

Bethel-Danebo Closed Landfill Progress Report

For January 2015

Actions during this month:

- Installation of additional gas probes. A full report by Tuppan Consultants is included as an attachment.
- Energyneering Solutions provided drawings for the blower skid. Reviews are being conducted.

- **Actions scheduled to be taken within the next two months:**
- Permitting of trench active gas system.
- Sampling of additional gas monitoring locations.

Problems experienced during the month:

- One of the newly installed gas probes LC2014-GP8 was flooded, this resulted in putting the gas monitor out of service until new water filters could be obtained and installed.

Monitoring Results:

Device ID	Date/Time	CH4	CO2	O2	Balance	%LEL
GEM™5000; G5 V1_11_16; LSGAM:6_0_20140529; {59440679217}		%	%	%	%	%
Probe001	1/29/2015 13:16	1.6	3.3	17.9	77.2	32
probe002	1/29/2015 13:20	42.8	25.2	0.6	31.4 >>>>	
Probe003	1/29/2015 13:25	11.3	12.6	0.9	75.2 >>>>	
Probe004	1/29/2015 13:29	17.6	24.4	1.8	56.2 >>>>	
Probe005	1/29/2015 13:34	0	5.1	15.6	79.3	0
Probe006	1/29/2015 13:39	25.1	9.5	0.5	64.9 >>>>	
Probe007	1/29/2015 13:47	0	0.1	21.5	78.4	0
Probe008	1/29/2015 13:52	0	4.3	14.2	81.5	0
LP08VPL8	1/29/2015 13:56	0	2.2	19.1	78.7	0
LP07VPL7	1/29/2015 14:00	0	0.5	21.1	78.4	0
Probe009	1/29/2015 14:07	46.8	10.5	0.4	42.3 >>>>	
Probe010	1/29/2015 14:12	11.2	6.4	4.1	78.3 >>>>	
LC14-07s	1/29/2015 14:23	21.8	13.5	0	64.7 >>>>	
LC14-07d	1/29/2015 14:29	20.9	15.2	0.2	63.7 >>>>	

Don Strunk
Supervisor/Technical Specialist
Lane County Waste Management Division

other relevant characteristics of the sampled material. Drilling and soil information was recorded in the field on a boring-log form

Once the boring reached the final depth and samples collected, the drive casing was removed from the ground and the methane probes were installed in the borehole. In two borings (P-4 and P-9) groundwater was encountered and the boring was backfilled with gravel to the water depth before installing the probe. For the deep probe at P-7D, the borehole collapsed to a depth of 9 feet after drilling to 12 feet. To stabilize the borehole, 6-inch diameter casing was driven to 12 feet, and the slough cleaned out from inside the casing. The boring below the casing was then deepened to 14 feet with the 5-inch sampler and remained open. The bottom 1.5 feet was subsequently backfilled with bentonite chips before completing the probe from a depth of 10 to 12 feet.

Probe Installation

Probes were constructed in an open hole after the sampler was retrieved from the boring because the boreholes remained open at the shallow depths. The probes were constructed with a ½-inch diameter Schedule 40, polyvinyl chloride (PVC) pipe connected to a 2-foot length of slotted ½-inch PVC pipe. The annulus around the slotted section was backfilled with washed pea gravel to allow flow of subsurface gas into the monitoring probe; the pea gravel extended approximately 0.5 foot above the screened interval. The annular space above the gravel was backfilled with bentonite chips that were subsequently hydrated with clean water to prevent surface water infiltration and short-circuiting of surface air to the probe completion interval. The top of the probe was capped with a ¼-inch brass labcock valve to allow for sampling of the gas from within the PVC pipe.

The capped probes were covered with 10-inch diameter flush mount vaults set slightly above the ground surface. The vaults were encased in concrete to provide a surface seal above the bentonite chip annual seal.

The ground surface at each methane probe was surveyed vertically and laterally to within 0.01 foot, by Lane County relative to Oregon Coordinate Reference System (OCRS) and the North American Vertical Datum 1988 (NAVD88). Results of the surveying are shown in Table 1.

Attachments: Table 1 - Methane Probe Survey and Completion Summary
Attachment A: Boring Logs and Methane Probe Completion Details

Table 1
Methane Probe Survey and Completion Summary
Former Bethel-Danebo Landfill
Lane County, Oregon

Probe #	P-1	P-2	P-3	P-4	P-5	P-6	P-7S	P-7D	P-8	P-9	P-10
Ground Surface	392.82	399.49	393.32	401.5	392.99	401.25	398.64	398.75	399.69	403.43	402.95
Top of Vault Box	392.76	399.91	393.57	401.85	393.04	401.41	398.90	399.04	400.01	403.86	403.15
Top of Brass Valve	392.67	399.80	393.24	401.72	392.79	401.05	398.68	398.84	399.76	403.69	402.82
Easting	162,639.05	162,802.16	163,052.90	163,282.25	163,439.63	163,709.63	163,975.37	163,974.81	163,702.29	163,277.96	162,943.44
Northing	113,125.22	112,896.62	113,193.21	112,867.24	113,250.76	112,715.27	111,933.97	111,928.99	111,806.86	111,711.37	111,746.11
Total Casing Length^a	6.4	6.4	6.3	6.4	6.5	6.3	6.5	12.1	6.0	5.7	6.5
Depth Top Bentonite	1.3	1.5	1.4	1.5	1.7	1.5	1.4	1.7	1.5	1.4	1.0
Depth Top Gravel	4.0	4.0	4.0	4.0	4.0	4.0	4.0	9.5	3.5	3.4	4.0
~ Depth Top Screen	4.4	4.0	4.3	4.1	4.5	4.3	4.4	9.9	3.8	3.5	4.5
~ Depth Base Screen	6.4	6.0	6.3	6.1	6.5	6.3	6.4	11.9	5.8	5.4	6.5
Depth bottom casing	6.5	6.1	6.4	6.2	6.6	6.4	6.5	12.0	5.9	5.5	6.6
Depth Bottom Hole	6.5	7.0	6.5	8.0	6.5	7.0	7.0	14.0	6.5	7.0	6.5

Notes: Survey information is tied to the ORGN Eugene Zone, Oregon Coordinate Reference System (OCRS) and the North American Vertical Datum 1988 (NAVD88).

^a total casing length measured from tip of brass valve to bottom of end cap.

ATTACHMENT A

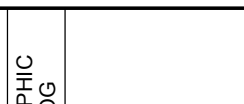



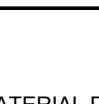



**BORING LOGS AND
METHANE PROBE COMPLETION DETAILS**

TUPPAN CONSULTANTS LLC
 460 SECOND STREET, SUITE 103
 LAKE OSWEGO, OREGON 97034
 TELEPHONE: (503) 675-1335

WELL NUMBER P-1

PAGE 1 OF 1

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/22/15 COMPLETED 1/22/15 GROUND ELEVATION 392.82 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic AT TIME OF DRILLING ---
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0						Casing Top Elev: 392.67 (ft) Casing Type: Brass Valve
	CC	100			FILL: Silty sandy soil with cobbles and roots; brown (10YR, 4/2); damp to moist.	
	RC	100			(ML) CLAYEY SILT: very dark grayish brown (10YR, 3/2); low plasticity fines; trace fine sand; no cobbles; appears to be native.	
			ML			
5	RC	100			(ML) SANDY SILT: dark brown (10YR, 3/3); increase in fine sand to approximately 20%; damp.	
			ML			
						

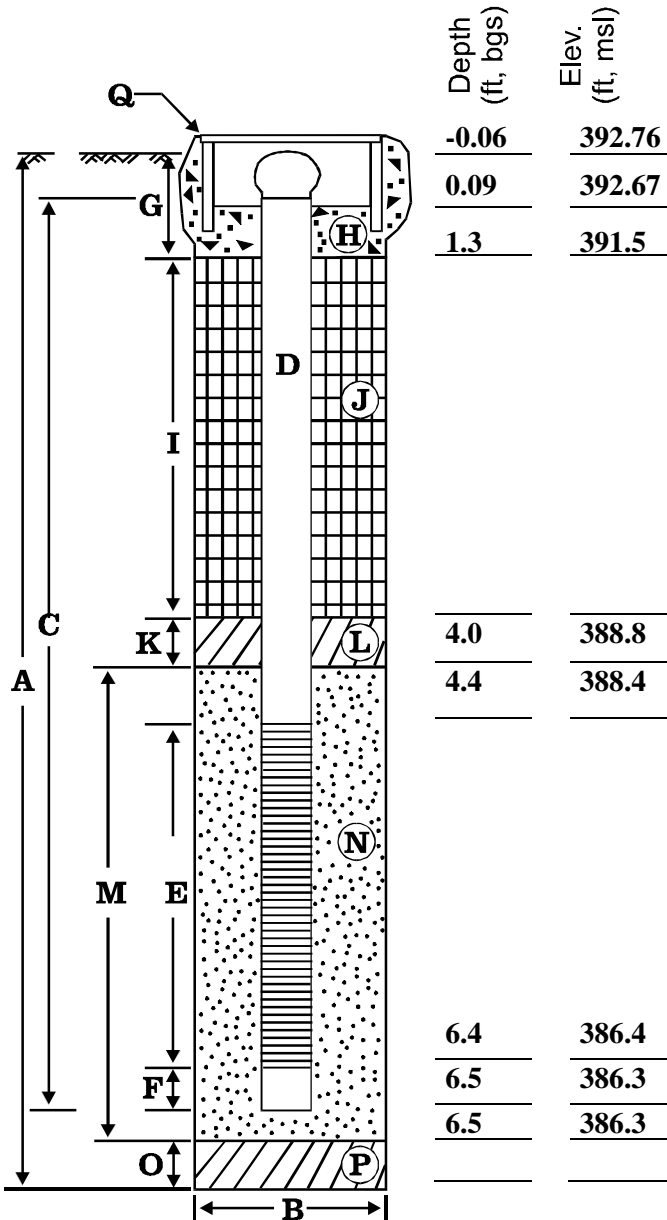
Bottom of borehole at 6.5 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 2/3/15 14:56 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P1-LC2015
 Top of Brass Valve: 392.67
 Ground Surface Elev.: 392.82
 Installation Date: 1/22/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 6.5 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.39 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.3 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.7 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 2.5 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

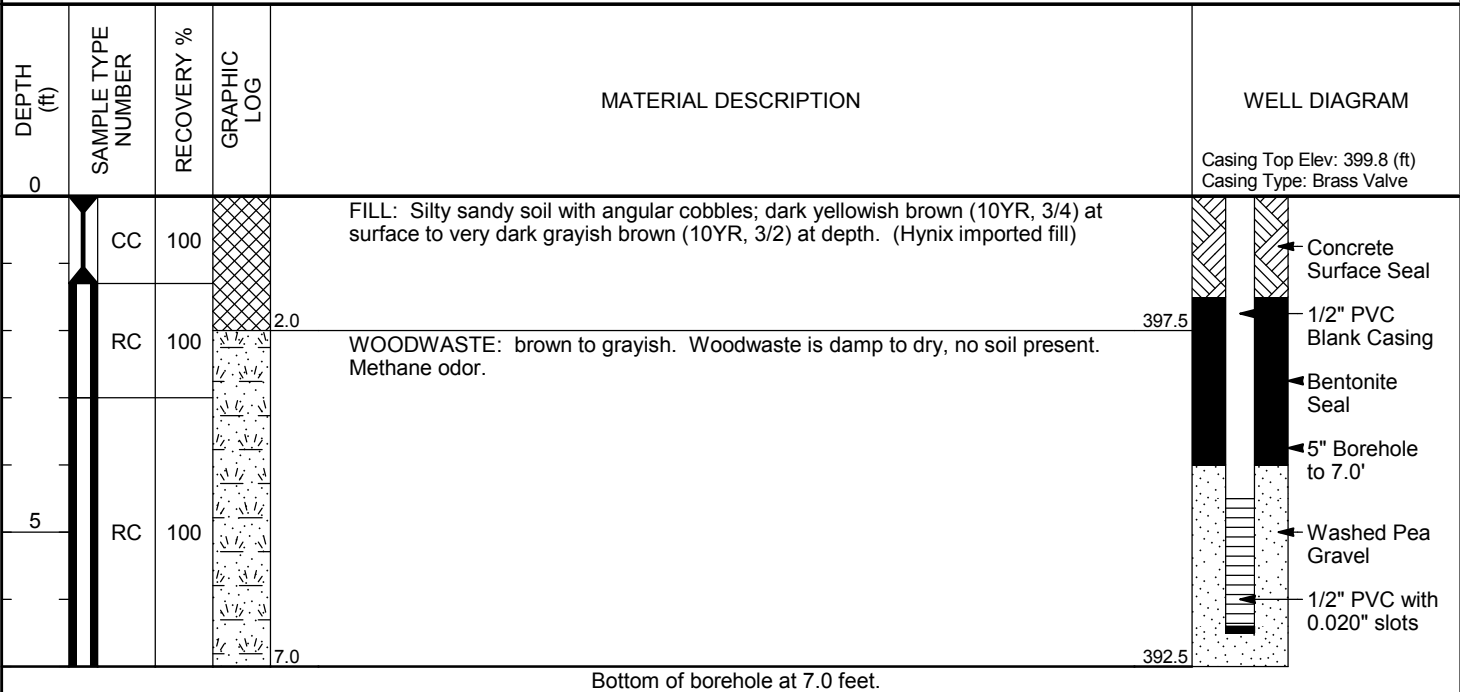
Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/3/15

TUPPAN CONSULTANTS LLC
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CLIENT Lane County - Waste Management Division **PROJECT NAME** Methane Probes
PROJECT NUMBER LNC-001-005 **PROJECT LOCATION** Former Bethel-Danebo Landfill
DATE STARTED 1/22/15 **COMPLETED** 1/22/15 **GROUND ELEVATION** 399.49 ft MSL **HOLE SIZE** 5"
DRILLING CONTRACTOR Cascade Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Sonic **AT TIME OF DRILLING** ---
LOGGED BY Eric Tuppan **CHECKED BY** EJT **AT END OF DRILLING** ---
NOTES Completed methane probe in boring **AFTER DRILLING** ---

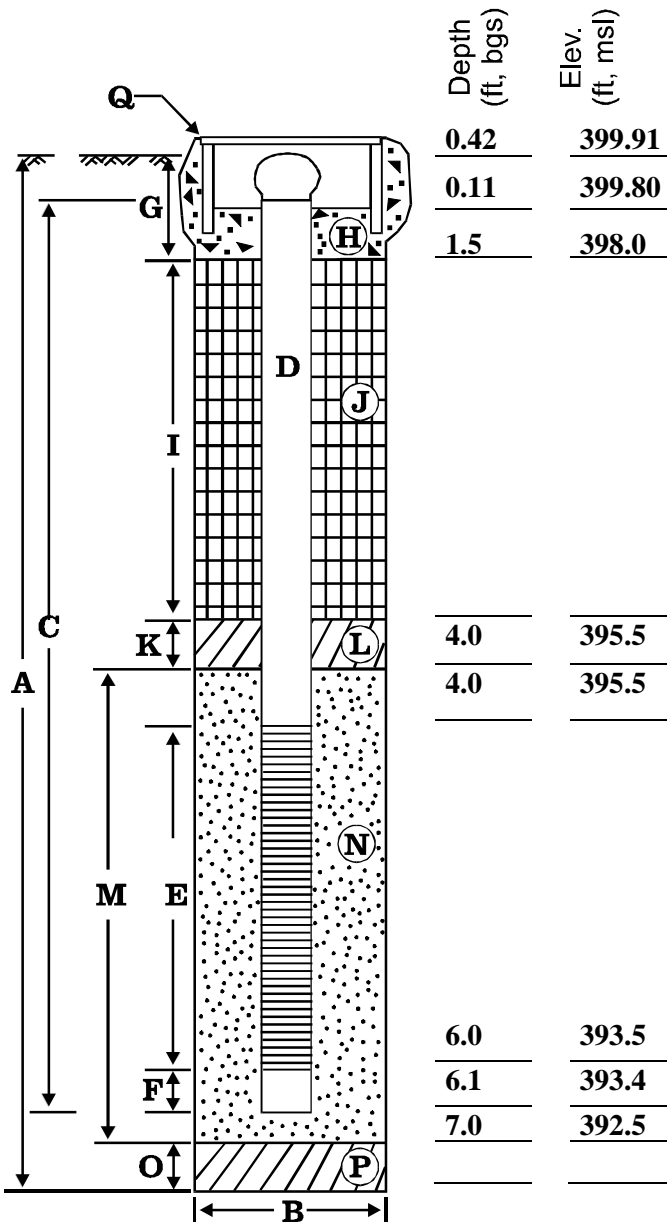
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PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P2-LC2015
 Top of Brass Valve: 399.80
 Ground Surface Elev.: 399.49
 Installation Date: 1/22/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 7.0 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.43 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.5 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.5 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 3.0 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

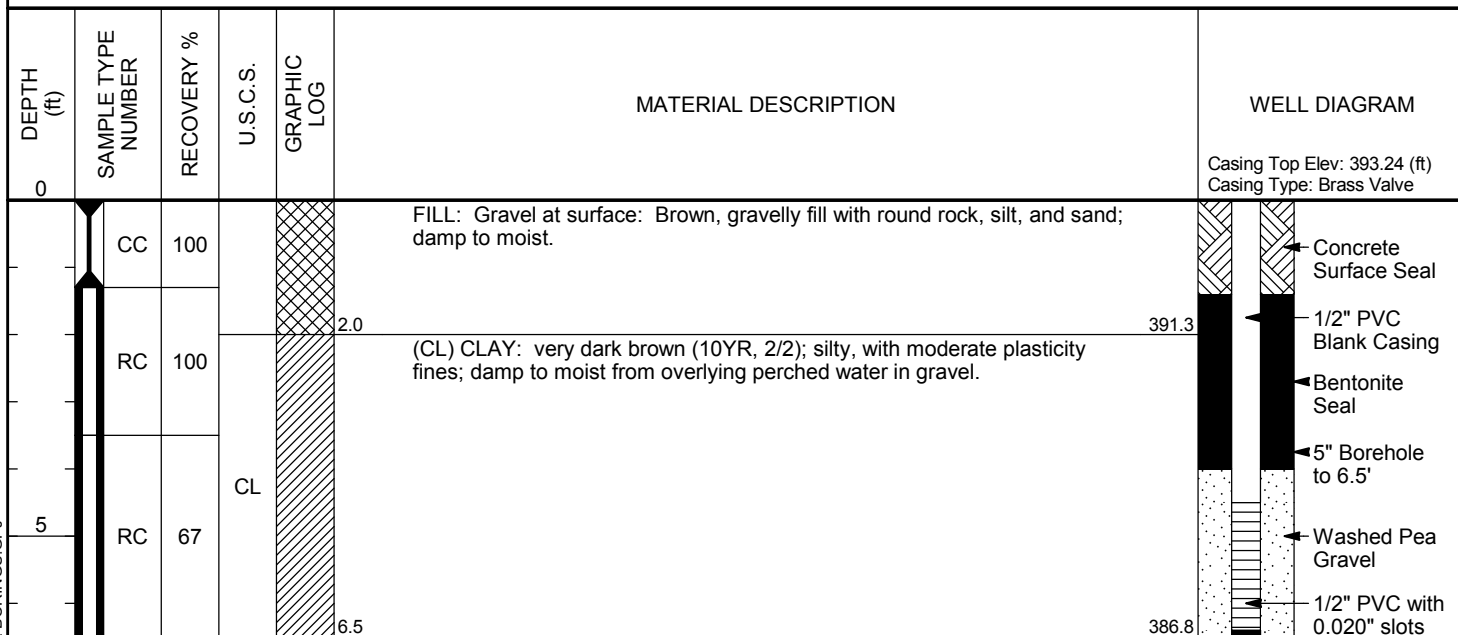
Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/3/15

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WELL NUMBER P-3

PAGE 1 OF 1

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/22/15 COMPLETED 1/22/15 GROUND ELEVATION 393.32 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic AT TIME OF DRILLING ---
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

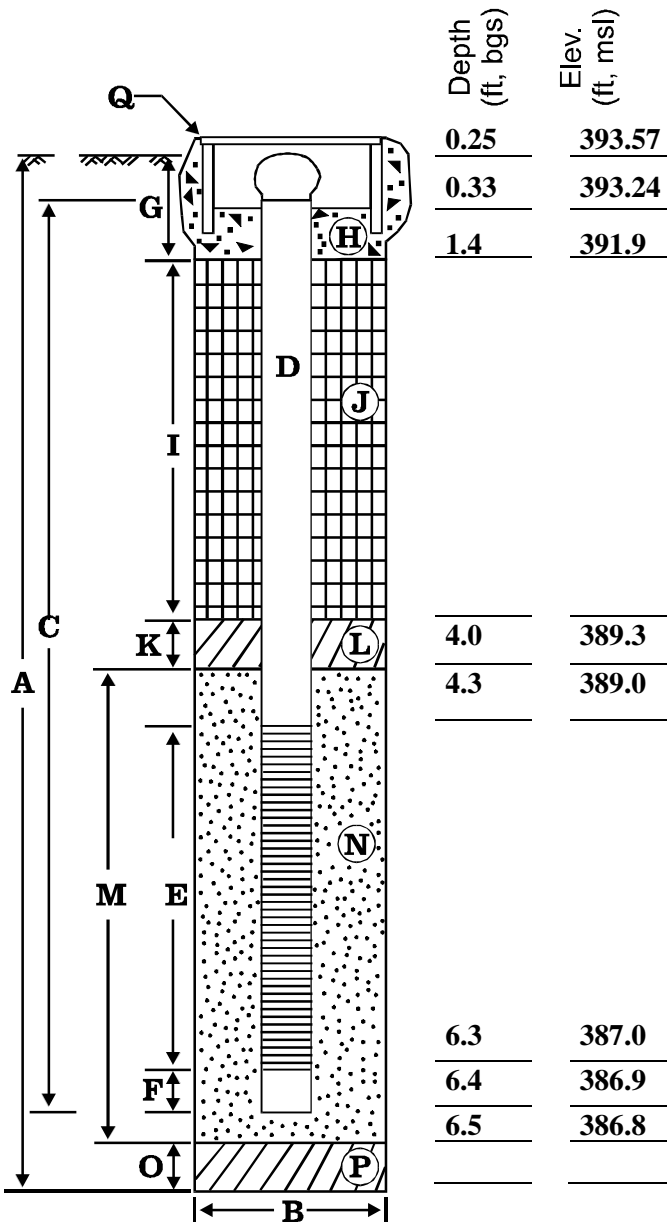


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PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P3-LC2015
 Top of Brass Valve: 393.24
 Ground Surface Elev.: 393.32
 Installation Date: 1/22/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 6.5 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.30 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.4 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.6 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 2.5 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

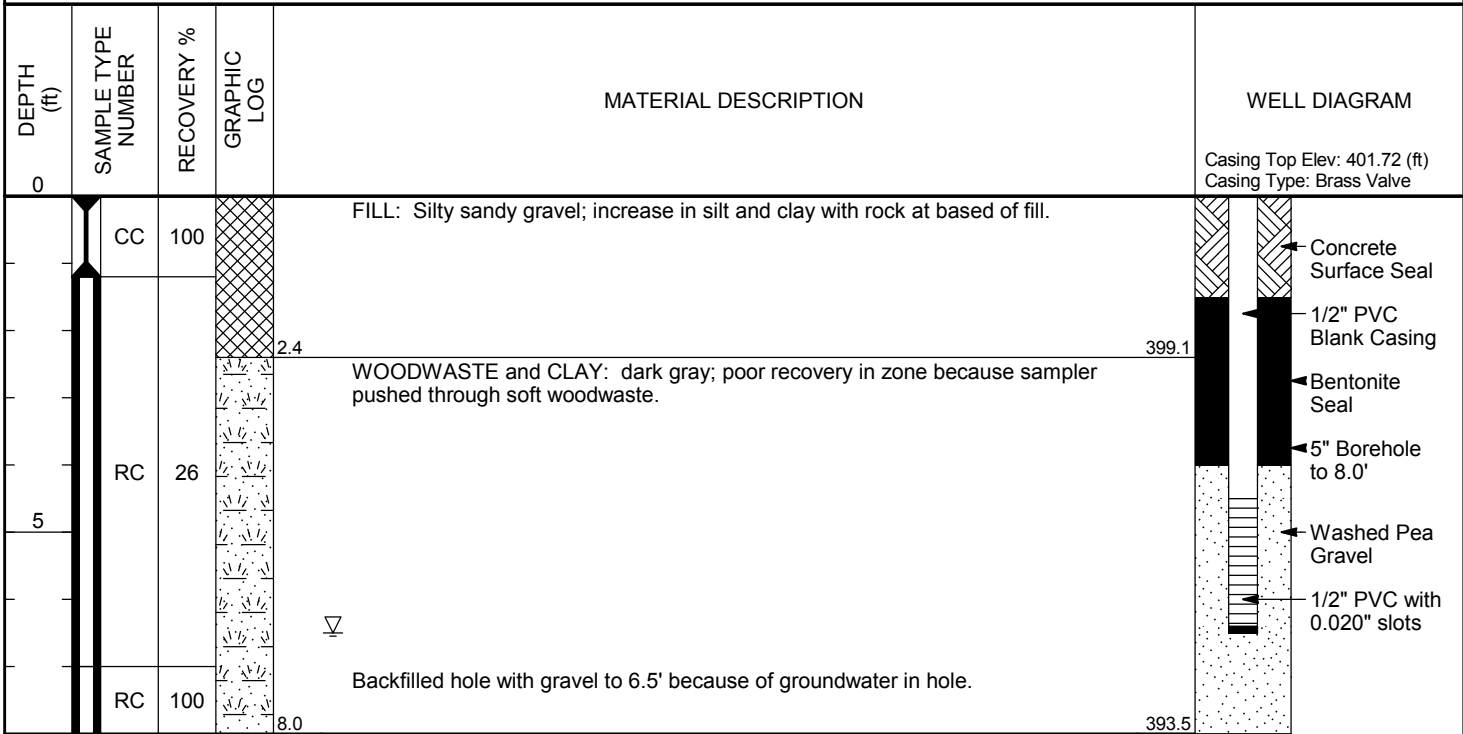
Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/3/15

TUPPAN CONSULTANTS LLC
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CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/21/15 COMPLETED 1/21/15 GROUND ELEVATION 401.5 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic ∇ AT TIME OF DRILLING 6.50 ft / Elev 395.00 ft
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

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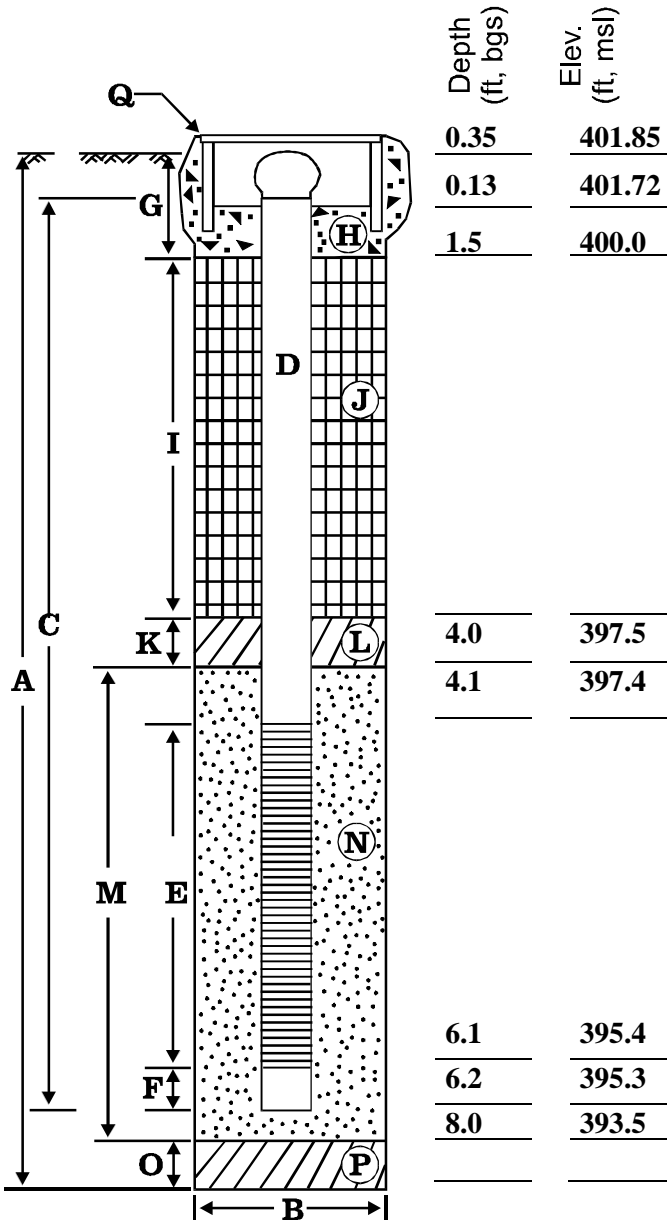


Bottom of borehole at 8.0 feet.

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P4-LC2015
 Top of Brass Valve: 401.72
 Ground Surface Elev.: 401.50
 Installation Date: 1/21/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 8.0 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.38 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.5 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.5 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 4.0 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

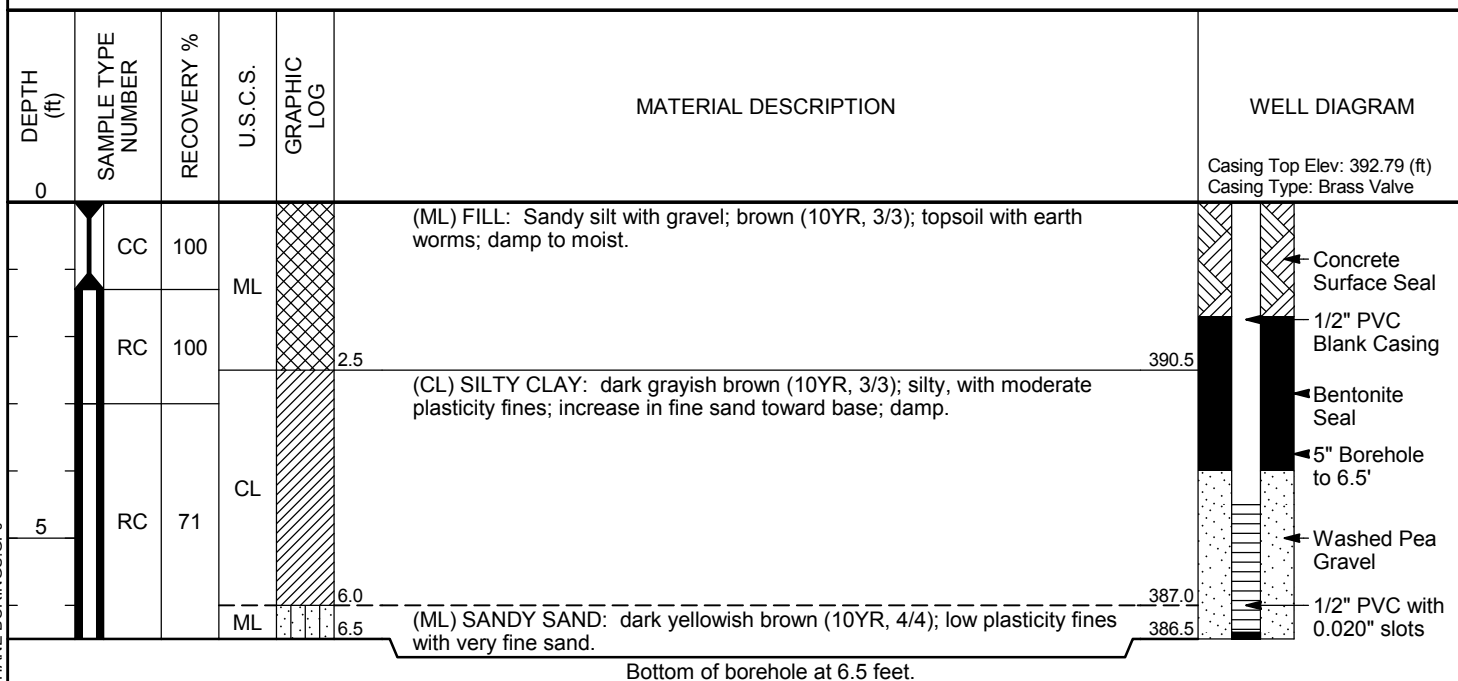
Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/3/15

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WELL NUMBER P-5

PAGE 1 OF 1

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/22/15 COMPLETED 1/22/15 GROUND ELEVATION 392.99 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic AT TIME OF DRILLING ---
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

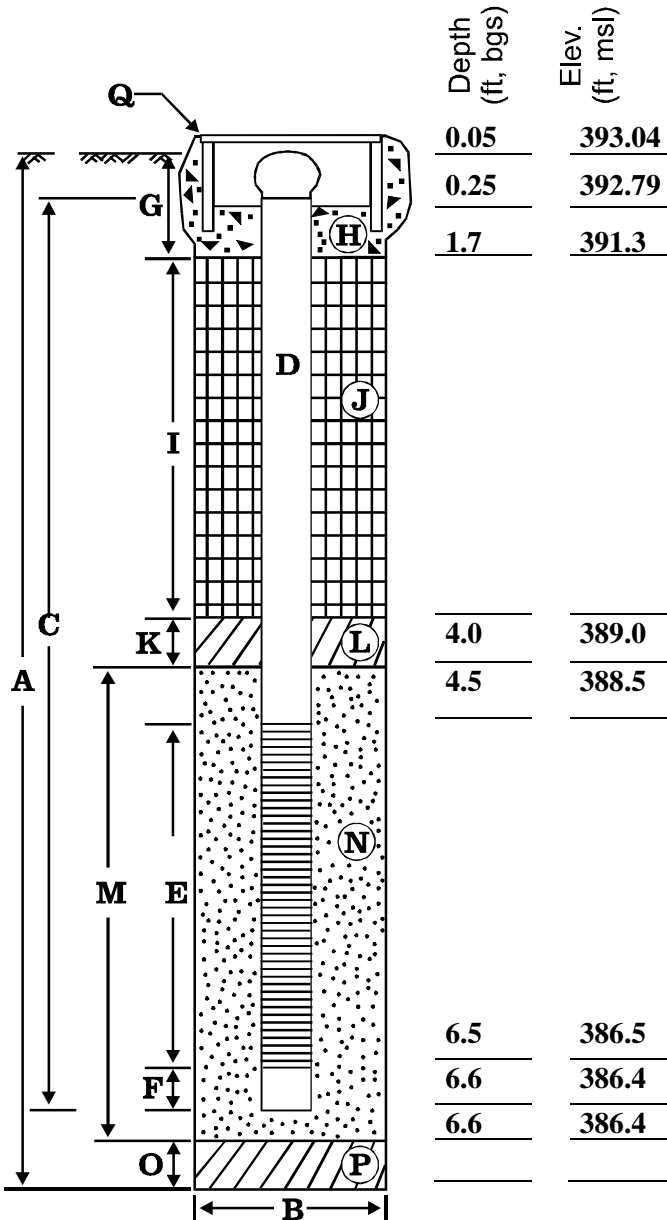


GENERAL BH / TP / WELL - GINT STD US.GDT - 2/3/15 15:00 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P5-LC2015
 Top of Brass Valve: 392.79
 Ground Surface Elev.: 392.99
 Installation Date: 1/22/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: ~6.5 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.45 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.7 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.3 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 2.5 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.













Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/3/15

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WELL NUMBER P-6

PAGE 1 OF 1

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/22/15 COMPLETED 1/22/15 GROUND ELEVATION 401.25 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic AT TIME OF DRILLING ---
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

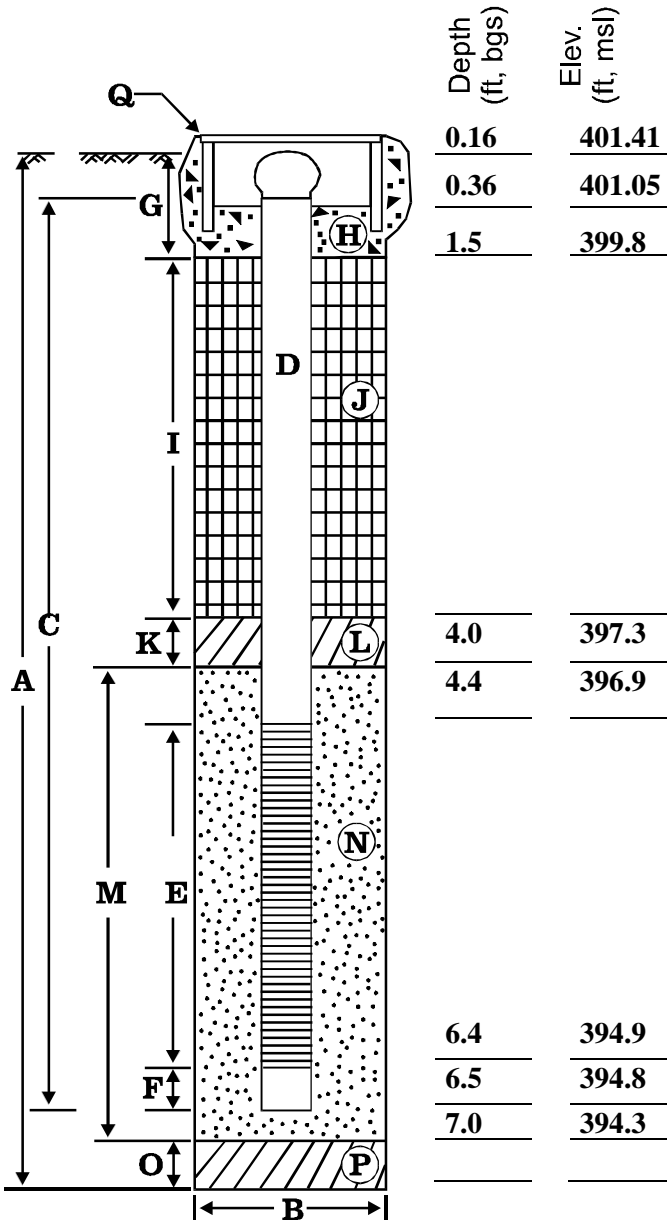
DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0						Casing Top Elev: 401.05 (ft) Casing Type: Brass Valve
	CC	100			(ML) FILL: Silty, sandy soil with gravel; brown (10YR, 4/3).	
	RC	100			@2.0': sand with gravel fill; very dark gray to black (10YR, 3/1 - 2/1); cobbles to 3 - 4 inches; slight hydrocarbon odor.	
			ML			
5	RC	100				
					@6.5': sample in shoe is slightly spongy woodwaste, moist.	
					Bottom of borehole at 7.0 feet.	

GENERAL BH / TP / WELL - GINT STD US.GDT - 2/3/15 15:00 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P6-LC2015
 Top of Brass Valve: 401.05
 Ground Surface Elev.: 401.25
 Installation Date: 1/22/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 7.0 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.25 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.5 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.5 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 3.0 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

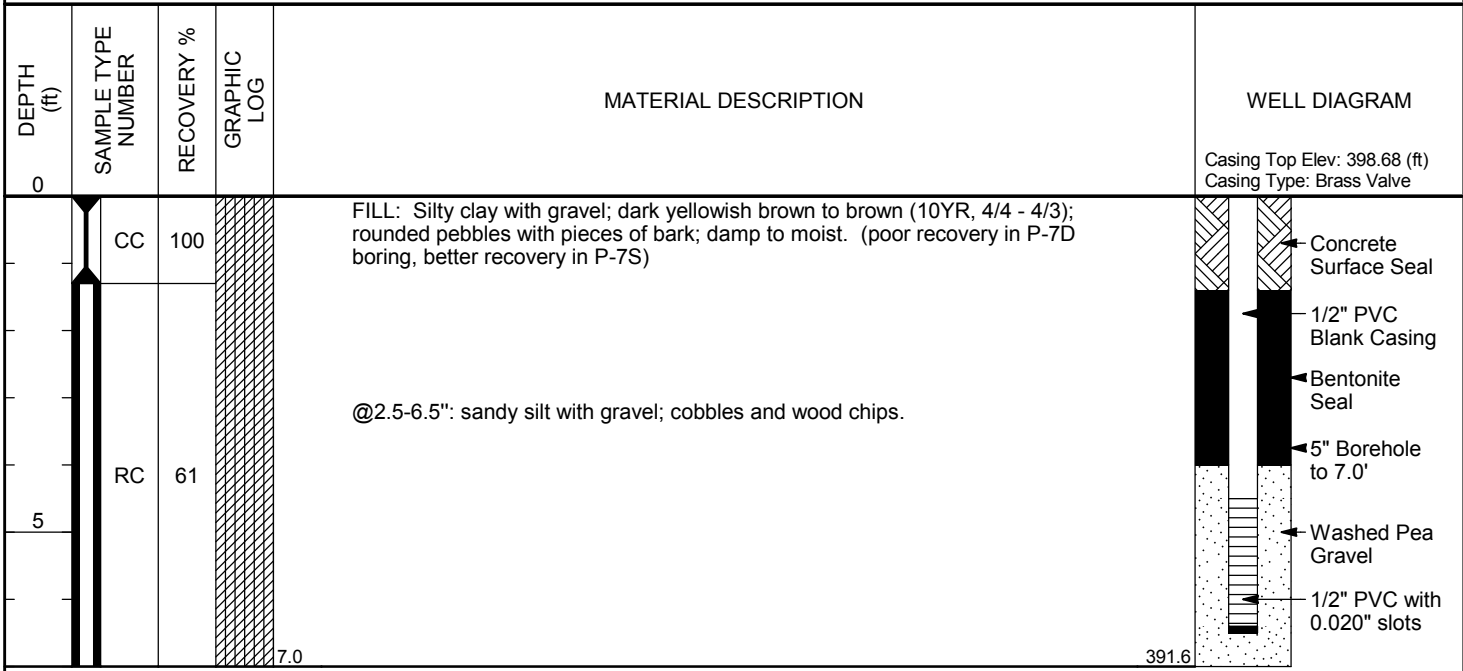
NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/4/15

TUPPAN CONSULTANTS LLC
 460 SECOND STREET, SUITE 103
 LAKE OSWEGO, OREGON 97034
 TELEPHONE: (503) 675-1335

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/21/15 COMPLETED 1/21/15 GROUND ELEVATION 398.64 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic AT TIME OF DRILLING ---
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

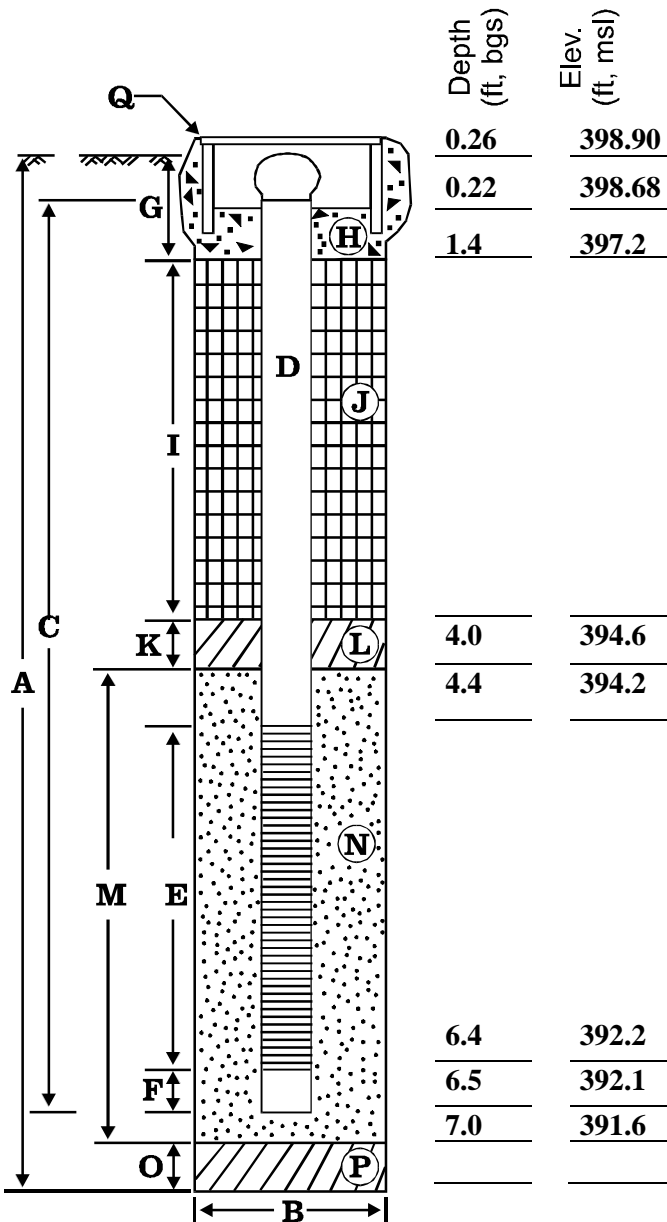


GENERAL BH / TP / WELL - GINT STD US.GDT - 2/3/15 15:01 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P7S-LC2015
 Top of Brass Valve: 398.68
 Ground Surface Elev.: 398.64
 Installation Date: 1/21/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 7.0 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

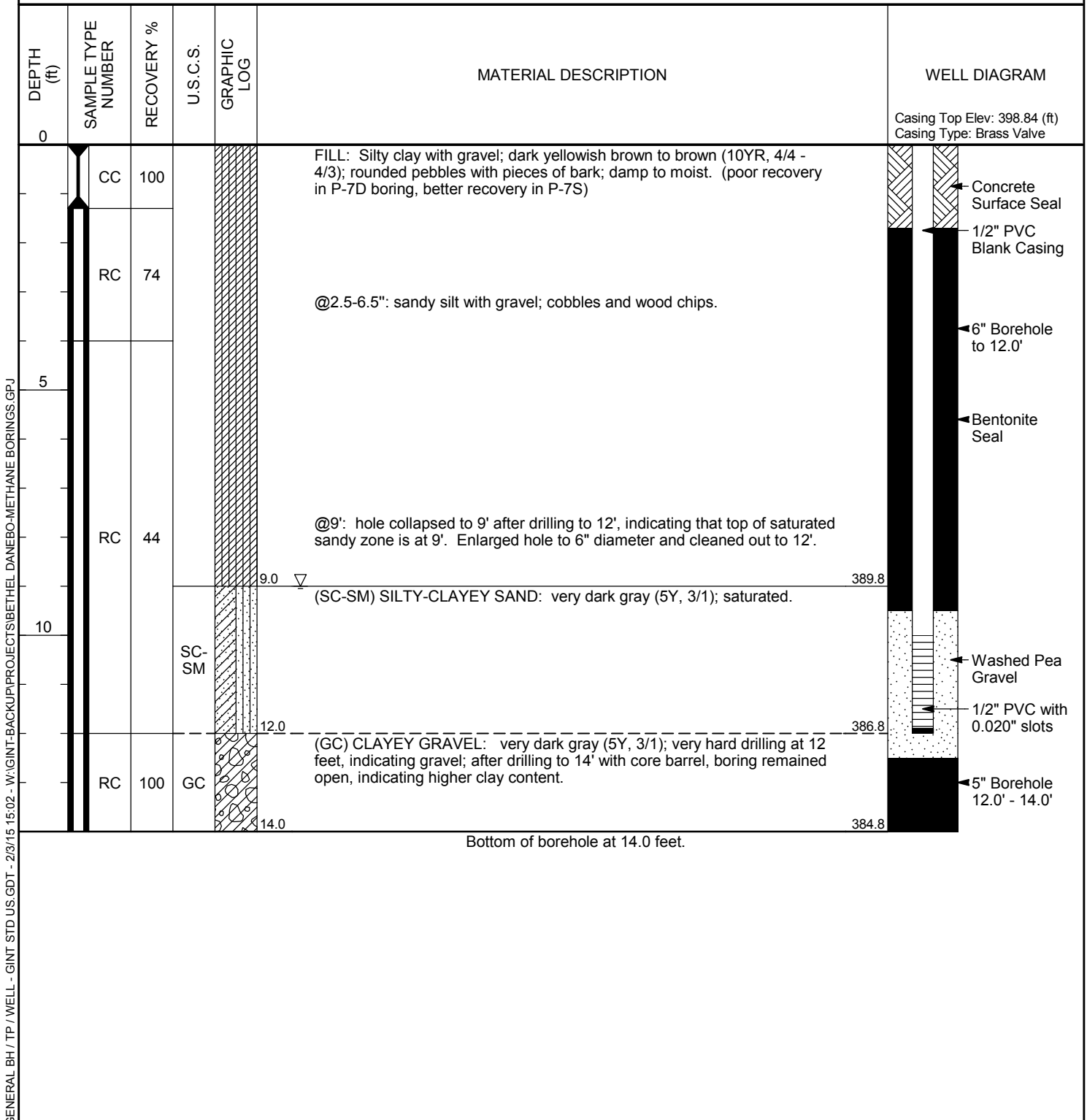
C. Well casing length: 6.54 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.4 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.6 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 3.0 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/4/15

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/21/15 COMPLETED 1/21/15 GROUND ELEVATION 398.75 ft MSL HOLE SIZE 6"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic ∇ AT TIME OF DRILLING 9.00 ft / Elev 389.75 ft
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

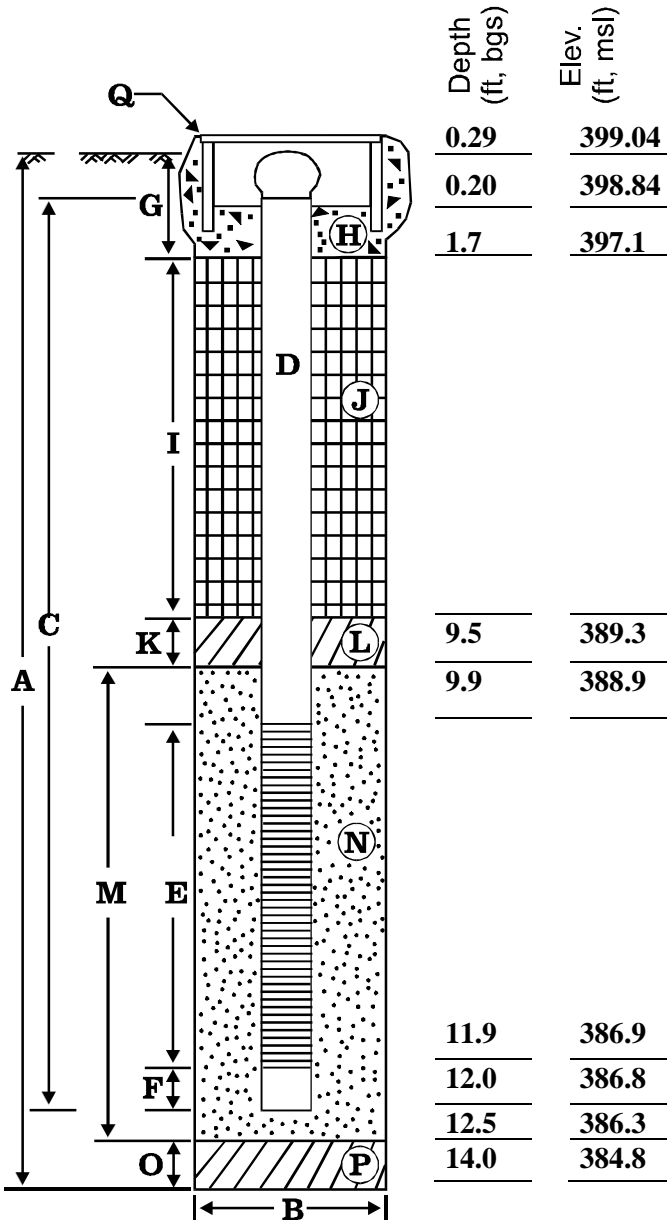


GENERAL BH / TP / WELL - GINT STD U.S.GDT - 2/3/15 15:02 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P7D-LC2015
 Top of Brass Valve: 398.84
 Ground Surface Elev.: 398.75
 Installation Date: 1/21/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 14.0 ft.
 B. Diameter: 6 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 12.09 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.7 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 7.8 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 4.5 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: 1.5 ft.
 P. Bottom material: Bent. Chips
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/4/15

TUPPAN CONSULTANTS LLC
 460 SECOND STREET, SUITE 103
 LAKE OSWEGO, OREGON 97034
 TELEPHONE: (503) 675-1335

CLIENT Lane County - Waste Management Division **PROJECT NAME** Methane Probes
PROJECT NUMBER LNC-001-005 **PROJECT LOCATION** Former Bethel-Danebo Landfill
DATE STARTED 1/21/15 **COMPLETED** 1/21/15 **GROUND ELEVATION** 399.69 ft MSL **HOLE SIZE** 5"
DRILLING CONTRACTOR Cascade Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Sonic **AT TIME OF DRILLING** ---
LOGGED BY Eric Tuppan **CHECKED BY** EJT **AT END OF DRILLING** ---
NOTES Completed methane probe in boring **AFTER DRILLING** ---

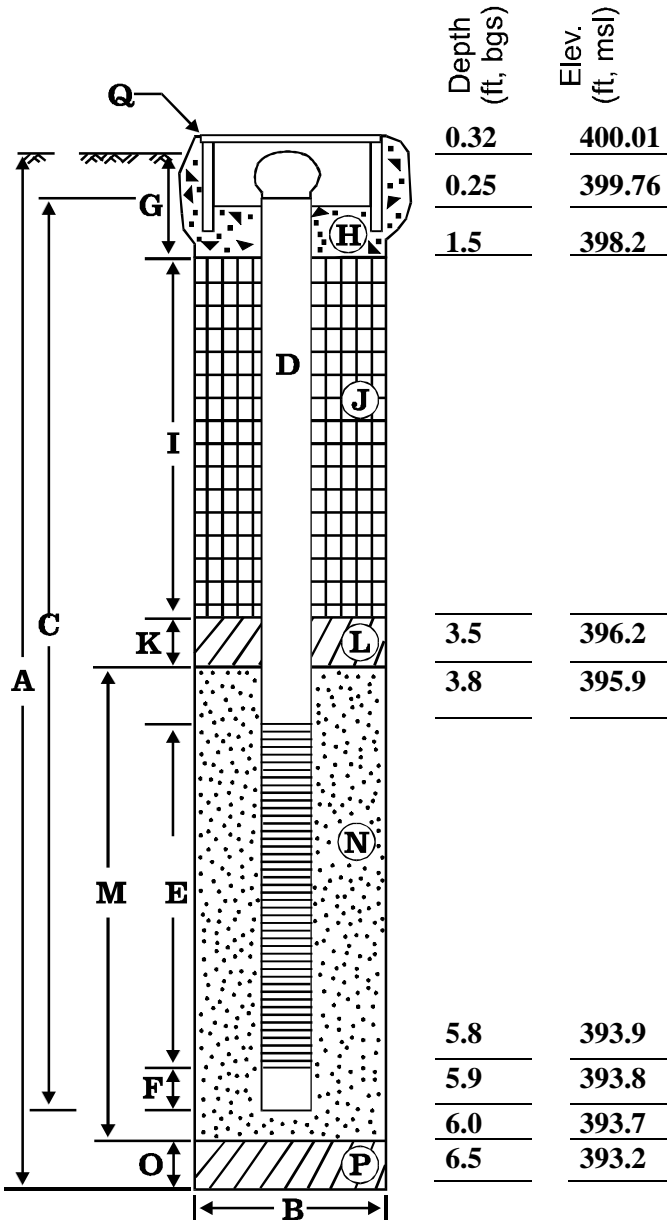
DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0						Casing Top Elev: 399.76 (ft) Casing Type: Brass Valve
0 - 1.0	CC	100			FILL: Silty clay topsoil with coarse gravel; dark brown (10YR, 3/3); damp.	
1.0 - 2.0					@1-2": Pit run gravel, 4" - 5" with some clay.	398.7
2.0 - 5.5	RC	47			WOODWASTE: with clay, damp; poor recovery through interval because of soft material.	397.7
5.5 - 6.5			CL		(CL) CLAY: very dark gray (2.5Y, N3/); moderate plasticity fines; damp.	394.2
6.5					Bottom of borehole at 6.5 feet.	393.2

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PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P8-LC2015
 Top of Brass Valve: 399.76
 Ground Surface Elev.: 399.69
 Installation Date: 1/21/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 6.5 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.0 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.5 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.0 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 2.5 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: 0.5 ft.
 P. Bottom material: Slough
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

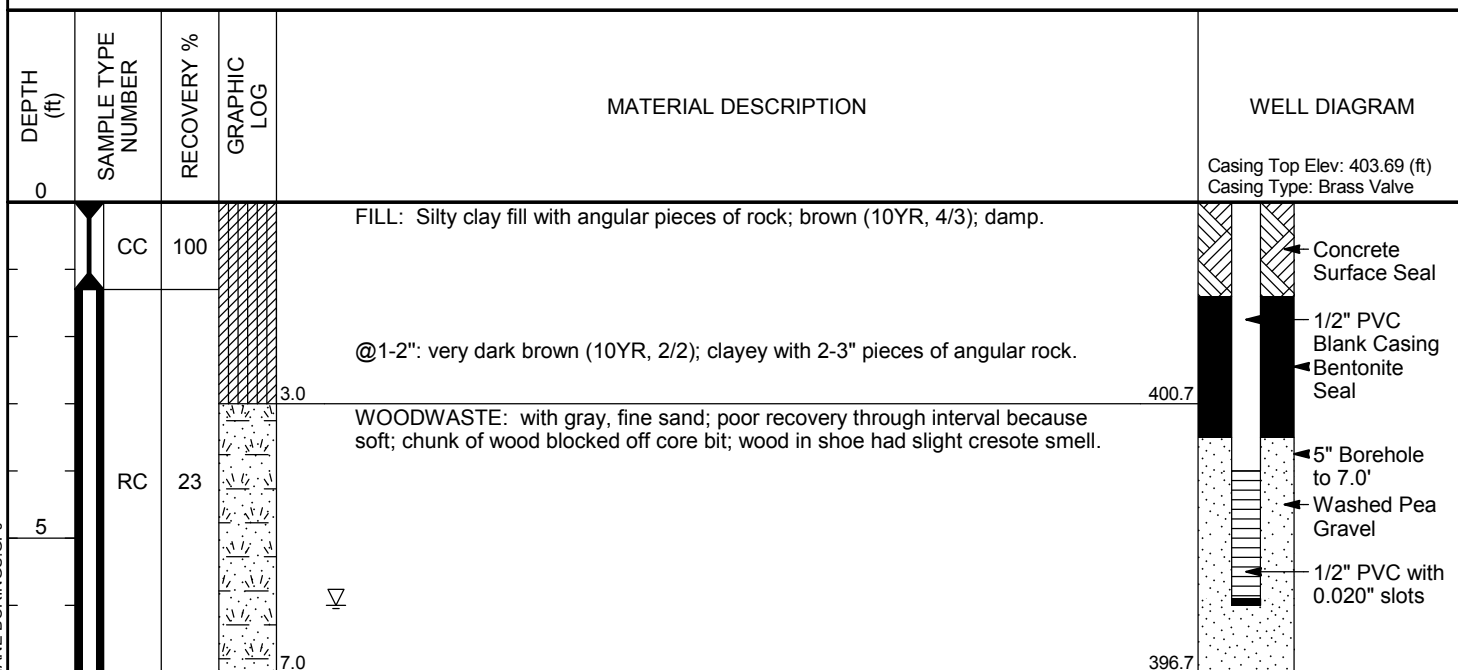
Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/4/15

TUPPAN CONSULTANTS LLC
 460 SECOND STREET, SUITE 103
 LAKE OSWEGO, OREGON 97034
 TELEPHONE: (503) 675-1335

WELL NUMBER P-9

PAGE 1 OF 1

CLIENT Lane County - Waste Management Division PROJECT NAME Methane Probes
 PROJECT NUMBER LNC-001-005 PROJECT LOCATION Former Bethel-Danebo Landfill
 DATE STARTED 1/21/15 COMPLETED 1/21/15 GROUND ELEVATION 403.69 ft MSL HOLE SIZE 5"
 DRILLING CONTRACTOR Cascade Drilling GROUND WATER LEVELS:
 DRILLING METHOD Sonic ∇ AT TIME OF DRILLING 6.00 ft / Elev 397.69 ft
 LOGGED BY Eric Tuppan CHECKED BY EJT AT END OF DRILLING ---
 NOTES Completed methane probe in boring AFTER DRILLING ---

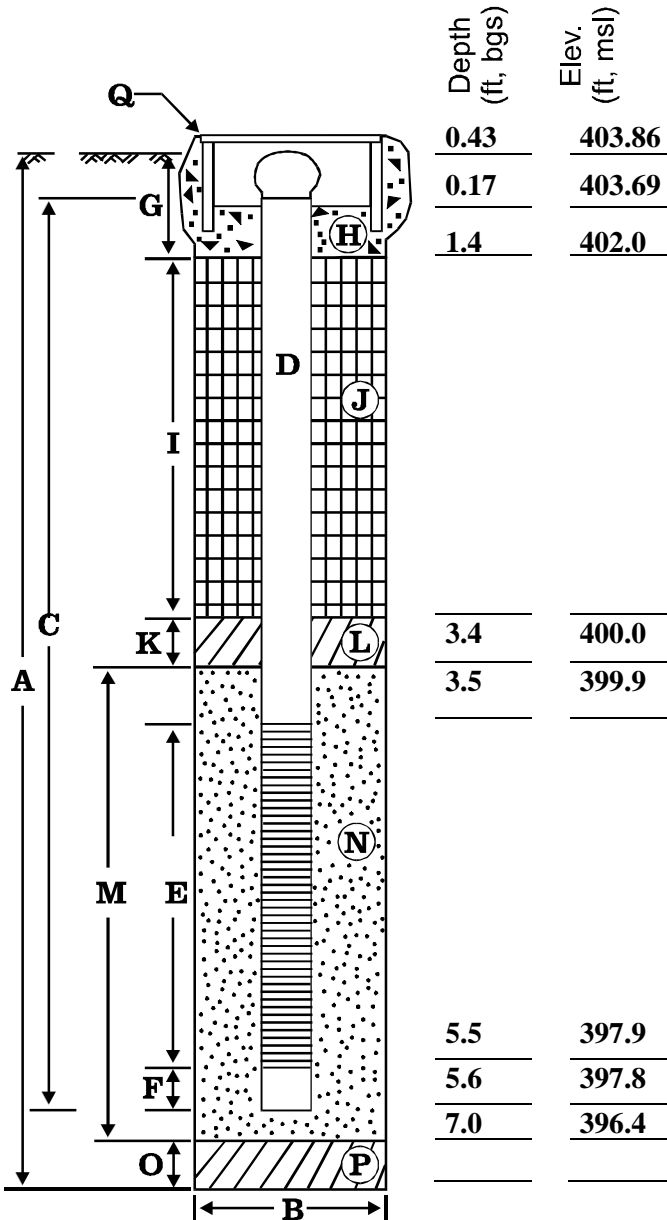


GENERAL BH / TP / WELL - GINT STD US.GDT - 2/3/15 15:03 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P9-LC2015
 Top of Brass Valve: 403.69
 Ground Surface Elev.: 403.43
 Installation Date: 1/21/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: 7.0 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 5.74 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.4 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 2.0 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 3.6 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

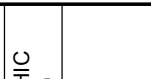
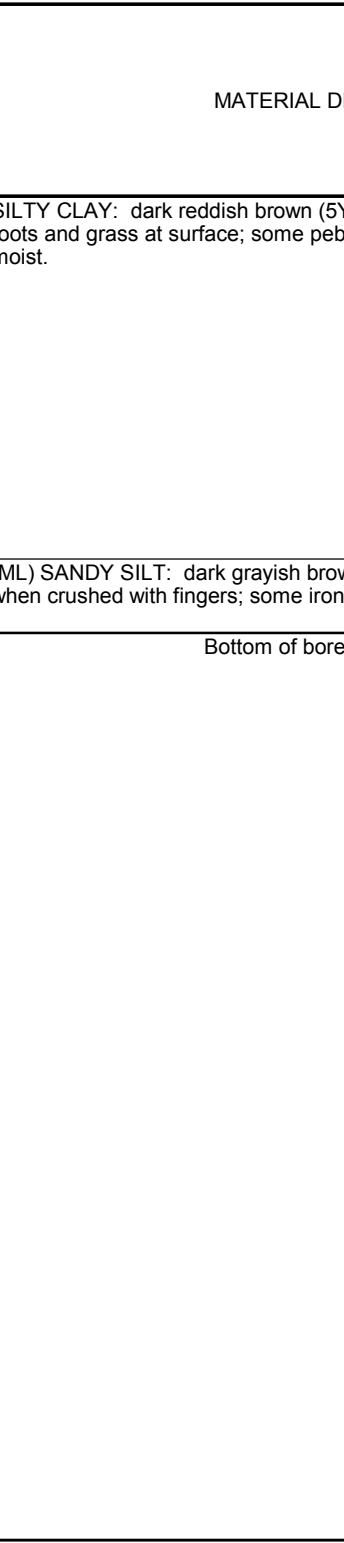


NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/4/15

TUPPAN CONSULTANTS LLC
 460 SECOND STREET, SUITE 103
 LAKE OSWEGO, OREGON 97034
 TELEPHONE: (503) 675-1335

CLIENT Lane County - Waste Management Division **PROJECT NAME** Methane Probes
PROJECT NUMBER LNC-001-005 **PROJECT LOCATION** Former Bethel-Danebo Landfill
DATE STARTED 1/21/15 **COMPLETED** 1/21/15 **GROUND ELEVATION** 402.95 ft MSL **HOLE SIZE** 5"
DRILLING CONTRACTOR Cascade Drilling **GROUND WATER LEVELS:**
DRILLING METHOD Sonic **AT TIME OF DRILLING** ---
LOGGED BY Eric Tuppan **CHECKED BY** EJT **AT END OF DRILLING** ---
NOTES Completed methane probe in boring **AFTER DRILLING** ---

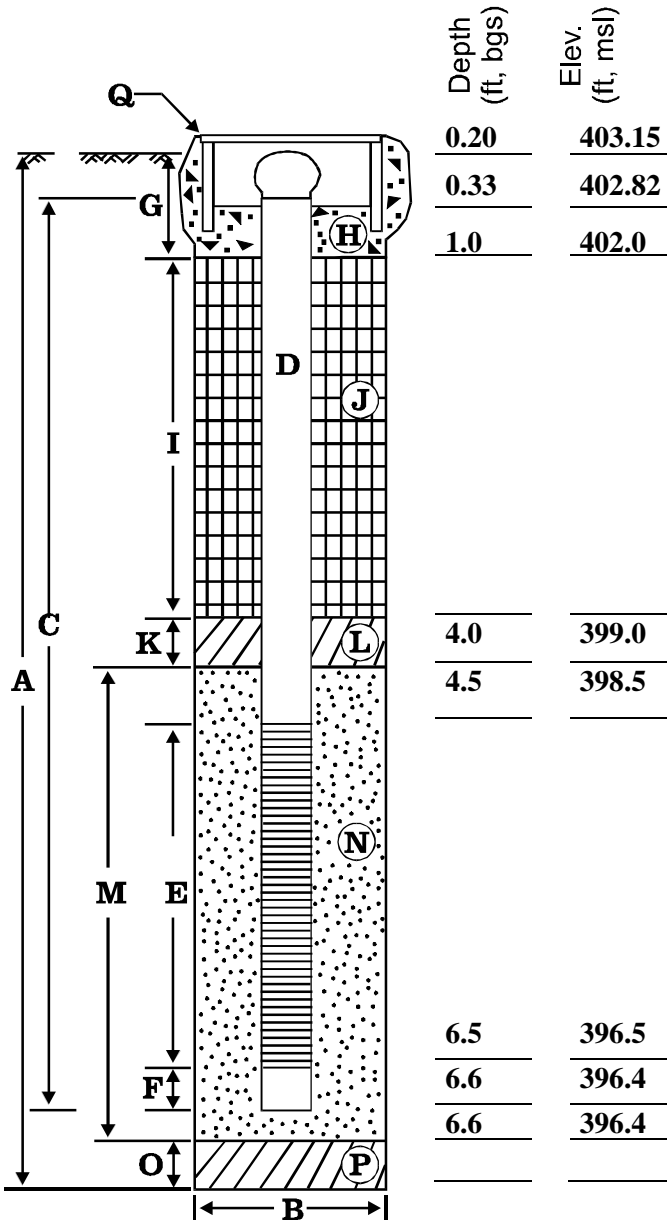
DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0						Casing Top Elev: 402.82 (ft) Casing Type: Brass Valve
	CC	100			SILTY CLAY: dark reddish brown (5YR, 3/4); moderate plasticity fines; roots and grass at surface; some pebbles and coarse sand grains; damp to moist.	
	RC	71				
5			ML		(ML) SANDY SILT: dark grayish brown (2.5Y, 4/2); fine sand, crumbles when crushed with fingers; some iron oxide stain; damp.	397.6 396.5
					Bottom of borehole at 6.5 feet.	Washed Pea Gravel 1/2" PVC with 0.020" slots

GENERAL BH / TP / WELL - GINT STD U.S.GDT - 2/3/15 14:57 - W:\GINT-BACKUP\PROJECTS\BETHEL DANEBO-METHANE BORINGS.GPJ

PROBE DETAILS

Project Number: LNC-005-001
 Client Name: Lane County-Waste Management
 Project Name: Methane Probe Installation
 Location: Former Bethel-Danebo Landfill
 Driller: Cascade Drilling

Boring/Well No.: P10-LC2015
 Top of Brass Valve: 402.82
 Ground Surface Elev.: 402.95
 Installation Date: 1/21/15
 Permit/Start Card No.: N/A



EXPLORATORY BORING

A. Total depth: ~6.5 ft.
 B. Diameter: 5 in.
 Drilling method: Sonic

WELL CONSTRUCTION

C. Well casing length: 6.45 ft.
 Well casing material: Sch 40 PVC
 D. Well casing diameter: 0.5 in.
 E. Well screen length: 2.0 ft.
 Well screen type: PVC
 Well screen slot size: 0.020 in.
 F. Well sump/end cap length: 0.10 ft.
 G. Surface seal thickness: 1.0 ft.
 H. Surface seal material: Concrete
 I. Annular seal thickness: 3.0 ft.
 J. Annular seal material: Bent. Chips
 K. Filter pack seal thickness: N/A ft.
 L. Filter pack seal material: N/A
 M. Sand pack thickness: 2.5 ft.
 N. Sand pack material: Pea Gravel
 O. Bottom material thickness: — ft.
 P. Bottom material: —
 Q. Vault box type: 10" diam.
 Well centralizer depths: — ft.

NOTES:

Probes completed with gas-rated brass valves secured onto the top of blank PVC casing with teflon tape.

Installed by: Eric Tuppan
 Reviewed by: EJT
 Date: 2/4/15

Device ID	Date/Time	CH4	CO2	O2	Balance	%LEL
GEM™5000; G5 V1_11_16; LSGAM:6_0_20140529; {59440679217}		%	%	%	%	%
Probe001	1/29/2015 13:16	1.6	3.3	17.9	77.2	32
probe002	1/29/2015 13:20	42.8	25.2	0.6	31.4	>>>>
Probe003	1/29/2015 13:25	11.3	12.6	0.9	75.2	>>>>
Probe004	1/29/2015 13:29	17.6	24.4	1.8	56.2	>>>>
Probe005	1/29/2015 13:34	0	5.1	15.6	79.3	0
Probe006	1/29/2015 13:39	25.1	9.5	0.5	64.9	>>>>
Probe007	1/29/2015 13:47	0	0.1	21.5	78.4	0
Probe008	1/29/2015 13:52	0	4.3	14.2	81.5	0
LP08VPL8	1/29/2015 13:56	0	2.2	19.1	78.7	0
LP07VPL7	1/29/2015 14:00	0	0.5	21.1	78.4	0
Probe009	1/29/2015 14:07	46.8	10.5	0.4	42.3	>>>>
Probe010	1/29/2015 14:12	11.2	6.4	4.1	78.3	>>>>
LC14-07s	1/29/2015 14:23	21.8	13.5	0	64.7	>>>>
LC14-07d	1/29/2015 14:29	20.9	15.2	0.2	63.7	>>>>

Adj. Power	Baro. Press.	Sys. Press.	Gas Pod Type	Gas Pod Value	CO	H2S	SO2	NO2
BTU	inches Hg	inches H2O			ppm	ppm		
N/A	29.79	N/A	N/A	N/A	0	0	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	4	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	1	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	10	N/A	N/A
N/A	29.78	N/A	N/A	N/A	0	0	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	44	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	0	N/A	N/A
N/A	29.78	N/A	N/A	N/A	0	0	N/A	N/A
N/A	29.78	N/A	N/A	N/A	0	0	N/A	N/A
N/A	29.78	N/A	N/A	N/A	0	0	N/A	N/A
N/A	29.78	N/A	N/A	N/A	0	12	N/A	N/A
N/A	29.78	N/A	N/A	N/A	0	8	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	1	N/A	N/A
N/A	29.79	N/A	N/A	N/A	0	0	N/A	N/A

