

## Lang Tool Co. Statement of Qualifications ISS Soil Mixing



Lang Tool Co. was formed 1993. The company produced modified excavators and specialized attachments mostly for forestry applications. In 1997 Lang Tool Co. was approached by the Itex company concerning equipment for stabilizing dredge material coming out of the New York-New Jersey harbor. The operation that Itex envisioned required large, high production machines that could stir cement slurry into large barges containing the dredge material. Lang Tool Co. built up two modified excavators with custom built blender attachments. This launched the Lang Tool Co. venture into producing soil mixing equipment.



Lang Tool Co. went on to design and manufacture soil blenders that have been used on remediation projects from Argentina to the Aleutian Islands. In addition to blenders Lang Tool Co. also produced reagent delivery equipment for ISCO and ISS soil mixing. In 2008 Lang Tool Co. produced the Dual Axis Blender and began to move into contracting.





The LTC designed and manufactured Dual Axis blender is unique in that the main drill stem turns on a vertical axis while the drums on the lower horizontal axis counter-rotate. Powered by a 490 hp engine, the DAB produces a violent mixing action. The reagent plumbing outlet is in the middle of the mixing action. The DAB has been used successfully on a multitude of projects including those involving a chemical oxidation process in hard glacial till clay. Equipped with GPS the Dual Axis Blender knows where it's going and where it's been.

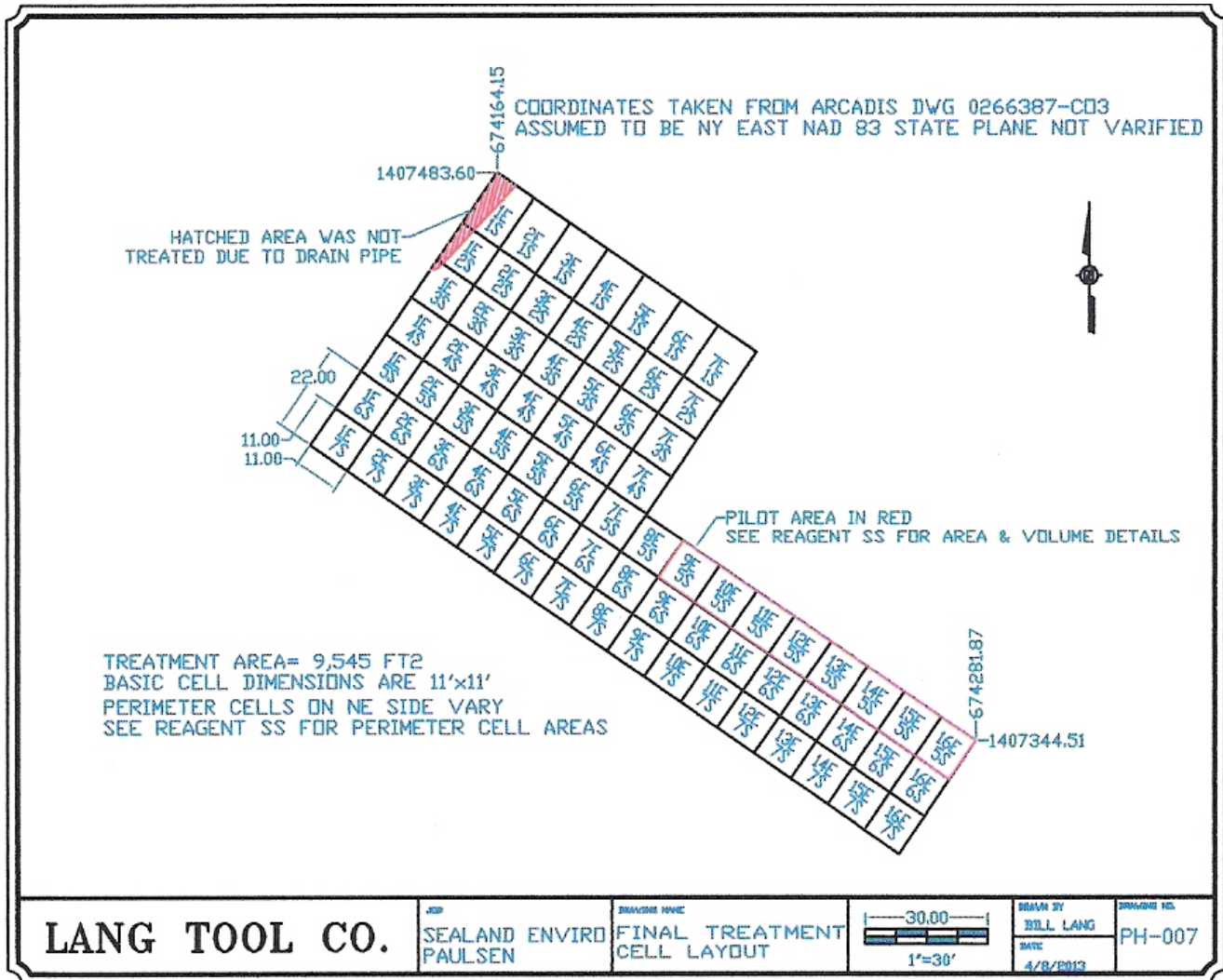
Lang Tool Co. has used its manufacturing and engineering abilities to produce extremely productive and accurate reagent delivery equipment. This equipment was designed to be easily transported and set up on the job. The ISS delivery plant consists of a truck, a horizontal silo, and a piston grout pump. The truck pulls the silo to the job site. The plant has a computerized, integrated scale system that allows reagent to be transferred from the silo to the truck while the truck is dispensing slurry without affecting the accuracy of the delivery and allows a pneumatic tanker to unload into the silo while the truck is dispensing without affecting the accuracy of the delivery. The system records the quantity of reagent and water and the time of delivery for each mixing cell.

The LTC Slurry Plant is unmatched in efficiency and accuracy of delivery. On the last two ISS projects that Lang Tool Co. completed with a combined total of 3,283 tons of reagent- over 6 1/2 million lb- the difference between the total of the load delivery tickets and the recorded output from the truck computer was 1,225 lb- 0.02%.





Lang Tool Co. uses GPS to enhance the productivity and accuracy of the ISS operations that it performs. A CAD drawing of the site with a mixing cell layout and designation is produced and uploaded into the DAB onboard computer. The drawing below was for the Paulsen-Holbrook project in Albany, New York.



The GPS equipment allows the Dual Axis Blender operator to see the cell layout, the cell designation, the mixing tool and the distance to the target mixing elevation. The operator can zoom in and out to get the best perspective for any given situation. The screen is color coded. When the mixing tool reaches the target elevation the screen turns green in that area. When the mixing tool goes below the target elevation the screen turns red. The colored screen can be down loaded from the DAB computer and put into daily and final reports showing that the treatment area has been mixed to the specified depth.



A spreadsheet that matches the cell layout drawing is produced for the Slurry Plant crew that lists the quantity of reagent components for each cell. The cell quantities sheet is part of an Excel workbook. The sheet below is for the Paulsen-Holbrook project as is the drawing on the preceding page.

Paulsen Full Scale Cell Qtys Final

S	1E	2E	3E	4E	5E	6E	7E	8E	9E	10E	11E	12E	13E	14E	15E	16E		
PC 1	11,402	19,290	18,251	18,145	18,093	18,001	18,607	0	0	0	0	0	0	0	0	0	121,789	
Ben 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
h2o 1	1,162	1,966	1,860	1,849	1,844	1,835	1,896	0	0	0	0	0	0	0	0	0	12,412	
PC 2	10,324	13,436	13,446	13,397	13,339	13,281	13,878	0	0	0	0	0	0	0	0	0	91,101	
Ben 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
h2o 2	1,052	1,369	1,370	1,365	1,359	1,354	1,414	0	0	0	0	0	0	0	0	0	9,285	
PC 3	13,416	13,494	13,504	13,446	13,358	13,291	13,954	0	0	0	0	0	0	0	0	0	94,462	
Ben 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
h2o 3	1,367	1,375	1,376	1,370	1,361	1,355	1,422	0	0	0	0	0	0	0	0	0	9,627	
PC 4	13,504	13,542	13,552	13,455	13,368	13,252	13,946	0	0	0	0	0	0	0	0	0	94,619	
Ben 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
h2o 4	1,376	1,380	1,381	1,371	1,362	1,351	1,421	0	0	0	0	0	0	0	0	0	9,643	
PC 5	13,852	13,542	13,513	13,436	13,387	13,242	13,891	12,720	3,219	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	110,803	
Ben 5	0	0	0	0	0	0	0	0	25%	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	0	
h2o 5	1,412	1,380	1,377	1,369	1,364	1,350	1,416	1,296	328	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	11,293	
PC 6	15,110	15,149	13,784	14,026	13,397	13,145	13,777	12,787	12,690	12,623	12,497	12,294	11,926	11,577	11,277	10,447	206,508	
Ben 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
h2o 6	1,540	1,544	1,405	1,430	1,365	1,340	1,404	1,303	1,293	1,286	1,274	1,253	1,215	1,180	1,149	1,065	21,047	
PC 7	15,643	15,294	13,746	14,007	13,378	13,116	13,694	12,778	12,681	12,536	12,390	12,265	12,158	11,732	11,335	10,616	207,369	
Ben 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
h2o 7	1,594	1,559	1,401	1,428	1,363	1,337	1,396	1,302	1,292	1,278	1,263	1,250	1,239	1,196	1,155	1,082	21,135	
Total #																	926,651	0
Tons																	463.3	0

Note that the quantites for every cell are different. Although many of the cells had the same area the actual depth to the target mixing elevation of 234' MSL was different due to the topography of the site. The 2nd sheet of the workbook shows the area and top elevation of each cell.

S	1E	2E	3E	4E	5E	6E	7E	8E	9E	10E	11E	12E	13E	14E	15E	16E		
Area 1	97.55	164.48	164.48	164.48	164.48	164.48	171.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,091.35	
Top El 1	248.61	248.66	247.87	247.79	247.75	247.68	247.57	0	0	0	0	0	0	0	0	0	0	
Yd3 1	52.78	89.31	84.49	84.01	83.76	83.34	86.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Area 2	93.45	121.00	121.00	121.00	121.00	121.00	127.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	825.54	
Top El 2	247.81	247.88	247.89	247.84	247.78	247.72	247.65	0	0	0	0	0	0	0	0	0	0	
Yd3 2	47.80	62.20	62.25	62.02	61.75	61.49	64.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Area 3	121.00	121.00	121.00	121.00	121.00	121.00	127.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	853.97	
Top El 3	247.86	247.94	247.95	247.89	247.8	247.73	247.63	0	0	0	0	0	0	0	0	0	0	
Yd3 3	62.11	62.47	62.52	62.25	61.84	61.53	64.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Area 4	121.00	121.00	121.00	121.00	121.00	121.00	128.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	854.84	
Top El 4	247.95	247.99	248	247.9	247.81	247.69	247.53	0	0	0	0	0	0	0	0	0	0	
Yd3 4	62.52	62.70	62.74	62.29	61.89	61.35	64.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Area 5	121.00	121.00	121.00	121.00	121.00	121.00	129.29	119.28	30.03	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	1,004.60	
Top El 5	248.31	247.99	247.96	247.88	247.83	247.68	247.43	247.33	247.4	247.1	247.2	246.8	246.4	246.1	245.7	245.8	0	
Yd3 5	64.13	62.70	62.56	62.20	61.98	61.31	64.31	58.89	14.90	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	0	
Area 6	121.00	121.00	121.00	121.00	121.00	121.00	129.29	121.00	121.00	121.00	121.00	121.00	121.00	121.00	121.00	113.26	1,936.55	
Top El 6	249.61	249.65	248.24	248.49	247.84	247.58	247.32	247.21	247.11	247.04	246.91	246.7	246.32	245.96	245.65	245.53	0	
Yd3 6	69.96	70.14	63.82	64.94	62.02	60.86	63.78	59.20	58.75	58.44	57.86	56.91	55.21	53.60	52.21	48.37	0	
Area 7	121.00	121.00	121.00	121.00	121.00	121.00	129.29	121.00	121.00	121.00	121.00	121.00	121.00	121.00	121.00	114.10	1,937.39	
Top El 7	250.16	249.8	248.2	248.47	247.82	247.55	247.24	247.2	247.1	246.95	246.8	246.67	246.56	246.12	245.71	245.63	0	
Yd3 7	72.42	70.81	63.64	64.85	61.93	60.72	63.40	59.16	58.71	58.04	57.36	56.78	56.29	54.32	52.48	49.15	0	

This information feeds into the cell quantity information on the 1st page of the workbook. Many jobs have a wide range of cell reagent quantities due to the difference in cell soil volume, differing target elevations and varying levels of contamination found in different parts of the site. This situation has the potential for errors in reagent delivery that Lang Tool Co. has taken steps to eliminate.



The DAB screen is broadcast to a screen on the slurry mixing plant so that the plant operator has realtime information on which cell the blender is working in and the mixing progress. This avoids confusion and allows the plant operator to match the rate of reagent delivery to the rate of mixing progress.



The LTC Slurry Plant does not make batches. It produces slurry on a continual basis. The system is set up so that the quantity of reagent and the water ratio can be entered. The operator sees the rate of delivery and the progress toward the entered quantity. The plant operator can adjust the rate of delivery to match the rate of mixing progress shown on the screen. When the entered quantity of reagent is reached the system shuts off. The cell designation, the reagent quantity and the time of delivery can be downloaded from the plant computer. This information is then available for daily and final progress reports.

The chart at the right was downloaded from the Dual Axis Blender computer at the conclusion of a project in Brantford, Ontario. The target ISS bottom elevation was 209 meters above MSL. The chart shows that the entire treatment area was mixed to slightly below the target depth. The uncompleted cells at the bottom of the chart were originally specified to be mixed. However, they were on the property border and within the drip line of trees in the neighboring lawns. These areas were treated by injection to protect the trees.

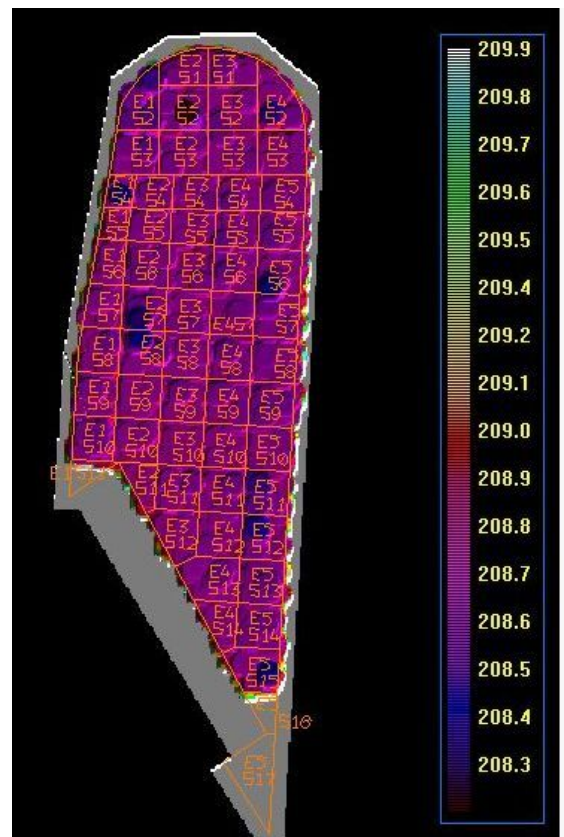
The DAB operator also records the coordinates of the bottom elevation in the quadrants of each mixing cell. As shown below.

Easting	Northing	Elevation
,559309.267902	,4777317.986077	,208.876343
,559310.826708	,4777317.664336	,208.955063
,559309.520577	,4777319.161112	,208.963379
,559310.764210	,4777319.121131	,208.977905

A sample of the download from the LTC Slurry Plant computer is shown below.

Date	Time	Cell	PC lb	H2O Gal
7/29/2014	6:47:32 AM	E259S	19,050	1,370
7/29/2014	7:25:42 AM	E2510S	19,040	1,370
7/29/2014	8:03:47 AM	E2511S	19,050	1,370
7/29/2014	8:44:59 AM	E2512S	19,080	1,370

A plant download, a progress chart, and cell quadrant coordinate information is included in the LTC daily and final reports.



Lang Tool Co. equipment coupled with the work procedures developed by Lang Tool Co. employees is extremely productive, extremely accurate and designed so that complete and accurate mixing can be easily verified. This combination of productivity, accuracy and verification results in successful projects completed ahead of schedule. Information on recent ISS projects are listed below. Numerous ISCO projects were also completed in this time frame using the Dual Axis Blender and the LTC ChemOx reagent delivery plant. The ChemOx plant has similar delivery accuracy and verification characteristics.

### Conley Container Terminal Project Berth 10 Contract South Boston, Massachusetts

The ISS Soil Volume was 24,000 cubic yards and there was 1,780' of 5' wide soil cement wall along a bulkhead. The mixing depth was approximately 15' to -7 MLLW. ISS Work Commenced on September 19th 2018 and was completed in 43 working days. The mix design was 8% Portland cement by weight to the soil. A total of 4,120 tons of cement were used. All performance requirements were exceeded.

Owner- Massport

Prime Contractor- D.W. White Construction, Inc.  
867 Middle Road  
Acushnet MA 02743 Phone (508) 763-8868  
Project Manager Jack Harney -

Engineer- Engineer GEI Consultants  
Mike Sabulis  
400 Unicorn Park Drive  
Woburn, MA 01801  
Phone (781) 721-4114 Email msabulis@geiconsultants.com

### CCR Pond Stabilization at the DTE facility in East China Township, Michigan

73,075 cubic yards of CCR sludge were stabilized with Portland cement in 55 working days. Work commenced on June 15th 2018. The mix design was 5% Portland cement by weight to the sludge. A total of 4,825 tons of cement were used. All performance requirements were exceeded.

Owner- DTE Energy  
Contact Jason Roggenbuck  
4901 Pointe Drive  
East China, MI 48054  
Phone (810) 326-6218  
roggenbuckj@dteenergy.com

Prime Contractor Raymond Excavating, Inc. Contact Jerry Thomas  
800 Gratiot Blvd.  
Marysville, Michigan 48040  
Phone (810) 364-6881  
jerry@raymondexcavating.com

### Hurricane and Storm Damage Reduction Raritan Bay & Sandy Hook Bay Phase II, Contract 2 Port Monmouth, New Jersey

11, 264 cubic yards of marsh land soil were stapilized to support a new flood control levee. The work was completed in 16 working days. The job required 1,035 tons of Type I/II Portland cement. It was completed in July of 2017.

Owner- US Army Corp of Engineers  
Prime Contractor- Anselmi & DeCicco, Inc.  
Contact Henry Meyers  
1977 Springfield Ave  
Maplewood, NJ 07040  
(973) 762-3359 hmeyers@anselminj.com

Engineer- Engineer GEI Consultants  
Mike Sabulis  
400 Unicorn Park Drive  
Woburn, MA 01801  
Phone (781) 721-4114 Email msabulis@geiconsultants.com

### Energy Transfer Partners Oster Quarry Project Massillon Ohio

The project involved the stabilization of 16,640 cubic yards of contaminated drilling mud with Portland cement. The project, completed in September 2017 required 2,438 tons of Portland cement and was completed in 20 working days.

Owner- Energy Transfer Partners  
Contact Bill Barth Jr.  
(330) 379-2824 wrbarth@sunocologistics.com

Prime Contractor- GHD  
Contact Don Osterhout  
200 W. Allegan St.  
Plainwell, MI 49080  
(269) 685-2710 donald.osterhout@ghd.com

### Former MGP site in Claremont, New Hampshire

3,845 cubic yards of contaminated soil were stabilized with Portland cement in 6 1/2 working days. The original treatability study called for a mix design of 10% Portland cement, 10% ground granular blast furnace slag and 2% bentonite by weight to the soil. Based on past experience Lang Tool Co. believed that it would not be necessary to use that quantity of reagent to meet the specified performance requirements. Lang Tool Co. in cooperation with the prime contractor, Enviro Air Technologies, initiated a bench scale treatability study. That study indicated that 15% Type II Portland cement would meet the performance requirements. Lang Tool Co. and Enviro Air offered the owner a \$66,000 reduction in the cost of the ISS work if the 15% cement mix design was used instead of the specified mix design. The proposal was accepted. The project passed all of the performance requirements in regard to unconfined compressive strength and hydraulic conductivity. The project was completed in July of 2015.

Owner- UGI-Amerigas Propane

Prime Contractor- Enviro-Air Technologies, Inc.  
Shawn O'Donnell  
P.O. Box 173 Coopersburg, PA 18036  
Phone 610-966-0740 Email shawnod7@aol.com

Engineer- GEI Consultants, Inc.  
Dave O'Donnell  
18000 Horizon Way, Suite 200  
Mt. Laurel, NJ 08054  
Phone (856) 291-5716 Email dodonnell@geiconsultants.com