



**LL&G/Pipeline Burial Services  
de Mexico, S.A. Langostino**

# The LL&G/PBS Mud Bug

## The LL&G/PBS Langostino

- Self-propelled pipeline trencher allowing work off of DP-1 or DP-2 vessel with 10 ton crane lift capacity (no anchor barge required)
- Up to 58" diameter pipelines
- 3' below mud line trench in a single pass.
- Up to 16' trench with multiple passes
- Stiff clay cutting (up to 750psi at nozzles 48 ea)
- Up to 250' water depths

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- 36 O.D.” Pipeline burial has been completed (7.7km) for Mexican firm (March 2016)
- 44 O.D.” Pipeline burial has been completed (13km) for Mexican firm (May 2016)

# Specifications



- Length: 6.0 meters
- Width: 2.4 meters
- Height: 2.2 meters
- Weight: 7,600 kgs

# Additional Equipments

## Specifications

No. of Units	Description	Length (m)	Width (m)	Height (m)	Weight (kgs)
1	Langostino Tool	6.0	2.4	2.2	7,600
3	Hazleton Water Jet Pump (with 1600HP Diesel Engines) (1500 GPM pump capacity (900PSI)	8.6	2.5	3.4	22,700
3	Water Feeder Pumps (5600 GPM)	3.7	1.6	1.8	4,600
1	Hose Reel (650ft of umbilical for hydraulics, air, and water)	3.7	3.6	3.2	18,600
2	1600 CFM Air Compressor (with hoses)	5.5	2.6	2.7	9,600
2	Hydraulic Power unit (15 GPM) (with safety shut down)	1.5	1.0	1.0	1,200
1	Control Shack	3.0	3.0	2.6	6,200
1	Storage/Spares Container	6.2	2.8	2.6	10,000

# Systems - Hydraulic



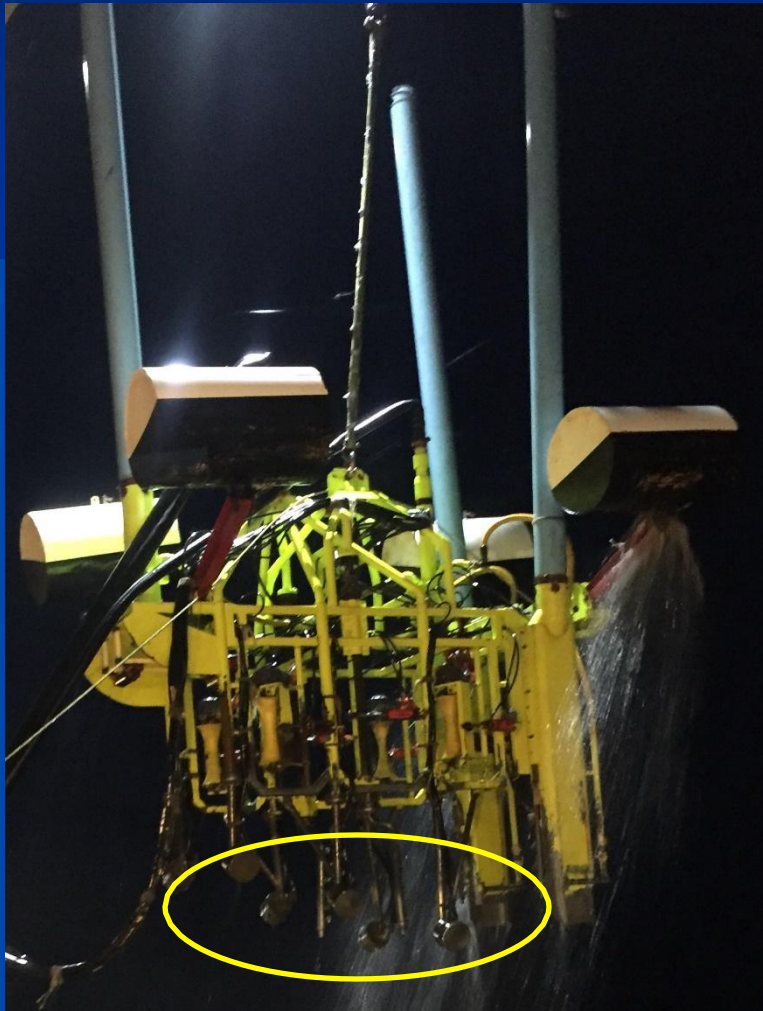
- 4 hourglass rollers squeeze the pipe and drive the machine along the pipeline. Load cells are used to ensure proper squeeze pressure and direct feedback of the machine's orientation with feedback from diver or ROV.

# Systems- Air



- 3 airlifts mounted on the machine for removal of cuttings and debris clearing of the ditch.

# Systems – Jetting



- 6 cutting heads
- 8 jetting nozzles per head (up to 750psi at nozzles)
- 3,000gpm @ 900psi jet pumps provided (modifications available to 4,000gpm)



# Jetting System- Hazelton Pump





# Advantages

- Simultaneous lay and bury
- 3' per minute in one pass (pending soils)
- Efficient over crossings
- Eliminates pre-mobilization inspections
- Can bury active pipelines
- Minimizes hand jetting at tie-in tube turns

# The LL&G/PBS Langostino

## Explanation of Operations-Optimum Conditions

- In optimum conditions, the burial tool will cut a trench to a preset depth adjusted during fabrication of burial tool.
- The cutter heads are attached to the stems and set 3 elevations for the Langostino, normally at 18” intervals of depth, as well as between cutter head rows.
- Customized jetting head arrangement accompanied by the ridge busters allow for more efficiency with project specific soil conditions.
- The purpose of the tool is to remove as much material as possible below the pipe, and as quickly as possible, in order to achieve trench width and depth adequate for the pipe to lay down. This trench width and depth is adjusted according to the pipe size.

# The LL&G/PBS Langostino

## Explanation of Operations-Optimum Conditions

- In medium to compact soil conditions the trench will hold up, and the pipe will settle at 1 to 1.5 meters pending the tool settings based on client requirements.
- The burial tool traverses down the pipe located on natural bottom, therefore leaving a trench behind the burial tool during its operation. As the trench is developed, it allows the pipe to lower down into the ditch behind the tool of ample width and depth achieving the desired depth of top of pipe. For example, a 36" pipeline recently buried lowered down in the bottom of ditch at a distance of 67 meters behind the Langostino.

# The LL&G/PBS Langostino

## Explanation of Operations-Optimum Conditions

- The conditions that affect the performance of the tool is based on pipe size, weight, and also soil conditions. For example, pipe size and weight (specific gravity of the pipe), along with pipe's ability to flex in trench governs the distance in which pipe will touch down. The soil conditions will also determine the efficiency of the tool.
- We normally would expect that touch down of the pipe will be at 100 meters or less (pending pipe size) from the time that the burial tool interfaces a section of natural bottom to the time that pipe touches down.
- When the trench holds, the pipe rests in the trench at the set depth and then the trench fills in. A more confined trench allows for less pipe exposure after burial.

# Illustration Trench-Optimum Conditions

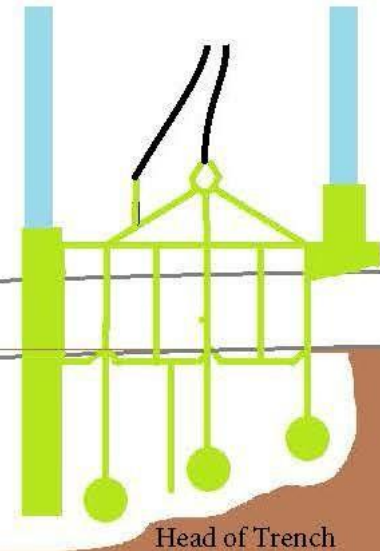
Cross Section  
of Ditch

Trench Walls  
Hold



Touchdown of Pipe

Profile View



# The LL&G/PBS Langostino

## Explanation of Operations- Sugar Sand Conditions- 44" O.D." Diameter Pipeline

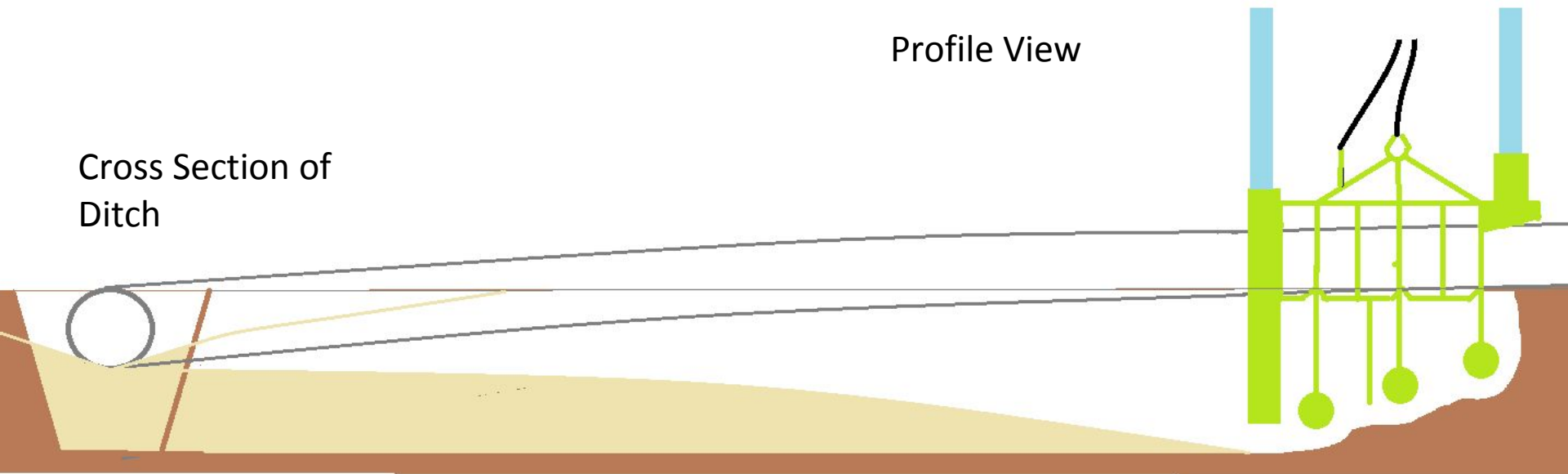
- In Sugar Sand Conditions, the burial tool operates the same as it would in optimum soil conditions, with the exception that the trench backfilling is increased in time from what is normally allowed for touch down of the pipe.
- For example: If the tool is traveling at 1.5 meters per minute and the trench is backfilling at a rate of 1% by volume per minute with an expected touchdown of the pipe at 67 meters, then we would expect 67 minutes of time for trench prior to touchdown. Therefore, our expected performance will allow for 67% of the trench to remain open prior to pipe touch down. Therefore, we would require a second pass to achieve the remaining 33% of the trench width and burial depth that is required. A third pass is required when backfill exceeds 1% per volume per minute.



# Illustration of Trench- Sugar Sand

Cross Section of  
Ditch

Profile View





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