars 21 Feet Long	
Contractor:	Mikel Construction	
Contact	Mike Moran	
Phone:	518-522-9799	

Project:	Dry Dock #1 Portsmouth Naval Shipyard	2011
Anchors:	1" Diameter Grade 150 All Thread Bars 12 Feet Long	
Contractor:	Cianbro	
Contact	Dave Shorey	
Phone:	207-553-2781	

Project:	Groton Wind Project Rumney, NH	2012
Anchors:	3" Diameter Grade 150 All Thread Bars 50' Feet Long	
Contractor:	Cianbro	
Contact	Pat Holland	
Phone:	207-416-7023	

Project:	Georgia Mountain Wind Project	2012
Anchors:	3" Diameter Grade 150 All Thread Bars 50 Feet Long	
Contractor:	Cianbro	
Contact	David Butler	
Phone:	860-878-8794	

Project:	Berlin Biomass Facility	2012
Anchors:	7" Diameter Mini-Piles / Anchors	
Contractor:	Mascaro Construction	
Contact	Dan Kmetz	
Phone:	603-326-3422	

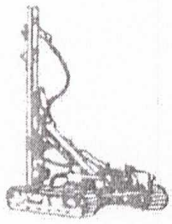
Project:	Brookfield Power	2012
Anchors:	1 7/8" Dia Grade 150 Anchors 80' deep	
Contractor:	Rozell Industries	
Contact	Bill Tatko	
Phone:	518-793-2634	

Project:	PNSY Drydock #1 Outer Seat Modernization	2012
Anchors:	Horizontal Wall Dowels / Verticle Floor Dowels	
Contractor:	Triton Marine Construction	
Contact:	Steve Slayton	
Phone:	843-513-7294	

Project:	Metro North RR Tieback / Micropile Project	2013
Anchors:	6 5/8 Casing 1 5/8 MCP Anchor	
Contractor:	Kiewit Infrastructure	
Contact:	Rob Culver	
Phone:	312-907-6152	

Project:	Bridge Replacement – County Road 48 Over Saranac River Micropile Project	2013
Anchors:	8 5/8 Casing 1" Grade 97 Anchor	
Contractor:	Friend Commercial Contracting	
Contact:	Beth Friend	
Phone:	518-534-2629	

Project:	AT & T Tower Foundation / Micropile Project	2013
Anchors:	8 5/8 Casing #7 Grade 97 Anchor	
Contractor:	Wireless Construction	
Contact:	Kyle Purington	
Phone:	207-642-5751	



THOMAS DRILLING AND BLASTING CORPORATION

1453 ROUTE 9, BOX 200
SPOFFORD, NEW HAMPSHIRE, 03642
TELEPHONE: 603 363-4706
FAX: 603-363-4249

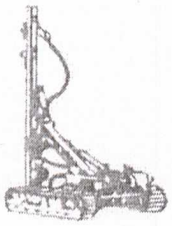
Stephen Christo
Project Superintendent

History:

- Worked for Thomas Companies continuously since 1986. Responsible for production and supervision of drilling and blasting, rock anchor and grouting projects.

Rock Anchor Experience:

- Worked on numerous anchor projects since 1986. Experience in installation and testing of the following anchor systems manufactured by Dywidag Systems International, Williams Form Engineering Corp. and SAS Stressteel:
    - Rock Anchor Solid Tendons, 150KSI, Grade 75, Grade 60, and Reinforcing Bar Mechanical Expansion, Grouted, Grouted and Post Tensioned, Epoxy Grouted, Epoxy Coated, Double Corrosion Protected.
    - Rock Anchors Hollow Tendons, Grade 75, Grade 60, and Reinforcing Bar Mechanical Expansion, Grouted, Post Tensioned.
    - Soil Anchors, Hollow Drillable, Grouted and Post Tensioned.
- The above anchors has been installed vertical down, vertical overhead, horizontal, battered, in cofferdams, retaining walls, foundations, pipe piles, tower bases and soil.



THOMAS DRILLING AND BLASTING CORPORATION

1453 ROUTE 9, BOX 200

SPOFFORD, NEW HAMPSHIRE, 03642

TELEPHONE: 603 363-4706

FAX: 603-363-4249

Stephen Christo – Installer

1. Portsmouth Naval Shipyard
   Cogeneration Upgrade
   Abington Constructors – Contractor
   U.S. Navy – Owner
   40' 2 ½" MCPIII Anchors

2. Baldwin, ME TV Towers
   Spectra-Site – Contractor
   65' 2 ½" MCPIII

3. Route 9 Bridge, Chesterfield NH
   Cianbro – Contractor
   1 ¼" Soil Nails for Sheet Pile Tieback

4. Vinalhaven Wind Park
   Vinalhaven, ME
   Cianbro – Contractor
   45' 2 ½" 150 KSI

5. Graving Dock Repair
   Groton, CT
   Kiewit – Contractor
   Electric Boat – Owner
   25' 1-7/8" MCPIII – 1500 Anchor


GILL ROCK
DRILL COMPANY INC.
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THE GILL BEETLE
A Versatile, Low Cost,
All Terrain
Down the Hole
Drilling Machine
For 4" to 24"
Drill Applications
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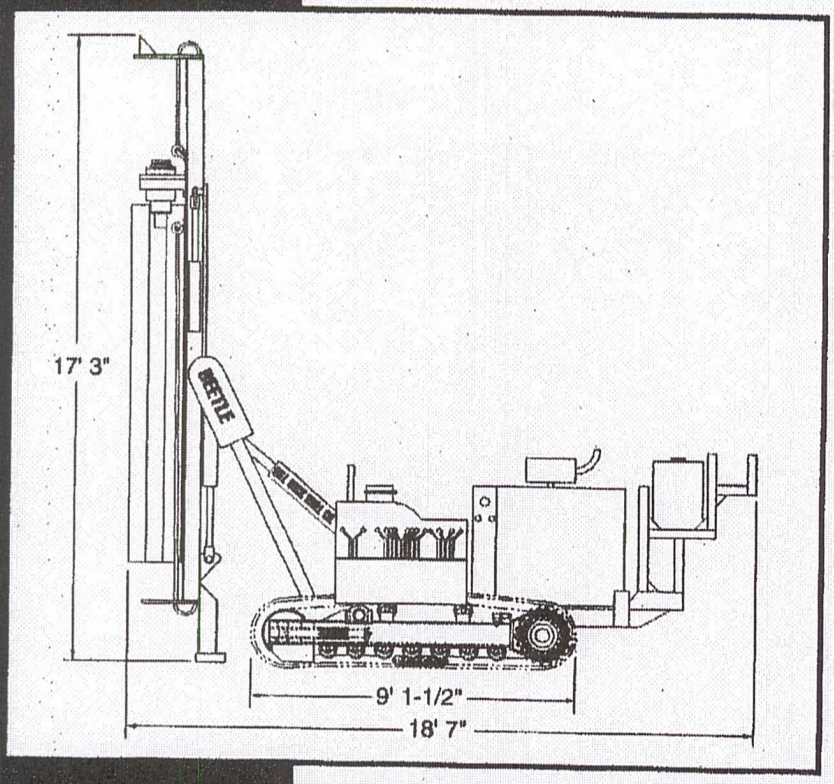
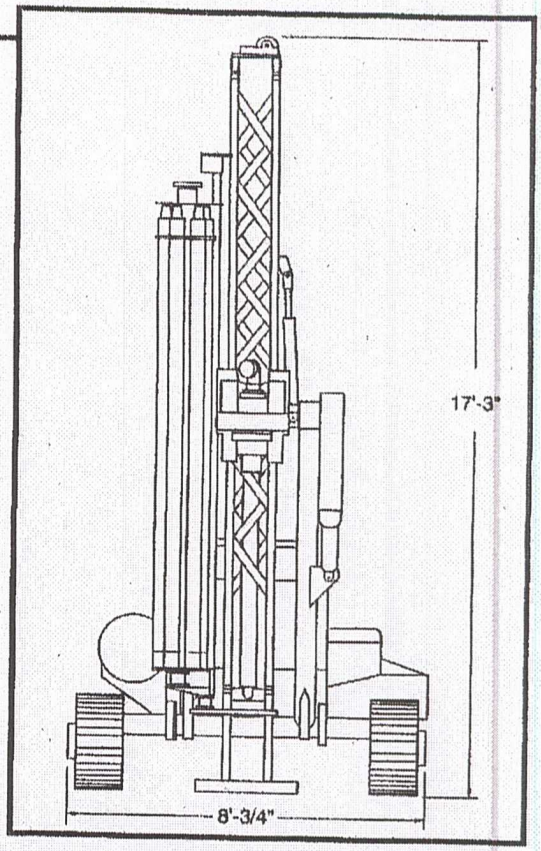




SPECIFICATIONS

OVERALL DIMENSIONS
Maximum Length (Mast Horizontal) . . . . . .25'-0"
Length (Mast Vertical) . . . . . .18'-7"
Maximum Width . . . . . .8'-3/4"
Maximum Height (Mast Vertical) . . . . . .17'-3"
Height (Mast Horizontal) . . . . . .8'-9"

MOUNTING
Length of Crawler Overall . . . . . .9'-1-1/2"
Width of Machine . . . . . .8'-3/4"
Width of Pad . . . . . .1'-0"

MAST
Height Above Ground . . . . . .17'-3"
Mast is positioned over hole by hydraulic cylinders
At required angle - no leveling jacks are used

WEIGHT
Working Weight With Hammer (approximate) . . . . . .9 Ton

PULLDOWN
Pulldown Force, Maximum . . . . . .31,400#
Pulldown Speed, Maximum (without rapid feed) . .24'/minute
Pulldown Speed, Maximum (with rapid feed) . . . .70'/minute

HOIST
Hoist Force, Maximum . . . . . .25,400#
Hoist Speed, Maximum (without rapid feed) . . . . .30'/minute
Hoist Speed, Maximum (with rapid feed) . . . . . .82'/minute

ROTARY DRIVE
Rotary Speed . . . . . .up to 60 RPM
Rotation Torque . . . . . .up to 6000 Ft. Lbs.
*Dependent on motor option

PROPEL SPEED
Maximum Propel Speed . . . . . .1.5 MPH

POWER UNIT
Cummins 4BT3.9 . . . . . .95 BHP at 2200 RPM
Detroit 3-53n . . . . . .75 BHP at 2200 RPM

DUST CONTROL
Water Pump, Bean . . . . . .9 Gallons/Minute
Optional, Dust Collector

HAMMER LUBRICATION
Manzel Model 76

HYDRAULIC SYSTEM
Hydraulic cylinders for boom, cross shaft swing, mast swing, crowd, power wrench and carousel. Hydraulic motors for rotary drive, propel, water pump and lubricator.
Hydraulic source 1-70 GPM tandem piggyback pump, 2500-3000 maximum PSI.

DRILL PIPE
2-3/8" I.F. Rotary Joint . . . . . .4" OD x 10'
BOTH LARGER AND SMALLER DIAMETERS AVAILABLE
Also available in 12' lengths.

THOMAS DRILLING & BLASTING CORP.

DRILLING AND BLASTING SPECIALISTS

BOX 200, SPOFFORD, NEW HAMPSHIRE 03462

TELEPHONE 603-363-4706

Micropile Submittal:

Project: Enosburg BRO 1448 (40)
Contractor: A.L. St. Onge Contractors, Inc.

Permanent Casing:
7"OD .50 wall 6.50" ID Grade 3 Pipe (Steel Casing) conforming to ASTM A252.

Type D Steel certification approval required before Micropile work begins on project.

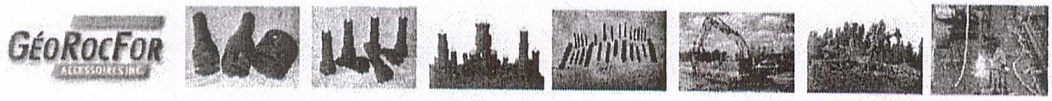
Anchors:
1¾ inch # 14 Grade 97 bar with 3.5 inch by 3.5 inch by ¾ inch and 8 inch by 8 inch by ¾ inch anchor plates with # 14 Hex Nut full Load and # 14 Lock Nut and PVC Centralizers to go over # 14 Bar.

Type D Steel Certification approval required before Micropile work begins on project.

Drilling and Installation Procedure:
Holes will be drilled with a top head rotary drill (Gill Beetle) using a GeoRocFor overburden drilling system and a down the hole (DTH) drill hammer. The crown bit is welded to the bottom of the casing and turns with the driver. The driver attached to the DTH locks into crown bit and they drill the casing through the overburden and into the rock. No drilling fluids are required the system is able to drill through cobbles and boulders and difficult strata. The drill cuttings are removed between the casing and inner drill pipe annulus. The drill does not drill or flush ahead of the casing at all. When the casing is drilled in the rock the 3 ft embedment the casing advancement is stopped and then the rock socket is drilled to depth of embedment.

When ready for installation the anchor rod with centralizers is placed into the casing to the bottom of the rock socket. A tremie tube is attached to the bottom of the anchor and grout is tremied from the bottom of the rock socket until good grout returns to the top of the casing.

A Chemgrout grout pump will be used to mix a place the cement grout. A 4.5 water to cement mix will be used. A water meter and water batcher will be used to control the amount of water in the mix. Each grout mix batch will be tested with a Baroid mud balance to check the specific gravity of the mixed grout prior to grouting the anchors.



Manufacturer of drilling and demolition tools

Xs GT drill

Home

Up

Video

Data sheet

How it works

Brochures

Photos

•**Description**: The Xs GT system is predominantly designed for piling, micro piling, anchor installation and other civil engineering applicatio where casing is left in the hole. Overburden can be cased and sub-casing anchor sockets drilled in the bedrock in one operation, with the same driver-bit, without removing the drill string. The driver as four (4) recesses which transfer impact directly to the crown, giving the necessary fo to drill and drive down casing. The drilling end of the driver bit like conventional bits is bigger than the body itself, to provide clearance when drilling in bedrock.

•**Advantages:**

Advantages using Xs GT over other systems

Advantages over other systems

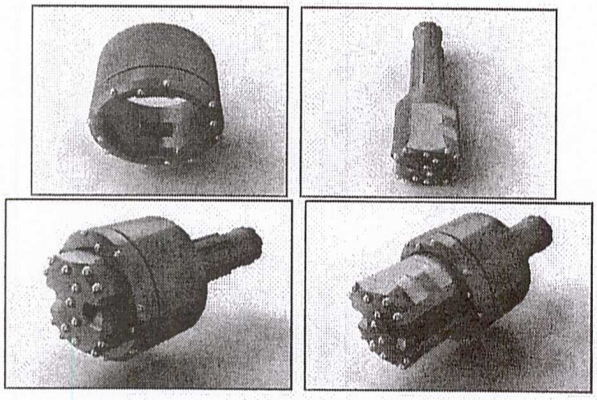
•:**Components:**

Driver Bit position

Driver bit

Overburden Position

Socket drilling



Driver bit: The driver bit is the device that transfers impact and rotation to the crown bit for drilling. The driver bit locks into four flats on casing crown and they act together as a standard drill bit, both the driver bit and the crown have tungsten carbide buttons. The Driver bit drills pilot hole of 3" below the crown to guide the direction of the casing in rough drilling. Afterwards the same driver bit can be used for sub-casing drilling.

Crown bit: The crown bit is a two-piece unit permanently connected together. The upper part is welded to the casing, and the lower part, wh has Tungsten Carbide is free to rotate with the driver bit.

•**Impact zone**: Direct energy from the hammer is transferred to the crown bit through two (4) recesses formed by the locking surface.

•**Evacuation**: Two (2) big air holes are drilled in the face of the bit (drilling end). Those holes are directly connected to two (2) large flushin air ways, placed at 180 degree between each other; these flushing grooves transfer the drill debris from the drilling end of the driver up to the hammer zone. To help keeping a good flow of debris, two (2) other smaller air holes in the flushing air ways, help give the cuttings some velocl

THOMAS DRILLING & BLASTING CORPORATION
1453 Route 9, Box 200
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Grout Submittal

DATE: 12/23/13

COMPANY: A.L. St. Onge Contractor

PROJECT: Drilled Micropiles Enosburg Falls, VT BRO1448(40)

SUBMITTAL: 1

ATTN: Artie St. Onge

FROM: John Whittaker

We propose to use Type I- II Portland cement with a water cement ratio of .45 per PTI recommendations.

See attached recent test results indicating compressive strengths at four (4) and seven (7) day intervals.

ATTN: JOHN
603-363-4249

DRAGON PRODUCTS COMPANY
P.O. Box 191, U.S. Route 1, Thomaston, Maine 04861 · 207-594-5555

MILL TEST RESULTS
Laboratory at Thomaston, Maine

Date: June, 2011
Cement Type: I / II
Silo Numbers: 20, 24, 27 & 30

CHEMICAL DATA	Percent
Silicon Dioxide	20.1
Aluminum Dioxide	4.2
Ferric Oxide	2.9
Calcium Oxide	62.2
Magnesium Oxide	3.5
Sulphur Trioxide	3.8
Loss on Ignition	1.2
Insoluble Residue	0.4
Tricalcium Silicate	57
Dicalcium Silicate	16
Tricalcium Aluminate	8
Sum of C3S + 4.75*C3A	87
Sodium Oxide	0.4
Potassium Oxide	1.3
Equivalent Alkalies	1.22

(Chemical Analysis all per ASTM C 114)

PHYSICAL DATA	
Specific Surface Blaine (sq m /kg) *(Per ASTM C 204)*	367
Percent Passing 325 Mesh *(Per ASTM C 430)*	95.9
Compressive Strength (psi) *(Per ASTM C 109)*	
1 day	2040
3 day	3660
7 day	4610
28 day	
Vicat Setting Time *(Per ASTM C 191)*	
Initial (min.)	110
Final (min.)	210
Air Content (%) *(Per ASTM C 185)*	7.9
Autoclave Expansion (%) *(Per ASTM C 151)*	0.20
Expansion in water (%) *(Per ASTM C 1038)*	0.010
Heat of Hydration (%) *(Per ASTM C186)*	80

Certified by:

Jennifer R. Colburn

We hereby certify that this cement complies with current ASTM C 150, AASHTO M-85 and CSA A3001 Type GU specifications.

Testing was completed by Brian Secord and/or Richard Erickson.
This mill test report is generated for silos produced in the calendar month prior to the date upon this report.

M & W Soils Engineering, Inc.
Main Street, P O Box 1466
Charlestown, NH 03603
603/826-5873

Concrete Cylinder Compression Test Results

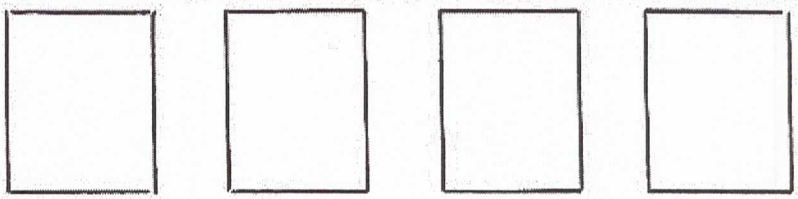
PROJECT: Thomas Drilling & Blasting

Cylinder Description: Thomas Drilling & Blasting

Sampled by: Others

Date of Sample: 6/6/13

Cylinder No.	TD-9	TD-10	TD-11	TD-12
Weight of Cylinder	0.55	0.55	0.60	0.60
Type of Cement				
Design Strength (psi)	Unknown	Unknown	Unknown	Unknown
Age of Test (days)	4	4	4	7
Date Tested	6/10/13	6/10/13	6/10/13	6/13/13
Load at Failure (lbs)	23,500	23,500	24,900	28,000
Cross-sectional Area	4.00	4.00	4.00	4.00
Stress at Failure (psi)	5,880	5,880	6,230	7,000
Failure Break				



Remarks:
Copies: Thomas Drilling & Blasting (1)

Date: 6/10/13 6/13/13

Delivered To Lab: 6/7/13

Tested by: J. Hart J. Hart

Signed .....

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Concrete Cylinder Compression Test Results

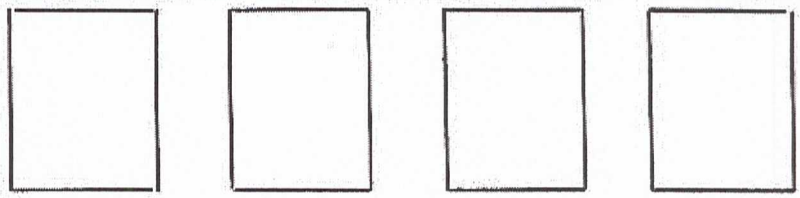
PROJECT: Thomas Drilling & Blasting

Cylinder Description: Thomas Drilling & Blasting

Sampled by: Others

Date of Sample: 6/6/13

Cylinder No.	TD-13	TD-14	TD-15	TD-16
Weight of Cylinder	0.60	0.55		
Type of Cement				
Design Strength (psi)	Unknown	Unknown	Unknown	Unknown
Age of Test (days)	7	7		
Date Tested	6/13/13	6/13/13		
Load at Failure (lbs)	29,500	26,800		
Cross-sectional Area	4.00	4.00	4.00	4.00
Stress at Failure (psi)	7,380	6,700		
Failure Break				



Remarks:
Copies: Thomas Drilling & Blasting (1)

Date: 6/13/13

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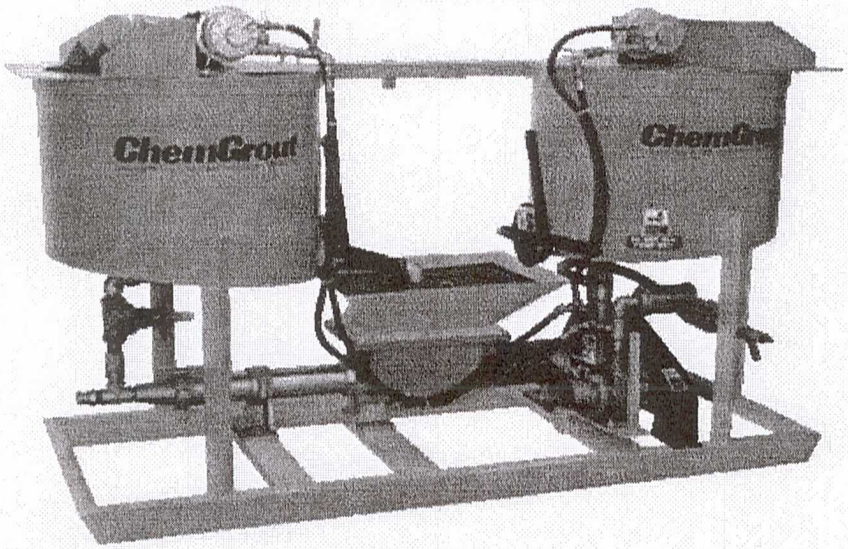
Signed .....

ChemGrout®

"Mfg. Grout Pumps, Grout Mixers, Largest Selection of Grouting Equipment in the World"

CG-500 Versatile Series



CG-500 Air Powered Shown

The ChemGrout CG-500 series are high volume production skid mounted grout plants. This versatile unit is designed to mix and pump neat cement, sanded grouts and most commercial pre-blended grout mixes. These units feature two 70-gallon (265 liters) mixing tanks, a 15-gallon (57 liters) holding hopper and an open throat progressive cavity grout pump. The unique double mix tank design permits continuous pumping as each mix tank alternates feeding the pump. Each mixer is equipped with baffles, bag breakers and variable speed high-efficiency paddles that provide rapid mixing. The tank outlet valves are large slide gates that allow the thickest materials to fall easily into the pump hopper. The holding hopper has an auger in it to keep the material thoroughly mixed while constantly supplying the grout pump with material for the continuous pumping operation. The grout pump is a variable speed, positive displacement, progressive cavity, rotor-stator pump. The rugged steel frame stands up to the toughest conditions on the job site. Operator controls are centrally located for efficient production. All components are easily accessible for operating, cleaning, and maintenance.

Applications include: soil compaction, rock grouting, voidfilling, waterproofing, soil anchors, cable bolts, rock bolts, well encasements, contact grouting, well abondonment, marine/underwater, post tensioning, precast, machine base installation, self leveling floor underlayments, slab undersealing, and slabjacking.

Pump Specifications

Progressing Cavity Pump	Hopper Volume	Maximum Output	Maximum Pressure
ChemGrout -2C6 Grout Pump	15 Gallons (57 Liters)	20 GPM (75 LPM)	174 PSI (12 BAR)

Model Number	Description	Dimensions	Weight
CG500/2C6/A	Skid Mounted Air Powered Grout Plant Requires 250 CFM, 100 PSI	88" L X 34" W X 58" H	1100 lbs

ChemGrout Inc.
805 E. 31st St. • LaGrange Park, IL 60526 • USA
Phone: (708) 354-7112 • Fax: (708) 354-3881

Please provide approximate time required for each installation sequence step, procedures for advancing through boulders and other obstructions, procedure for containment of drilling fluid, and spoil, and disposal of spoil.

Please provide welding procedure and welder certifications for review and approval.