



MODEL 1200TW

PRAIRIE DOG BORING MACHINE



OWNERS MANUAL & PARTS LIST

PRAIRIE DOG BORING EQUIPMENT, INC.

10006 AIRLINE DRIVE HOUSTON, TEXAS 77037 281-448-8442 FAX: 281-448-5553

Toll Free 866-631-3786

Prairie Dog Boring Equipment, Inc.

Limited Warranty

To the original purchaser for 1 year from purchase date we will repair or replace at our option and free of charge any parts found to be defective under normal use and service resulting from defects in material and/or workmanship after an examination at our factory in Houston, Texas.

All transportation charges, damages, and loss incurred in connection with the transportation of all parts for inspection, replacement, or repair under this warranty shall be borne by the purchaser.

The express warranty contained herein shall not be applied to any boring machine attachment or part which has been altered in any way, nor shall such express warranty apply to any damages resulting from accident, misuse, or abuse, nor shall such express warranty apply to any damages resulting from failure to follow the Prairie Dog Boring Equipment, Inc. instruction for operation and maintenance of boring machine attachments and parts. Also, the express warranty contained herein shall not apply to engines, clutches, gearboxes, etc., which are not of our manufacture as they are covered by the design and specification changes on future machines without notice and without obligation on our part to present owners.

The foregoing express warranty is in lieu of all other express warranties. Prairie Dog Boring Equipment, Inc. neither assumes nor authorizes any other person, natural or corporate, to assume for it any other obligation or liability in connection with or with respect to any boring machine attachments or parts.

Prairie Dog Boring Equipment, Inc. hereby disclaims any and all implied warranties, including, but not limited to warranties of merchantability and fitness for any particular purpose, if and to the extent, but only if and to the extent, that such disclaimer is not forbidden by any applicable law and any implied warranties, including, but not limited to which Prairie Dog Boring Equipment, Inc. is so forbidden to disclaim by any applicable law, are limited to the periods of the express warranty as defined in the first paragraph of this warranty. Prairie Dog Boring Equipment, Inc. shall in no event be liable for any consequential, incidental or special damages, and/or expenses.

PRAIRIE DOG BORING MACHINE

NO REGISTRATION (WARRANTY) CARD IS NECESSARY TO OBTAIN WARRANTY ON PRAIRIE DOG BORING MACHINE. FILL IN THE REQUIRED INFORMATION AND REQUIRED INFORMATION AND RETAIN FOR YOUR RECORDS.

Prairie Dog Boring Machine: Serial No. _____ Model No. _____
Dealer Purchased from: _____ Date: _____

If warranty service is needed, contact your nearest authorized dealer or Prairie Dog Boring Equipment, Inc. For prompt attention our service department will need to know the trouble experienced and the total number of hours the boring machine has been operated. If you differ with the decision of our service department on warranty claim, ask your service department to submit all supporting facts for our review. If Prairie Dog Boring Equipment, Inc. decides that your claim is justified, you will be fully reimbursed for those items accepted as defective.

To avoid misunderstandings which might occur between boring machine owners and Prairie Dog Boring Equipment, Inc., we are listing causes of boring machine failures, where repair or replacement is NOT covered by Prairie Dog Boring Equipment, Inc. warranty.

ABUSE OR NEGLECT

1. Parts which are scored or broken because the machine was operated without sufficient lubricating oil or the power grade of oil are not covered by warranty. Check oil level at least every five hours, and refill when necessary. Change oil as recommended.
2. Damage or wear caused by dirt which enters the machine because of improper maintenance is not covered by warranty. Clean and re-oil regularly.
3. Warranty does not cover the adjustment of the machine unless the need for such repair is the result of defects in material or workmanship or both. Minor adjustment are NOT covered by warranty.

PRAIRIE DOG BORING MACHINE (Continued)

4. Broken parts which result from improper operation, over speeding, lugging or abuse in operation are not covered by warranty.
5. Repair or adjustment of associated parts which are not of Prairie Dog Boring Equipment, Inc. manufacture will not be covered by Prairie Dog Boring Equipment, Inc. warranty.
6. Only ORIGINAL PRAIRIE DOG BORING EQUIPMENT, INC. PART OR PARTS APPROVED PRAIRIE DOG BORING EQUIPMENT, INC. may be covered by warranty.
7. About improvements: Prairie Dog Boring Equipment, Inc. is continually striving to improve its products, therefore, we reserve the right to make improvements or changes when it becomes practical to do so, without incurring any obligations to make changes or additions to the equipment sold previously.

WARRANTY IS AVAILABLE ONLY THROUGH SERVICE CENTERS OR SERVICE DEPARTMENT WHICH HAVE BEEN APPROVED AND AUTHORIZED BY PRAIRIE DOG BORING EQUIPMENT, INC.

**BORING MACHINES CAN BE DANGEROUS IF OPERATED
IMPROPERLY SO FOLLOW THESE
SAFETY INSTRUCTIONS**

- 1. Only the OPERATOR should be allowed near the machine.**
- 2. NEVER STAND or allow anyone else to stand near the boring machine when rotating.**
- 3. KEEP ALL GUARDS and shields in place while machine is running.**
- 4. SHUT OFF ENGINE before leaving machine.**
- 5. ALWAYS STOP engine before servicing machine.**
- 6. REMOVE KEY or spark plug wire when leaving machine unattended**
- 7. ALLOW ENGINE TO COOL before refueling**
- 8. WEAR TIGHT FITTING CLOTHES when using boring machines and keep your hands, feet, and clothing away from moving parts.**
- 9. KNOW what is down there before you bore. If necessary, get clearance from the phone company, power company, community water and sewer departments.**
- 10. MOVE SLOWLY when starting to bore.**
- 11. USE THE BUDDY SYSTEM Do not work alone in isolated areas**
- 12. ALWAYS be aware that internal combustion engines produce noxious fumes. Allow for proper ventilation of the work space.**

*** SPECIAL CAUTION ***

ALWAYS, ALWAYS, ALWAYS stay at the controls of the machine. You may have to stop suddenly to avoid danger.

PLEASE observe all instructions. They are considered common sense by professional boring contractors. There is just no substitute for a careful, safety minded operators SERIOUS INJURY OR DEATH COULD RESULT FROM FAILURE TO FOLLOW THESE SUGGESTIONS.

PLEASE READ AND UNDERSTAND ANY ACCOMPANYING ENGINE OR TRANSMISSION OWNER'S MANUALS THAT COME WITH YOUR "PRAIRIE DOG" BORING MACHINE. THEY CONTAIN IMPORTANT SAFETY, OPERATION AND MAINTENANCE INFORMATION. IF YOU ARE UNSURE WHETHER YOU HAVE ALL OF THE CORRECT MANUALS PLEASE CALL OR EMAIL. BE SURE TO HAVE YOUR MODEL NUMBER HANDY.

PRAIRIE DOG SUGGESTED OPERATIONS & PROCEDURES FOR MODEL'S PDP500TW, PDP900TW, PDP1200TW, AND PDP1800TW

SOIL CONDITIONS CAN VARY TREMENDOUSLY AND MAY AFFECT LOCAL PROCEDURES. THESE PROCEDURES ARE GIVEN AS GUIDELINES. MANY USERS FIND IT EASIER TO USE OTHER METHODS OF THEIR OWN MAKING.

THE HOLE

FIRST, YOU NEED A BORE PIT TO SET THE MACHINE AT THE DESIRED DEPTH OF DRILL ROD ENTRY. THE DIMENSIONS OF THE PIT NEED TO BE A MINIMUM OF 20" WIDE AND 9' LONG. WHERE THE PILOT LEAVES THE BORE HOLE (COMMONLY CALLED A COME-OUT HOLE) YOU WILL NEED A SECOND BORE PIT. THE DIMENSIONS NEED TO BE A MINIMUM OF 20" WIDE AND A LENGTH AND DEPTH SUFFICIENT FOR THE INSTALLATION OF YOUR PIPE, WIRE OR OTHER UNDERGROUND UTILITY EQUIPMENT. (Figure 1)

THE LINE UP

SET THE MACHINE IN THE BORE PIT ON LEVEL TO ENSURE STRAIGHT BORES. AFTER INSTALLING YOUR FIRST DRILL STEM TO THE "PRAIRIE DOG" HORIZONTAL BORING MACHINE, USE A LEVEL ON TOP OF THE DRILL STEM TO FURTHER ENSURE THE BORE WILL BE ON GRADE. TWO STAKES IN EACH BORE PIT ATTACHED TOGETHER WITH STRING CAN ALSO PROVIDE A STRAIGHT LINE REFERENCE FOR BORES. NEXT TAKE AN ACCURATE MEASUREMENT OF THE LENGTH OF BORE OR LAY YOUR PIPE OUT FROM BORE PIT TO HELP GUAGE YOUR DISTANCE. WHEN THE LAST SECTION OF PIPE IS ADDED FOR DRILLING, YOU SHOULD BE ABLE TO SEE IT IN THE COME-OUT HOLE. (Figure 2)

WATER

THE EASIEST APPLICATION IS OF COURSE FROM AN EXISTING WATER SOURCE USING A COMMON GARDEN HOSE. IF A WATER SUPPLY IS NOT AVAILABLE, TANKS AND DRUMS, WITH THE ADDITION OF A WATER PUMP THAT CAN MAINTAIN A WATER PRESSURE OF 40 TO 50 PSI IS ALL THAT IS NECESSARY. THE AMOUNT OF WATER NEEDED FOR YOUR SPECIFIC SOIL CONDITIONS CAN VARY, BUT IN NORMAL CONDITIONS A 55 GALLON DRUM OF WATER IS SUFFICIENT TO BORE 2" HOLE 30 FEET.

DRILLING

INSTALL THE PILOT BIT TO YOUR FIRST DRILL STEM, START THE MOTOR, ENGAGE THE TRANSMISSION IN THE CLOCKWISE OR "FORWARD" DIRECTION AND TURN THE WATER ON TO ENSURE THE PILOT BIT IS FREE OF ANY OBSTRUCTIONS. THE MACHINE ADVANCES WHEN THE HANDLE IS ROTATED. ENOUGH PRESSURE SHOULD BE APPLIED TO THE HANDLE ADVANCING SYSTEM TO ALLOW SMOOTH EASY OPERATION. IF TOO MUCH PRESSURE IS APPLIED, THE WATER WILL NOT BE ABLE TO MOVE THROUGH THE DRILL BIT EASILY AND CAUSE THE PILOT BIT TO BECOME CLOGGED. IF THIS HAPPENS STOP THE ADVANCING SYSTEM AND THE WATER SHOULD UNCLOG THE BIT MOMENTARILY. (Figure 3, Figure 4)

BEFORE SEPARATING THE RODS DISENGAGE THE TRANSMISSION BY PLACING THE LEVER IN THE CENTER OR NEUTRAL POSITION. (SOME TURNING MAY STILL OCCUR UNDER INERTIA BUT WILL EASILY STOP WHEN HELD. TO REDUCE THE INERTIA, THROTTLE THE ENGINE DOWN.) PIPE WRENCHES MAY BE USED TO LOOSEN THE DRILL RODS FROM EACH OTHER OR FROM THE DRILL ROD ADAPTOR ON THE MACHINE. ONCE LOOSE THEY SHOULD UNTHREAD EASILY AND COMPLETELY DISENGAGE IN 1½ TURNS. ALWAYS TURN THE RODS THAT ARE EXPOSED IN THE BORE PIT NOT THE ONES IN THE BORE HOLE. TURNING RODS IN THE HOLE COULD CAUSE A BIT, BACK REAMER OR OTHER RODS TO UNTHREAD AND BE LOST.

IF WATER AND CUTTINGS ARE NOT COMING BACK OUT OF THE HOLE STOP AND INVESTIGATE THE REASON IMMEDIATELY. IT MAY ONLY TAKE SIMPLY BACKING OFF AND LETTING THE ROD TURN WHILE PUMPING WATER TO CLEAR THE PILOT HOLE OR IT MAY REQUIRE REMOVING THE DRILL RODS FROM THE HOLE COMPLETELY TO CHECK THE WATER JETS IN THE PILOT BIT. AT ANY RATE, CONTINUING TO PUSH ON WILL ONLY ALLOW THE CUTTINGS TO COLLECT AND BIND UP AROUND THE DRILL ROD AND LUG THE ENGINE. THE PROBLEM WILL GET WORSE IF IT IS NOT CORRECTED. EVEN AT OVER 100' THE DRILL ROD SHOULD TURN EASILY WITHOUT LUGGING THE ENGINE DOWN.

BACK REAMING

ONCE YOU'VE REACHED YOUR COME OUT HOLE YOU MAY NEED TO ENLARGE IT TO ACCOMMODATE PIPE OR CONDUIT. REMOVE THE PILOT BIT AND INSTALL A BACK REAMER AND CABLE SWIVEL.(Figure 5) THE CABLE SWIVEL IS NECESSARY FOR PULLING BACK A CABLE FOR LATER USE IF YOU INTEND TO PULL THE WIRE, PIPE OR CONDUIT BACK THROUGH THE HOLE OR IF YOU NEED TO PULL BACK A PLUG TO SWAB THE HOLE BEFORE INSTALLATION OF THE UNDERGROUND UTILITY. IF YOU INTEND TO PUSH IT YOU STILL NEED THE CABLE SWIVEL ON THE END OF THE BACK REAMER TO CONTROL THE WATER FLOW.

BACKREAM A HOLE ROUGHLY 2" BIGGER THAN YOUR PIPE, OR OTHER UNDERGROUND UTILITY MATERIAL, WHICH WILL ALLOW FOR EASE OF INSTALLATION.(Figure 6) WHEN DRILLING BE SURE NOT TO FORCE THE MACHINE. THE ROTATING HANDLE SHOULD PROVIDE ALL THE POWER YOU NEED WITHOUT USING EXCESSIVE FORCE. A SIMPLE RULE TO USE IS THAT IF THE MACHINE IS TIRING THE OPERATOR HE NEEDS TO BACK OFF. THE BITS ARE DESIGNED TO CUT THE SOIL EASILY WITH CARBIDE INSERTS.

IT IS BEST TO BORE WITH SLOW STEADY FORCE. LISTENING TO THE ENGINE IS A GOOD INDICATOR OF PROPER FORCE. A COMMON NEW OPERATOR ERROR IS TO LET THE MACHINE REV UP AND THEN FORCE THE BIT INTO THE SOIL TOO HARD UNTIL THE ENGINE CAN'T TURN AT FULL SPEED THEN LIGHTENING THE PRESSURE TO LET THE ENGINE REV UP AGAIN. THIS LUGS THE ENGINE, SLOWS THE BACKREAMER AND PUTS UNNEEDED STRESS ON THE ADVANCE MECHANISM. STEADY PRESSURE WITH SOME GOVERNOR "KICKING IN" WILL ALWAYS WORK BETTER THAN FORCING AND RELEASING. WITH THE ADDITION OF WATER, THE SOIL NEEDS TO BE SIMILAR TO THE CONSISTANCY OF A THICK MALT. THIS IS DESIRABLE FOR TWO REASONS; THE MIXTURE KEEPS THE HOLE OPEN SO IT WILL NOT CAVE IN, AND ALLOWS THE PIPE, WIRE, OR PLUG TO BE PULLED BACK EASILY. ALWAYS TURN THE RODS THAT ARE EXPOSED IN THE BORE PIT NOT THE ONES IN THE BORE HOLE. TURNING RODS IN THE HOLE COULD CAUSE A BIT, BACK REAMER OR OTHER RODS TO UNTHREAD AND BE LOST. ATTACHING A CABLE TO THE CABLE SWIVEL WILL AT LEAST ENSURE YOU CAN RETRIEVE LOST BACK REAMERS OR RODS.

A WORD OF CAUTION

WHEN BORING, START EARLY AND TRY TO COMPLETE YOUR BORE THE SAME DAY. NEVER LEAVE A DRILL ROD IN THE HOLE FOR MORE THAN A COUPLE OF HOURS WHEN YOU STOP DRILLING. YOU CAN SEIZE THE DRILL STEM IF YOU ATTEMPT THIS BECAUSE THE WATER LEECHES OUT OF THE SOIL AND MAKES IT BECOME STICKY OR HARD AGAIN. IF IT BECOMES NECESSARY TO LEAVE THE HOLE OVERNIGHT, DRILL THE PILOT HOLE FIRST AND THEN REMOVE THE DRILL ROD FROM THE HOLE. YOU MAY THEN RE-DRILL THE PILOT HOLE IN JUST A FEW MINUTES.

INSTALLING THE PIPE

WHEN BORING SMALL HOLES OF 1' AND 2" DIAMETER, IT IS NOT NECESSARY TO USE A PULL PLUG OR SWAB. THE PLUG IS PULLED BACK THROUGH THE HOLE WITH A CABLE ON EITHER SIDE, TO FORCE THE SLUDGE OUT OF THE HOLE. YOU CAN THEN ATTACH CABLE TO THE PIPE AND PULL IT THROUGH THE BORE PIT. THE JOB IS NOW COMPLETE.(Figure 8)

OPERATION IN EXTREMELY SANDY SOILS

WHEN BORING EXTREMELY SANDY SOILS THERE IS A POSSIBILITY OF THE SOIL BEING UNSTABLE AND CAVING IN. BENTONITE CLAY WILL HELP TO STABILIZE THE SOIL AND PREVENT THE HOLE FROM COLLAPSING BY LINING THE HOLE WITH THE CLAY MIXTURE MADE UP OF THIN PLATELETS THAT STICK TOGETHER. BENTONITE CLAY CAN BE MIXED IN A DRUM OR OTHER SUITABLE CONTAINER OF WATER. IT WILL RESEMBLE HEAVY CREAM AND CAN BE PUMPED INTO THE HOLE WITH ANY CENTRIFICAL PEUMP AT 40 TO 50 POUNDS OF PRESSURE.

DIFFICULT CLAY, GUMBO OR OTHER STICKY SOILS

WHEN DRILLING IN THESE SOILS THE CLAY MAY BE SO STICKY THAT IT DOES NOT WANT TO BREAK UP WITH PLAIN WATER TO FORM THAT PANCAKE BATTER CONSISTENCY WHICH ALLOWS IT TO RUN OUT OF THE HOLE. THIS CAN BE ESPECIALLY TROUBLESOME WHEN DRILLING THE PILOT HOLE AS THE CLAY MAY BEGIN TO SWELL AND BIND UP ON THE DRILL RODS. THE ADDITION OF DETERGENT (MAKE SURE IT IS BIO-DEGRADABLE) CAN HELP BREAK THE CLAY PARTICLES UP SO THEY MIX AND RUN MORE FREELY. ADDING DETERGENT CAN BE AS EASY AS A SMALL SQUIRT INTO EACH ROD AS THEY ARE ADDED IN THE PILOT DRILLING PROCESS OR IT CAN BE MIXED IN A DRUM OR OTHER SUITABLE CONTAINER OF WATER AND PUMPED THROUGH THE SYSTEM. ADDITIONALLY THERE ARE COMMERCIAL PRODUCTS ON THE MARKET THAT WILL PREVENT THE CLAY FROM ABSORBING WATER AND STICKING TOGETHER. THIS PRODUCT IS CALLED A "CLAY INHIBITOR". USED ACCORDING TO DIRECTIONS AND MIXED IN A SUITABLE CONTAINER CLAY INHIBITORS ARE AN EXCELLENT AND COST EFFECTIVE SOLUTION TO TOUGH CLAY CONDITIONS.

DRILLING ROCK

MOST ROCK, SUCH AS SANDSTONE, CALICHE, SOFT LIMESTONE AND CONCRETE ARE FAIRLY EASY TO BORE THROUGH USING CARBIDE BITS. OTHER ROCK SUCH AS FLINT AND GRANITE WOULD REQUIRE A BORING RIG THAT UTILIZES A LARGE CRANE FOR SET-UP. IF YOU HAVE DIFFICULTY ON A BORE, AND THERE SEEMS TO BE AN IMPOSSIBLE OBSTRUCTION, THE BEST OPTION IS TO ATTEMPT TO BORE ANOTHER ROUTE IF POSSIBLE. RE-ROUTING IS NOT COMMON BUT NOT UNHEARD OF. IT IS PART OF THE BUSINESS OF BORING.

MODELS WITH FNR TRANSMISSIONS:

COUPLING AND UNCOUPLING DRILL RODS

WHEN COUPLING RODS IT IS RECOMMENDED TO LIGHTLY FEATHER THE TRANSMISSION INTO FWD AND TURN THE WATER SWIVEL SHAFT UNTIL IT HAS FULL THREAD ENGAGEMENT. ONCE FULL THREAD ENGAGEMENT IS ACHIEVED PULL THE TRANSMISSION HANDLE IN THE FORWARD DIRECTION UNTIL IT FIRMLY SNAPS INTO PLACE. THE MOTOR SHOULD ALWAYS BE RUN AT FULL RPM IN ORDER TO GET A GOOD MIXING ACTION WITH THE WATER AND SOIL. THIS WILL PRODUCE THE BEST POSSIBLE SLURRY THAT SHOULD RUN OUT OF THE HOLE. FAILURE TO START THE DRILL ROD TURNING IN THE HOLE BY USING THE CLUTCH RATHER THAN COUPLING UNDER POWER CAN RESULT IN THE WATER SWIVEL SHAFT SNAPPING OFF AT THE ADAPTOR. THIS IS DUE TO SHOCK LOAD FROM A SUDDEN INCREASE IN RPM, SLIGHT TWISTING OF THE DRILL ROD WHICH THEN SNAPS BACK.

WHEN BORING A PILOT HOLE RUN THE ROD IN AS FAR AS POSSIBLE THEN BACK IT OUT JUST ENOUGH TO BE ABLE TO PUT PIPE WRENCHES ON THE DRILL ROD. DISENGAGE THE TRANSMISSION, IDLE DOWN THE ENGINE OR TURN OFF THE AIR OR HYDRAULIC SUPPLY AND ALLOW THE WATER TO RUN FOR A FEW SECONDS. THIS WILL CLEAR THE SOIL IN THE GAP YOU CREATED AND PREVENT THE PILOT PIT FROM GETTING CLOGGED. THE SAME PROCEDURE SHOULD BE USED IN BACKREAMING. THE POINT IS TO NOT STOP EITHER THE BIT OR BACKREAMER WHEN IT IS ENGAGED WITH THE SOIL. LEAVE JUST A LITTLE BUFFER GAP SO THAT RESTARTING THE ROD TURNING WILL BE EASIER.

WHEN UNCOUPLING THE DRILL ROD, DO NOT USE THE TRANSMISSION IN REVERSE TO BREAK THE ROD FREE. THIS MAY RESULT IN THE ADAPTOR UNTHREADING FROM THE WATER SWIVEL SHAFT AND STRIPPING THE THREADS. ALWAYS USE 2 PIPE WRENCHES TO BREAK THE DRILL ROD THREADS FREE. ONCE THE ROD IS LOOSE THE TRANSMISSION CAN BE FEATHERED IN REVERSE TO FINISH UNCOUPLING. THIS WILL BE NO MORE THAN 1 ½ TURNS.

A FINAL NOTE

WE, AT PRAIRIE DOG BORING EQUIPMENT, INC. ARE SURE YOU WILL GET MANY YEARS OF SERVICE AND PROFITABILITY WITH THE PURCHASE OF ONE OF OUR MACHINES. OUR "PRAIRIE DOG" HORIZONTAL BORING MACHINES WILL PUT A HOLE IN THE GROUND, AND NOT IN YOUR POCKET. FAMILY OWNED AND OPERATED FOR OVER 40 YEARS, WE TAKE PRIDE IN THE SERVICE AND CRAFTSMANSHIP THAT GO INTO EVERY "PRAIRIE DOG" WE BUILD.

How it works- Simple 7 step procedure

Step 1:

Dig trenches on either side of the road up to desired depth, one trench to accommodate the machine and the other for come-out hole.

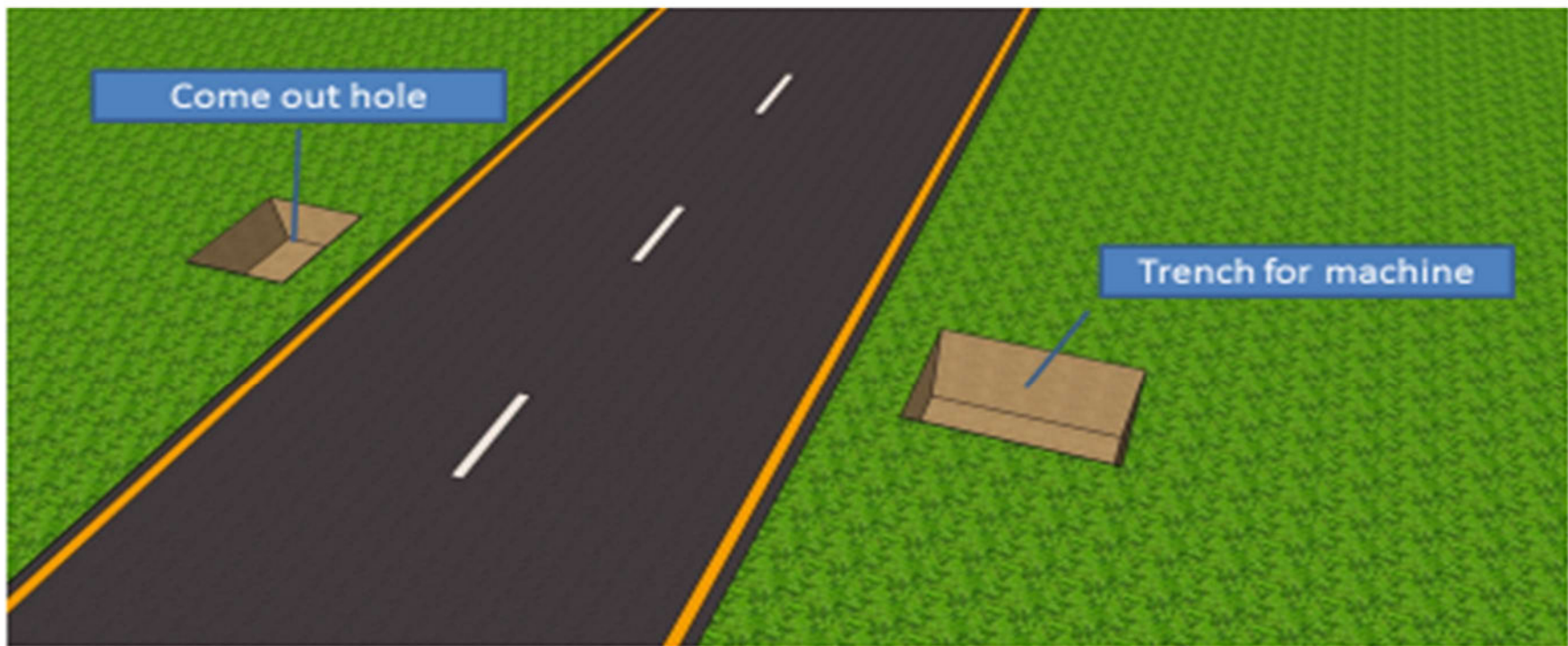


Figure 1

Step 2:

Lower the machine into the trench and attach the first **Drill Rod** and **Pilot Bit** at the end. Attach the water hose and start engine. Start moving the machine forward.

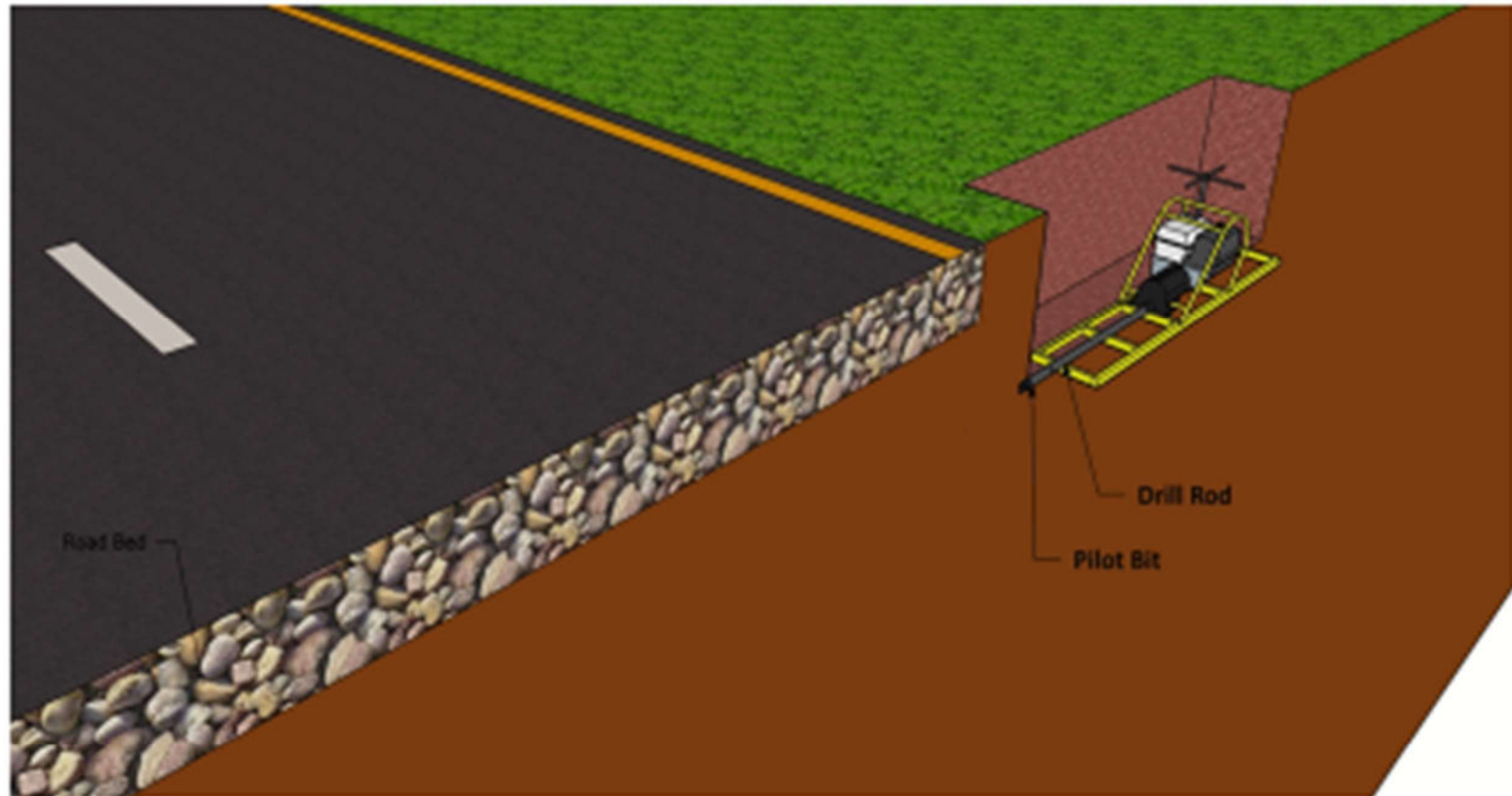


Figure 2

Step 3:

As each joint of Drill Rod is pushed into the ground a new one is added behind.

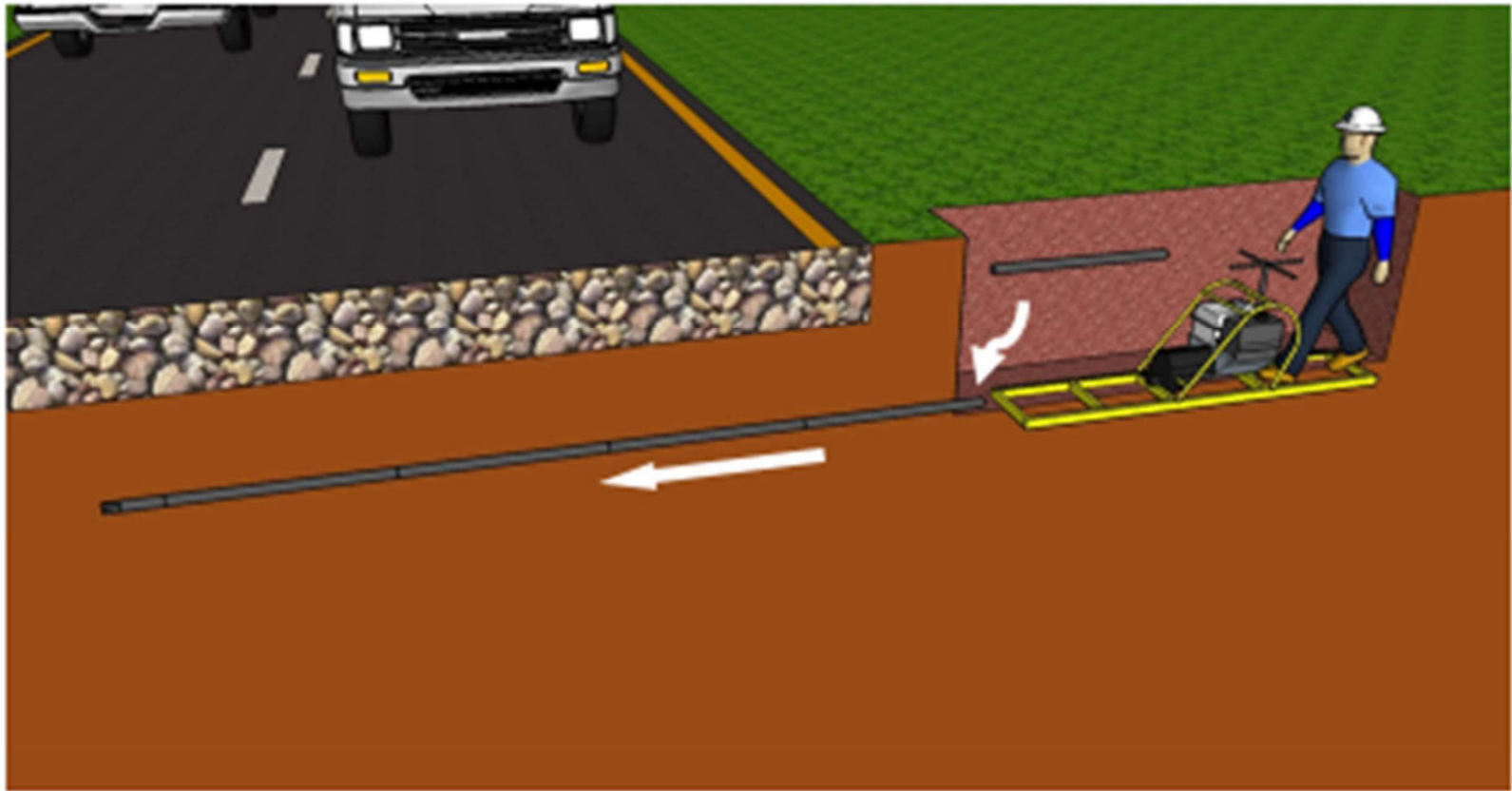


Figure 3

Step 3: (Contd..)

Continue adding **Drill Rods** until the **Pilot Bit** reaches the come-out hole.

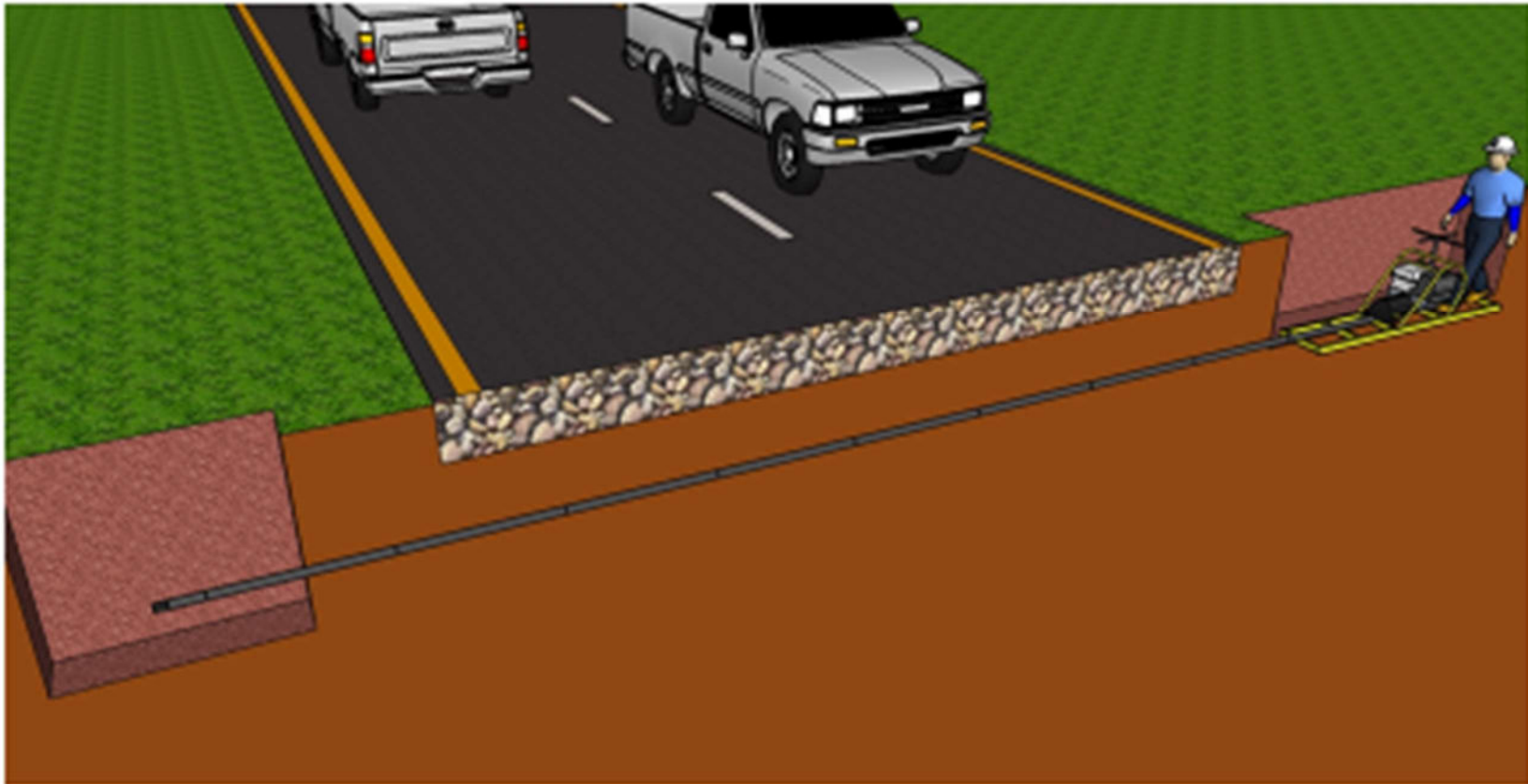


Figure 4

Step 4:

Remove the Pilot Bit and screw on the Backreamer

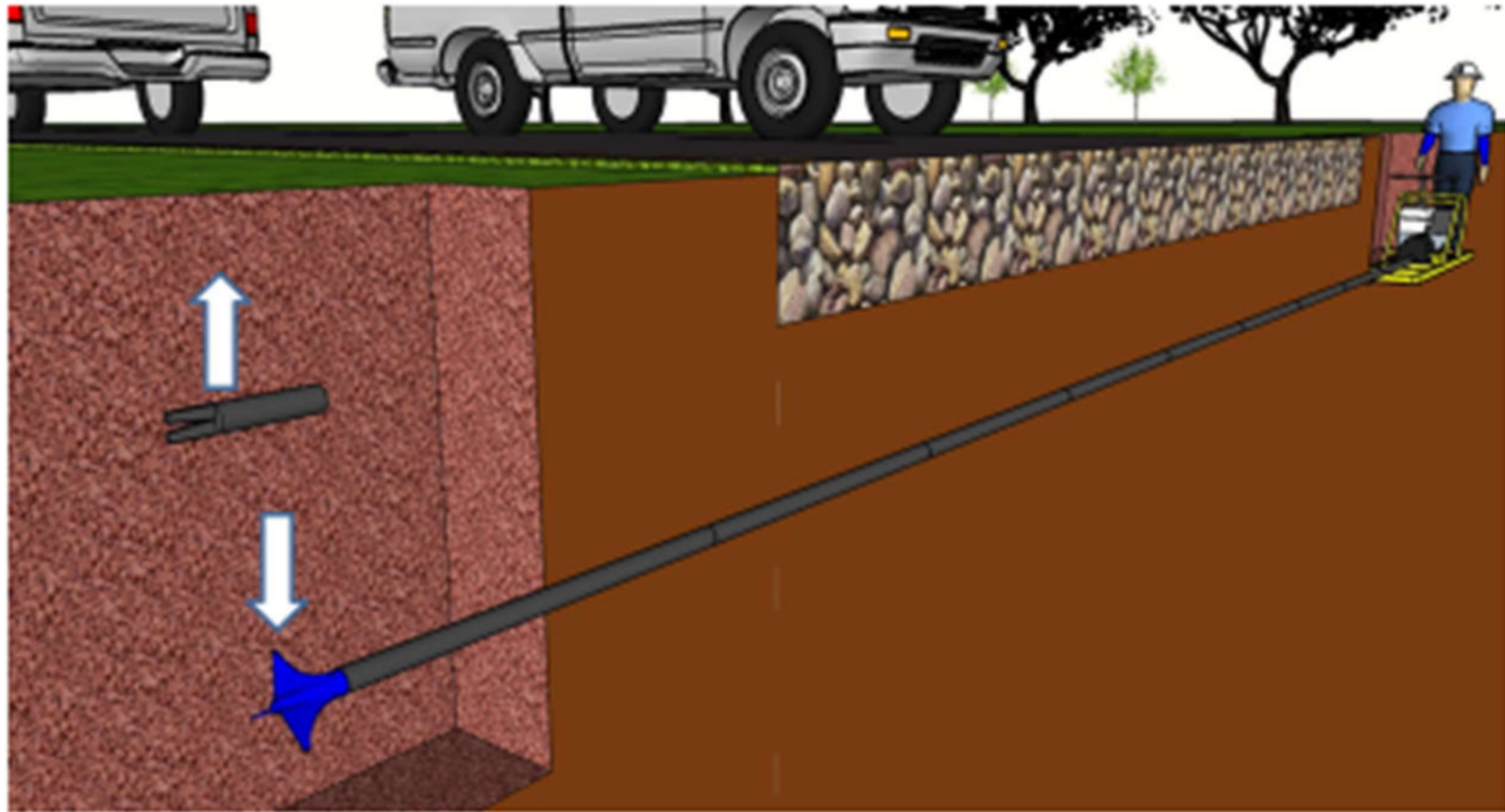


Figure 5

Step 5:

Start moving the machine backwards and disconnect the emerging Drill Rods as they becomes completely exposed (at machine end)

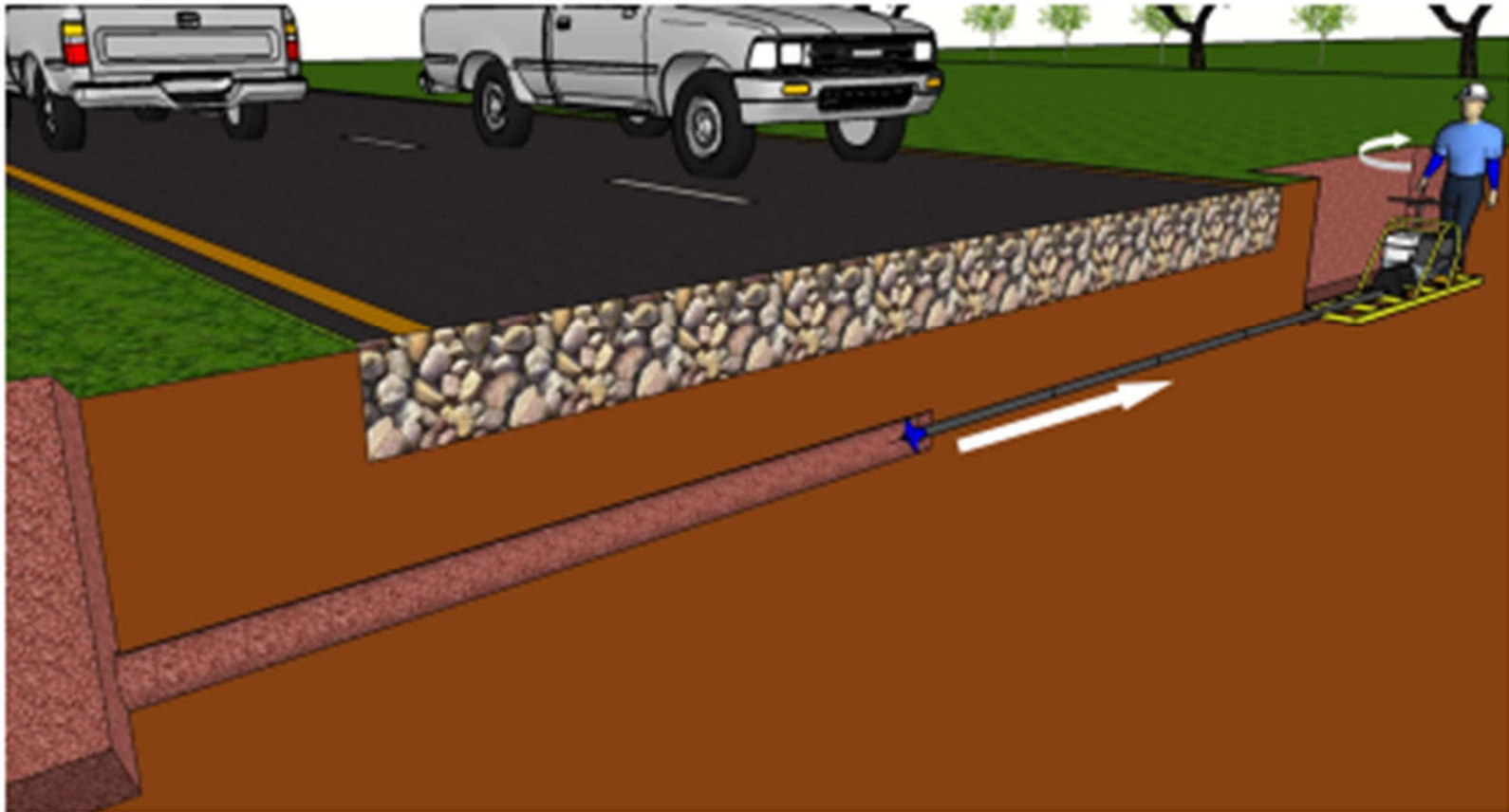


Figure 6

Step 6:

Once the **Backreamer** reaches the start point cleanup the hole with a Pull-plate (if required).

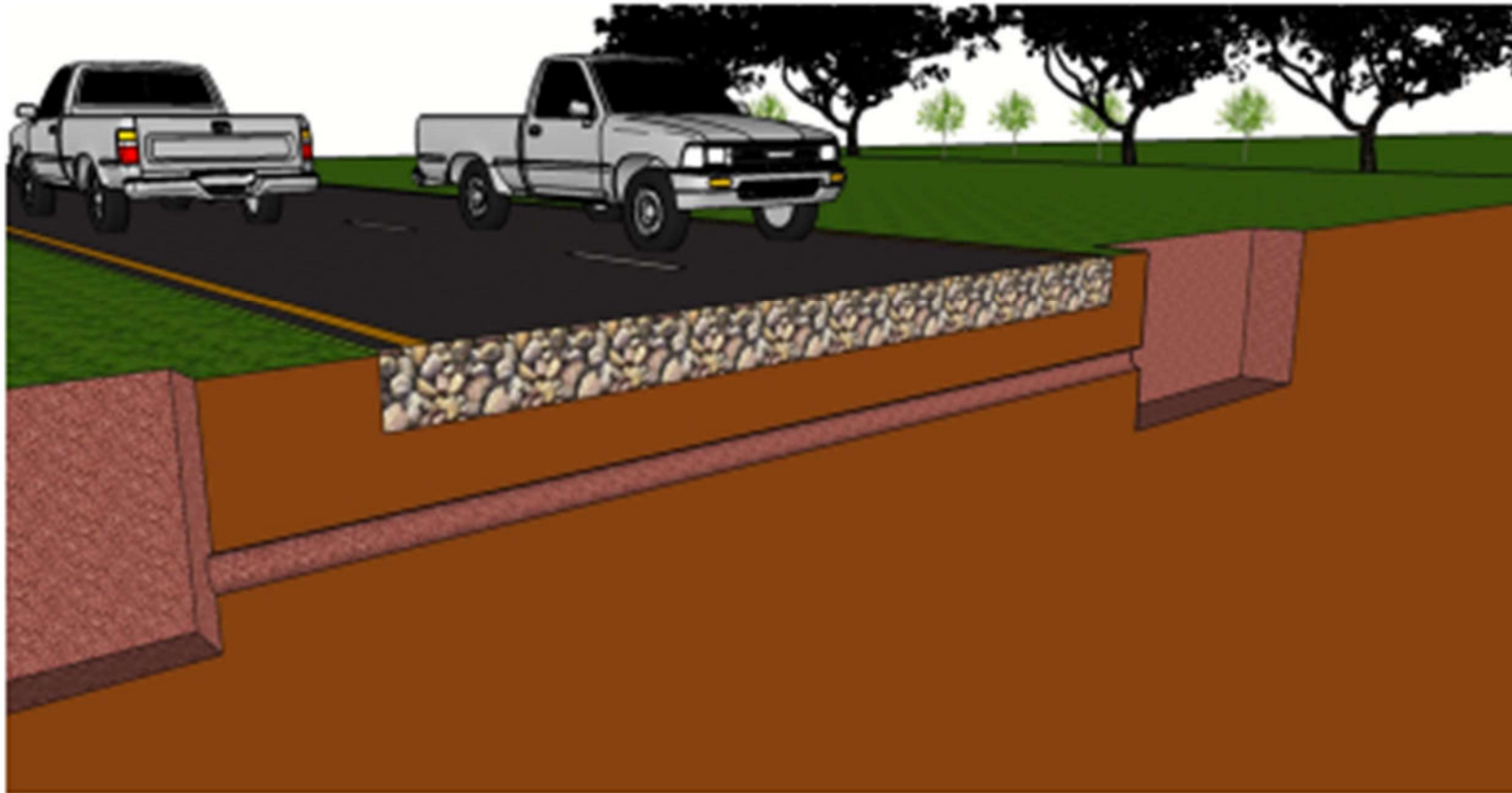
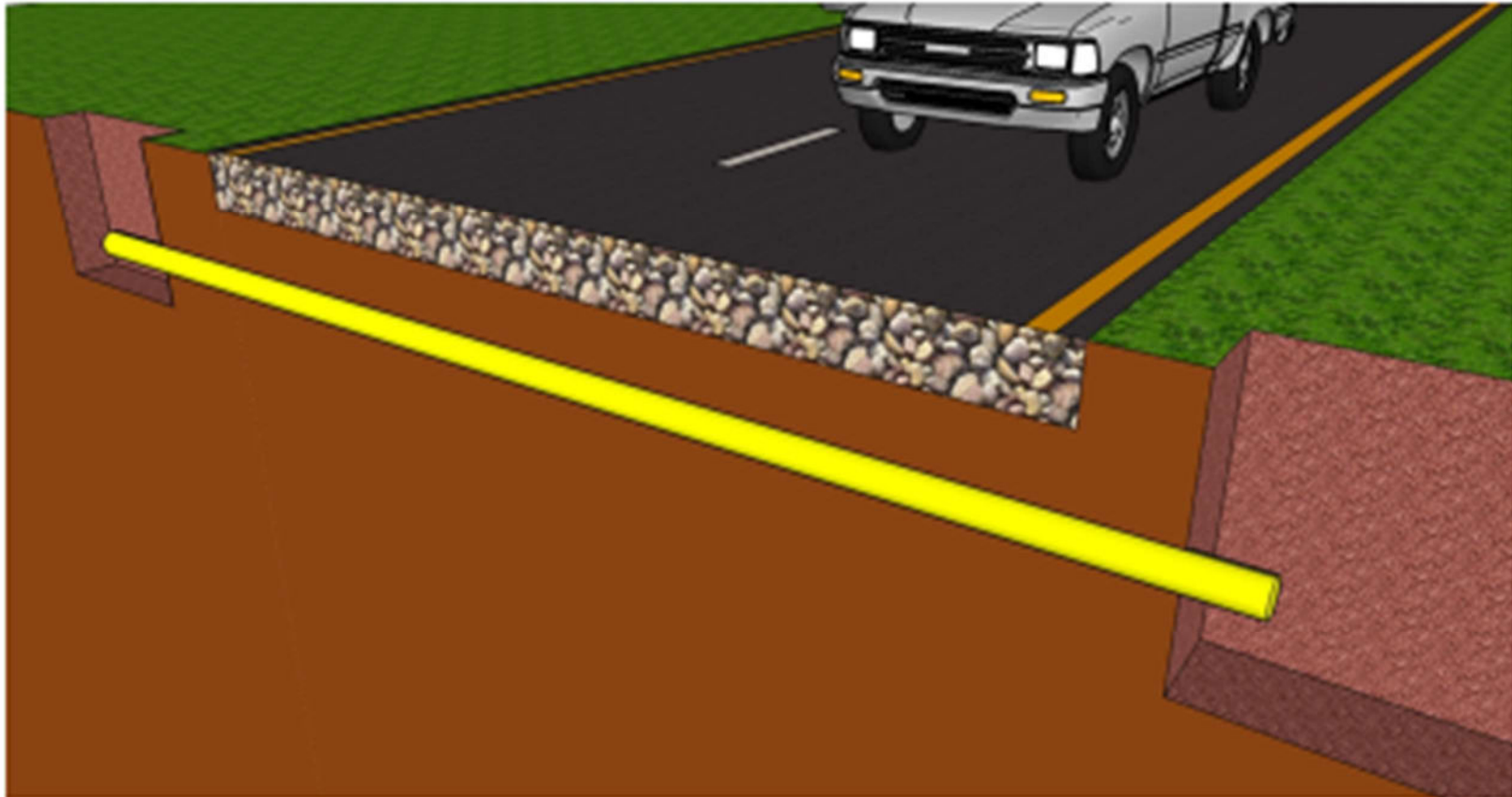


Figure 7

Step 7:

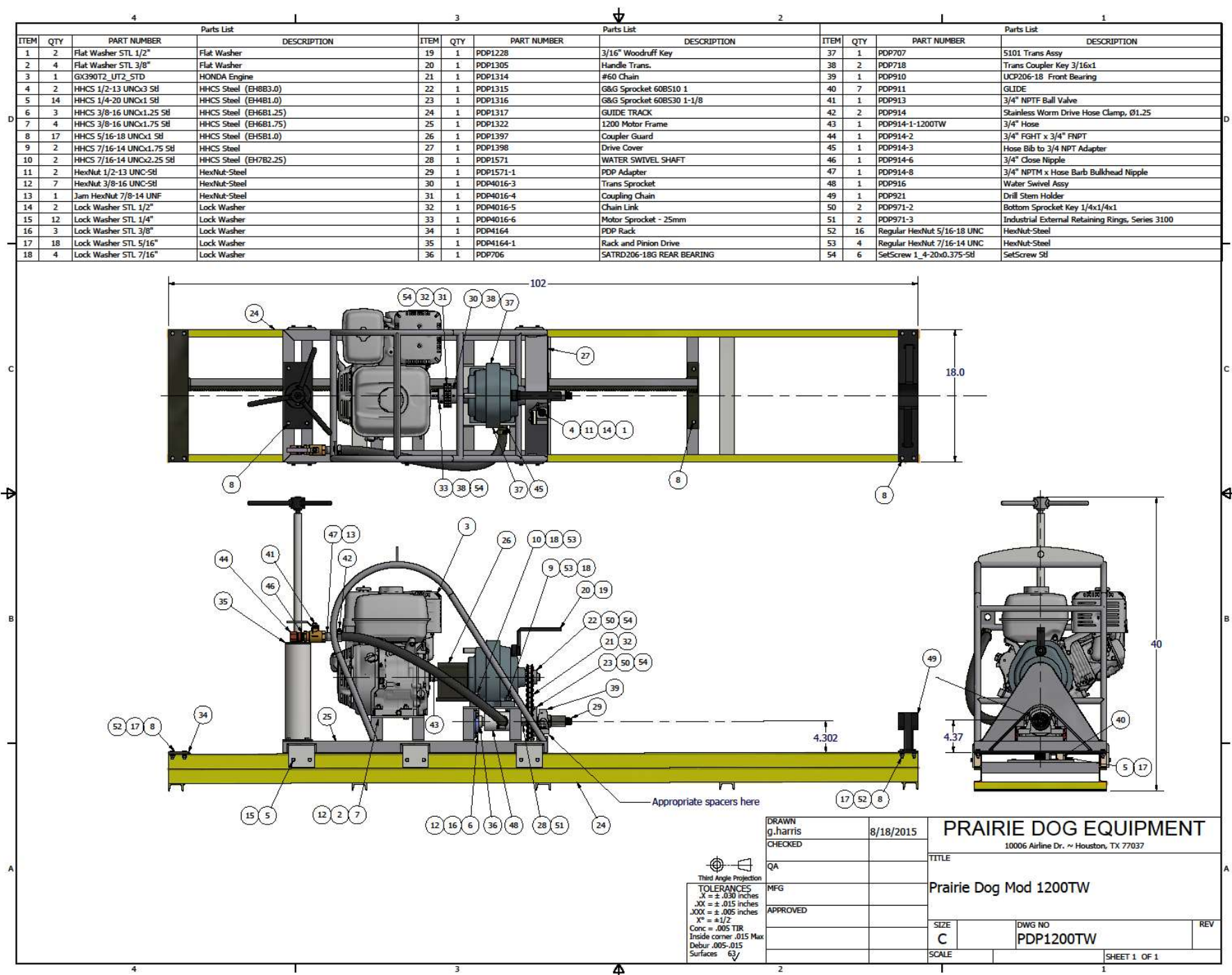
Slide in the pipe while the hole is still lubricated with slurry

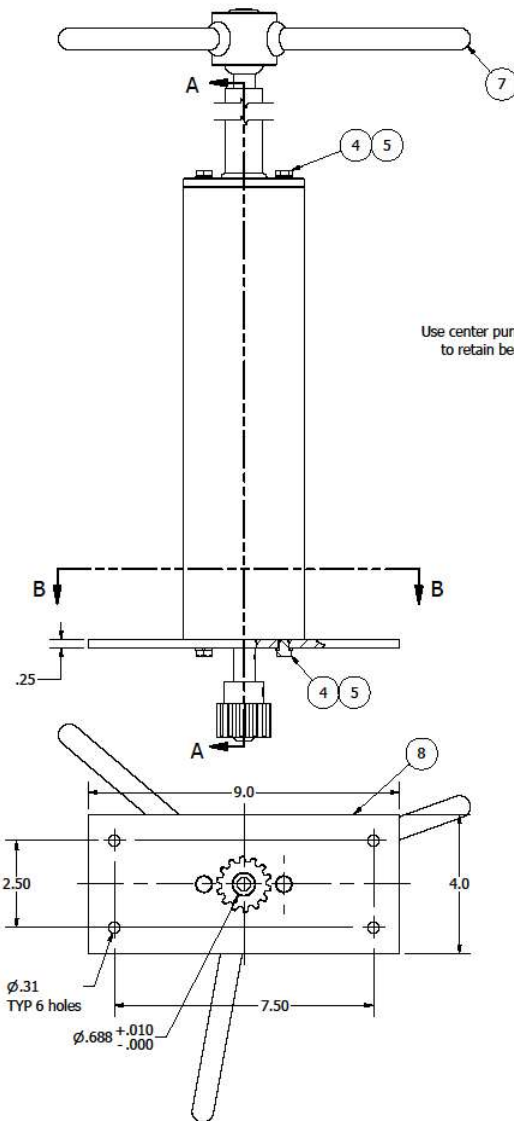


Note: The above steps are for illustration purpose only. Please read the user manual and safety instructions [supplied with the machine] before operating.



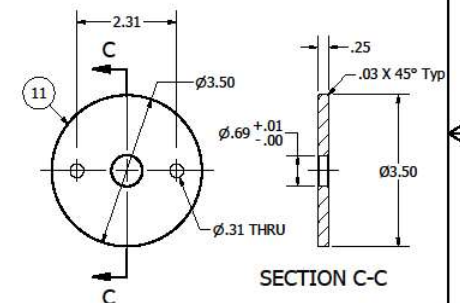
Figure 8

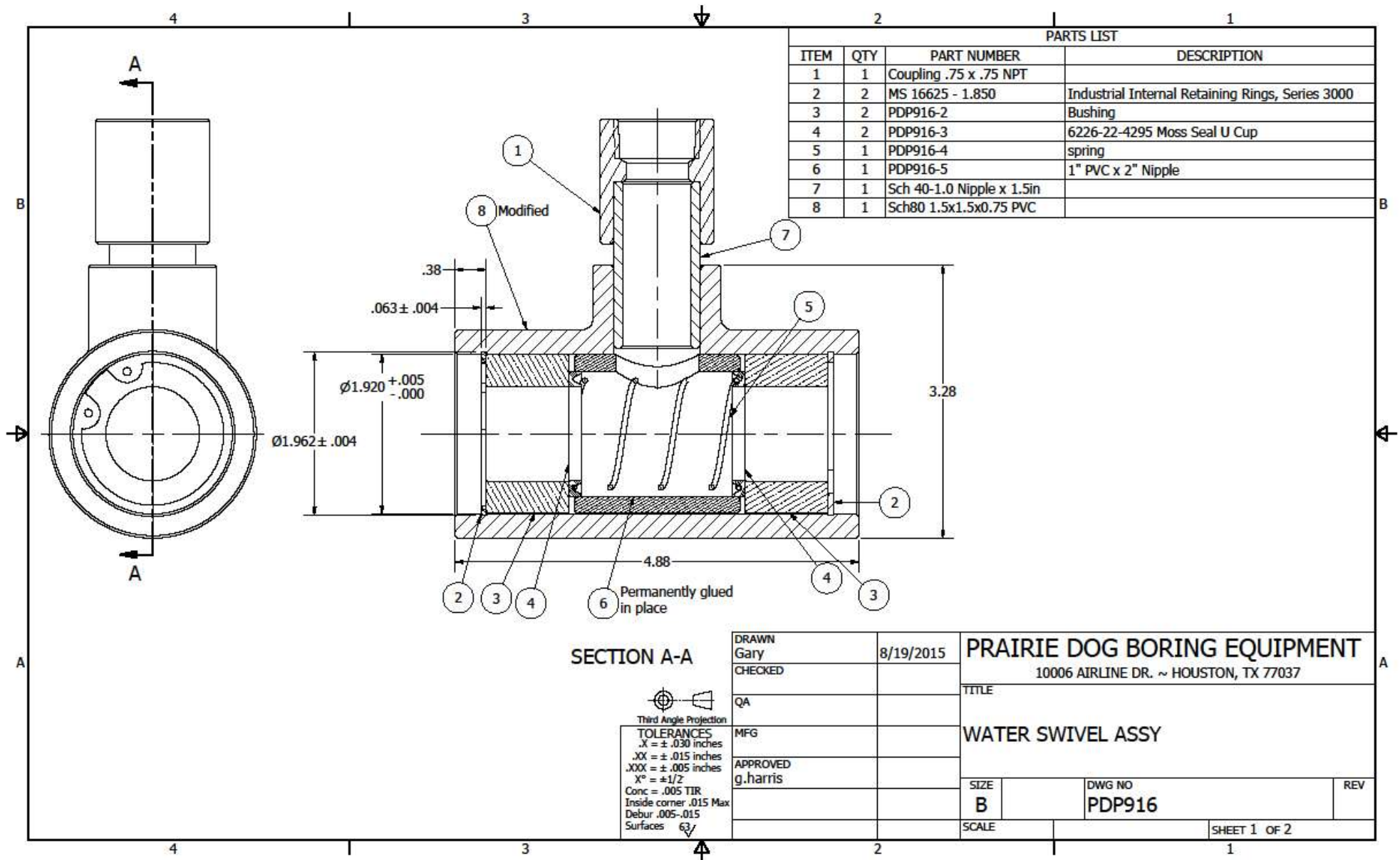




SECTION A-A

This technical drawing shows a cross-section of a mechanical assembly. The central component is a shaft with a diameter of $\phi(1.66)$. It is supported by two bearings, labeled 6 and 9, which are mounted on a base plate. The shaft has a total length of 13.0 units. At the top of the shaft, there is a nut (3) and a washer (11). The distance from the top of the shaft to the center of the upper bearing is .50 units. The distance between the centers of the two bearings is TYP (typical). The distance from the center of the lower bearing to the bottom of the shaft is .25 units. The shaft has a threaded section at the bottom, labeled 10, with a nut (12) and washer (10) at the very end. The shaft is also labeled with a note: "Seen over lip P each end."

19 | Page



SNOW-NAPBSTEDT POWER TRANSMISSION

REVERSING TRANSMISSION

1. WARRANTY

THE COMPANY'S PRODUCTS ARE GUARANTEED TO BE MADE OF THE FIRST CLASS MATERIAL, AND IN A SKILLFUL AND WORKMANLIKE MANNER, AND TO BE IN PERFECT RUNNING ORDER AT THE TIME THEY LEAVE THE FACTORY. THEY ARE GUARANTEED AGAINST ANY DEFECTIVE MATERIAL OR WORKMANSHIP, AND ANY PARTS PROVEN DEFECTIVE WITHIN TWELVE MONTHS FROM THE DATE OF SHIPMENT WILL BE REPLACED FREE OF CHARGE, F.O.B. OUR PLANT, ON RETURN OF SUCH DEFECTIVE PART TO THE COMPANY, TRANSPORTATION CHARGES PREPAID. NO PARTS, HOWEVER, SHALL BE RETURNED WITHOUT THE EXPRESS AUTHORIZATION OF THIS COMPANY SO TO DO.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT SUCH WARRANTIES AS ARE DEFINITELY SET FORTH HEREIN. ANY PART OR PARTS MANUFACTURED ALTERED OR REPAIRED OUTSIDE THE FACTORY WITHOUT WRITTEN APPROVAL FROM THE FACTORY SHALL VOID ALL WARRANTIES SET FORTH HEREIN. UNDER NO CIRCUMSTANCES WILL THE COMPANY BE CHARGED FOR LABOR TO INSTALL PARTS FURNISHED UNDER WARRANTY UNLESS IT AGREES IN ADVANCE TO DO SO. SHIPPING CHARGES ON WARRANTY PARTS SHALL BE FOR THE ACCOUNT OF THE CUSTOMER UNLESS THE COMPANY AGREES IN ADVANCE TO PAY THEM.

THE COMPANY SHALL IN NO EVENT BE HELD LIABLE FOR ANY CONSEQUENTIAL DAMAGES OR OTHER DAMAGES OR DELAY CAUSED BY DEFECTIVE MATERIAL. EQUIPMENT AND ACCESSORIES, INCLUDING BEARINGS, NOT MANUFACTURED BY THE COMPANY ARE GUARANTEED ONLY TO THE EXTENT OF THE ORIGINAL MANUFACTURER'S GUARANTEE.

THE COMPANY RESERVES THE RIGHT TO IMPROVE ITS PRODUCTS THROUGH CHANGES IN DESIGN OR MATERIAL WITHOUT BEING OBLIGATED TO INCORPORATE SUCH CHANGES IN PRODUCTS OR PRIOR MANUFACTURE.

2. ADJUSTMENT

THE FORWARD AND REVERSE CLUTCH ARE ADJUSTED EXTERNALLY WITH THE SCREWS WHICH PROJECT FROM BOTH SIDES OF THE CASE. ADJUST ONE CLUTCH AT A TIME. LOOSEN THE JAM NUT. TURN IN THE ADJUSTING SCREW A FRACTION OF A TURN IF MORE TENSION IS DESIRED. TURN OUT THE ADJUSTING SCREW FOR LESS TENSION. TEST THE ADJUSTMENT BY MOVING THE OPERATING LEVER TOWARDS ITS RESPECTIVE ADJUSTING SCREW. TIGHTEN THE JAM NUT.

DO NOT TIGHTEN CLUTCHES EXCESSIVELY SINCE THIS ONLY INCREASES THE OPERATING EFFORT WITHOUT IMPROVING CLUTCH ACTION AND MAY RESULT IN DAMAGED BRAKE BANDS. OCCASIONALLY, DURING COLD WEATHER OPERATION, THE CLUTCHES MAY SLIP EVEN THOUGH CORRECTLY ADJUSTED, IN SUCH A CASE THE LUBRICANT MUST BE CHANGED TO A LIGHTER GRADE AS SPECIFIED IN LUBRICATION INSTRUCTIONS.

3. LUBRICATION

IMPORTANT: ALL GEARS ARE SHIPPED DRY FROM THE FACTORY. BE SURE TO ADD OIL BEFORE

RUNNING. QUALITY OF OIL- USE A GOOD GRADE OF STRAIGHT MINERAL OIL--SAE 30 ABOVE 32°F SAE 10 BELOW 32°F. EXAMPLES OF RECOMMENDED LUBE OILS; ESSO LUBE MOTOR OIL; GULF LUBE MOTOR OIL; QUAKER STATE **NON-DETERGENT** MOTOR OIL (ML,MM), OR EQUIVALENT.

FILL UNIT WITH LUBRICATING OIL THROUGH THE BREATHER HOLE ON TOP UNIT OIL FLOWS FROM OIL LEVEL HOLE ON EITHER SIDE. SOMETIMES OIL WILL FOLLOW THE INTERNAL PARTS AND OIL FLOW OUT THE OIL LEVEL HOLES BEFORE THE UNIT IS FILLED WITH OIL TO LEVEL HOLES. BE SURE UNIT IS FILLED TO OIL LEVEL HOLE.

OIL CHANGE

1. THE TRANSMISSION SHOULD DRAINED AND REFILLED AFTER THE FIRST 30 HOURS OF OPERATION.
2. AFTER THIS A CHANGE OF OIL EVERY 100 HOURS OF OPERATION OR EVERY SIX MONTHS, WHICHEVER OCCURS FIRST, FOR UNITS OPERATING UNDER FAVORABLE CONDITIONS.
3. WHERE OPERATING CONDITIONS ARE SEVERE, SUCH AS RAPID RISE AND FALL IN TEMPERATURE OF THE GEAR CASE WITH ACCOMPANIED CONDENSATION ON THE INSIDE WALLS AND RESULTING FORMATION OF SLUDGE, OR WHERE OPERATION IS IN MOIST OR DUSTY ATMOSPHERES, OR IN THE PRESENCE OF THE CHEMICAL FUMES, IT MAY BE NECESSARY TO CHANGE THE OIL AT INTERVALS OF ONE TO THREE MONTHS.

4. REPLACEMENT OF PARTS

SHOULD IT BECOME NECESSARY TO REPLACE ANY GEAR DUE TO WEAR OR BREAKAGE, THE MATING GEARS MUST BE CAREFULLY EXAMINED FOR WEAR OR CRACKS. IF ANY DOUBT EXISTS AS TO THE CONDITION OF THE MATING GEAR, THEY SHOULD BE REPLACED.

IN GENERAL, ALL GEARING IS SOLD COMPLETE WITH BEARING AND BUSHING INSTALLED.

THE SINTERED BUSHINGS AND NEEDLE BEARINGS USED IN THIS TRANSMISSION REQUIRE SPECIAL ASSEMBLY AND SIZING TOOLS AS SPECIFIED BY THE RESPECTIVE MANUFACTURERS. THEREFORE, THE REPLACEMENT OF THESE PARTS SHOULD NOT BE ATTEMPTED UNLESS PROPER EQUIPMENT IS AVAILABLE.



<u>REF #</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
501	20186	OIL SEAL	1
502	10237-1	BEARING	1
503	30X-5106	OUTPUT HOUSING ASSEMBLY	1
503A	6267	BUSHING	1
503B	4527	ADJUSTMENT BOLT	1
503C	1703	JAM NUT	1
503D	2101	PIPE PLUG	2
504	31H-5105	BREATHER	1
505	5X-5104	BRAKE BAND ASSEMBLY	2
506	7AX-5106	GEAR DRUM ASSEMBLY	1
506A	6268	BUSHING	1
507	27AX-5106	CROSS SHAFT ASSEMBLY	1
507A	(10)-5104	CAM	2
507B	27A-5106	CROSS SHAFT	1
508	3X-5104	GEAR CAGE ASSEMBLY	1
508A	48X-5106	OUTPUT SHAFT ASSEMBLY	1
508B	(3)-5104	GEAR COVER	1
508C	9AX-5103	SHORT PINION ASSEMBLY	2
508D	9X-5103	LONG PINION ASSEMBLY	2
508E	6271	BUSHING	2
508F	6273	BUSHING	1
509	26-5109	INPUT SHAFT	1
510	8AX-5102	FLAT DRUM ASSEMBLY	1
510A	8X-5102	GEAR ASSEMBLY	1
510B	26A-5101	BUSHING	1
510C	6272	BUSHING	1
510D	51042	SNAP RING	1
512	30X-51027	INPUT HOUSING ASSEMBLY	1
512A	4527	ADJUSTMENT BOLT	1
512B	1703	JAM NUT	1
512C	2101	PIPE PLUG	1
513	10736	BEARING	1
514	2076	OIL SEAL	1
515	31A-5105	GASKET	1
516	20187	OIL SEAL	1
520	1228	KEY	2
521	8TF-5101	WASHER	1
522	8TR-5101	WASHER	1
523	8TR-5134	WASHER	1

NOTES: