OPTION PHASE 1b

Posillico Environmental, Inc.

National Grid
Rockaway Park Former Manufactured Gas Plant
Rockaway Park, Queens, NY

Reference: Waterloo Matrix - Procedures for ~~Options 3A, 3B and 4~~ OPTION PHASE 1b

02/23/2010

Introduction

The pre-drilling of relief shafts will be performed at selected locations adjacent to the proposed barrier wall in order to allow for the waterloo barrier wall to be driven as per original plan. In addition to pre-drilling, a bentonite (AquaGel) or bentonite polymer blend (BoreGel) mixture will be added to decrease the skin friction of the soil while installing the sheets

Methods and Procedures

The primary piece of equipment used to pre-drill for the barrier wall will be a Casagrande B400-TRD. The Casagrande B400-TRD, which is a dual rotary drill rig, is also equipped to drill in reverse circulation. The distinguishing feature of the dual rotary drill rig is a lower rotary drive which is used to independently advance casing up to 42" in diameter. The lower rotary drive transmits pull down, pullback, and rotational forces to the casing. A carbide studded shoe welded to the bottom of the casing cuts through the overburden.

The rotary top drive has its own feed system that raises and lowers independently of the lower drive. The rotary top drive handles the inner drill string which will be tooled with a roller cone bit or a down hole hammer (if necessary). Since the top drive and lower drive operate independently of each other the drill tool will be positioned above the casing shoe, this will minimize cross contamination and circulation loss, thus eliminating borehole instability.

The drill string has a 16" outside diameter with an 8" inside diameter opening for reverse circulation/grouting capabilities. The drill rods are hex connection with bolts and o-rings to

maintain a seal for air delivery as well as spoil removal. The tri-cone roller bit will have a 22" nominal outside diameter with reverse circulation capabilities.

Soil cuttings will be removed using air from up to three auxiliary compressors through the center of the drill pipe to a discharge swivel located above the upper rotary. Once passed the swivel the spoils continue through hoses mounted on the side of the mast of the machine and exiting through 8" steel piping at the base of the machine. The end of the steel piping will be coupled with sufficient length of discharge hose to allow the drilling spoils to be directly deposited in covered roll off containers inside the temporary enclosure. To further control the deposition of spoils, the material will be passed through a cyclone which will decelerate the velocity of the drilling spoils. This will facilitate a more controlled placement of the drilling spoils, and enhanced mobility of the operation, with a minimal set up time.

As described in the site specific HASP, Posillico will continually air monitor the interior of the temporary enclosure and the effluent of the TIGG units and react accordingly. PPE upgrades will be made based on current procedures. If readings inside the temporary enclosure are such that levels are elevated, Posillico will drape 6 mil plastic sheeting to contain the area affected by the discharge of drilling spoils to a minimum. The drilling spoils will be sampled for characterization and subsequently disposed off-site as per contract specifications.

The casing used on this project will have a nominal outside diameter or 24 inches, with a wall thickness of 3/4". The top of the casing will be fitted with a bonnet (see attached). The bonnet is fabricated to bolt around the outside of the top of the casing, and it is made with rubber rings that will allow the drill string to travel while blocking the passage for any type of soil or vapors to escape. The bonnet can be removed and replaced to allow for additional sections of casing to be added.

The intent is to drill within each inboard "belly" of the barrier wall. Relief shafts will be located approximately 50" on center (Option 3A). Drawings are attached showing the proposed relief shaft layout for option 3A, as well as, for 3B and 4, if they are necessary. This should create enough relief for the 120' Waterloo sheets to be driven while maintaining enough stability so that the surface area between the relief shafts will maintain the Waterloo barrier wall's specified line and level. The Casing and drill string will be advanced to 55' below grade, at which point another section of casing and drill string will be mechanically spliced. In order to minimize the number of splices a 30" x 55' "doodle" or "rat" hole will be utilized to hold the top section of casing and drill string. The shaft will

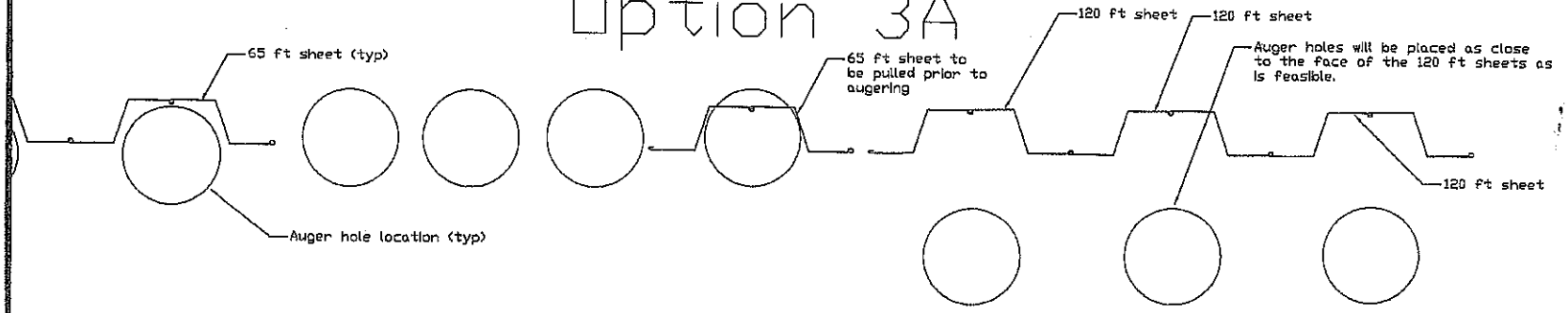
then be advanced to approximately 110' below grade. Final depth is established through operator controls inside the cab that measure the depth of the drill rod. The casing will also be externally marked with measurements as a secondary control for the foreman to communicate to the operator. Once the shaft has reached the target depth the air will be turned off and the bentonite mixture will begin to be placed through the internal drill string. Once the required volumetric mixture of bentonite solution is placed within the shaft, the casing and drill string will be extracted and drilling will commence at the next location.

**The procedure will be the same for all three proposed options, the only variable being the relief shaft location.

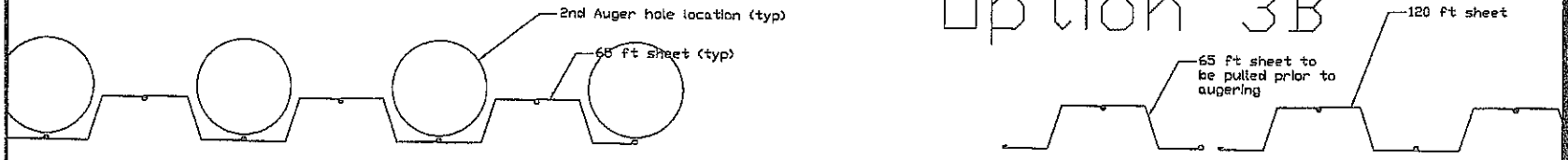
Materials

To further reduce the soil resistance while installing the barrier wall either a bentonite (AquaGel) or blended bentonite (BoreGel) mixture will be added to each relief shaft. The bentonite solution will be mixed onsite with fresh water as per the manufacturers recommendations at an approximate ratio of 30lbs/100 gallons of water, this ratio will result in approximately 850 lbs of bentonite per relief hole. A bentonite solution will be prepared for each relief shaft or for multiple shafts depending on production rates and/or storage capacity. Preparing the solution will be accomplished by either mixing the materials directly in a hydrating tank or by means of a high shear mixer (AD1010H). In order to store the solution, a hydrating tank of up to 30,000 gallons will be utilized to store the required volume of water and the appropriate weight of AquaGel. Circulating pumps will be used to ensure proper mixture of the solution and prevent the AquaGel from settling out of the mix.

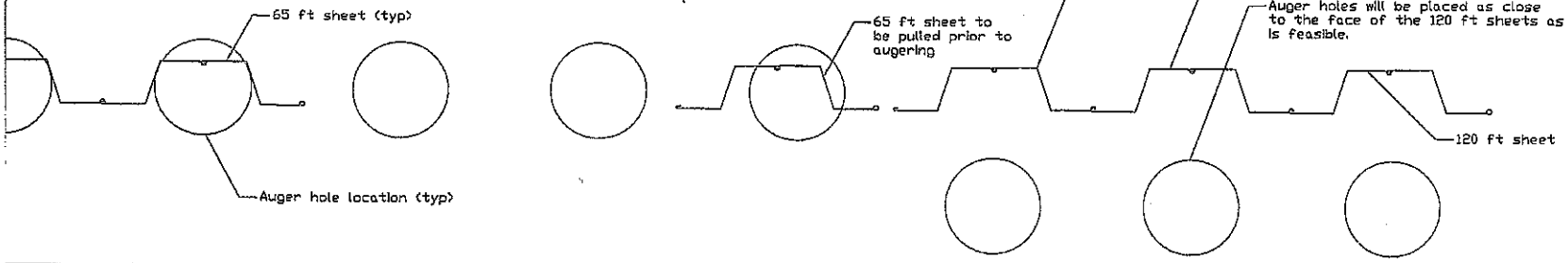
Option 3A



Option 3B



Option 4



Rockaway Park Former MGP Remediation Project

RD 4/13/09
RD 1/22/10
RD 3/4/10

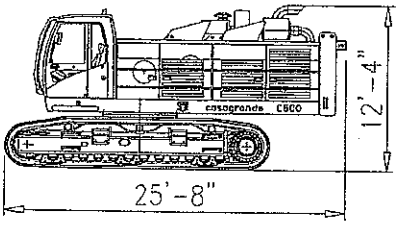
Posillico | We know how.

Posillico Environmental
1750 New Highway
Farmingdale, New York 11735
(631) 249-1872

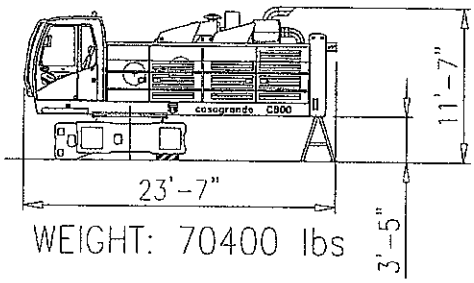
Auger hole location for Option 3A, 3B and 4

B400NG TRD – TRANSPORT WEIGHTS

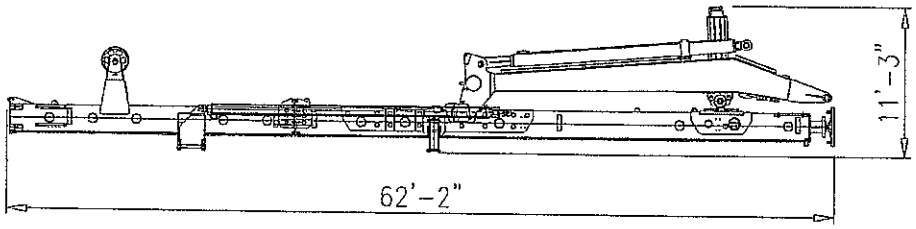
casagrande



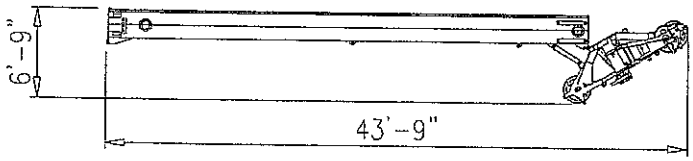
WEIGHT: 123200 lbs



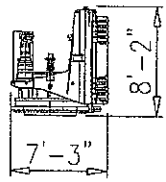
WEIGHT: 70400 lbs



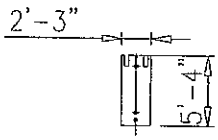
WEIGHT: 50700 lbs



WEIGHT: 11000 lbs



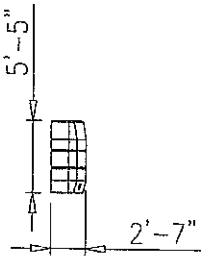
WEIGHT: 22000 lbs



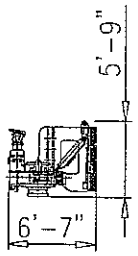
WEIGHT: 4975 lbs
Two pcs

lower chuck t.b.d.

WEIGHT: 13200 lbs

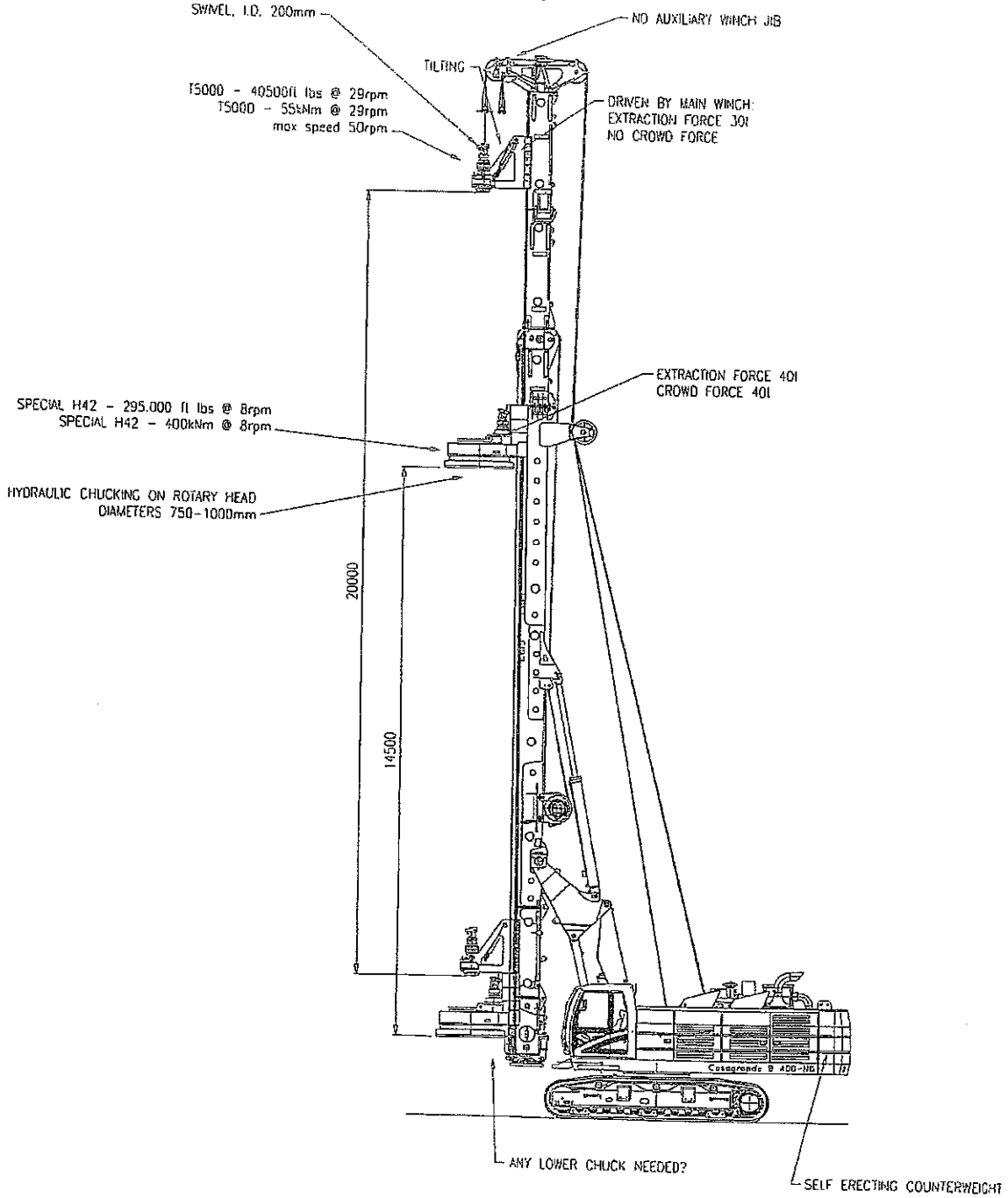


WEIGHT: 30900 lbs



WEIGHT: 8800 lbs

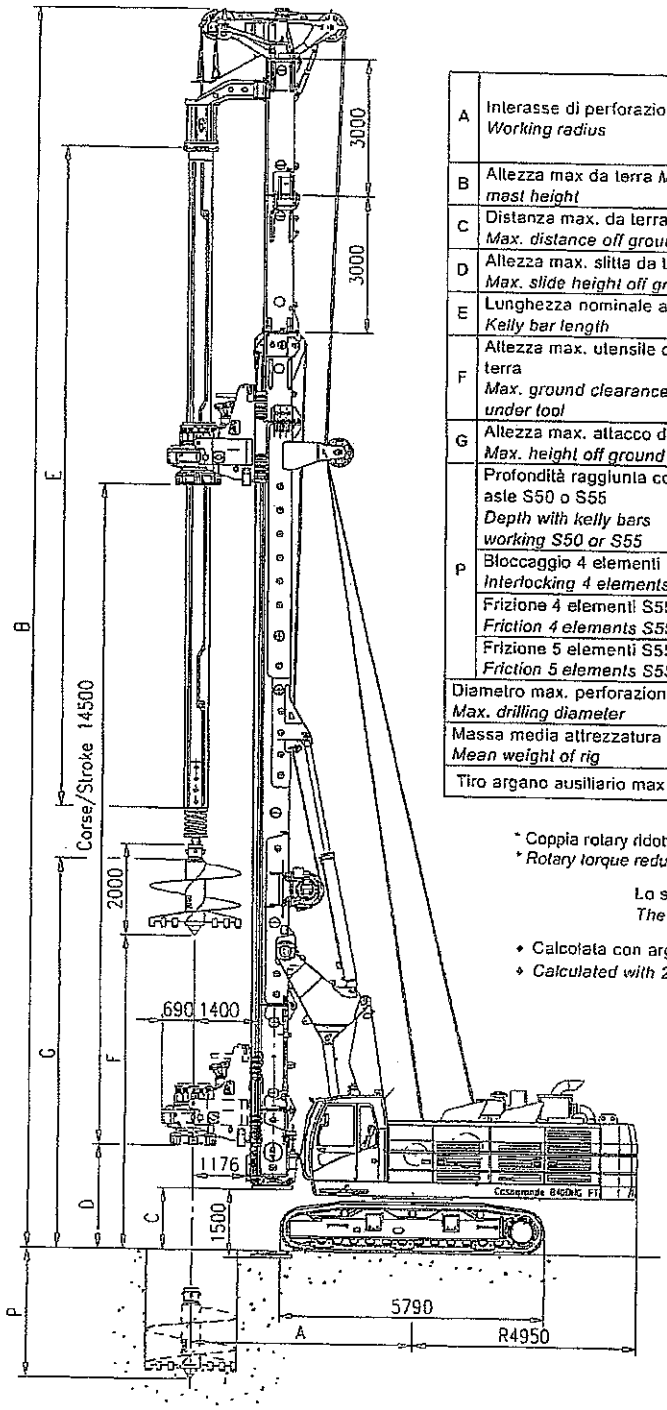
B400NG – long stroke



weight of base machine + mast, without rotary heads and counterweight: 78t

PT - PDW - H40

Mast base + PDW 2m + 3m + 3m



A	Interasse di perforazione *Working radius*	min	Aste fino a Kelly bars up to					max ♦
		4380	5x12500					5000
			5x18500					4800
B	Altezza max da terra *Max mast height*	27320						
C	Distanza max. da terra *Max. distance off ground*	1370						
D	Altezza max. slitta da terra *Max. slide height off ground*	2310						
E	Lunghezza nominale aste *Kelly bar length*	7500	9500	11000	12500	14500	16500	18500
F	Altezza max. utensile da terra *Max. ground clearance under tool*	14340	12340	10840	9340	7350	5340	3340
G	Altezza max. attacco da terra *Max. height off ground*	16000	14000	12500	11000	9000	7000	5000
P	Profondità raggiunta con aste S50 o S55 *Depth with kelly bars working S50 or S55*	Con L. Utenslie = 2000 mm *With L. tool*						
	Bloccaggio 4 elementi S50 *Interlocking 4 elements S50*	25800	33800	39800	45800	53800	61800	69800
	Frizione 4 elementi S55 *Friction 4 elements S55*		33800	39800	45800	53800	61800	69800
	Frizione 5 elementi S55 * *Friction 5 elements S55**		42150	49850	57150	67150	77150	87150
Diametro max. perforazione *Max. drilling diameter*		2200						
Massa media attrezzatura *Mean weight of rig*		~ 112000 kg						
Tiro argano ausiliario max / *Auxiliary line max 120 kN*								

* Coppia rotary ridotta a 220 kNm
* *Rotary torque reduced to 220 kNm*

Lo stabilizzatore è obbligatorio se usati i rivestimenti
The mast foot is compulsory with casings

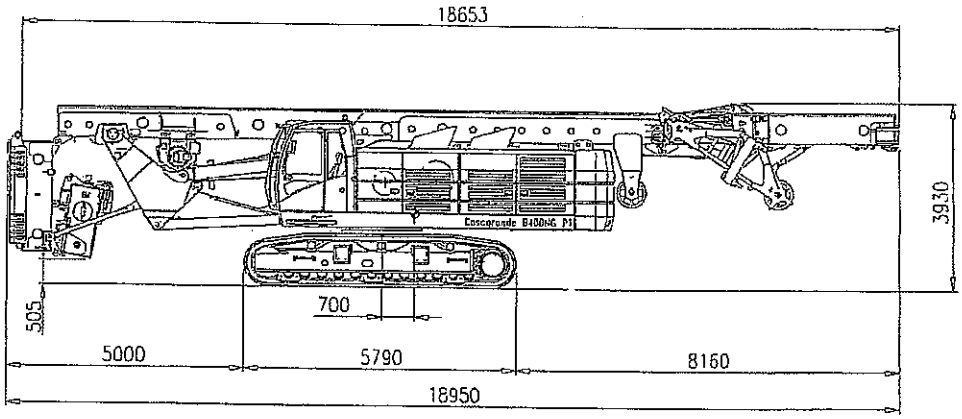
♦ Calcolata con argano da 250 kN
♦ *Calculated with 250 kN winch*

Argano pull-down
Pull down Winch

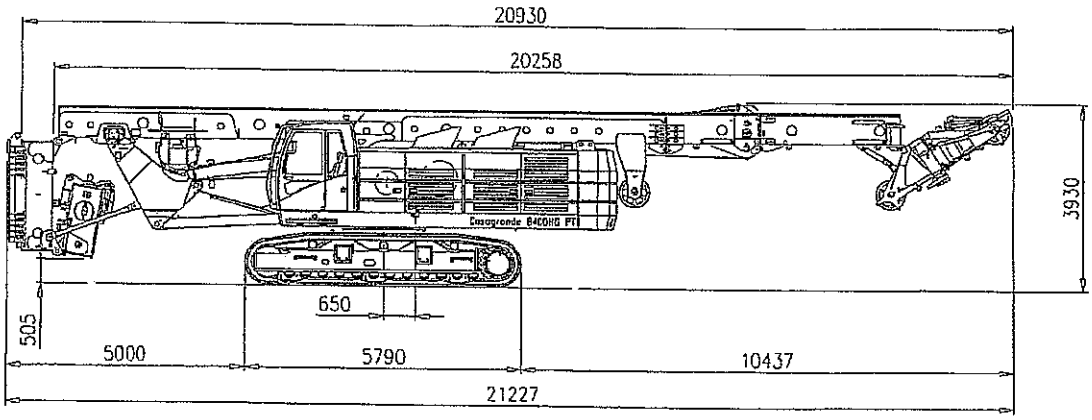
Corsa/*Stroke*	14500 mm
Spinta/*Crowd*	400 kN
Forza di estrazione/ *Extraction force*	400 kN
Velocità/*Speed*	40 m/min

Caratteristiche di trasporto / *Transport features*

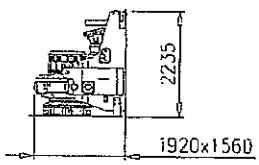
Mast base + PDW 2m + 3m + 3m



Massa/*Weight* (mast base + PDW 2m + 3 m + 3 m) ~ 92000 kg



Massa /*Weight* (mast base + PDW 2m + 3 m) ~ 91000 kg



Massa rotary /
Rotary *weight* ~ 7000 kg

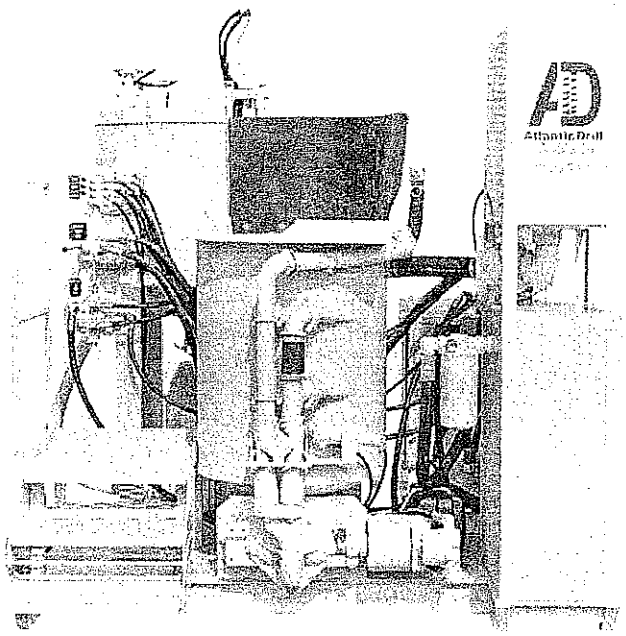
Atlantic Drill & Equipment Co.

GROUT PLANT

AD1010H - Colshear

The AD1010H colloidal grout plant is designed with quality, productivity, and ease of operation in mind. Each grout plant is inspected and tested for the highest level of quality.

The Colcrete mixer produces a superior colloidal mix and is the industry leader. The vertical pump on the holding tank has been proven to be very durable and reliable. The hydraulic controls allow the operator to manage all functions of the plant individually from one position. Pump output and all grout valves are controlled with ease.



SPECIFICATIONS

Engine: 65 hp

Mixer Capacity: 74 gal

Holding Tank Capacity: 198 gal

Pump Output Flow: 38 gpm

Pump Output Pressure: 240 psi

Overall Dimensions: 101 in x 85 in x 94 in

COLCRETE EURODRILL

Leaders in Ground Engineering Equipment

Atlantic Drill & Equipment Company, Inc.
P.O. Box 488 - 273 Lakeview Drive, Woodstock, Virginia 22664
Toll Free: 866-459-5309/ Tel: 540-459-5309/ Fax: 540-459-3071

www.AtlanticDrill.com

Atlantic Drill & Equipment Co.

GROUT PLANT

WHY USE A COLSHEAR COLLOIDAL MIXER?

Superior grouting processes rely on first-rate equipment. The Colcrete mixer is the leading colloidal mixer in the industry and is recommended by grouting experts around the world.

Higher Strengths. *The colloidal mixing action allows the use of lower water/cement ratios, resulting in grouts with higher strengths than those mixed by conventional methods.*

Minimal Bleed. *The combination of low water/cement ratios and efficient grout mixing ensures that more of the water is absorbed by hydration, therefore minimizing bleed. Every particle of cement is thoroughly wetted and separated completely, with no clumping.*

Minimal Dilution by Groundwater. *One critical property of colloidally mixed grout is that dilution in water is minimal. This makes it ideal for underwater grouting or for grouting anchors in highly saturated ground conditions.*

Rapid Mixing of Grouts Containing Sand. *A sand/cement ratio of up to 4:1, and neat cement grouts with water/cement ratios as low as 0.36:1 are possible without the use of additives. Even lower ratios can be achieved by adding plasticizers or super plasticizers, providing the flexibility required on site. The vortex action inside the mixing tank rapidly assimilates the powder materials into the mixer which results in minimal batching times. The through-put far exceeds that of other mixing technologies. With an experienced operator, the cycle times for charging, mixing and discharging the grout can approach one minute.*

High Shear for Optimum Mixing. *With a discar tip speed of 26.5 meters/sec at 2,100 rpm the high rate of shear results in a mix that is fluid and stable enough to be pumped over considerable distances. Without separation properly sheared mixes will permeate uniformly into voids. The slurry is repeatedly re-circulated through the zone of high shear within the mixer. This breaks down any clusters of dry particles and ensures maximum dispersion of fluids and solids.*

Best for Bentonite. *Very efficient at mixing Bentonite and other clay additives as the shearing process accelerates hydration and produces a more stable product. Colloidally mixed Bentonite slurries are less permeable than those produced by competitive systems.*

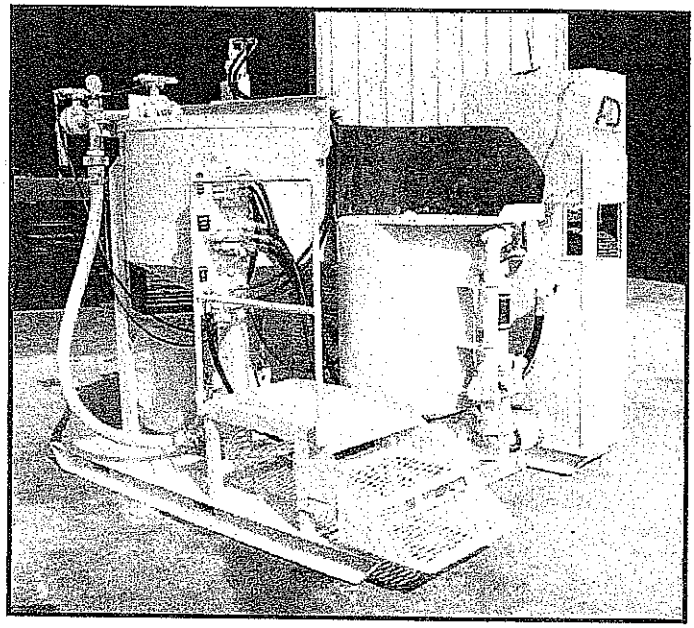
Cost Savings. *The combined effect of the highly efficient mixing action and the ability to mix lower water/cement ratios can allow for reductions in the cement content to achieve a given strength requirement. The cement may be replaced by less costly filler such as sand or pulverized fly ash.*

Pressure Discharge. *The pumping action of the mixer enables rapid transfer of the mixed slurry out of the mixer and directly to the agitation tank. No additional slurry pump is required.*

Fast, Easy Cleaning & Minimal Maintenance. *The unique design allows the operator to easily clean the unit in very short order, resulting in less maintenance and repair than with competitors' machines. Our mixers have been designed with easy access cleaning ports at critical locations and other features which reduce the likelihood of maintenance problems.*

Reliable, Integrated Designs. *The combination of robust design, few moving parts, and the ready availability of spare parts ensures long life and reliability. Our designs place grout mixing, agitated storage and pumping on one compact platform with integrated controls. If desired, a dry bulk cement storage and dispensing system can be integrated with the mixing and pumping system.*

Low-Risk Investment. *The Colcrete Colloidal mixer continues to prove itself as the worldwide industry standard. Many companies depend on the reliability and superior mixing capabilities of this proven technology.*



Atlantic Drill & Equipment Company, Inc.
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www.AtlanticDrill.com

AQUAGEL®

Viscosifier

Description

AQUAGEL is a finely ground, premium-grade Wyoming sodium bentonite which meets the American Petroleum Institute (API) Specification 13A, section 9 requirement. AQUAGEL functions as a viscosifier and filtrate reducer in freshwater drilling fluids.

Applications/Functions

- Viscosify water-based drilling fluids
- Reduce filtration by forming a thin filter cake with low permeability
- Improves hole cleaning capabilities
- Promote hole stability in poorly consolidated formations

Advantages

- NSF/ANSI Standard 60 Certified
- Develops gel structure for cuttings suspension
- Can be added directly to fresh water or freshwater drilling fluids
- Provides lubricity in drilling fluids

Typical Properties

• Appearance	Variable-colored powder (gray to tan)
• Bulk density, lb/ft^3	68 to 72 (as packaged)

Recommended Treatment

Mix slowly through a jet mixer or sift slowly into the vortex of a high-speed stirrer.

Approximate Amounts of AQUAGEL Added to Fresh Water or to Freshwater Drilling Fluids

Application/Desired Result			
Added to Fresh Water	**lb/100 gal**	**lb/bbl***	**Kg/m^3**
Under normal drilling conditions	30-50	13-22	35-60
To stabilize caving formations	60-80	25-35	70-100
To stop circulation loss	70-95	30-40	85-110
Added to Freshwater Mud	**lb/100 gal**	**lb/bbl***	**Kg/m^3**
Under normal drilling conditions	10-25	4-10	11-28
To stabilize caving formations	20-45	9-18	25-50
To stop circulation loss	25-50	10-20	28-56

* 1 bbl = 42 U.S. gallons

Rev. 2/2005 · IDP 044

Packaging AQUAGEL® is packaged in 50-lb (22.7 kg) multiwall paper bags.

Availability AQUAGEL can be purchased through any Baroid Industrial Drilling Products Distributor. To locate the Baroid IDP distributor nearest you, contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

BORE-GEL®

Boring Fluid System – U.S. Patent Number 5,723,416

Description

BORE-GEL® single sack, boring fluid system is specially formulated for use in horizontal directional drilling (HDD) applications. BORE-GEL fluid system is a proprietary blended product using high-quality Wyoming sodium bentonite. When BORE-GEL system is mixed with fresh water, it develops an easy-to-pump slurry with desirable fluid properties for HDD.

Applications/Function

- Provide optimum gel strength with minimum viscosity for cuttings suspension and transport
- Improve borehole stability in poorly consolidated/cemented sands and gravel formations
- Reduce filtration by forming a thin filter cake with low permeability
- Lubricate pipe in microtunneling operations
- Produce a pumpable slurry with maximum amount of reactive solids for borehole stability

Advantages

- Minimizes the number of boring fluid products required
- Easy to mix and fast to yield
- Low viscosity minimizes pump pressures
- Provides lubricity for pulling product line
- NSF/ANSI Standard 60 certified
- Can be used in Water Wells in unconsolidated formations or when additional gel strengths are required to compensate for low annular velocity

Typical Properties

Appearance	Tan to gray powder
pH (4% slurry or 15 lb/bbl)	10.2
Bulk density, lb/ft^3	68 to 72 (compacted)

Rev. 5/2008 · IDP 032

Recommended Treatment

Add slowly and uniformly through a high-shear, jet-type mixer over one or more cycles of the volume of slurry. Continue to circulate and agitate the slurry until all unyielded bentonite is dispersed.

Recommended application amounts

Boring Application	lb/100 gal	kg/m^3
Normal boring conditions	25 – 35	30 – 42
Poorly consolidated sand/gravel	35 – 60	42 – 72
Lubrication fluid for microtunneling	50 – 60	60 – 72

Packaging

BORE-GEL fluid system is packaged in a 50-lb (22.7-kg) multiwall paper bag. The bag is sturdy, moisture resistant and easy to handle, store and transport.

Availability

BORE-GEL fluid system can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613